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Environmental Evaluation Interim Report

Sulphur River Basin

Comparative Assessment

Prepared for:

Fort Worth District

U.S. Army Corps of Engineers (USACE)

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US Army Corps of Engineers®
Fort Worth District

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1.0 INTRODUCTION

Freese and Nichols, Inc. (FNI) has been tasked by the Fort Worth District U.S. Army Corps of Engineers (USACE) with conducting a comparative environmental assessment for up to five alternative reservoir sites located within the Sulphur River Basin of Texas. The alternative reservoir sites that were evaluated in this study included two possible reallocations at Wright Patman Lake, a reallocation at Jim Chapman Lake, as well as the development of new reservoir sites, including Parkhouse I, Parkhouse II, Marvin Nichols 1A, and Talco. Each site is depicted in Figure 1. The purpose of this assessment is to give consideration to potential environmental concerns associated with the development of additional water supply within the Sulphur River Basin. More specifically, this assessment includes preliminary environmental investigations which could help with the identification of potential impacts and constraints for each of the five alternative reservoir sites being evaluated. For each alternative reservoir site, readily available information related to land cover/resources, wetlands, bottomland hardwoods, water quality, archeological resources, instream uses, groundwater, and state and federally listed threatened or endangered species was gathered and reviewed. Each resource category was analyzed within the footprint of each alternative reservoir site to identify potential impacts and/or constraints in an attempt to develop a structured and objective comparative assessment. The methodology used in the assessment is described in the following sections for each resource category. Once the data were analyzed, each alternative reservoir site was then ranked based on impacts/constraints that were identified.

In selecting alternatives for inclusion in this study, emphasis was placed on taking advantage of prior work where appropriate and on evaluating a range of geographic locations suitable for the development of new storage or yield. The George Parkhouse I project is representative of an upstream storage location within the Sulphur River Basin. The George Parkhouse I site is located on the South Sulphur River downstream of Jim Chapman Dam and upstream of the South Sulphur River's confluence with the Sulphur River (Figure 1). The George Parkhouse II site is located on the North Sulphur River upstream of the South Sulphur confluence (Figure 1). The Parkhouse I and II sites are included in the 2006 Region C Regional Water Plan as alternative strategies for North Texas Municipal Water District (NTMWD), the Upper Trinity Regional Water District (UTRWD) and/or Tarrant Regional Water District (TRWD). The Parkhouse I site is recommended as an alternative strategy for Dallas Water Utilities (DWU), NTMWD,

UTRWD and the City of Irving in the 2011 Region C Regional Water Plan. Both sites were recommended for protection in the Reservoir Site Protection Study (TWDB 2008).

The Marvin Nichols project is representative of a more downstream location for new storage within the Sulphur River Basin. At least five locations for this dam have been considered in previous studies. In general, these alternative sites represent an attempt to locate the impoundment so as to avoid conflicts with Priority 1 bottomland hardwood habitats and oilfield activity while maintaining yield. A potential reservoir at the Marvin Nichols 1A site (Figure 1) was identified as a recommended strategy for NTMWD, UTRWD, and TRWD in the 2006 and 2011 Region C Regional Water Plan and an alternative strategy for DWU and the City of Irving in the 2011 plan. The Marvin Nichols 1A site is also recommended for protection in the Reservoir Site Protection Study.

The existing Jim Chapman Lake is located in the western portion of the Sulphur River Basin on the South Sulphur River (Figure 1). As discussed in the Institutional Issues Interim Report (FNI, 2012), Jim Chapman Lake includes flood storage between elevations 440 and 446.2 ft. msl. As such, this analysis includes an estimate of potential impacts to resources located between these two elevations. This storage has a volume of 130,361 acre-feet. Possible reallocation of this flood storage to conservation storage was included in the current analysis as an alternative water supply source.

White Oak Creek has a significant drainage area and is a major tributary of the Sulphur River. There are a number of suitable dam locations on White Oak Creek that could be utilized to create new storage. In particular, a site located upstream of the City of Talco near the Talco gage (Figure 1) presents the opportunity for an on-channel reservoir that could be hydraulically connected to the main stem of the Sulphur River to take advantage of both the White Oak Creek and Sulphur River flows. This concept is included in this analysis as an alternative.

Wright Patman Lake is an existing reservoir located on the Sulphur River in Bowie and Cass Counties, Texas (Figure 1). The top of Wright Patman Dam is at elevation 286 ft. msl. In terms of normal operations, elevation 259.5 ft. msl is considered the top of the flood control pool. At this elevation, Wright Patman Lake would have a cumulative storage capacity of 2,659,000 acre-feet. Theoretically, reallocation of almost any portion of that flood storage is possible. In a practical sense, reallocations are typically limited by either the need to maintain a large amount of flood control storage in order to protect downstream lives and properties, or the constraint on the increase in dependable yield that can be obtained as a result of limited water rights availability, or both. For the purposes of this analysis, the

assessment of potential impacts to resources was estimated for two scenarios: 1) the portion of the flood pool from the existing top-of-conservation-pool elevation of 227.5 ft. msl* up to 237.5 ft. msl (i.e., an increase of 10 ft. msl in the conservation pool) and 2) the entire flood pool from the existing top-of-conservation-pool elevation of 227.5 ft. msl up to 259.5 ft. msl.

** The existing top-of-conservation pool elevation of 227.5 ft. msl was determined by calculating an average for seven years of daily water surface elevations recorded by the USGS Gage (Wright Patman Lk nr Texarkana, TX) located at Wright Patman Lake from February 2006 to February 2013.*

2.0 LAND RESOURCE / COVER TYPE ASSESSMENT

2.1 BACKGROUND

The Texas Parks and Wildlife Department (TPWD) Ecological Systems Classification data set was utilized to develop the cover types within the footprints of the alternative reservoir sites, including Parkhouse I, Parkhouse II, Marvin Nichols 1A, Wright Patman (237.5 ft. msl and 259.5 ft. msl), Jim Chapman, and Talco. A number of key partners including the Texas Natural Resources Information System (TNRIS), Texas Forest Service, Natural Resources Conservation Service (NRCS), NatureServe, The Nature Conservancy (TNC), and the Missouri Resource Assessment Partnership (MoRAP) were involved in developing the Ecological Systems Classification project.

The creation of the Ecological Systems Classification took into consideration a wide variety of biotic and abiotic variables to establish detailed regional comparisons of vegetation and habitats. Data sources utilized in this classification system included the Farm Service Agency (FSA) National Agriculture Imagery Program (NAIP) aerial imagery, satellite imagery, 10-meter digital elevation models (DEM), U.S. Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) soil data types, TPWD vegetational areas, U.S. Geologic Survey (USGS) National Hydrography Dataset (NHD) layers, USGS Geologic Atlas of Texas, as well as field verified site data. The objective of this classification was to create a land cover type set with sufficient detail to be useful at the sub-county level, targeting the scale of 1:24,000, such as the USGS's 7.5 minute quadrangle scale.

Supervised classifications were performed on both color infra-red and multi-spectral satellite imagery to break down the images into objects that were more easily definable. Both leaf-on and leaf-off imagery conditions were used to establish a proper baseline. Detailed spatial analysis was performed at a 10-meter resolution, with the use of DEM's to identify areas of steep slopes (20% or greater), cliffs, and aspect. The "Ecological Site Type/Range Site" attributes from the NRCS soils data provided more detail to the species typically found in specific soils types, and field verification along public roads and public lands were used to sample present species. Seasonally flooded, versus temporarily flooded areas were estimated based on information from the SSUGRO soil data layer. Riparian data was determined to be either small or large stream riparian areas based on the NHD stream types.

All of the alternative reservoir sites evaluated in this report fell within the area surveyed in the Ecological Classification System project. As such, the data from the TPWD Ecological Classification

System project was considered to be the most recent, readily available data collected for all alternative reservoir sites that would allow for a balanced comparison.

2.2 METHODOLOGY

The cover types used in the TPWD Ecological Systems Classification were derived from the NatureServe Ecological Classification System (Comer, 2003). This classification methodology resulted in a large number of cover types that were not readily observable or comparable at the scale spanning much of the Sulphur River Basin. To produce a cover type/vegetation classification within each alternative reservoir site that would be more readily observable and comparable, the Ecological Classification System cover types were re-assigned into broader and more general categories based on the EPA's Level I National Land Cover Data (NLCD). The definitions from the NLCD cover types were compared to the definitions contained in the Draft Descriptions of Systems, Mapping Subsystems, and Vegetation Types for Phase II (Elliott, 2009), and matched accordingly. Table 1 identifies the cover types resulting from this re-classification and the corresponding Ecological Classification System cover types that were included. Once this initial re-classification was complete, an additional re-classification was conducted utilizing the U.S. Fish and Wildlife Service's (USFWS) National Wetlands Inventory (NWI) data within each alternative reservoir site. A GIS analysis was then conducted and the re-classified vegetation/cover types were clipped to the NWI data layer in an effort to try and distinguish the bottomland hardwood forest cover type from the forested wetland cover type, as these cover types often overlap when based solely on remotely sensed data. Table 2 summarizes the final types and amounts (acres) of each cover type that were identified within the footprint of each alternative reservoir site. Figures 2 through 8 display the cover types identified within the footprint of each alternative reservoir site.

Table 1: Results of the Re-Classification of the Ecological Classification System Cover Types into EPA-based Level I NLCD Cover Types

EPA-Based Level I Cover Types	TPWD Ecological Systems Classification Cover Types
Barren	○ Barren
Bottomland Hardwood Forest	○ Pineywoods: Bottomland Seasonally Flooded Hardwood Forest ○ Pineywoods: Bottomland Temporarily Flooded Hardwood Forest ○ Pineywoods: Bottomland Temporarily Flooded Mixed Pine / Hardwood Forest ○ Pineywoods: Small Stream and Riparian Seasonally Flooded Hardwood Forest ○ Pineywoods: Small Stream and Riparian Temporarily Flooded Hardwood Forest
Forested Wetland	○ Pineywoods: Bottomland Baldcypress Swamp ○ Pineywoods: Small Stream and Riparian Baldcypress Swamp ○ Swamp
Grassland/Old Field	○ Blackland Prairie: Disturbance or Tame Grassland ○ Pineywoods: Bottomland Wet Prairie ○ Pineywoods: Small Stream and Riparian Wet Prairie ○ Post Oak Savanna: Savanna Grassland ○ Pineywoods: Disturbance or Tame Grassland
Herbaceous Wetland	○ Marsh ○ Pineywoods: Bottomland Herbaceous Wetland ○ Pineywoods: Herbaceous Seepage Bog ○ Pineywoods: Small Stream and Riparian Herbaceous Wetland ○ Pineywoods: Wet Hardwood Flatwoods
Open Water	○ Open Water ○ Pineywoods: Herbaceous Flatwoods Pond
Row Crops	○ Row Crops
Shrub Wetland	○ Pineywoods: Bottomland Deciduous Successional Shrubland ○ Pineywoods: Small Stream and Riparian Deciduous Successional Shrubland
Shrubland	○ Native Invasive: Deciduous Shrubland ○ Native Invasive: Juniper Shrubland ○ Native Invasive: Mesquite Shrubland ○ Pineywoods: Small Stream and Riparian Evergreen Successional Shrubland ○ Red River: Floodplain Evergreen Shrubland

(Table 1 continued)

EPA-Based Level I Cover Types	TPWD Ecological Systems Classification Cover Types
Upland Forest	○ Native Invasive: Deciduous Woodland ○ Pine Plantation > 3 meters tall ○ Pine Plantation 1 to 3 meters tall ○ Pineywoods: Dry Pine / Hardwood Forest or Plantation ○ Pineywoods: Dry Pine Forest or Plantation ○ Pineywoods: Dry Upland Hardwood Forest ○ Pineywoods: Hardwood Flatwoods ○ Pineywoods: Longleaf or Loblolly Pine / Hardwood Flatwoods or Plantation ○ Pineywoods: Longleaf or Loblolly Pine Flatwoods or Plantation ○ Pineywoods: Northern Mesic Hardwood Forest ○ Pineywoods: Northern Mesic Pine / Hardwood Forest ○ Pineywoods: Pine / Hardwood Forest or Plantation ○ Pineywoods: Pine Forest or Plantation ○ Pineywoods: Sandhill Pine Woodland ○ Pineywoods: Small Stream and Riparian Temporarily Flooded Mixed Forest ○ Pineywoods: Upland Hardwood Forest ○ Post Oak Savanna: Oak / Hardwood Slope Forest ○ Post Oak Savanna: Post Oak / Redcedar Motte and Woodland ○ Post Oak Savanna: Post Oak Motte and Woodland
Urban*	○ Urban High Intensity ○ Urban Low Intensity

* According to the descriptions contained within the TPWD Ecological Systems Classification, urban areas consist of built-up areas including wide transportation corridors that are dominated by impervious cover (Elliott, 2009). By definition, this cover type could include smaller roadways, parking lots, and other areas dominated by impervious cover.

Table 2: Summary of Types and Approximate Amounts (acres) of Cover Types within the Footprint of each Alternative Reservoir Site

ALTERNATIVE RESERVOIR SITES	Wright Patman (237.5)	Wright Patman (259.5)	Marvin Nichols 1A	Talco	Parkhouse I	Parkhouse II	Jim Chapman (446.2)
COVER TYPES							
Barren	<1	<1	<1	<1	1	1	1
Bottomland Hardwood Forest	2,566	8,202	10,156	7,251	4,267	1,960	2,264
Forested Wetland	16,069	35,098	21,444	10,316	5,487	1,116	736
Grassland/Old Field	201	4,026	18,241	18,107	12,133	7,718	373
Herbaceous Wetland	438	1,151	1,244	276	432	91	94
Open Water	2,636	3,376	1,162	394	181	182	42
Row Crops	39	292	706	1,989	3,987	3,626	2
Shrub Wetland	55	204	1,405	468	278	28	109
Shrubland	34	187	444	288	65	19	241
Upland Forest	5,951	34,062	11,223	9,803	1,521	602	1,029
Urban	17	105	78	23	10	14	9
TOTAL	**28,006**	**86,703**	**66,103**	**48,915**	**28,362**	**15,357**	**4,900**

2.3 ASSESSMENT OF POTENTIAL IMPACTS TO BOTTOMLAND HARDWOOD FORESTS

Bottomland hardwood forests are found along rivers and streams of the southeast and south central United States, generally in broad floodplains. These ecosystems are commonly found wherever streams or rivers at least occasionally cause flooding beyond their channel confines (EPA, 2012). A typical major stream bottom in the southern United States may have willows and cottonwoods on the riverbanks; less water tolerant species (e.g. elm, pecan, and sugarberry) growing on the ridges; water-loving species (e.g. water hickory and overcup oak) in the sloughs; and mixtures of both types, as well as median species (e.g. green ash) on the flats (Hodges, 1997). Although these areas are considered by many to be functionally unique, they are not necessarily afforded protection under Section 404 of the Clean Water Act. In order for a bottomland hardwood area to be protected under Section 404 (i.e., regulated), it must also be determined to be a jurisdictional wetland. That is, it would need to meet the soil,

vegetation, and hydrologic criteria identified in the 1987 Corps of Engineers Wetlands Delineation Manual and applicable Regional Supplement(s).

Utilizing the information developed from the land resource/cover type assessment, each alternative reservoir site was then ranked based on its potential impacts to bottomland hardwood forests. For the purposes of this assessment, both forested wetland and bottomland hardwood forest cover types were included in the "bottomland hardwood forest" classification. The ranking of each alternative reservoir site (highest to lowest) based on potential impacts to bottomland hardwood forests is shown in Table 3. Wright Patman at the maximum reallocation elevation of 259.5 ft. msl appears to have the potential to impact the highest acreage of bottomland hardwood forest while Jim Chapman appears to have the least. Figures 9 through 15 display the areas identified as bottomland hardwood forests within the footprint of each alternative reservoir site. It should be noted that this ranking is based solely on acreages determined from the land resource/cover type assessment and did not take into consideration the potential differences in habitat quality that could exist between each alternative reservoir site for this specific cover type. To determine the quality of the bottomland hardwood forests at each alternative reservoir site, a more intensive field investigation and analysis would be required. Habitat quality could be estimated using methodologies such as the USFWS's Habitat Evaluation Procedures (HEP), TPWD's Wildlife Habitat Appraisal Procedure (WHAP), or another appropriate and acceptable method.

Table 3: Ranking of Alternative Reservoir Sites based on Potential Impacts to Bottomland Hardwood Forests

Reservoir Site	Approximate Bottomland Hardwood Forest Impacts (acres)	Rank
Wright Patman (259.5)	43,300	7
Marvin Nichols 1A	31,600	6
Wright Patman (237.5)	18,635	5
Talco	17,567	4
Parkhouse I	9,754	3
Parkhouse II	3,076	2
Jim Chapman (446.2)	3,000	1

2.4 ASSESSMENT OF POTENTIAL IMPACTS TO WETLANDS

The USACE (Federal Register 1982) and the EPA (Federal Register 1980) jointly define wetlands as, "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." (Environmental Laboratory, 1987). The USACE regulates waters of the U.S., including wetlands, under Section 404 of the Clean Water Act. Under Section 404, a permit is required from the USACE for any activity involving the discharge of dredged or fill material into waters of the U.S., including wetlands. Due to the nature of the activities involved either with the construction of a new reservoir (i.e., Talco, Parkhouse I, Parkhouse II, Marvin Nichols 1A) or with a reallocation at an existing reservoir (i.e., Jim Chapman, Wright Patman), a Section 404 permit would likely be required from the USACE prior to construction. The Regulatory Program regulations (33 CFR 320-331 and 40 CFR 230) also authorize the USACE to require mitigation for impacts to waters of the United States, including wetlands. When the USACE reviews a project that requires their authorization, its evaluation includes a determination of whether the applicant has taken sufficient measures to avoid, minimize and mitigate the project's unavoidable adverse impact (i.e., a loss of waters of the U.S. resulting from filling, flooding, excavating, or draining) on the aquatic ecosystem.

Utilizing the information developed from the land resource/cover type assessment, each alternative reservoir site was also ranked based on its potential impacts to wetlands. For the purposes of this assessment, areas classified as bottomland hardwood forest were not included within the forested wetland category. However, this assessment did include all wetland cover types (i.e., forested, shrub, and herbaceous wetland) identified during the land resource/cover type assessment. The wetland cover types identified in this assessment are based solely on data collected as part of the TPWD Ecological Classification System and/or the USFWS NWI data. As such, these areas should not be considered jurisdictional until a formal jurisdictional determination and delineation has been completed. The ranking of each alternative reservoir site (highest to lowest) based on potential impacts to wetlands is shown in Table 4. Potential wetland areas identified within each alternative reservoir site are depicted in Figures 16 through 22. Again, Wright Patman (259.5 ft. msl) appears to have the potential to impact the highest acreage of wetlands while Jim Chapman appears to have the least. It should be noted that this ranking is based solely on acreages determined from the land resource/cover type assessment and did not take into consideration the potential differences in habitat quality that could exist between each

alternative reservoir site. To determine the quality of the wetlands, a more intensive field investigation and analysis would be required. Habitat quality could be estimated using methodologies such as the USFWS's HEP, TPWD's WHAP, the Fort Worth and Tulsa District USACE TXRAM for Wetlands, or another appropriate and acceptable method.

Table 4: Ranking of Alternative Reservoir Sites based on Potential Impacts to Wetlands

Reservoir Site	Approximate Wetlands Impacts (acres)	Rank
Wright Patman (259.5)	36,453	7
Marvin Nichols 1A	24,093	6
Wright Patman (237.5)	16,562	5
Talco	11,060	4
Parkhouse I	6,197	3
Parkhouse II	1,235	2
Jim Chapman (446.2)	939	1

2.5 WHITE OAK CREEK MITIGATION AREA

The White Oak Creek Mitigation Area (WOCMA) presents a special set of circumstances with respect to a potential reallocation at Wright Patman Lake. Conversion of approximately 25,500 acres of flood easements in the upper reaches of the original Wright Patman flood pool to fee title and the management of those lands for wildlife habitat constitute the majority of the original plan to mitigate the fish and wildlife impacts associated with Jim Chapman (Cooper) Reservoir. This plan was described conceptually in the Supplemental EIS for Cooper and the specific location of the mitigation lands was defined in the 1982 Mitigation Report which was subsequently authorized by Congress in 1986. Mitigation lands are currently leased to TPWD, which discharges the USACE's mitigation responsibilities on a reimbursable basis. Through a 1994 contract between the USACE and TPWD, the Federal Government reimburses 76% of TPWD's management expenses. Revenues generated through hunting permits and other fees are retained by TPWD to further offset management expenses. Annual management activities are defined in a 5-year plan developed by TPWD and approved by the USACE.

In general, the mitigation lands at White Oak Creek Mitigation Area are located between elevation 230 and 280 ft. msl. Seventy-three per cent of the mitigation lands are below elevation 259.5 ft. msl (FNI, 2003). Depending on the specific reallocation option and operational regime, the mitigation

performance of those lands could be adversely affected. To quantify the amount (acres) of potential inundation impacts within the WOCMA, a GIS analysis was conducted using the lowest and highest reallocation elevation contours of 237.5 ft. msl and 259.5 ft. msl for Wright Patman. These contours were then overlaid and clipped to the WOCMA to estimate acreages that would potentially be inundated following a reallocation. The results are displayed in Table 5.

Table 5: Approximate Area (acres) within the White Oak Creek Mitigation Area Inundated from Two Flood Pool Reallocation Elevations at Wright Patman Lake

Reallocation Elevation at Wright Patman	Approximate Area (acres) Inundated	Percentage of Area within WOCMA Inundated
Up to the 237.5 ft. msl Elevation	2,750	11
Up to the 259.5 ft. msl Elevation	18,286	70

To further assess potential impacts within the WOCMA, a second GIS analysis was conducted to determine potential impacts to cover types associated with each reallocation elevation (237.5 ft. msl and 259.5 ft. msl) at Wright Patman. Cover type classification within the WOCMA was performed the same as within the alternative reservoir sites using the TPWD Ecological Classification System and the USFWS NWI data. Once the cover type classification was complete, the 237.5 ft. msl and 259.5 ft. msl contour intervals were overlaid and clipped to the WOCMA to estimate acreages of cover types that would potentially be inundated. The results of this analysis are summarized in Table 6 and displayed in Figures 23 and 24.

As is the case with all other alternatives, impacts to WOCMA by a reallocation at Wright Patman Lake would be required to be evaluated by an intensive field survey and disclosed as part of the 404 permit decision-making process. Consultation with resource agencies, including TPWD, would be required by several statutes. To the degree that the Congressionally-authorized purpose--whether wildlife mitigation or flood risk reduction--would be significantly affected by any reallocation proposal, Congressional approval would be required.

Table 6: Summary of the Types and Approximate Amounts (acres) of Cover Types Potentially Inundated from Various Reallocations at Wright Patman Lake

Reallocation Elevation at Wright Patman	Cover Type	ACRES	TOTAL (ACRES)
Up to the 237.5 ft. msl Elevation	Bottomland Hardwood Forest	563	2,750
	Forested Wetland	1,747	
	Grassland/Oldfield	6	
	Herbaceous Wetland	110	
	Open Water	298	
	Shrub/Wetland	0	
	Upland Forest	26	
	Urban	0	
Up to the 259.5 ft. msl Elevation	Bottomland Hardwood Forest	2,554	18,286
	Forested Wetland	12,923	
	Grassland/Oldfield	28	
	Herbaceous Wetland	440	
	Open Water	505	
	Shrub/Wetland	28	
	Shrubland	6	
	Upland Forest	1,797	
	Urban	5	

3.0 FEDERAL AND STATE LISTED THREATED AND ENDANGERED SPECIES ASSESSMENT

3.1 FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES

The Endangered Species Act (ESA) was passed by Congress in 1973. The purpose of the ESA is to protect and recover imperiled species and the ecosystems upon which they depend. The U.S. Fish and Wildlife Service (USFWS) has primary responsibility for administering the ESA for terrestrial and freshwater organisms. Section 7 of the ESA requires Federal agencies to use their legal authorities to promote the conservation purposes of the ESA and to consult with the USFWS to ensure that effects of actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of listed species (http://www.fws.gov/endangered/June2011).

Under the ESA, species may be listed as either endangered or threatened. "Endangered" means a species is in danger of extinction throughout all or a significant portion of its range. "Threatened" means a species is likely to become endangered within the foreseeable future. Section 9 of the ESA protects endangered and threatened species and their habitats by prohibiting the "take" of listed animals and the interstate or international trade in listed plants and animals, including their parts and products, except under Federal permit. Take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct."

3.2 STATE LISTED THREATENED AND ENDANGERED SPECIES

The Texas Endangered Species Act gives the Texas Parks and Wildlife Department (TPWD) the authority to establish a list of fish and wildlife that are endangered or threatened with statewide extinction. As defined by the statute, "fish and wildlife" excludes all invertebrates except mollusks and crustaceans. No person may capture, trap, take, or kill or attempt to capture, trap, take, or kill listed fish and wildlife species without a permit. Plants are not protected by these provisions. Endangered, threatened or protected plants may not be taken from public land for commercial sale or taken from private land for commercial purposes without a permit. Laws and regulations pertaining to state listed endangered or threatened animal species are contained in Chapters 67 and 68 of the Texas Parks and Wildlife (TPW) Code and Sections 65.171 - 65.184 of Title 31 of the Texas Administrative Code (T.A.C.). Laws and regulations pertaining to state listed endangered or threatened plant species are contained in Chapter 88 of the TPW Code and Sections 69.01 - 69.14 of the T.A.C.

The Texas Endangered Species Act does not protect wildlife species from indirect or incidental take (e.g., destruction of habitat, unfavorable management practices, etc.). The TPWD has a Memorandum of Understanding with every state agency to conduct a thorough environmental review of state initiated and funded projects, such as highways, reservoirs, land acquisition, and building construction, to determine their potential impact on state endangered or threatened species.

3.3 IMPACT ASSESSMENT

For the purposes of evaluating each alternative reservoir sites potential to impact state or federally listed threatened or endangered species, county lists published by the USFWS and TPWD were referenced. When a reservoir's footprint extended across more than one county, all of the species listed for those counties were included in the assessment for that particular reservoir. Table 7 contains a summary of the approximate acreages associated with each alternative reservoir site as well as the counties used for their respective assessments. Due to there being a range of potential reallocation elevations at Wright Patman, this assessment utilized the lowest proposed alternative reallocation elevation of 237.5 ft. msl and the highest proposed reallocation elevation of 259.5 ft. msl to assess potential ranges of impacts. Figure 1 depicts the location of each of the alternative reservoir sites.

If a species was found to be listed by either agency, further analyses were conducted to determine the likelihood of occurrence for each species within the footprint of each alternative reservoir site. The likelihood of occurrence was evaluated using habitat and range descriptions provided by the USFWS, TPWD, or other relevant scientific literature sources. This information was then compared to the location of the reservoir sites and the habitats (cover types) that currently exist within these sites.

Table 7: Summary of Acreages and County Locations Associated with each Alternative Reservoir Site

ALTERNATIVE RESERVOIR SITE	Approximate Acreage	County Location
Wright Patman (259.5)	86,703	Bowie, Cass, Morris, Red River, Titus
Wright Patman (237.5)	28,007	Bowie, Cass, Morris, Red River,
Marvin Nichols 1A	66,103	Red River, Titus, Franklin, Delta, Lamar
Talco	48,916	Titus, Franklin, Hopkins
Parkhouse I	28,362	Delta, Hopkins
Parkhouse II	15,359	Lamar, Delta
Jim Chapman (446.2)	4,902	Delta, Hopkins

Cover type classifications within each potential reservoir site were conducted utilizing data from the TPWD Ecological Classification System that was completed in 2012 for this area of Texas supplemented with the USFWS NWI data. Other factors taken into consideration as part of this analysis included species dispersal potential (i.e., mobility), whether the species would be considered a permanent resident or stopover species (i.e., migratory), and the anticipated response a species might have following construction of a reservoir (i.e., positive or negative response). Table 8 contains the common and scientific names of the current federal and state listed species included in this assessment along with a brief description of their likely ranges, preferred habitats, and potential impacts. Results of the impact assessment are summarized in Table 9.

Table 8: State and Federally Listed Threated / Endangered Species and Potential Impact

Common Name	Scientific Name	Discussion
FEDERAL SPECIES		
American Burying Beetle	*Nicrophorus americanus*	Low to no potential to negatively impact due to unlikely presence of the species. The historic Texas population consists of four Texas specimens from the 1880's. Since then, there were no confirmed specimens in Texas until 2003 when a single individual was found in Lamar County, Texas. Since 2008, no individuals have been captured in Texas. None have been collected from any other county outside of Lamar (Bauer, 2010).
Least Tern	*Sterna antillarum*	Low to no potential to negatively impact due to lack of preferred habitat within proposed project area. Species is primarily associated with the habitat along the Red River, which is not located within the assessment area. Nesting habitat of the Interior Least Tern includes bare or sparsely vegetated sand, shell, and gravel beaches, sandbars, islands, and salt flats associated with rivers and reservoirs. In Texas, Interior Least Terns are found at three reservoirs along the Rio Grande River, on the Canadian River in the northern Panhandle, on the Prairie Dog Town Fork of the Red River in the eastern Panhandle, and along the Red River (Texas/Oklahoma boundary) into Arkansas (TPWDb). Reservoirs could benefit this species by providing habitat along the shoreline.
Piping Plover	*Charadrius melodus*	Low to no potential to negatively impact due to lack of habitat and migratory nature of this species. Piping plovers are primarily a resident of the upper and central coastal area of Texas (Oberholser, 1974). These shorebirds live on sandy beaches and lakeshores (TPWDc). Reservoirs could benefit this species by providing habitat along the shoreline.
STATE SPECIES		
American Peregrine Falcon	*Falco peregrinus anatum*	Low potential to negatively impact due to unlikely presence of the species. Species is a resident of the Trans-Pecos region, including the Chisos, Davis, and Guadalupe mountain ranges, except during migration (TPWDa). Peregrine falcons prefer to nest on very tall sheer cliff faces with a commanding view, a nearby water source and a good prey base. The breeding population in Texas is located in the remote wild canyons of the Rio Grande up into pine-oak woodlands in the Big Bend and Guadalupe Mountains national parks (Arnold, 2001b).

(Table 8 continued)

Common Name	Scientific Name	Discussion
Bachman's Sparrow	*Aimophila aestivalis*	Low potential to negatively impact due to lack of suitable habitat and rarity of the species. In Texas, Bachman's Sparrow is most abundant in forests on the south side of the Angelina National Forest. These areas are managed for open longleaf pine (*Pinus palustris*) savannah that the red-cockaded woodpecker (*Picoides borealis*) frequents. Here, frequent prescribed burning maintains the preferred and historical grassy understory among the mature longleaf pines (Arnold, 2001a). East Texas appears to be the western most extent of this species range (Oberholser, 1974).
Bald Eagle	*Haliaeetus leucocephalus*	Bald Eagles breed in Texas from near sea level to about 1100 m (3600 ft); (Oberholser, 1974) in and around large aquatic environments (ocean coasts, reservoirs, large lakes and rivers, marshes and swamps). Reservoir construction has the potential to benefit this species by providing more habitat for hunting prey (i.e., lake/reservoir area).
Wood Stork	*Mycteria americana*	Low potential to negatively impact due to the migratory nature of this species. This species is primarily associated with coastal marshes, bays, prairies, and lakes. Current populations are composed of postbreeding transients, apparently from southern Mexico (Rappole and Blacklock, 1994). In Texas, there are only three known nesting records: 1930 in Chambers County, Elm Grove; 1960 in southwestern Jefferson County, Johnny Pipkin's Big Hill Ranch (about 50 breeding adults with nests, eggs, and chicks); and, year unknown in Harris County, San Jacinto River (Oberholser 1974). Reservoirs have potential to benefit this species by providing more habitat for hunting prey (i.e., lake/reservoir area).
Whooping Crane	*Grus americana*	Low to no potential to negatively impact due to the migratory nature of this species. Whooping cranes winter on the Aransas National Wildlife Refuge's 22,500 acres of salt flats and marshes. The area's coastal prairie rolls gently here and is dotted with swales and ponds. They summer and nest in poorly drained wetlands in Canada's Northwest Territories at Wood Buffalo National Park (TPWDf). Although unlikely, the reservoirs could provide stop-over/resting areas for migrating whooping cranes (i.e., Granger Lake).
Eskimo Curlew	*Numenius borealis*	Low to no potential to negatively impact due to rarity of the species and its migratory nature. This species has likely been extirpated. Last known specimen from Texas was from Cameron County in 1897 (Oberholser, 1974).

(Table 8 continued)

Common Name	Scientific Name	Discussion
Peregrine Falcon	*Falco peregrinus*	See description for *F. p. anatum.*
Piping Plover	*Charadrius melodus*	See previous description.
Least Tern	*Sterna antillarum*	See previous description.
Blackside Darter	*Percina maculate*	Low to no potential to negatively impact. This species occurs in small to medium rivers (Page and Burr 1991). In Texas, this species is restricted to the Red River basin in the northeast part of the state (Hubbs et al. 2008).
Creek Chubsucker	*Erimyzon oblongus*	Moderate potential to negatively impact due to the potential presence of this species and its non-migratory nature. Occurs in eastern Texas streams from the Red River southward to the San Jacinto Drainage; an early record exists from the Devils River (Hubbs et al. 1991). Please see further discussion at the end of this section.
Paddlefish	*Polyodon spathula*	Low to no potential to negatively impact this species as it is known to occur within reservoirs. Warren et al. (2000) listed the following drainage unit for distribution of paddlefish in Texas: Red River (from the mouth upstream to and including the Kiamichi River). Large reservoirs make good feeding areas, with paddlefish moving from reservoirs into flowing streams in the spring for spawning (Russell 1986). Reservoirs have the potential to benefit this species by providing more habitat.
Bluehead Shiner	*Pteronotropis hubbsi*	Low to no potential to negatively impact as this species is not likely to be present within the Sulphur River Basin. Apparently, this species has only been identified (in Texas) from Caddo Lake (Hubbs et al. 2008).
Blue Sucker	*Cycleptus elongates*	Low to no potential to negatively impact. This species inhabits large, deep rivers, and deeper zones of lakes (reservoirs; Cross 1967). Reservoirs have the potential to benefit this species by providing more habitat.
Shovelnose Sturgeon	*Scaphirhynchus platorynchus*	No potential to negatively impact as this species is not present within the Sulphur River Basin. Found only in the Red River below Dennison Dam (Lake Texoma Reservoir; Hubbs et al. 2008); Red River system (Bonn and Kemp 1952).
Black Bear	*Ursus americanus*	Low to no potential to negatively impact due to lack of habitat and rarity of the species. This species is known to occur in the Chisos and Guadalupe Mountains of far west Texas. The Louisiana Black Bear (subspecies *U. a. luteolus*) is not known to be found in Texas, although potential habitat exists in the eastern part of the state (TPWDd).

(Table 8 continued)

Common Name	Scientific Name	Discussion
Rafinesque's big-eared bat	*Corynorhinus rafinesquii*	Low potential to negatively impact due to rarity of the species. Rafinesque's big-eared bat reaches the westernmost portion of its range in the pine forests of East Texas (TPWDe). No known county records of this species occur within the Sulphur River Basin watershed in Texas (Davis and Schmidly 1997).
Red Wolf	*Canis rufus*	No potential to impact. This species has been extirpated.
Louisiana Pigtoe	*Pleurobema riddellii*	Low to no potential to negatively impact as this species is not known to occur within the Sulphur River Basin. This species is known to occur in the Trinity, Neches, and Sabine River systems (Howells, et al. 1996). No museum collections or records of this species have been identified from the Sulphur River Basin (Winemiller and Lujan 2010.)
Southern Hickorynut	*Obovaria jacksoniana*	Low to no potential to negatively impact as this species is not likely to be present within the Sulphur River Basin. This species occurs in the Neches, Sabine, and Red River drainages of eastern Texas (Howells et al. 1996). No museum collections or records of this species have been identified from the Sulphur River Basin (Winemiller and Lujan 2010.)
Texas Pigtoe	*Macrochelys temminckii*	Low to no potential to negatively impact as this species is not likely to be present within the Sulphur River Basin. This species has been reported from the Brazos, Neches, Sabine, and San Jacinto rivers (Howells et al. 1996). No museum collections or records of this species have been identified from the Sulphur River Basin (Winemiller and Lujan 2010.)
Alligator Snapping Turtle	*Macrochelys temminckii*	No potential to negatively impact. Alligator snapping turtles are aquatic bottom dwellers. They have been found in a variety of environs including lakes, oxbows, bayous, deep rivers, canals, creeks, ponds and even brackish estuaries (http://www.texasturtles.org/index. html). Reservoirs have the potential to benefit this species by providing more habitat.
Northern Scarlet Snake	*Cemophora coccinea copei*	Moderate potential to negatively impact due to potential presence of this species and its non-migratory nature. Please see further discussion at the end of this section.

(Table 8 continued)

Common Name	Scientific Name	Discussion
Texas Horned Lizard	*Phrynosoma cornutum*	Low to no potential to negatively impact as this species is not likely to be present within the Sulphur River Basin. Apparently, they no longer occur in Texas east of an imaginary line from Fort Worth to Corpus Christi (Donaldson et al. 1994), except for small, isolated populations.
Timber/Canebrake Rattlesnake	*Crotalus horridus*	Moderate potential to negatively impact due to potential presence of this species and its non-migratory nature. Please see further discussion at the end of this section.

Table 9: Summary of Potential Impacts to State and Federally Listed Threated/Endangered Species Associated with each Alternative Reservoir Site

ALTERNATIVE RESERVOIR SITES	Wright Patman (237.5)	Wright Patman (259.5)	Marvin Nichols 1A	Talco	Parkhouse I	Parkhouse II	Jim Chapman (446.2)
FEDERAL SPECIES							
American Burying Beetle	○	○	○	NL	NL	○	NL
Least Tern	○	○	○	○	○	○	○
Piping Plover	NL	NL	○	NL	○	○	○
STATE SPECIES							
American Peregrine Falcon	○	○	○	○	○	○	○
Bachman's Sparrow	○	○	○	○	○	○	○
Bald Eagle	○	○	○	○	○	○	○
Wood Stork	○	○	○	○	○	○	○
Whooping Crane	NL	NL	○	○	○	○	○
Eskimo Curlew	NL	NL	NL	NL	NL	○	NL
Peregrine Falcon	○	○	○	○	○	○	○
Piping Plover	○	○	○	○	○	○	○
Least Tern	○	○	○	○	○	○	○
Blackside Darter	○	○	○	○	○	○	○
Creek Chubsucker	◑	◑	◑	◑	◑	◑	◑
Paddlefish	○	○	○	○	○	○	○
Bluehead Shiner	○	○	NL	NL	NL	NL	NL
Blue Sucker	NL	NL	NL	NL	NL	○	NL

(Table 9 continued)

ALTERNATIVE RESERVOIR SITES	Wright Patman (237.5)	Wright Patman (259.5)	Marvin Nichols 1A	Talco	Parkhouse I	Parkhouse II	Jim Chapman (446.2)
Shovelnose Sturgeon	○	○	○	NL	NL	○	NL
Black Bear	○	○	○	○	○	○	○
Rafinesque's Big-eared Bat	○	○	○	NL	NL	NL	NL
Red Wolf	○	○	○	○	○	○	○
Louisiana Pigtoe	○	○	○	○	○	NL	○
Southern Hickorynut	○	○	○	○	NL	NL	NL
Texas Pigtoe	○	○	○	○	NL	NL	NL
Alligator Snapping Turtle	○	○	○	○	○	○	○
Northern Scarlet Snake	◑	◑	◑	◑	NL	NL	NL
Texas Horned Lizard	○	○	○	○	○	○	○
Timber Rattlesnake	◑	◑	◑	◑	◑	◑	◑

NL – Species is not listed within the counties of the alternative reservoir site. ○ - Alternative reservoir site has low or no potential to negatively impact. ◑ - Alternative reservoir site has moderate potential to negatively impact. ● - Alternative reservoir site has high potential to negatively impact.

The results of the above analysis do not show a clear distinction between the alternative reservoir sites and their potential to impact threatened/endangered species. All six alternative reservoir sites have low to no potential to negatively impact federally listed threatened/endangered species. This conclusion is based on data which indicates that these species are not likely present within the area of the alternative reservoir sites and/or that the reservoirs could potentially provide habitat for these species. The results also indicate that three state-listed species (timber rattlesnake, northern scarlet snake, and creek chubsucker) have a moderate potential to be negatively impacted at the Wright Patman (237.5 ft. msl and 259.5 ft. msl), Marvin Nichols 1A, and Talco sites, while two state-listed species (timber rattlesnake and creek chubsucker) show a moderate potential to be negatively impacted at the Jim Chapman, Parkhouse I, and Parkhouse II sites. The moderate potential to impact these species is due to their known ranges and potential habitat being located within the Sulphur River Basin coupled with their non-migratory nature.

In an attempt to make a distinction between the alternative reservoir sites, the three state-listed species with a moderate potential to be negatively impacted were selected to undergo a more detailed analysis. This more detailed analysis was conducted utilizing GIS technology to identify and quantify potential habitat for each of these species within each alternative reservoir site. Once completed, each reservoir site was then ranked based on its potential to impact these species. The methodology used to identify potential habitat for these species is described below.

A. *Northern Scarlet Snake*: This species is listed as threatened by the TPWD within Bowie, Cass, Morris, Titus, and Franklin Counties. Alternative reservoir sites located within a portion of these counties include Wright Patman (237.5 ft. msl and 259.5 ft. msl), Marvin Nichols 1A, and Talco (Figure 1). According to the Southwestern Center for Herpetological Research, this species occurs only in extreme east Texas (http://southwesternherp.com/snakes/copei.html). Scarlet Snakes are fossorial and spend most of their lives underground in soils suitable for burrowing (http://digital.sfasu.edu/cdm/singleitem/collection/Herpetology/id/35/rec/11). This snake surfaces to feed mainly on eggs of other reptiles and occasionally rodents, lizards, and other small snakes (http://mdc.mo.gov/discover-nature/field-guide/northern-scarletsnake). The TPWD habitat description includes mixed hardwood scrub on sandy soils. Based on this information, it appears that one primary habitat requirement for this species includes soils that are suitable for burrowing (i.e., sandy textured soils). To identify and quantify the area (acres) of potential habitat for the Northern Scarlet Snake within each alternative reservoir site, the vegetative cover types as well as the USDA SSURGO soil database were used to isolate appropriate conditions. Soils that were categorized in the range of loam, sandy-loam, or silty-loam types were identified as potential habitat. We eliminated unsuitable habitats by performing an intersect analysis of our target soils with preferred vegetation types that fell in the shrubland, upland forest, or grassland categories. These datasets were clipped to the boundary of the alternative reservoir locations and overlaid together to eliminate areas that did not meet these conditions. Each reservoir site was then ranked, highest to lowest, based on the area of potential habitat. The results are displayed in Figures 25-28 and summarized in Table 10.

Table 10: Area Identified as Potential Habitat for the Northern Scarlet Snake within the Footprints of Alternative Reservoir Sites within the Sulphur River Basin

Reservoir Site	Approximate Acreage of Potential Habitat	Rank
Wright Patman (259.5)	28,329	7
Talco	14,527	6
Marvin Nichols 1A	11,811	5
Wright Patman (237.5)	4,741	4
Parkhouse I	N/A	N/A
Parkhouse II	N/A	N/A
Jim Chapman (446.2)	N/A	N/A

** Jim Chapman, Parkhouse I, and Parkhouse II were not included in this analysis as this species is not listed as threatened within the counties where these potential reservoirs would be located.*

B. Timber Rattlesnake: This species is listed as threatened by the TPWD within all nine counties where these alternative reservoir sites are located. According to the Southwestern Center for Herpetological Research, this species occurs only in eastern and southeastern Texas (http://southwesternherp.com/snakes/horridus.html). The TPWD states that timber rattlesnakes prefer moist lowland forests and hilly woodlands or thickets near permanent water sources such as rivers, lakes, ponds, streams and swamps where tree stumps, logs and branches provide refuge (http://www.tpwd.state.tx.us/huntwild/wild/species/timberrattlesnake/). Based on these habitat descriptions, this species would be most associated with riparian/bottomland hardwood and forested wetland habitat types. Potential habitat for this species was identified by selecting vegetative cover types from the bottomland hardwood forest and forested wetland areas which were then clipped to the boundary of the alternative reservoir sites to identify and quantify the area (acres) of potential habitat. Each reservoir site was then ranked, highest to lowest, based on the area of potential habitat. The results of this analysis are displayed in Figures 29-35 and summarized in Table 11.

Table 11: Area Identified as Potential Habitat for the Timber Rattlesnake within the Footprints of Alternative Reservoir Sites within the Sulphur River Basin

Reservoir Site	Approximate Acreage of Potential Habitat	Rank
Wright Patman (259.5)	43,299	7
Marvin Nichols 1A	31,600	6
Wright Patman (237.5)	18,635	5
Talco	17,566	4
Parkhouse I	9,753	3
Parkhouse II	3,076	2
Jim Chapman (446.2)	3,001	1

C. *Creek Chubsucker*: This species is listed as threatened by the TPWD within all nine counties where these potential reservoir sites could be constructed. This species occurs in East Texas streams from the Red River southward to the San Jacinto Drainage with an early record from the Devils River (Hubbs et al. 1991). Its habitat includes small rivers and creeks often highly vegetated (Wall and Gilbert, 1980), and less often in ponds (Wagner and Cooper, 1963). It occurs over a wide variety of gradients, bottom types, and vegetation depending somewhat on age and stage of reproductive cycle. Seldom, if ever, does this species occupy impoundments or springs, but it may be taken in spring fed creeks (Wall and Gilbert 1980). Based on these habitat descriptions, this species seems to be mainly associated with lotic environments such as creeks and rivers. To identify and quantify potential habitat for this species, the USGS National Hydrography Dataset flowline was clipped to the boundary of the alternative reservoir locations to calculate the linear miles of streams within each alternative reservoir site. Each reservoir site was then ranked, highest to lowest, based on the amount of potential habitat. The results of this analysis are displayed in Figures 36-42 and summarized in Table 12.

Table 12: Area Identified as Potential Habitat for the Creek Chubsucker within the Footprints of Alternative Reservoir Sites within the Sulphur River Basin

Reservoir Site	Approximate Miles of Potential Stream Habitat	Rank
Wright Patman (259.5)	523	7
Marvin Nichols 1A	445	6
Talco	329	5
Wright Patman (237.5)	186	4
Parkhouse I	176	3
Parkhouse II	93	2
Jim Chapman (446.2)	50	1

The results of the above analyses indicate that the alternative reservoir site with the highest potential to impact habitat for these three species would be Wright Patman at the full reallocation elevation of 259.5 ft. msl. Wright Patman (259.5 ft. msl) is then followed by Marvin Nichols 1A, Talco, Wright Patman (237.5 ft. msl), Parkhouse I, Parkhouse II, and Jim Chapman. It should be noted that these results were ascertained at a desktop level with limited field work or on-site verification. A more definitive assessment and ranking of these sites related to their potential impact on threatened/endangered species would require on-site investigations by qualified biologists/scientists to verify if listed species or their potential habitats are present.

4.0 CULTURAL RESOURCES COMPARATIVE ANALYSIS

A preliminary cultural resources analysis was conducted for six alternative reservoirs in the Sulphur River Basin of East Texas (Figure 43) using information collected from the Texas Historical Commission's (THC) Texas Archaeological Site Atlas (TASA) and the Texas Archaeological Research Library (TARL) records repository. The purpose of this study was to assess the scope of archaeological work required for each alternative reservoir and to determine the extent of potential resource impacts. This evaluation was accomplished using spatial and tabular data for cultural resource sites within one half kilometer of the alternative reservoir boundaries. The results of this study are presented below and followed by a summary.

4.1 ARCHAEOLOGICAL BACKGROUND AND SITE CLASSIFICATION

Records research within the TARL identified a large volume of material associated with contract work within the project area. Since the early work led by the University of Texas in the 1920's and 1930's, almost one thousand cultural resource sites have been documented within the proposed pool elevations for the six reservoirs. Approximately 90% of these cultural sites were discovered during survey for the development of Jim Chapman Lake (formerly Cooper Lake) and Lake Wright Patman (formerly Lake Texarkana) reservoirs, which began in the 1950's and 1960's. Much of the historical and archaeological data around Cooper Lake and the Wright Patman/White Oak Creek region have been used to synthesize the archaeology (Journey et al., 1989, Fields et al., 1997, Hunts et al., 1998) and Quaternary geology (Darwin et al., 1990, Bousman et al., 1988) for the Sulphur Basin.

The late Quaternary geology of the Sulphur Basin can be summarized by the deposition and erosion of Holocene sediments. The North Sulphur River's stratigraphy shows evidence of early Holocene alluvium overlying late Pleistocene sediments (Ferring, 1995). Stability in the mid Holocene led to soil development within this alluvium, which would provide the potential for early to mid-Holocene occupation. This soil was buried during the late Holocene, with areas being truncated to the base of the early Holocene alluvium, potentially preserving mid Holocene occupations in some areas while obliterating the record of this time period in others. Fault scarps along the South Sulphur River Valley provided conditions for fan development that showed considerable growth during the early Holocene with decreasing sedimentation rates through the mid to late Holocene, providing the potential for stratified cultural deposits.

The Sulphur Basin is made up of cultural traditions within the Red River and Northeast Texas archaeological regions. Occupation by man has been relatively continuous in this area for more than 10,000 years (Perttula, 2004) with archaeological deposits identified during previous surveys representing activity from Paleoindian camps, Archaic/Prehistoric occupations, Caddoan villages to historic Euro-American homesteads (Hunt et al., 1998, Fields et al., 1997). Several chronologies have been proposed for the occupation of East Texas, most follow closely with the adaptation of Perttula's (2004) presented below:

Paleoindian :	~12,000 Years Before Present (BP) to 8,000 BP (Early Holocene)
Early Archaic:	~8,000 BP to 6,000 BP (Mid - Early Holocene)
Middle Archaic:	~6,000 BP to 4,000 BP (Middle Holocene)
Late Archaic:	~4,000 BP to 2,000 BP (Late – Mid Holocene)
Woodlands:	~2,000 BP to 1,200 BP (Late Holocene)
Late Prehistoric/Caddo:	~1,200 BP to 250 BP (Late Holocene)
Historic:	~450 BP to 0 BP (Chipman, 1987)

As many of the sites reviewed were originally recorded prior to the 1970's and lacked details on diagnostic artifacts or temporal affiliation, a simplified chronology was used for this evaluation, with ***Prehistoric*** covering sites from Paleoindian to Late Prehistoric, ***Caddo*** covering sites associated with prehistoric or historic Caddo occupation, ***Historic*** primarily covering sites associated with Euro-American activities, ***Multi-Component*** covering sites with a prehistoric and a historic period component, and ***Prehistoric Multi-Component*** covering sites with two phases of prehistoric occupation.

These sites were further classified based on their research potential and their eligibility for inclusion in the National Register of Historic Properties (NRHP). Sites listed as NRHP eligible, retaining research potential or with descriptions matching one of the NRHP eligibility criteria a – d listed in 36 CFR 60, were marked as ***Likely*** with a preservation class of ***1***, meaning these sites are the most likely to warrant preservation or mitigation**.** Sites listed with unknown eligibility or unclear descriptions of setting and material were marked as ***Possibly*** with a preservation class of ***2*** if there is a fair chance of meeting NHRP eligibility requirements or ***3*** if there is a poor chance of meeting those criteria. Sites listed as ineligible, low potential, or described as not matching one of the NRHP eligibility criteria a – d listed in 36 CFR 60

were marked as ***Likely NOT*** with a preservation class of ***4,*** suggesting no further work outside of location confirmation is expected**.**

All sites inundated or frequently flooded by the current Wright Patman and Jim Chapman reservoirs are considered NRHP not eligible. Sites within these inundated areas were evaluated for their pre-inundation recommendations based on the reports listed in Appendix I. These original recommendations were used for calculating ranking criterion 1 (as described in the Project Area Potential Impact Ranking Criteria and Methodology Section) to provide a representative assessment of the pre-reservoir landscape. Despite the original recommendation of these sites, no additional work will be required for submerged cultural resources.

4.2 CULTURAL RESOURCE PREDICTIVE ANALYSIS AND THE ZONES OF ARCHAEOLOGICAL POTENTIAL

As the amount of land surveyed within each alternative reservoir is disproportional and represents only a fraction of the area to be evaluated, a method for determining the potential for cultural resources outside of previous investigations was necessary. To determine cultural resource potential outside of previous archaeological work, five physiographic criteria were used to assess the project area based on accepted predictive model elements, including geomorphic setting, slope aspect, soil development, land cover and distance to a water source (Mehrer and Wescott, 2006). These criteria were based on the United States Department of Agriculture's (USDA) soil surveys for Bowie, Cass, Delta, Franklin, Hopkins, Lamar, Morris, Red River, and Titus counties, the NHD flowlines collected from the United States Geological Survey (USGS), ten meter digital elevation models (DEM) produced by the USGS, and land use/cover from the National Land Cover Database (NLCD) collected from the Multi-Resolution Land Characteristics Consortium. Analyses of these data where conducted using ArcGIS to produce a layer depicting Zones of Archaeological Potential (ZAP). These zones represent probability of archaeological site occurrence within each of the alternative reservoirs based on favorable site formation characteristics. The ZAP layer is considered useful for planning purposes at the 1: 100,000 scale based on the minimum scale value used in the analysis. As past land usage was a continuum and not confined to discreet "site" locations, it should be noted that the ZAP does not account for all aspects of human activity. An explanation of the assumptions associated with each of the five criteria used in the ZAP layer is presented in Appendix II.

4.3 PROJECT AREA POTENTIAL IMPACT RANKING CRITERIA AND METHODOLOGY

The archaeological information collected from the THC and the ZAP provide the best resources for comparing possible impacts among seven alternative strategies for development of additional water supply including reservoir construction and reallocating the flood pool of existing reservoirs to use as water supply. As the goal of this study was to compare the potential for impacts, a quantitative ranking system was developed with an attempt to limit the influence of differing degrees of survey coverage and previous work. Five criteria were chosen for this comparison based on site value and dispersion within the project area. The criteria and associated values are as follows:

1. Ratio of High to Low Value Sites in the Project Area:

   Assumption: High value or potentially NRHP eligible sites will require more effort. It is expected that reservoirs with a greater percentage of high value sites will have a greater impact on cultural resources or will be more expensive to adequately complete a field investigation.

   Calculation: The frequency of sites with a preservation class of 1 or 2 (as described in the Archaeological Background and Site Classification Section) within an alternative reservoir divided by the frequency of sites with a preservation class of 3 or 4.

   Ranking Value:

Table 13: Criterion 1 Values

Ratio	Value	Ratio	Value
1+ - 0.9	10	0.5 - 0.4	5
0.9 - 0.8	9	0.4 - 0.3	4
0.8 - 0.7	8	0.3 - 0.2	3
0.7 - 0.6	7	0.2 - 0.1	2
0.6 - 0.5	6	0.1 - 0	1

2. Presence of known human remains/burials:

   Assumption: Transplanting human remains and costly consultations triggered by the Native American Graves Protection and Repatriation Act (NAGPRA) require a significant amount of time, expense and effort. It is expected that projects with burials/cemeteries will incur restrictions or increased effort making them more expensive.

Calculation: As this criterion is partially related to the amount of sites identified through survey, a semi-qualitative presence/absence rank was used.

Ranking Value:

Table 14: Criterion 2 Values

Listing of Burials	Value
No Human Remains	0
1 - 10 Burial Sites	5
10 + Burial Sites	10

3. Acres of Zones of Archaeological Potential within the project area:

Assumption: As approximately seventy-two percent of all archaeological sites previously evaluated are located within the ZAP layer, it is expected that larger areas of ZAPs within a reservoir have a greater chance of impacting significant cultural resources and subsequently will require more effort to investigate.

Calculation: Since larger area, and not greater percentage, of ZAP is expected to be an important indicator of the amount of effort required for investigation, Criterion 3 is calculated as the total acreage of ZAPs within the proposed reservoir pool elevation.

Ranking Value:

Table 15: Criterion 3 Values

Acreage	Value	Acreage	Value
100,000+ - 90,000	10	50,000 - 40,000	5
90,000 - 80,000	9	40,000 - 30,000	4
80,000 - 70,000	8	30,000 - 20,000	3
70,000 - 60,000	7	20,000 - 10,000	2
60,000 - 50,000	6	10,000 - 0	1

4. Percentage of Project within Previous Survey:

Assumption: Project areas with significant amounts of previous work tend to require less time and effort during the field portion of a cultural resource investigation.

Calculation: This criterion is calculated based on the percentage of previous cultural resources survey area (collected from the TASA database) divided by the total area within the proposed reservoir pool elevation.

Ranking Value:

Table 16: Criterion 4 Values

Ratio	Value	Ratio	Value
100 – 90%	1	50 – 40%	6
90 – 80%	2	40 -30%	7
80 – 70%	3	30 – 20%	8
70 – 60%	4	20 – 10%	9
60 – 50%	5	10 – 0%	10

5. Surveyed Site Density:

Assumption: It is expected that locations with dense or close proximity sites will have a greater chance of more frequent/significant cultural resource sites in the surrounding area.

Calculation: Since there is only a fraction of surveyed land within the project area, site density was calculated based on the acreage shown as surveyed (collected from the TASA database) within the one half kilometer buffer divided by sites within twenty meters of previous survey inside that buffer. This provides an average number of acres per site within the reservoir.

Ranking Value:

Table 17: Criterion 5 Values

Acres Per Site	Value	Acres Per Site	Value
10 - 0	10	50 - 60	5
20 - 10	9	60 - 70	4
30 - 20	8	70 - 80	3
40 - 30	7	80 - 90	2
50 - 40	6	90 - 100+	1

Based on the five criteria and their associated values, each alternative reservoir was given a ranking number. This was calculated by adding all of the criteria values. The alternative reservoir site with the lowest ranking value is expected to have to the smallest potential impact on cultural resources and therefore be the less expensive choice in regards to cultural resource management. The following sub-

sections will discuss each alternative reservoir and their rankings based on these criteria. All reservoir site ranking values are summarized in Table x.10.1.

4.4 WRIGHT PATMAN REALLOCATIONS (237.5 AND 259.5 FT. MSL)

Wright Patman Lake is located in East Texas, near the community of Maud, Texas. At present, Wright Patman has a conservation pool elevation of 227.5 ft. msl. For the purposes of this analysis, both the 237.5 and 259.5 ft. msl reallocation elevations were evaluated during this assessment.

4.4.1 Known Cultural Resources for the Wright Patman Reservoir Project Area

There are 300 known cultural resource sites located within the maximum reallocation elevation, 160 of which are within the minimum lake expansion. Eighty-three previously recorded resources have been flooded by the existing 227.5 ft. msl Lake Wright Patman pool elevation. A summary of these sites can be found in Table 18, categorized by the age and research value/NRHP Eligibility potential as described in the Archaeological Background and Site Classification Section. Twelve sites are not included in the table below as no cultural, temporal, or categorical information was available during the review period. A detailed list of these sites is provided in Appendix III.

Table 18: Summary of Known Cultural Resources within the Wright Patman Reallocation (259.5 ft. msl)

NRHP Eligibility	Historic	Prehistoric	Caddo	Multi-Component	Prehistoric Multi-Component	Total
1 (Likely)	2	44 (-10)	12	1	0	59 (-10)
2 (Possibly)	0	35 (-14)	5	4 (-1)	1	45 (-15)
3 (Possibly)	0	57 (-18)	1 (-1)	2	0	60 (-19)
4 (Likely Not)	8	100 (-36)	9 (-3)	7	0	124 (-39)

Twelve sites with no cultural affiliation were excluded from the summary. Negative numbers indicate sites that have already been impacted by Lake Wright Patman

4.4.2 Ranking Criteria Values for Lake Wright Patman Reallocation Alternatives (237.5 and 259.5 ft. msl)

Criterion 1: Ratio of High to Low Value Sites in the Lake Wright Patman Project Area

To use the most representative ratio for the project area, sites that have already been inundated below elevation 227.5 ft. msl in the existing reservoir were included to calculate the Criterion 1 ranking value. The differences in impacts between the maximum and minimum reallocations are presented in Table 19.

Table 19: Criterion 1 Ranking Value Table for Lake Wright Patman

Preservation Class	Site Count	Combined Class	Ratio	Value
1 (Likely)	59 (22)	104 (48)	0.57 (0.44)	6 (5)
2 (Possibly)	45 (26)			
3 (Possibly)	60 (34)	184 (109)		
4 (Likely Not)	124 (75)			

Values in parenthesis indicate differences between the maximum and minimum reallocation elevations.

Criterion 2: Presence of Known Human Remains in the Lake Wright Patman Project Area

Through the review of all 300 sites and their associated documents, six locations implicitly expressed the potential for human remains. Based on this review, Criterion 2 was given a value of ***5***.

Criterion 2: Presence of Known Human remains in the Lake Wright Patman Project Area

Through the review of all 300 sites and their associated documents, six locations implicitly expressed the potential for human remains. Based on this review, Criterion 2 was given a value of ***5***.

Criterion 3: Acres of ZAP with the Wright Patman Project Area

Out of the 119,948.5 acres of land proposed to be inundated at the maximum fill, including the existing Wright Patman Reservoir, 53,795.6 acres fall within the ZAP for the 259.5 ft. msl elevation and 10,468.9 are within the 237.5 ft. msl elevation. Criterion 3 was given a value of ***6*** for the maximum reallocation and ***2*** for the minimum.

Criterion 4: Percentage of Wright Patman Reallocation Area within Previous Survey

Based on the distribution of the previous survey data collected from the TASA online database for the reservoir rise, Table 20 was used to assign the value for Criterion 4.

Table 20: Criterion 4 Ranking Value Table for Lake Wright Patman

Project Acres (Excluding Inundated Areas)	Surveyed Acres (Excluding Inundated Areas)	Percentage	Value
60,429.8 (19,974.3)	11,585 (5,216.5)	19% (26%)	9 (8)

Values in parenthesis indicate differences between the maximum and minimum reallocation elevations

Criteria 5: Surveyed Site Density in the Lake Wright Patman Project Area

Based on the number of known sites found within the spatial extent of survey present on TASA, Table 21 was used to assign the value for Criterion 5. To get a representative sample of surveyed area to site occurrence, sites and surveys within the current pool elevation were included.

Table 21: Criterion 5 ranking value table for Lake Wright Patman

Acres Surveyed (including Inundated Areas)	Site Counts (Including Inundated Areas)	Acres/Sites	Value
21845.0 (11,633.1)	270 (133)	80.9 (87.5)	2

Values in parenthesis indicate differences between the maximum and minimum reallocation elevations

4.5 PARKHOUSE I RESERVOIR

The Parkhouse I alternative reservoir site is located in East Texas, approximately 13 miles north of Sulphur Springs, TX. The proposed normal pool elevation of 401 ft. msl extends the reservoir from the current Jim Chapman Lake Dam approximately 12 miles east, just north of Sulphur Bluff, Texas.

4.5.1 Known Cultural Resources at the Parkhouse I Site

There are nine known cultural resource sites located within the proposed reallocation area, with more than 300 cultural sites located in the adjacent Jim Chapman Lake footprint. A summary of these sites is found in Table 22 categorized by the age and NRHP Eligibility potential as described in the Archaeological Background and Site Classification Section. A detailed list of cultural resources is provided in Appendix VI.

Table 22: Summary of Known Cultural Resources Within the Parkhouse I Alternative Reservoir Site

NRHP Eligibility	Historic	Prehistoric	Caddo	Multi-Component	Prehistoric Multi-Component	Total
1 (Likely)	1	2	0	0	0	3
2 (Possibly)	0	2	0	0	0	2
3 (Possibly)	0	0	0	0	0	0
4 (Likely Not)	0	4	0	0	0	4

4.5.2 Ranking Criteria Values

Criterion 1: Ratio of High to Low Value Sites in the Parkhouse I Project Area

Using the site counts from Table 22, Table 23 was used to determine the assigned value for ranking Criterion 1.

Table 23: Criterion 1 Ranking Value Table for the Parkhouse I Alternative Reservoir Site

Preservation Class	Site Count	Combined Class	Ratio	Value
1 (Likely)	3	5	1.25	10
2 (Possibly)	2			
3 (Possibly)	0	4		
4 (Likely Not)	4			

Criterion 2: Presents of Known Human remains in the Parkhouse I Project Area

Through the review of all nine sites and their associated documents, no locations implicitly expressed the potential for human remains. Based on this review, Criterion 2 was given a value of ***0***.

Criterion 3: Acres of ZAP within the Parkhouse I Project Area

Out of the 28,380 acres of land that could be inundated, 22,034 acres fall within the ZAP. Criterion 3 was given a value of ***3***.

Criterion 4: Percentage of Parkhouse I Project Area within Previous Survey

Based on the distribution of the previous survey data collected from the THC online database for the reservoir rise, Table 24 was used to determine the assigned value for Criterion 4.

Table 24: Criterion 4 Ranking Value Table for the Parkhouse I Alternative Reservoir Site

Project Acres	Surveyed Acres	Percentage	Value
28,380	83.3	0.2%	10

Criterion 5: Surveyed Site Density for the Parkhouse I Project Area

Based on the number of known sites found within the spatial extent of survey in one half kilometer of the Parkhouse I project area (more area than within the reallocation), Table 25 was used to determine the assigned value for ranking Criterion 5.

Table 25: Criterion 5 Ranking Value Table for the Parkhouse I Alternative Reservoir Site

Acres Surveyed	Site Counts	Acres/Sites	Value
83.3	1	83.3	2

4.6 PARKHOUSE II RESERVOIR

The Parkhouse II alternative reservoir site is located in East Texas, approximately 13 miles south of Paris, TX. The proposed normal pool elevation of 410 ft. msl extends approximately 14 miles along the Lamar/Delta County boundaries (Figure 43).

4.6.1 Known Cultural Resources at the Parkhouse II Site

There are seven known cultural resource sites located within the Parkhouse II alternative reservoir site, none of which have been flooded due to previous reservoir construction. A summary of these sites is found in Table 26 categorized by the age and NRHP Eligibility potential as described in the Archaeological Background and Site Classification Section. A detailed list of these sites is provided in Appendix V.

Table 26: Summary of known Cultural Resources within the Parkhouse II Alternative Reservoir Site

NRHP Eligibility	Historic	Prehistoric	Caddo	Multi-Component	Prehistoric Multi-Component	Total
1 (Likely)	0	0	2	0	0	2
2 (Possibly)	0	1	0	0	0	1
3 (Possibly)	0	2	0	0	0	2
4 (Likely Not)	0	2	0	0	0	2

4.6.2 Ranking Criteria Values for the Parkhouse II Alternative Reservoir Site

Criterion 1: Ratio of High to Low Value Sites in the Parkhouse II Project Area

Using the site counts from Table 26, Table 27 was used to determine the assigned value for ranking Criterion 1.

Table 27: Criterion 1 Ranking Value Table for the Parkhouse II Alternative Reservoir Site

Preservation Class	Site Count	Combined Class	Ratio	Value
1 (Likely)	2	3	0.75	8
2 (Possibly)	1			
3 (Possibly)	2	4		
4 (Likely Not)	4			

Criterion 2: Presents of Known Human remains in the Parkhouse II Project Area

Through the review of all seven sites and their associated documents, one location implicitly expressed the potential for human remains. Based on this review, Criterion 2 was given a value of ***5***.

Criterion 3: Acres of ZAP within the Parkhouse II Project Area

Out of the 15,370 acres of land that could be inundated, 11,827.5 acres fall within the ZAP. Criterion 3 was given a value of ***2***.

Criterion 4: Percentage of Parkhouse II Project Area within Previous Survey

Based on the distribution of the previous survey data collected from the THC online database for the Parkhouse II alternative reservoir site, Table 28 was used to determine the assigned value for Criterion 4.

Table 28: Criterion 4 Ranking Value Table for the Parkhouse II Alternative Reservoir Site

Project Acres	Surveyed Acres	Percentage	Value
15,370	78.4	0.5%	10

Criterion 5: Surveyed Site Density for the Parkhouse II Project Area

Based on the number of known sites found within the spatial extent of survey present on TASA, Table 29 was used to determine the assigned value for ranking Criterion 5.

Table 29: Criterion 5 Ranking Value Table for the Parkhouse II Alternative Reservoir Site

Acres Surveyed	Site Counts	Acres/Sites	Value
78.4	0	N/A	1

4.7 TALCO RESERVOIR

The Talco alternative reservoir site is located in East Texas, southwest of the community of Talco, Texas. The proposed normal pool elevation of 370 ft. msl extends approximately 21 miles west of Talco, TX (Figure 43).

4.7.1 Known Cultural Resources at the Talco Alternative Reservoir Site

There are 16 known cultural resource sites located within the Talco alternative reservoir site. A summary of these sites is found in Table 30 categorized by the age and NRHP Eligibility potential as described in the Archaeological Background and Site Classification Section. A detailed list of these sites is provided in Appendix VI. Two sites are not included in the table as no cultural, temporal, or categorical information was available during the review period.

Table 30: Summary of Known Cultural Resources within the Talco Alternative Reservoir Site

NRHP Eligibility	Historic	Prehistoric	Caddo	Multi-Component	Prehistoric Multi-Component	Total
1 (Likely)	0	2	4	1	0	7
2 (Possibly)	0	2	0	0	0	2
3 (Possibly)	0	1	0	0	0	1
4 (Likely Not)	0	4	0	0	0	4

Two sites with no cultural affiliation were excluded from the summary

4.7.2 Ranking Criteria Values for the Talco Alternative Reservoir Site

Criterion 1: Ratio of High to Low Value Sites in the Talco Project Area

Using the site counts from Table 30, Table 31 was used to determine the assigned value for ranking Criterion 1.

Table 31: Criterion 1 Ranking Value Table for the Talco Alternative Reservoir Site

Preservation Class	Site Count	Combined Class	Ratio	Value
1 (Likely)	7	9	1.8	10
2 (Possibly)	2			
3 (Possibly)	1	5		
4 (Likely Not)	4			

Criterion 2: Presents of Known Human remains within the Talco Alternative Reservoir Site

Through the review of all seven sites and their associated documents, one location implicitly expressed the potential for human remains. Based on this review, Criterion 2 was given a value of ***5***.

Criterion 3: Acres of ZAP with the Talco Alternative Reservoir Site

Out of the 48,940 acres of land that could be inundated, 40,252.8 acres fall within the ZAP. Criterion 3 was given a value of ***5***.

Criterion 4: Percentage of Talco Project Area within Previous Survey

Based on the distribution of the previous survey data collected from the THC online database for the reservoir rise, Table 32 was used to determine the assigned value for Criterion 4.

Table 32: Criterion 4 Ranking Value Table for the Talco Alternative Reservoir Site

Project Acres	Surveyed Acres	Percentage	Value
48,940	252.1	0.5%	10

Criterion 5: Surveyed Site Density for the Talco Project Area

Based on the number of known sites found within the spatial extent of survey present on TASA, Table 33 was used to determine the assigned value for ranking Criterion 5.

Table 33: Criterion 5 Ranking Value Table for the Talco Alternative Reservoir Site

Acres Surveyed	Site Counts	Acres/Sites	Value
252.1	3	84	2

4.8 MARVIN NICHOLS 1A RESERVOIR

The Marvin Nichols 1A alternative reservoir site is located in East Texas, north of the community of Wilkinson, TX. The proposed normal pool elevation of 328 ft. msl extends west approximately 24 miles along State Highway 154 (Figure 43).

4.8.1 Known Cultural Resources within the Marvin Nichols 1A Project Area

There are 66 known cultural resource sites located within the Marvin Nichols 1A alternative reservoir site. A summary of these sites is found in Table 34 categorized by the age and NRHP Eligibility potential

as described in the Archaeological Background and Site Classification Section. A detailed list of these sites is provided in Appendix VII. Three sites are not included in the table as no cultural, temporal, or categorical information was available during the review period.

Table 34: Summary of known Cultural Resources within the Marvin Nichols 1A Alternative Reservoir Site

NRHP Eligibility	Historic	Prehistoric	Caddo	Multi-Component	Prehistoric Multi-Component	Total
1 (Likely)	0	20	9	2	3	31
2 (Possibly)	0	4	2	0	0	6
3 (Possibly)	0	4	1	0	0	5
4 (Likely Not)	0	15	1	2	0	18

Three sites with no cultural affiliation were excluded from the summary

4.8.2 Ranking Criteria Values for the Marvin Nichols 1A Alternative Reservoir Site

Criterion 1: Ratio of High to Low Value Sites in the Marvin Nichols 1A Project Area

Using the site counts from Table 34, Table 35 was used to determine the assigned value for ranking Criterion 1.

Table 35: Criterion 1 Ranking Value Table for the Marvin Nichols 1A Alternative Reservoir Site

Preservation Class	Site Count	Combined Class	Ratio	Value
1 (Likely)	31	37	1.6	10
2 (Possibly)	6			
3 (Possibly)	5	23		
4 (Likely Not)	18			

Criterion 2: Presence of Known Human remains within the Marvin Nichols 1A Alternative Reservoir site

Through the review of all 66 sites and their associated documents, no locations implicitly expressed the potential for prehistoric human remains, though a review of cemetery records shows there are located within the footprint of this site. Based on this review, Criterion 2 was given a value of ***5***.

Criterion 3: Acres of ZAP within the Marvin Nichols 1A Project Area

Out of the 67,150 acres of land that could be inundated, 51,653.5 acres fall within the ZAP. Criterion 3 was given a value of ***6***.

Criterion 4: Percentage of Marvin Nichols 1A Project Area within Previous Survey

Based on the distribution of the previous survey data collected from the THC online database for the Marvin Nichols 1A alternative reservoir site, Table 36 was used to determine the assigned value for Criterion 4.

Table 36: Criterion 4 Ranking Value Table for the Marvin Nichols 1A Alternative Reservoir Site

Project Acres	Surveyed Acres	Percentage	Value
67,150	901.4	1.3%	10

Criterion 5: Surveyed Site Density for the Marvin Nichols 1A Project Area

Based on the number of known sites found within the spatial extent of survey present on TASA, Table 37 was used to determine the assigned value for ranking Criterion 5.

Table 37: Criterion 5 Ranking Value Table for the Marvin Nichols 1A Alternative Reservoir Site

Acres Surveyed	Site Counts	Acres/Sites	Value
901.4	10	90.1	1

4.9 JIM CHAPMAN LAKE REALLOCATION

Jim Chapman Lake is located in East Texas, south of the community of Cooper, TX. The proposed reallocation would bring the elevation from 440 ft. msl to 446.2 ft. msl, extending the reservoir west approximately two miles to Farm Road 71 (Figure 43).

4.9.1 Known Cultural Resources for the Jim Chapman Lake Project Area

There are 244 known cultural resource sites located within the existing and proposed Jim Chapman Lake project area, 201 of which have been flooded, isolated on an island, or destroyed due to previous reservoir construction. A summary of these sites is found in Table 38 categorized by the age and NRHP Eligibility potential as described in the Archaeological Background and Site Classification Section. A

detailed list of these sites is provided in Appendix VIII. Four sites are not included in the table as no cultural, temporal, or categorical information was available during the review period.

Table 38: Summary of known Cultural Resources within the Jim Chapman Lake Reallocation Site

NRHP Eligibility	Historic	Prehistoric	Caddo	Multi-Component	Prehistoric Multi-Component	Total
1 (Likely)	4 (-3)	28 (-24)	2 (-2)	4 (-3)	7 (-7)	45 (-39)
2 (Possibly)	7 (-3)	14 (-12)	3 (-2)	2 (-2)	1 (-1)	27 (-20)
3 (Possibly)	5 (-5)	23 (-23)	0	3 (-3)	3 (-3)	34 (-34)
4 (Likely Not)	57 (-44)	64 (-53)	2 (-1)	10 (-9)	1 (-1)	134 (-108)

Three sites with no cultural affiliation were excluded from the summary

4.9.2 Ranking Criteria Values for the Jim Chapman Lake Reallocation Site

Criterion 1: Ratio of High to Low Value Sites in the Jim Chapman Lake Project Area

Using the site counts from Table 38, Table 39 was used to determine the assigned value for ranking Criterion 1.

Table 39: Criterion 1 Ranking Value Table for the Jim Chapman Lake Reallocation Site

Preservation Class	Site Count	Combined Class	Ratio	Value
1 (Likely)	45	72	0.43	5
2 (Possibly)	27			
3 (Possibly)	34	168		
4 (Likely Not)	134			

Criterion 2: Presents of Known Human remains within the Jim Chapman Lake Reallocation Site.

Through the review of all 244 sites and their associated documents, six locations implicitly expressed the potential for prehistoric human remains. Based on this review, Criterion 2 was given a value of ***5***.

Criterion 3: Acres of ZAP within the Jim Chapman Lake Project Area

Out of the 4,904.4 acres of land that could be inundated, 412.3 acres fall within the ZAP. Criterion 3 was given a value of ***1***.

Criterion 4: Percentage of Jim Chapman Lake Project Area within Previous Survey

Based on the distribution of the previous survey data collected from the THC online database for the Jim Chapman reallocation site, Table 40 was used to determine the assigned value for Criterion 4.

Table 40: Criterion 4 Ranking Value Table for the Jim Chapman Lake Reallocation Site

Project Acres	Surveyed Acres	Percentage	Value
4904.4	4390.1	89.%%	2

Criterion 5: Surveyed Site Density for the Jim Chapman Lake Project Area

Based on the number of known sites found within the spatial extent of survey present on TASA, Table 41 was used to determine the assigned value for ranking Criterion 5.

Table 41: Criterion 5 Ranking Value Table for the Jim Chapman Lake Reallocation Site

Acres Surveyed	Site Counts	Acres/Sites	Value
4390.1	43	102.1	1

4.9.3 Discussion and Comparative Analysis for the Alternative Reservoir Sites

Based on the values calculated for each of the six reservoirs, an overall rank was assigned to each project site for comparing potential cultural resource impacts. It should be noted that these values, particularly for the Parkhouse I, Parkhouse II and Talco sites, were influenced by the lack of previously surveyed area. As such, these rankings are viewed as tentative for project planning purposes. The summarized ranking values for each alternative reservoir are presented in Table 42 in order of the least expensive to the most expensive project in terms of cultural resource management.

Table 42: A Summary of the Ranking Values for each Alternative Reservoir Site

Alternative Reservoir Sites	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5	Overall Rank	Interpreted Rank Order
Jim Chapman	5	5	1	2	1	**14**	**1**
Wright Patman (237.5 ft. msl)	5	5	2	8	2	**22**	**2**
Parkhouse I	10	0	3	10	2	**25**	**3**
Parkhouse II	8	5	2	10	1	**26**	***3**
Wright Patman (259.5 ft. msl)	6	5	4	9	2	**26**	***3**
Marvin Nichols	10	5	6	10	1	**32**	**4**
Talco	10	5	5	10	2	**32**	**4**

**Ranking value differences of one were not considered significant. As such, rank order for Parkhouse I, Parkhouse II and Wright Patman were interpreted as similar.*

4.9.4 Interpretation of Ranking Results

The Lake Jim Chapman reallocation is expected to have the least impact to cultural resources. This is partially expected, as the Jim Chapman reallocation covers the least amount of land but the largest amount of previous work. Archaeological findings within the Jim Chapman Lake survey were extensive, including over 300 historic and prehistoric properties (including the area outside of the proposed reallocation). A large percentage of these sites (N>200) have already been affected by construction of the dam or are located below the current pool elevation of 440 ft. msl. Additionally, areas between the 440 ft. msl elevation and the proposed 446.2 ft. msl reallocation elevation have potentially been affected by flooding. USGS elevation data shows monthly averages during 2001 exceeding the normal pool with March, 2001 reaching a mean pool elevation of 444.7 ft. msl. A small portion of the proposed reallocation footprint falls outside of the previous survey and it is possible that additional unrecorded resources will be discovered during field analysis. Based on the ZAP and the results of previous fieldwork, it is expected that cultural resource discoveries and the potential for mitigation will be minimal.

The minimum reallocation elevation of 237.5 feet at Lake Wright Patman also ranks low in terms of potential cultural resource impacts. Like Jim Chapman, Lake Wright Patman has undergone multiple survey projects, including a portion of the White Oak Creek Mitigation area, which falls on the western edge of the minimum reallocation. Numerous cultural resources have been identified, many (N=83) of which have been submerged below the 227.5 ft. msl elevation. Monthly mean water level fluctuations at Wright Patman have already exceeded the proposed reallocation during early 2001 and late 2009/early 2010 due to climatic events. It is possible that cultural resources within the proposed project area have already been affected by these flood events. It is expected that additional cultural resources would be identified during compliance survey but, based on the amount of previous work conducted for this area and the potential that previous floods may have impacted the project area, the risk of additional cultural resource mitigation should be minimal.

Parkhouse I, Parkhouse II, and the Wright Patman maximum reallocation are expected to have moderate impacts to cultural resources. Poor survey coverage within both Parkhouse alternative reservoir sites make assumptions about the degree of cultural resource management efforts difficult to assess. Both reservoir locations fall just west of the major cultural centers of the Southern Caddoan and Fourche Maline traditions and north of a noted cluster of Paleoindian sites (interpreted from Perttula et al., 2004). An assessment completed in 1997 for the area just upstream of the Parkhouse I site at Jim

Chapman Lake identified 243 sites with a prehistoric component (Fields et al., 1997). Fields suggests that activity within the Jim Chapman Lake area increased across the Late Prehistoric to Protohistoric transition with a decrease in the intensity of site use. Assuming that similar conditions exist at the Parkhouse I site, it is likely that numerous unrecorded cultural resources are present, but many of them will represent small, low intensity sites with little research potential.

The Parkhouse II site is located in a different drainage network (North Sulphur River) than the Parkhouse I site (South Sulphur River) and therefore assumptions about similar occupational patterns are tenuous. Preliminary field investigations at the proposed Ralph Hall reservoir, located 15 miles upstream of the Parkhouse II site, suggest that there is strong potential for unrecorded prehistoric and historic properties along the first terrace of the North Sulphur Valley (Skinner et al., 2005). It is expected that the Parkhouse II site may require deep testing based on the assumption in Skinner's report and it is likely that at least some site mitigation would be necessary prior to reservoir construction.

The maximum reallocation to 259.5 ft. msl at Lake Wright Patman covers a significant amount of land, including almost the entire White Oak Creek Mitigation Area. Between the 259.5 ft. msl and 237.5 ft. msl elevations, block survey coverage is poor. A large percentage (>80%) of high priority ZAP (Figure 43) falls within this 20-foot elevation difference, along with the volume of sites within previous surveys at Wright Patman, suggests a high probability of undocumented prehistoric and historic sites being present. It is likely that at least some mitigation would be required but, based on the amount of research conducted within the existing reservoir, it is expected that mitigation excavation could be limited, as a large volume of representative sites within the area have already been excavated and documented.

The Talco and Marvin Nichols 1A alternative reservoir sites are expected to be the most expensive choice from a cultural resource management stand point, though poor survey coverage is partially responsible for this ranking. Site density within the Talco site appears to be high based on the amount of survey area. The majority of cultural resources within survey are presumed to retain research potential. The sampling size in relation to the total project area however, is too small to make assumptions based on this data. Review of Geo-Marine's work (Hunt and Cliff, 1998), in the White Oak Creek Mitigation Area located approximately 15 miles downstream, showed only one isolated find within a 245-acre block survey, suggesting extremely low site density elsewhere within the White Oak Creek watershed. It is likely that cultural site densities fall somewhere between these two extremes for the Talco site. This assumption is backed up by the high percentage of moderate site potential zones within the ZAP (Figure

43). Site potential for Talco is partially based on environmental characteristics. A portion of the soils within the reservoir footprint exhibit recent pedogenic (soil) development based on the USDA soil classification. This may be a result of a historically dynamic geologic environment that would be favorable for prehistoric site preservation in areas of deposition but unfavorable for near surface discoveries. It is expected that cultural resource mitigation would be necessary for this area, pending the results of field analysis. Documentation of the representative cultural landscape of White Oak Creek is lacking and therefore the unknown degree of effort in managing the cultural resources in this area puts this alternative reservoir site as more expensive than the previously discussed locations.

Similar to the Talco site, more than half of the recorded resources within the Marvin Nichols 1A alternative reservoir site have been recommended as potentially NRHP eligible or requiring additional research to make a determination. While this trend is unlikely to be maintained with increased sampling, the alternative reservoir's location on the edge of the McCurtain and Titus Caddoan traditions combined with favorable geologic/environmental conditions (ZAP) for site development along the Sulphur River and one of its major tributaries suggests that there is a strong chance for identifying potentially significant, unrecorded archaeological resources. The Marvin Nichols 1A alternative reservoir site is situated within the same primary watershed as Lake Wright Patman, which is located downstream. If cultural occupation patterns are similar to Lake Wright Patman, it is expected that mitigation will be required. Based on this information, survey and mitigation within the Marvin Nichols 1A site may be the most time consuming, making this site the most expensive choice in regards to cultural resources management.

4.9.5 Summary of Ranking Comparison

Based on the review of cultural resource records and environmental data, a ranking system was developed for assessing potential cultural resource impacts. The results of this analysis have been used to rank each alternative water supply reservoir as follows:

Lowest Impacts

Lake Jim Chapman reallocation, Lake Wright Patman minimum reallocation (237.5 ft. msl).

Moderate Impacts

Parkhouse I, Parkhouse II, Wright Patman maximum reallocation (259.5 ft. msl).

Highest Impacts

Talco, Marvin Nichols 1A

Differing degrees of survey coverage and limited documentation for some areas make accurate assessment difficult. As a result, these comparisons are tentative and may require additional field testing.

5.0 WATER QUALITY

5.1 INTRODUCTION

Water quality is an integral part of any water supply project. The Sulphur River watershed has been the focus of numerous water resources evaluations. This report presents and summarizes currently available water quality data for the Sulphur River watershed upstream of Wright Patman Dam collected as part of the Sulphur River Basin Clean Rivers Program. The purpose of the water quality study was to synthesize water quality data in the watershed and assess potential impacts of existing water quality impairments on seven potential water supply alternatives being assessed as part of the Sulphur River Basin Comparative Analysis. These alternatives include two different reallocations at Wright Patman Lake, another at Chapman, and development the following four reservoirs: Parkhouse I, Parkhouse II, Marvin Nichols 1A, and Talco. A discussion of the potential projects on regional groundwater resources is also provided.

5.2 BACKGROUND

The general approach of this analysis was to 1) obtain available water quality data pertaining to the Sulphur River watershed upstream of Wright Patman Dam, 2) organize and assess data in relation to proposed locations of the potential water supply alternatives listed above, and 3) rank the potential alternatives on the basis of their likelihood to be affected by known water quality impairments in the watershed. The data source for water quality information used in this report was the Texas Commission on Environmental Quality Draft 2012 Texas Integrated Report for Clean Water Act Sections 305(b) and 303(d) (the "Texas Integrated Report", or "TIR") (TCEQ, 2013). The Texas Clean Rivers Program (CRP) was developed and implemented by the Texas Commission on Environmental Quality (TCEQ) in response to the requirements of the Clean Water Act Sections 305(b) and 303(d). The goal of the CRP is to collect water quality throughout Texas, and the TIR summarizes the condition of the state's surface waters, including concerns for public health, fitness for use by aquatic species and other wildlife, and specific pollutants and their possible sources.

Data are organized by segment and sub-segment. The segments and sub-segments in the Sulphur River watershed are mapped in Figures 44-46.

Both the 303(d) report and the 305(b) report are included in the TIR for reporting to the U.S. Environmental Protection Agency (EPA). The 303(d) report includes a list of all the impaired and

threatened waters (stream/river sediments and lakes) that the Clean Water Act requires all states to submit to the EPA for approval every two years on even numbered years. States are required to identify all waters where required pollution controls are not sufficient to attain or maintain applicable water quality standards and establish priorities for developing Total Maximum Daily Loads (TMDLs) based on the severity of the pollution and the sensitivity of the uses to be made of the waters. In addition to the 303(d) report, the Clean Water Act section 305(b) requires that states report the health of all waters, not just those that are impaired. The 305(b) report contains the 303(d) list and a list of all waters that are deemed a risk to be listed on the 303(d) report. Also included in the 305(b) report are summaries of all available water quality data that produce ratings of each water body's suitability for different uses, including: general use, aquatic life use, recreation, and fish consumption. This report summarizes assessments for impaired water bodies (303(d)), water bodies of concern, and use ratings for segments in the Sulphur River watershed upstream of Wright Patman Dam.

5.3 GENERAL WATER QUALITY

The following paragraphs provide a general discussion of water quality parameters (constituents) that affect water bodies in the Sulphur River watershed, their potential causes, and typical impacts on aquatic life.

5.3.1 Dissolved Oxygen

Dissolved oxygen (DO) is a relative measure of the amount of oxygen that is dissolved or carried in water. The standard unit is milligrams per liter (mg/L). Dissolved oxygen is important to the sustainability of an ecosystem. Insufficient dissolved oxygen, often caused by the decomposition of organic matter and/or high water temperatures, may occur in bodies of water such as ponds and rivers, tending to suppress the presence of aerobic organisms such as fish. Deoxygenation increases the relative population of anaerobic organisms such as some types of bacteria, resulting in fish kills and other adverse events.

5.3.2 pH

pH is a measure of how acid or basic a media is and is measured on a scale form 0-14. Acidic values are from 0-7, with 0 being the most acidic. Basic values lie in the range from 7-14. A neutral pH is 7 (distilled water). There are many natural factors that influence pH. Calcium carbonate from soils and geology can combine with the extra hydrogen or hydroxyl ions that alter water's pH and make it

relatively basic. In addition, groundwater percolates through soils, and if the soils are buffered by carbonate minerals, the pH may be somewhat higher (7-8). Also when precipitation falls through the air, it can dissolve gases like carbon dioxide and form a weak acid. Other factors that affect the pH of water include vegetation type and seasonal changes. In the fall, when leaves and conifer needles fall they add acidity to the soil and also influence the acidity of nearby streams and water. Human factors such as point source discharges of pollutants also can affect the pH of water. A change in the pH of water can alter the behavior of other chemicals in the water which can affect aquatic plants and animals (http://extension.usu.edu/waterquality/htm/whats-in-your-water/ph).

5.3.3 Phosphorus and Nitrogen

Both phosphorus and nitrogen are essential nutrients for the plants and animals that make up the aquatic food chain. Both are natural elements found in rocks, soils, and organic material. Orthophosphorus is the form of phosphorus that is readily available for use by algae and other aquatic plants for growth, and total phosphorus is the total concentration of all forms of phosphorus found in a water sample. Nitrate, nitrite, organic nitrogen and ammonia are forms of nitrogen. Together with phosphorus, introducing excess amounts of nitrogen can accelerate eutrophication, which increases aquatic algae growth that can negatively impact plants and animals that live in streams, lakes and reservoirs.

There are many sources of phosphorus and nitrogen, both natural and human. Some examples include soil and rocks, wastewater effluent, runoff from fertilized lawns and cropland, failing septic systems, runoff from animal manure storage areas, disturbed land areas, drained wetlands, water treatment, and commercial cleaning preparations (http://water.epa.gov/type/rsl/monitoring/vms56.cfm).

5.3.4 Bacteria

Bacteria are microscopic, single-celled organisms that are the most numerous organisms on earth. Bacteria can live in numerous environments and perform many complex actions, some of which are beneficial and some harmful. However, most bacteria are not harmful and do not cause human health problems. Escherichia coli (E. coli) is one subgroup of fecal coliform bacteria that can cause illness and humans. Elevated levels of E. coli in a water body can reduce the waters suitability for contact recreational activities such as swimming or boating.

Bacteria in water can originate from the intestinal tracts of both humans and other animals such as pets, livestock, and wildlife. Human sources include failing septic systems, leaking sewer lines, poorly treated wastewater effluent, combined sewer overflow, boat discharges, and urban storm water runoff (http://www.usawaterquality.org/volunteer/ecoli/june2008manual/chpt2_ecoli.pdf).

5.3.5 Chlorophyll-A

Chlorophyll, in various forms, is bound within the living cells of algae and other phytoplankton found in surface water. Rivers and streams are monitored for excessive growth of algae resulting from high concentrations of plant nutrients. Elevated chlorophyll-a levels are an indicator of excessive algal growth. This can be a concern for fish because of adverse effects on DO concentrations. While algae produce DO through photosynthesis during the day, they consume DO through respiration at night, which can lead to depressed DO levels and stress on aquatic life. In addition, as algae die, bacteria decompose them and depress or deplete the DO levels in the water.

5.3.6 Polycyclic Aromatic Hydrocarbon (PAHs)

Polycyclic aromatic hydrocarbon (PAHs) are lipophilic, meaning they mix more easily with oil than water. The larger compounds are less water soluble and less volatile. Because of these properties, PAHs in the environment are found primarily in soil, sediment, and oily substances, as opposed to in water or air. Benzo(a)pyrene, Fluoranthene, and Pyrene, are PAHs. Accumulation of PAHs in fish tissue, primarily fat, can make the affected fish unsuitable for human consumption.

5.4 WATER QUALITY IMPAIRMENTS AND CONCERNS IN THE SULPHUR RIVER BASIN

This section presents data for the Sulphur River basin segments that are listed in the 305(b) report for being impaired or being a water body of concern. Table 43 contains all the water body segments in the Sulphur River watershed with associated impairment(s) or concern(s).

For each segment, Table 43 contains segment impairments (i.e., 303(d) listings), concerns, and level of use attainment. Impaired water quality constituents were rated by TCEQ using the following categories:

- Category 5a. The water body does not meet applicable water quality standards or is threatened for one or more designated uses by one or more pollutants

- Category 5b. A review of the water quality standards for the water body will be conducted before a management strategy is selected.
- Category 5c. Additional data and information will be collected or evaluated before a management strategy is selected.

Water quality constituents of concern in Table 43 were classified by TCEQ as follows:

- NS: Non-supporting
- CN: Concern for near non-attainment
- CS: Concern for screening levels

The four water body uses listed in Table 43 were described by TCEQ as follows:

Aquatic Life Use (ALU)

(ALU) is based on assessment of dissolved oxygen criteria, toxic substances in water criteria, ambient water and sediment toxicity test results, and indices for habitat, benthic macroinvertebrate and fish community, provided that the minimum number of samples are available. Each classified segment in the Texas Surface Water Quality Standard is assigned an ALU based on physical, chemical, and biological characteristics of the water body. The five ALU categories are exceptional, high, intermediate, limited, or minimal (no significant) aquatic life use.

Recreational Use

Recreational use is based on the amount of bacteria in the water body. In freshwater, fecal coliform and Escherichia coli (E. Coli) are both analyzed to determine support of the contact recreation use. Full support of the contact recreation use is not a guarantee that the water is completely safe of disease-causing organisms.

General Use

General use water quality criteria for several constituents are established in the Texas State Water Quality Standards (TSWQS) to safeguard general water quality, rather than for protection of one specific use. Water temperature, pH, chloride, sulfate, and total dissolved solids (TDS) are the parameters protecting aquatic life, recreation, public water supply, and other beneficial uses of water resources.

Fish Consumption Use

Fish consumption use attainment is evaluated using advisories, closures, and risk assessments. For a full assessment of use attainment for fish consumption and determination of fully supporting, a Department of State Health Services (DSHS) risk assessment or advisory is required. Risk assessments are costly and conducted only on water bodies where the screening has indicated a risk from consumption and as a result, few water bodies are identified as fully supporting the fish consumption use.

The levels of use attainment listed in Table 43 are classified as follows:

- NS: Non-Supporting
- FS: Fully Supporting
- NA: Not Applicable

Table 43. Water body segments in the Sulphur River watershed with associated impairment(s) or concern(s)

		303 (d) Impaired					Parameter of Concerns																	Uses			
		pH	Depressed DO	Bacteria	Fish Community	Marcobenthic Community	Chlorophyll-a	pH	DO 24hr Avg	DO 24hr Min	DO Grab	Orthophosphorus	Total Phosphorus	E. coli	Nitrate	Ammonia	Habitat	Macrobenthic Community	Fish Community	Fish Kill Reports	Benzo(a)pyrene	Fluoranthene	Pyrene	Aquatic Life	Recreation	General Use	Fish Consumption
Reservoirs	**0302 Wright Patman Lake**																							NS	FS	NS	FS
	0302_01	5b					CS	NS																			
	0302_02	5b	5c				CS	NS	NS	NS																	
	0302_04	5b					CS	NS																			
	0302_05	5b						NS																			
	0302_06	5b					CS	NS																			
	0302_07	5b						NS																			
	0302_08	5b						NS																			
	0302_09						CS					CS															
	0302_10		5c				CS		NS	NS		CS	CS														
	0307 Cooper Lake (Jim Chapman Lake)																							FS	FS	NS	NA
	0307_01	5b						NS																			
	0307_03	5b						NS																			
	0307_04	5b						NS																			
Creeks and Rivers	**0301 Sulphur River below Wright Patman Lake**																							FS	FS	FS	FS
	0301_01						CS																				
	0302_02						CS													CN							
	0302A Big Creek (unclassified water body)																							FS	NA	NA	NA
	0302A_02												CS														
	0302C Anderson Creek (unclassified water body)																							FS	NA	NA	NA
	0302C_01								CN	CN	CS						CS										
	0302F Akin Creek (unclassified water body)																							FS	NA	NA	NA
	0302F_01																	CS	CN								
	0303 Sulphur/South Sulphur River																							FS	FS	FS	NA
	0303_01						CS																				
	0303_02						CS																				
	0303B White Oak Creek (unclassified water body)																							NS	NS	NA	FS
	0303B_01		5b	5b					NS					NS													
	0303B_02		5b						NS	NS																	
	0303B_03		5b						NS	NS	CS																
	0303B_04		5b	5b					NS			CS	CS	NS	CS		CS										
	0303D Rock Creek (unclassified water body)																							NA	NA	NA	NA
	0303D_01		5c						NS		CS		CS	CN	CS		CS		CN								
	0303E East Caney Creek (unclassified water body)																							FS	NA	NA	NA
	0303E_01												CS	CN				CS	CS								
	0303F Stouts Creek (unclassified water body)																							FS	NA	NA	NA
	0303F_01												CS	CN													
	0303G North Caney Creek (unclassified water body)																							FS	NA	NA	NA
	0303G_01																	CS									
	0303I Big Creek (unclassified water body)																							FS	NA	NA	NA
	0303I_01																	CS									
	0303L Kickapoo Creek (unclassified water body)																							FS	NA	NA	NA
	0303L_01																	CS									
	0304 Days Creek																							FS	FS	FS	NA
	0304_01														CS						CS	CS	CS				
	0304A Swampoodle Creek (unclassified water body)																							NS	NA	NA	NA
	0304A_01				5b	5b												NS	NS								
	0304B Cowhorn Creek (unclassified water body)																							NS	NA	NA	NA
	0304B_01				5b												CS	CN	NS								
	0304C Wagner Creek (unclassified water body)																							FS	NA	NA	NA
	0304C_01								CN	CN	CS				CS	CS											
	0304D Nix Creek (unclassified water body)																							FS	NA	NA	NA
	0304D_01																CS										
	0305 North Sulphur River																							NS	FS	FS	NA
	0305_01						CS											NS	NS								
	0305_02				5b	5b																					
	0305B Auds Creek (unclassified water body)																							FS	NA	NA	NA
	0305B_01																CS	CN									
	0305D Big Sandy Creek (unclassified water body)																							FS	NA	NA	NA
	0305D_01																CS	CN									
	0306 Upper South Sulphur River																							FS	FS	NS	NA
	0306_01						CS					CS	CS		CS												
	0306_03	5b						NS																			

5a	Category 5a: The water body does not meet applicable water quality standards or is threatened for one or more designated uses by one or more pollutants
5b	Category 5b: A review of the water quality standards for the water body will be conducted before a management strategy is selected.
5c	Category 5c: Additional data and information will be collected or evaluated before a management strategy is selected.
NS	Non-supporting
CN	Concern for near non-attainment
CS	Concern for screening levels
FS	Fully Supporting
NA	Not Applicable

5.5 EFFECTS OF WATER QUALITY IMPAIRMENTS AND CONCERNS ON WATER SUPPLY ALTERNATIVES

The following sections describe the potential impacts of the water quality impairments and concerns on the seven potential water supply alternatives being evaluated as part of this study: reallocation at Wright Patman Lake and Lake Chapman, and development of Parkhouse I, Parkhouse II, Marvin Nichols 1A and Talco. The sections are divided into two parts: existing conditions and potential future conditions. The existing conditions sections describe the locations and potential causes of existing impairments and concerns. The potential future conditions sections describe the potential effects of existing impairments and concerns on the seven water supply alternatives.

5.5.1 Jim Chapman Lake Reallocation

Within Potential Reservoir

Cooper (Chapman) Lake (segment ID: 0307_01, 03, 04)

- There are some impairment(s) and/or concern(s)

Upstream of Potential Reservoir

Upper South Sulphur River (segment ID: 0306_01, 02)

- There are some impairment(s) and/or concern(s)

Existing Conditions

Jim Chapman Lake is located in East Texas, south of the community of Cooper, TX. The proposed pool rise would bring the elevation from 440 ft. msl to 446.2 ft. msl extending the reservoir west approximately 2 miles to Farm Road 71 (Figure 44).

Jim Chapman Lake was built for flood control by the USACE. Construction started in August 1987 and was completed in September 1991. By January 1993, the lake was filled to the conservation level. The lake occupies over 19,000 acres and is fed by the South Sulphur River. In addition, the lake provides water supply storage for North Texas Municipal Water District, the City of Irving, and the Sulphur River Municipal Water District. The lake is currently listed on the 303(d) List for elevated pH levels attributed to natural sources. The impairment was first listed in 2000.

The Upper South Sulphur River extends from Jim Chapman Lake (approximately 0.6 miles downstream of FM 71) to its origin near Leonard, Texas in Fannin County. The stream drains low rolling terrain of

chalks and marls that weather to deep, black fertile clay soils. The blacklands soils are dominated by rangeland or have been cleared of vegetation and cultivated for crops. The soil reaction (pH) has a range of 7.4 to 8.4. The portion of the Upper South Sulphur from the confluence with Hickory Creek approximately 12 miles to State Highway 78 is listed on the 303(d) list for elevated pH levels. The pH of the in-situ soil and geology would affect the pH of the stream flow, which would in turn affect the pH of Jim Chapman Lake downstream. In addition, the segment of river from about 0.6 miles upstream of FM 71 upstream approximately 6 miles to Dunbar Creek contains the City of Commerce wastewater treatment plant outfall. The TCEQ list concerns for high concentrations of total phosphorus, orthophosphorus, nitrate, and chlorophyll-a in this segment. The nutrients likely would have an effect on concentrations of chlorophyll-a.

Potential Future Conditions

Water quality at the reallocation elevations would likely be similar as existing condition. In general, the existing water quality issues at the lake could be expected to continue, no matter what the lake elevation is, because of the surrounding soils and geology. Future studies could explore what effects a reallocation would have on pH.

5.5.2 Parkhouse I

Within Potential Reservoir

Sulphur/South Sulphur River (segment ID: 0303_01, 02)

- No impairment and/or concern

Tributary to Potential Reservoir

Big Creek (segment ID: 0303H_01)

- No impairment and/or concern

Upstream of Potential Reservoir

Refer to:

- Jim Chapman Lake reallocation alternative

Existing Conditions

The proposed Parkhouse I Reservoir would be located on Sulphur/South Sulphur River immediately downstream of Jim Chapman Lake (formerly Cooper Lake) (Figure 50). There are no listed impairments

and/or concerns in the segment of the Sulphur/South Sulphur River where Parkhouse I would be located.

Jim Chapman Lake is currently listed on the 303(d) List for elevated pH levels attributed to natural sources. The impairment was first listed in 2000.

The portion of the Upper South Sulphur from the confluence with Hickory Creek approximately 12 miles to State Highway 78 is listed on the 303(d) for elevated pH levels. The TCEQ lists concerns for high concentrations of total phosphorus, orthophosphorus, nitrate, and chlorophyll-a for this segment. The nutrients likely would have an effect on concentrations of chlorophyll-a.

Potential Future Conditions

A primary source of inflow to the Parkhouse I reservoir would be spills and releases (constant 5 cfs) from Jim Chapman Lake. As such, it would be reasonable to assume that the potential Parkhouse I reservoir would have water quality similar to Jim Chapman Lake (impaired for pH), except for those pollutant that might be associated with the sediment that is trapped by Jim Chapman Lake.

5.5.3 Parkhouse II

Within Potential Reservoir

North Sulphur (segment ID: 0305_01)

- There are some impairment(s) and/or concern(s)

Tributary to Potential Reservoir

Auds Creek (segment ID: 0305B_01)

- There are some impairment(s) and/or concern(s)

Upstream of Potential Reservoir

North Sulphur River (segment ID: 0305_02)

- There are some impairment(s) and/or concern(s)

Existing Conditions

The North Sulphur River extends northwest from its confluence with the Sulphur River in Delta and Lamar Counties for approximately 54 miles to its origin near Bailey, Texas in Fannin County. The proposed Parkhouse II Reservoir would be located on North Sulphur River (Figure 44). The river is

intermittent in the upper reaches. The North Sulphur River and its tributaries are deeply incised and eroding. Current conditions are the result of channelization in the late 1920's to early 1930's to prevent frequent overbank flooding that straightened the sinuous, meandering river and significantly reduced its channel length. The original channelized and straightened channel had a top width of 16 to 30 feet and a depth of 9 to 12 feet (Avery, 1974). The channelization caused the channel to erode and currently, in some locations, the river is about 300 feet wide and 40 feet deep, the bed and lower banks of the channel are composed of erodible shale (Harvey, et al. 2006).

The segment (segment ID: 0305_02) of the North Sulphur River from the confluence with Morrison Creek upstream approximately 23 miles to the headwaters is listed on the 303(d) List as impaired and in the Texas Integrated Report as a concern for fish and macrobenthic communities. The source of the impairment and concern is channelization. Another water supply reservoir, Lake Ralph Hall, has been proposed and would be located on the North Sulphur River upstream of the potential Parkhouse II reservoir near Ladonia, TX. Lake Ralph Hall would inundate a portion of the channelized North Sulphur River and would likely change the existing aquatic life use designation of "not supporting" to "fully supporting" for the inundated reach and would also likely change the "impaired" status of the reach for fish and macrobenthic communities.

The segment (segment ID 0305_01) of the North Sulphur River where Parkhouse II would be located has elevated Chlorophyll-a levels. Chlorophyll in rivers comes mostly from floating algae and algae are important because they form the base of the food chain. The conditions in the North Sulphur are suitable for algae growth due to the shallow, little to no flow, and a wide channel bed (result of the channelization) exposed to sunlight. One unclassified water body, Auds Creek (segment ID: 0305B_01), flows into the segment of the North Sulphur River where Parkhouse II would be located (Figure 44). The creek is listed in the Texas Integrated Report for a concern for habitat and impaired macrobenthic community. The source of the concern is channelization, and the impairment is an industrial point source discharge and a municipal point source discharge. The entire stretch of the North Sulphur River is listed as not fully supporting aquatic life.

Potential Future Conditions

The potential Parkhouse II reservoir would inundate a reach of the North Sulphur River (Segment 0305_01) that is currently listed as a concern for chlorophyll-a and not supporting for aquatic life. Inundation of the channel by the potential reservoir could improve the aquatic life use, but further

studies would be needed to substantiate this conclusion. Inundation would likely not have an effect on the chlorophyll-a listing, unless the greater volume of water in the reservoir diluted inflowing dissolved nutrients to the point that an algal community in the lake would be less virulent. The impaired listing for habitat and macrobenthic community in Auds Creek is not likely to change, unless the cause of the impairment is addressed.

5.5.4 Marvin Nichols 1A

Within Alternative

Sulphur/South Sulphur (0303_03, 04)

- No impairment and/or concern

Cuthand Creek (0303J_01)

- No impairment and/or concern

Kickapoo Creek (0303L_01)

- There are some impairment(s) and/or concern(s)

Tributary to Potential Reservoir

Little Mustang Creek (0303K_01)

- No impairment and/or concern

Upstream of Potential Reservoir

Big Sandy Creek (0305D_01)

- There are some impairment(s) and/or concern(s)

Refer to information about:

- Parkhouse I
- Parkhouse II

Existing Conditions

The proposed Marvin Nichols 1A Alternative Reservoir Site would be located on the Sulphur/South Sulphur River (Figure 45). This segment of river is slow moving and meanders through large hardwood forests and rangeland. The segment is used extensively for hunting and fishing (TCEQ, 2011).

Segment 0303L_01, Kickapoo Creek, is an unclassified water body that would be partially inundated by the potential alternative. The creek is listed in the Texas Integrated Report for a concern for an impaired macrobenthic community. Potential causes of impairment are non-point sources such as agriculture and channelization. Segment 0305D_01, Big Sandy Creek, is a tributary of the North Sulphur River upstream of the North Sulphur River/South Sulphur River confluence. Big Sandy Creek is listed in the Texas Integrated Report for a concern for habitat and impaired macrobenthic community. The source of the impairment might be related to point source impacts from municipal and industrial/commercial wastewater discharges.

Potential Future Conditions

The only existing impairment/concern that would be within the pool of the potential reservoir is the macrobenthic community in Kickapoo Creek. Inundation of the channel with reservoir water should serve to dilute the pollutants that may be affecting the macrobenthic organisms. The absence of other impairments and concerns in Kickapoo Creek, however, provides little insight into the cause of the existing macrobenthic community impairment. In portions of Kickapoo Creek and Big Sandy Creek that are not inundated by the reservoir, existing impairments to macrobenthic communities and habitat can be expected to continue.

The existing impairments upstream of the potential reservoir site are not currently affecting water quality in the reach of the Sulphur River that would be inundated by the reservoir. Therefore, it can be expected that they would not negatively impact the water quality of the potential reservoir.

5.5.5 Talco

Within Alternative

White Oak Creek (0303B_03, 04)

- There are some impairment(s) and/or concern(s)

Tributary to Potential Reservoir Alternative

Big Creek (0303I_01)

- There are some impairment(s) and/or concern(s)

Stouts Creek (0303F_01)

- There are some impairment(s) and/or concern(s)

Upstream of Potential Reservoir Alternative

East Caney Creek (0303E_01)

- There are some impairment(s) and/or concern(s)

North Caney Creek (0303G_01)

- There are some impairment(s) and/or concern(s)

Rock Creek (0303D_01)

- There are some impairment(s) and/or concern(s)

Existing Conditions

White Oak Creek (Segment 0303B) is an unclassified water body that drains the southern portion of the Sulphur River watershed. It originates near the City of Sulphur Springs and flows generally east to its confluence with the Sulphur River north of Naples, TX. Land use is dominated by forest and rangeland, with a substantial dairy industry in Hopkins County. The water in White Oak Creek is generally turbid, slow flowing, and the channel is well shaded.

The TCEQ has performed a use-attainability analysis (UAA) using the available water quality data for White Oak Creek. The purpose of the UAA was to determine if the criteria used for assessment of the creek were appropriate, given what is known about the water body. The TCEQ proposed an aquatic life use of intermediate, and dissolved oxygen criterion of 4.0 mg/L (24-hr average) and 3.0 mg/L (minimum) for White Oak Creek. The TCEQ Commissioners adopted the standards proposed by the UAA in 2010 and the standards were approved by the EPA in 2011. In general, this means that these updated, site-specific standards are now in effect for Clean Water Act permitting and assessment purposes. These new standards, however, were not attained during the 2012 sampling period, and the creek remains listed as impaired on the 303(d) list for depressed DO. The cause of the depressed DO in the White Oak Creek watershed might be related to the flow characteristics of the water in the creek. Turbid, shallow, slow flowing water can have a relatively high temperature, and dissolved oxygen can be depressed under such conditions.

The potential Talco reservoir site would be located on White Oak Creek near Talco, TX upstream of the Highway 96 bridge crossing (Figure 45). White Oak Creek Segments 0303B_03 and 04 would be inundated by the reservoir and are listed as impaired for depressed DO and bacteria. These sub-segments are also listed in the Texas Integrated Report for concerns for DO 24-hr average, DO 24-hr

minimum, DO grab, orthophosphorus, total phosphorus, E. coli, nitrate, and habitat. The DO, nutrient and bacteria concerns may be caused by runoff and discharges from dairy operations and wastewater treatment plants in the watershed, but additional analysis would be required to verify the source of these pollutants. Multiples tributaries and creeks upstream of the potential reservoir are listed as having impairments and/or concerns. These include the following: Big Creek (0303I_01), Stouts Creek (0303F_01), East Caney Creek (0303E_01), North Caney Creek (0303G_01), and Rock Creek (0303D_01).

Sources of impairments in the potential Talco reservoir watershed include both point sources and non-point sources. Point sources are primarily municipal WWTP effluent discharges. These discharges may increase nutrient levels in the water bodies that could cause increased chlorophyll-a levels and decreased DO levels. Non-point sources include agriculture, loss of riparian habitat, livestock (grazing and/or feeding operations), wildlife other than waterfowl, and other unknown sources.

Potential Future Conditions

Inundation of all or portions of creeks and rivers by the potential Talco reservoir may reduce the degree of impairment caused by some pollutants by increasing water volumes, which may increase dilution of pollutants. It should be expected that that existing point and non-point sources not inundated by the reservoir would continue to contribute pollutants directly to the reservoir or indirectly through tributaries. Nutrient contributions from upstream point and non-point sources would continue and could cause elevated chlorophyll-a and depressed dissolved oxygen in the potential reservoir.

Inundation of stream segments by a reservoir would increase aquatic habitat availability, which may improve aquatic life use attainment. Bacteria and E. coli levels would likely be reduced at least in portions of the potential Talco Reservoir site, which would improve the recreation use attainment on the inundated portions of White Oak Creek (0303B_03, 04) to fully supporting.

5.5.6 Wright Patman Reallocation

Existing Reservoir

Wright Patman Lake (0302_01, 02, 04, 05, 06, 07, 08, 09, 10)

- There are some impairment(s) and/or concern(s)

Upstream of Existing Reservoir (inundated by reallocation)

Sulphur/South Sulphur River (0303_01, 02)

- There are some impairment(s) and/or concern(s)

White Oak Creek (0303B_01)

- There are some impairment(s) and/or concern(s)

Upstream of Existing Reservoir (not inundated by reallocation)

White Oak Creek (0303B_02)

- There are some impairment(s) and/or concern(s)

Tributary to Existing Reservoir

Big Creek (0302A_02)

- There are some impairment(s) and/or concern(s)

Anderson Creek (0302A_01)

- There are some impairment(s) and/or concern(s)

Akin Creek (0302F_01)

- There are some impairment(s) and/or concern(s)

Refer to:

- There are some impairment(s) and/or concern(s)
- Talco

Existing Conditions

The existing Wright Patman Lake (Segment 0303) is the primary water source for Texarkana, Texas and other surrounding communities (Figure 46). The lake has been listed on the Texas 303(d) list since 1996. Certain sub-segments in the lake do not meet pH and/or DO criteria. Occasional fish kills have been attributed to low dissolved oxygen levels. The lake also is listed in the Texas Integrated Report with concerns for chlorophyll-a, pH, DO 24hr average, DO 24hr minimum, orthophosphorus and total phosphorus. The sources of these impairments are likely natural internal nutrient recycling in the lake and non-point source contributions to the lake from tributaries. In general, the water quality of tributaries to a lake dictates the water quality of the lake. Most of the tributaries to Wright Patman Lake are listed for multiple impairments and/or concerns. The sources of impairment in the lake tributaries are a combination of point and non-point sources. Numerous municipalities discharge treated wastewater effluent into the tributaries. Non-point sources to the tributaries include agriculture, silviculture, and other unidentified non-point sources. Additional analyses would be

required to located and quantify the effects that the tributary inflows have on the water quality of Wright Patman Lake.

Potential Future Conditions

For the purposes of this analysis, the assessment of potential impacts to resources was estimated for a reallocation amount from the existing top-of-conservation-pool elevation of 227.5 ft. msl up to 237.5 ft. msl (i.e., an increase of 10 ft. msl in the conservation pool) and a full reallocation amount from the existing top-of-conservation-pool elevation of 227.5 ft. msl up to 259.5 ft. msl. Water quality at these two pool elevations would likely be similar. In general, the existing water quality issues at the lake could be expected to continue, no matter what the lake elevation. Fluctuations in lake levels due to reservoir operations, withdrawals, and watershed hydrology will continue to allow grass and other vegetation to grow on exposed portions of the lake bed. As water levels rise, the vegetation will die and begin to decompose. Decomposition of organic material uses dissolved oxygen, meaning there could be localized DO depression during the initial period when newly inundated vegetation decomposes. Water quality impairments in tributaries to the lake would continue to affect lake water quality. A greater portion of the tributary channels and surrounding watershed would be inundated, but upstream pollutant sources would persist.

5.6 GROUNDWATER RESOURCES IN THE SULPHUR RIVER BASIN

According to the Texas Natural Resources Conservation Commission (TNRCC, 1999; predecessor of TCEQ), the Sulphur River watershed overlies the outcrops of one major aquifer (Carrizo-Wilcox Sand) and one minor aquifer (Nacatoch Sand). Additionally, Quaternary alluvium deposits parallel the river channels in the watershed. Alluvium deposits are known to yield groundwater in other parts of the state, so it can be postulated that the deposits in the Sulphur River watershed could also yield limited amounts of groundwater. Limited data are available on the quantifiable extent of groundwater – surface water interactions in the Sulphur River watershed, but some generalizations can be made.

The Nacatoch Sand outcrops along the South Sulphur River starting near Neylandville, TX and continues to the North Sulphur River – South Sulphur River confluence (Figure 47). The outcropping portion of the Nacatoch aquifer is also exposed along and to the north of the Sulphur River between the North Sulphur River – South Sulphur River confluence and the Cuthand Creek – Sulphur River confluence. The Carrizo-Wilcox Sand outcrops along the southern extent of the Sulphur River watershed from Sulphur Springs, TX to the Texas-Louisiana state line (Figure 48). TRNCC (1999) suggests that alluvium deposits along the

channel of the North Sulphur River may store groundwater for a brief period of time following flood events, but that the magnitude of this bank storage cannot be quantified due to insufficient monitoring data.

5.6.1 Effects of Potential Reservoirs on Groundwater

Parkhouse I and Marvin Nichols 1A would overly the outcrop of the Nacatoch Aquifer. The two reservoirs could provide recharge to the aquifer during times when reservoir water surface elevations exceed local water table elevations. The Nacotoch Sand could contribute flow to the river channels in locations where the channels flow over the outcrop, but there is insufficient data to substantiate this assumption.

Wright Patman Lake is the only reservoir being considered in this study that overlies the Carrizo-Wilcox Aquifer. TNRCC (1999) states that Wright Patman Lake recharges the underlying aquifer when the lake water surface elevation is higher than the elevation of the water table. Numerous springs and seeps along the White Oak Creek and the Sulphur River suggest that the Carrizo-Wilcox aquifer is contributing flow to the river channels.

The Parkhouse II and Talco alternative reservoir sites would likely not influence (or be influenced by) groundwater, except on a regional scale where water-bearing units of Quaternary alluvium are present.

5.7 WATER QUALITY CONCLUSIONS

This report summarized existing water quality impairments, concerns and use designations in the Sulphur River watershed, and the water quality effects of existing impairments and concerns on potential water supply alternatives. It is apparent that some projects may be affected by water quality issues more than others. It can be inferred that water quality is not a limiting factor and that the seven potential water supply alternatives could use the water being that Jim Chapman Lake and Wright Patman Lake are currently using and treating the water. However the purpose of the study was to assess the potential impact of existing water quality impairments and concerns on the seven potential water supply alternatives. The following list ranks the potential alternatives in order of decreasing suitability based on the number of existing water quality impairments, concerns, and use attainments that would affect each project.

1. Jim Chapman Lake Reallocation

2. Parkhouse II
3. Parkhouse I
4. Marvin Nichols, 1A
5. Talco
6. Wright Patman Reallocation (237.5 ft. msl)
7. Wright Patman Reallocation (259.5 ft. msl)

This study provides an initial analysis of the potential effects of water quality and groundwater resources on multiple potential water resource projects. Water quality, however, is only one issue that must be addressed when evaluating water supply alternatives. Additional analysis of a preferred water supply alternative is warranted to evaluate spatial and temporal water quality trends as they could relate to a future water supply reservoir or expansion of an existing reservoir. A future study should collect data at a time step no greater than monthly for at least three years in multiple locations to adequately characterize the quality of reservoir inflows and the potential changes to water quality that could occur once water is impounded.

6.0 SUMMARY

In order to provide a structured assessment of the potential impacts associated with each alternative reservoir site considered in this preliminary environmental investigation, a summary/comparison matrix was developed taking into consideration each resource evaluated for each alternative reservoir (Table 44). The overall ranking of each reservoir site (7 = higher potential to negatively impact resources; 1 = lower potential to negatively impact resources) was based on each reservoirs potential to negatively impact resources. Based on the results of this analysis, it appears that Wright Patman at the full reallocation elevation (259.5 ft. msl) would have the highest potential to negatively impact state listed threatened/endangered species, bottomland hardwood forests, wetlands, as well as have the poorest water quality. In addition to these impacts, the full reallocation at Wright Patman would inundate approximately 73% of the White Oak Creek Mitigation Area. Conversely, a reallocation at Jim Chapman Lake appears to have the lowest potential to negatively impact all resource categories assessed in this analysis. The final ranking of the other reservoir sites is shown below.

Table 44: Summary/Comparison Matrix of the Potential Impacts of the Alternative Reservoir Sites

Reservoir Site	T&E Impacts	Archeological Resources Impacts	Bottomland Hardwood Impacts	Wetlands	Water Quality	Overall Ranking
Wright Patman (259.5)	7	3	7	7	7	7
Marvin Nichols 1A	6	4	6	6	4	6
Wright Patman (237.5)	4	2	5	5	6	5
Talco	5	4	4	4	5	4
Parkhouse I	3	3	3	3	3	3
Parkhouse II	2	3	2	2	2	2
Jim Chapman (446.2)	1	1	1	1	1	1

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TPWDc. http://www.tpwd.state.tx.us/huntwild/wild/species/piplover/

TPWDd. http://www.tpwd.state.tx.us/huntwild/wild/species/blackbear/

TPWDe. http://www.tpwd.state.tx.us/huntwild/wild/species/rafinesque/

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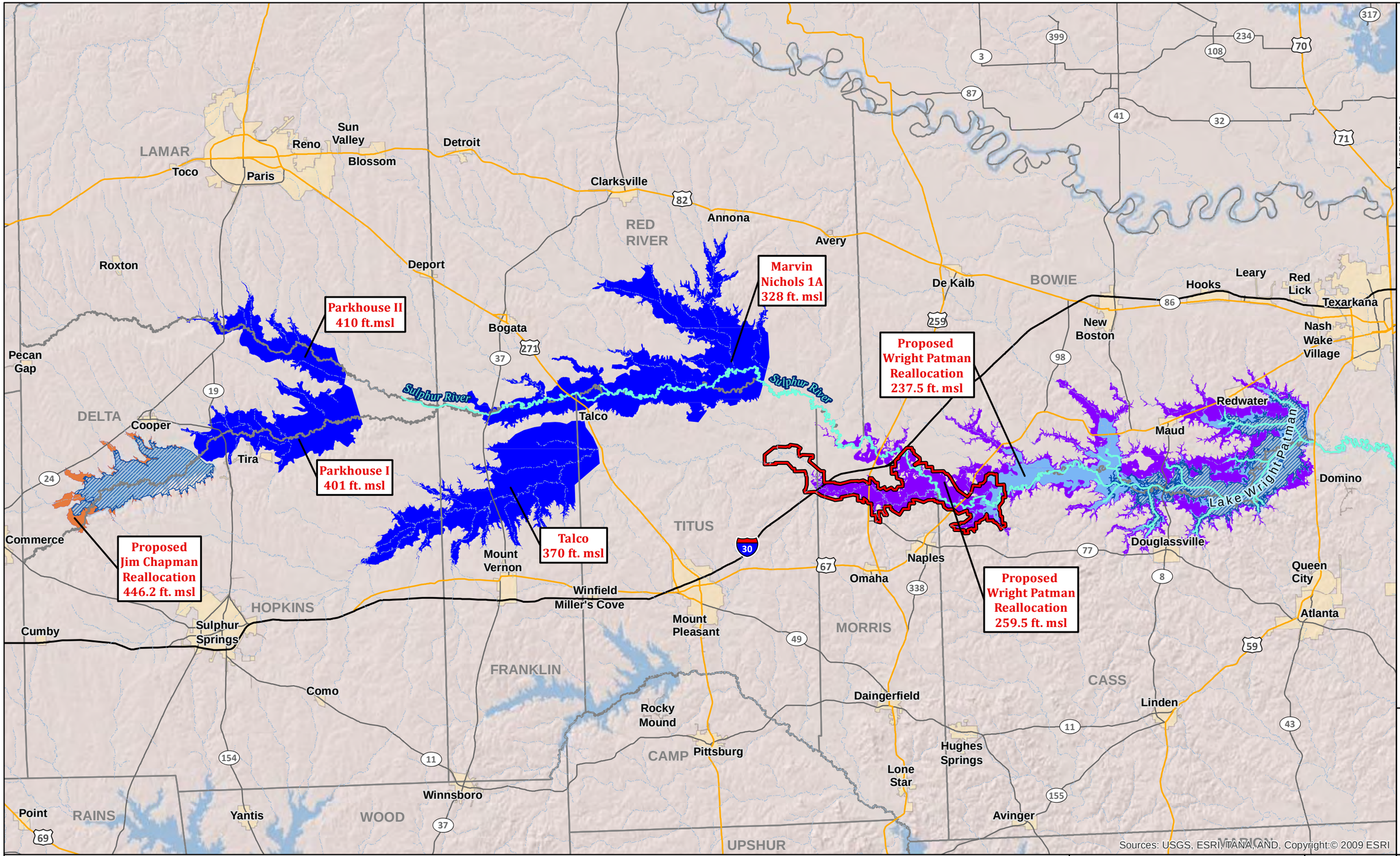
ATTACHMENT A

FIGURES



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White Oak Creek Wildlife Management Area

Existing Reservoir
Sulphur River
Streams

Alternative Reservoir Site; Proposed Jim Chapman Reallocation
Proposed Jim Chapman Reallocation 446.2 ft msl
Proposed Wright Patman Reallocation 237.5 ft. msl
Proposed Wright Patman Reallocation 259.5 ft. msl

County Boundary
City Boundary

1:443,520

0 3.5 7 14 Miles

1 inch equals 7 miles

N W E S

1

FIGURE

Alternative Reservoir Site

Sulphur River Basin

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

FN PROJECT NO. MHP11453
DATE CREATED 6/13/2013
DATUM & COORDINATE SYSTEM NAD83 State Plane (feet) Texas North Central
FILE NAME 1_Location
PREPARED BY SSJ

FREESE NICHOLS
4500 International Plaza Suite 200
Fort Worth, Texas 76109-4895
(817) 735-7300

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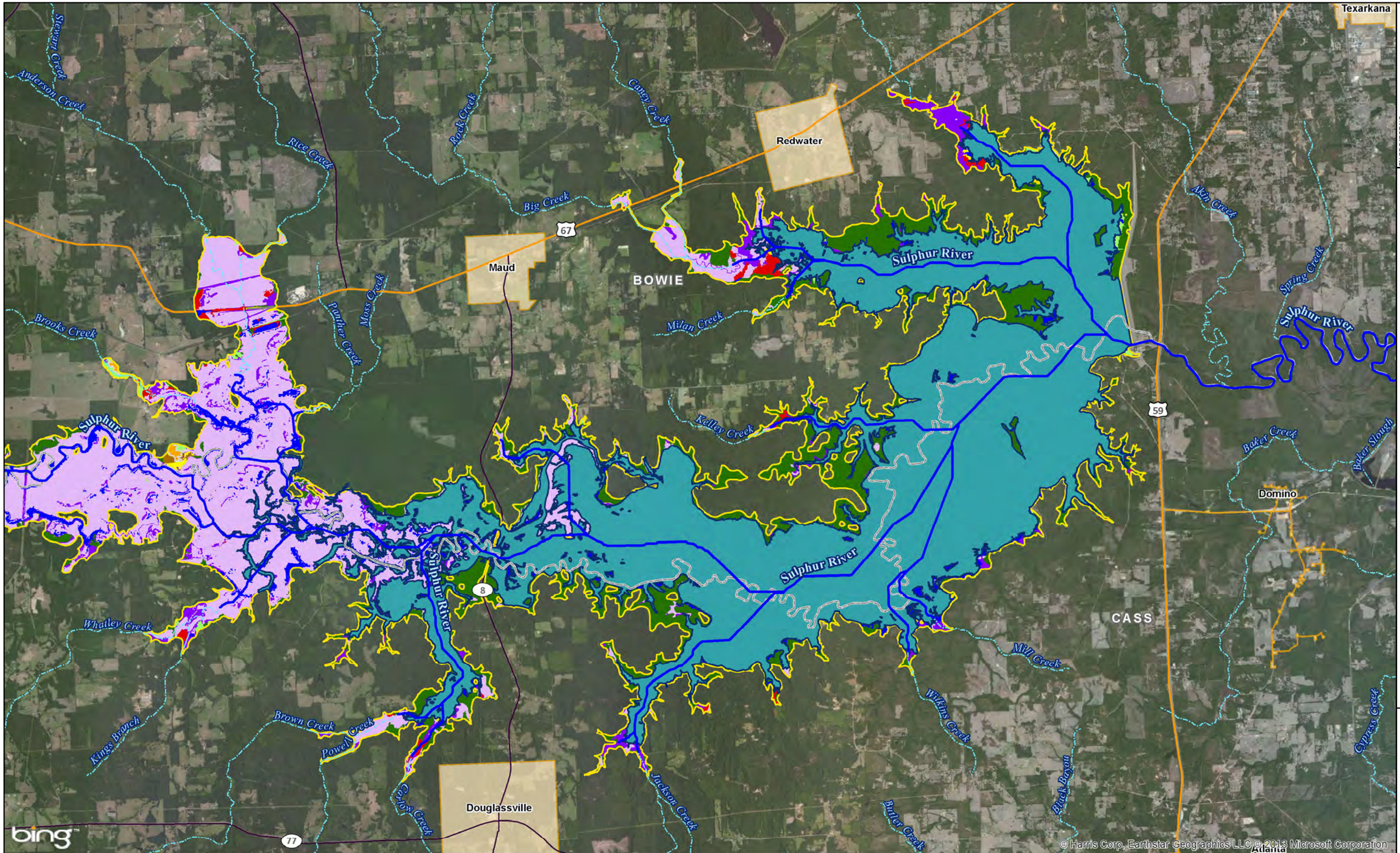
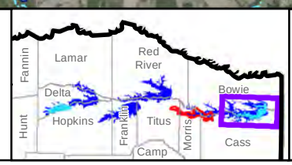


County Boundary
City Boundaries
Streams
Sulphur River
Proposed Wright Patman Reallocation (237.5 ft. msl)
White Oak Creek Mitigation Area
Existing Reservoir
Barren
Bottomland Hardwood Forest
Forested Wetland
Grassland/Oldfield
Herbaceous Wetland
Open Water
Row Crops
Shrub Wetland
Shrubland
Upland Forest
Urban



1:100,000
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N W E S

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT
Sulphur River Basin
Proposed Wright Patman Reallocation (237.5 ft. msl)

Land Cover Types

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	2_Cover_Types_WP_237.5
PREPARED BY	SSJ

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2.1

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\2-8_23-24_Land_Cover_Types\2_Cover_Types_WP_237.5.mxd

Land Cover Types

Proposed Wright Patman Reallocation (237.5 ft. msl)
Sulphur River Basin
U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	2_Cover_Types_WP_237.5
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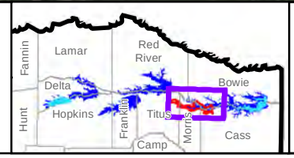
RED RIVER
BOWIE
TITUS
MORRIS
CASS
Naples
Omaha

Sulphur River
Dillard Creek
Cedar Creek
Dalby Creek
Holly Creek
Boothe Creek
Lacy Creek
Snake Creek
Calvert Creek
Ward Creek
Kruse Branch
Eds Creek
Anderson Creek
Brooks Creek
Bisser Creek
Crow Creek
Mill Creek
Whatley Creek
Elliot Creek
Caney Creek
Village Creek
Buck Creek
Bear Creek
Sand Springs Branch
Horse Creek

30
259
67
98
77

- County Boundary
- City Boundaries
- Streams
- Sulphur River
- Proposed Wright Patman Reallocation (237.5 ft. msl)
- White Oak Creek Mitigation Area
- Existing Reservoir
- Barren
- Bottomland Hardwood Forest
- Forested Wetland
- Grassland/Oldfield
- Herbaceous Wetland
- Open Water
- Row Crops
- Shrub Wetland
- Shrubland
- Upland Forest
- Urban



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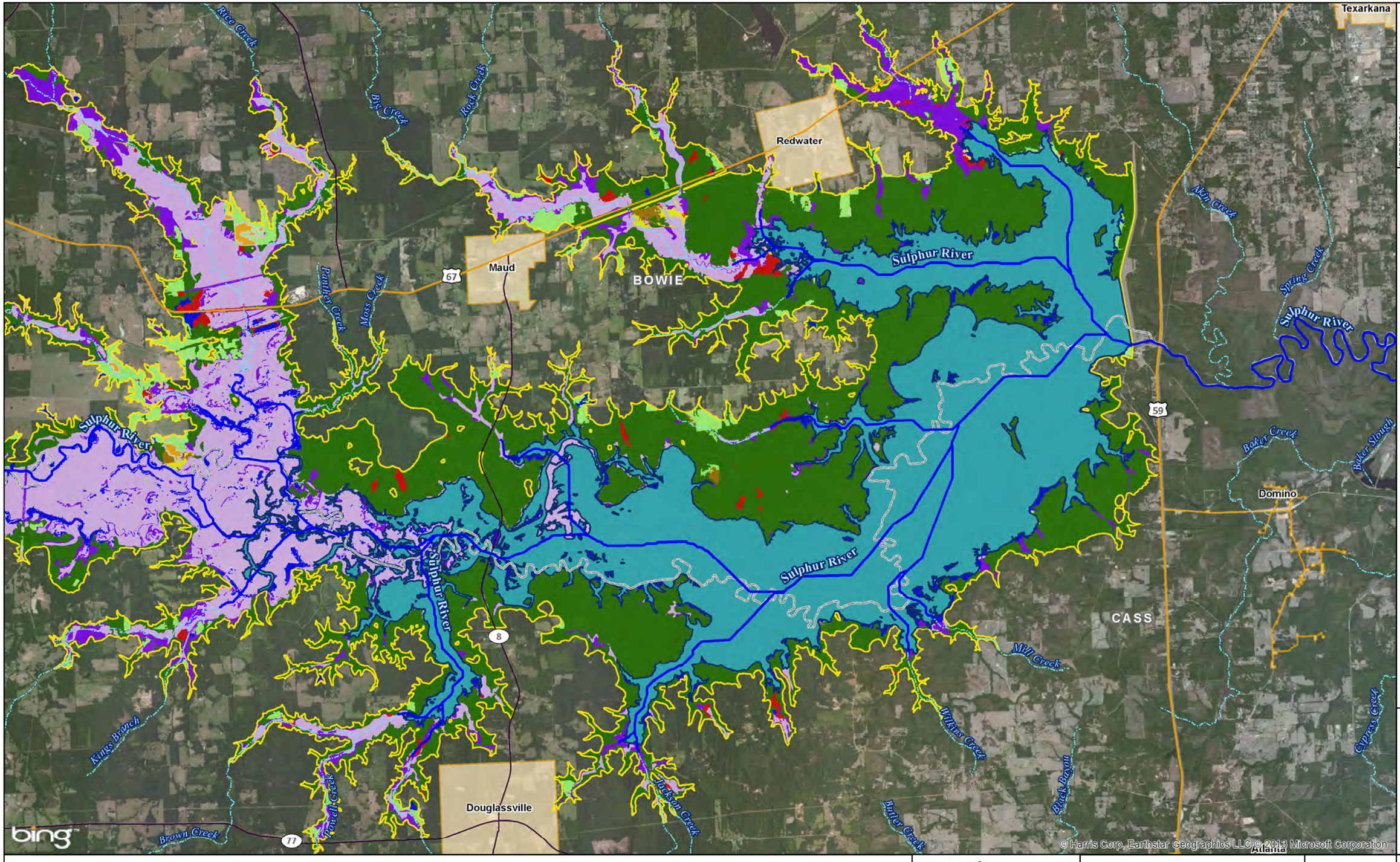


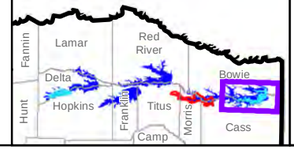
County Boundary
City Boundaries
Streams
Sulphur River

Proposed Wright Patman Reallocation (259.5 ft. msl)
White Oak Creek Mitigation Area
Existing Reservoir

Barren
Bottomland Hardwood Forest
Forested Wetland
Grassland/Oldfield

Herbaceous Wetland
Open Water
Row Crops
Shrub Wetland

Shrubland
Upland Forest
Urban



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N W E S

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT
Sulphur River Basin
Proposed Wright Patman Reallocation (259.5 ft msl)

Land Cover Types

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	3_Cover_Types_WP_259.5
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3.1

FIGURE

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U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Proposed Wright Patman Reallocation (259.5 ft msl)

Land Cover Types

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	3_Cover_Types_WP_259.5
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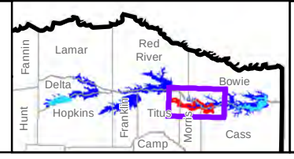
- County Boundary
- City Boundaries
- Streams
- Sulphur River
- Proposed Wright Patman Reallocation (259.5 ft. msl)
- White Oak Creek Mitigation Area
- Existing Reservoir
- Barren
- Bottomland Hardwood Forest
- Forested Wetland
- Grassland/Oldfield
- Herbaceous Wetland
- Open Water
- Row Crops
- Shrub Wetland
- Shrubland
- Upland Forest
- Urban



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U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Marvin Nichols1A Alternative Reservoir Site

Land Cover Types

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	4_MN_Cover_Types
PREPARED BY	SSJ

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- County Boundary
- City Boundaries
- Streams
- Sulphur River
- Marvin Nichols 1A Alternative Reservoir Site (328 ft. msl)
- White Oak Creek Mitigation Area
- Barren
- Bottomland Hardwood Forest
- Forested Wetland
- Grassland/Oldfield
- Herbaceous Wetland
- Open Water
- Row Crops
- Shrub Wetland
- Shrubland
- Upland Forest
- Urban

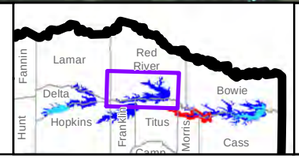

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FIGURE

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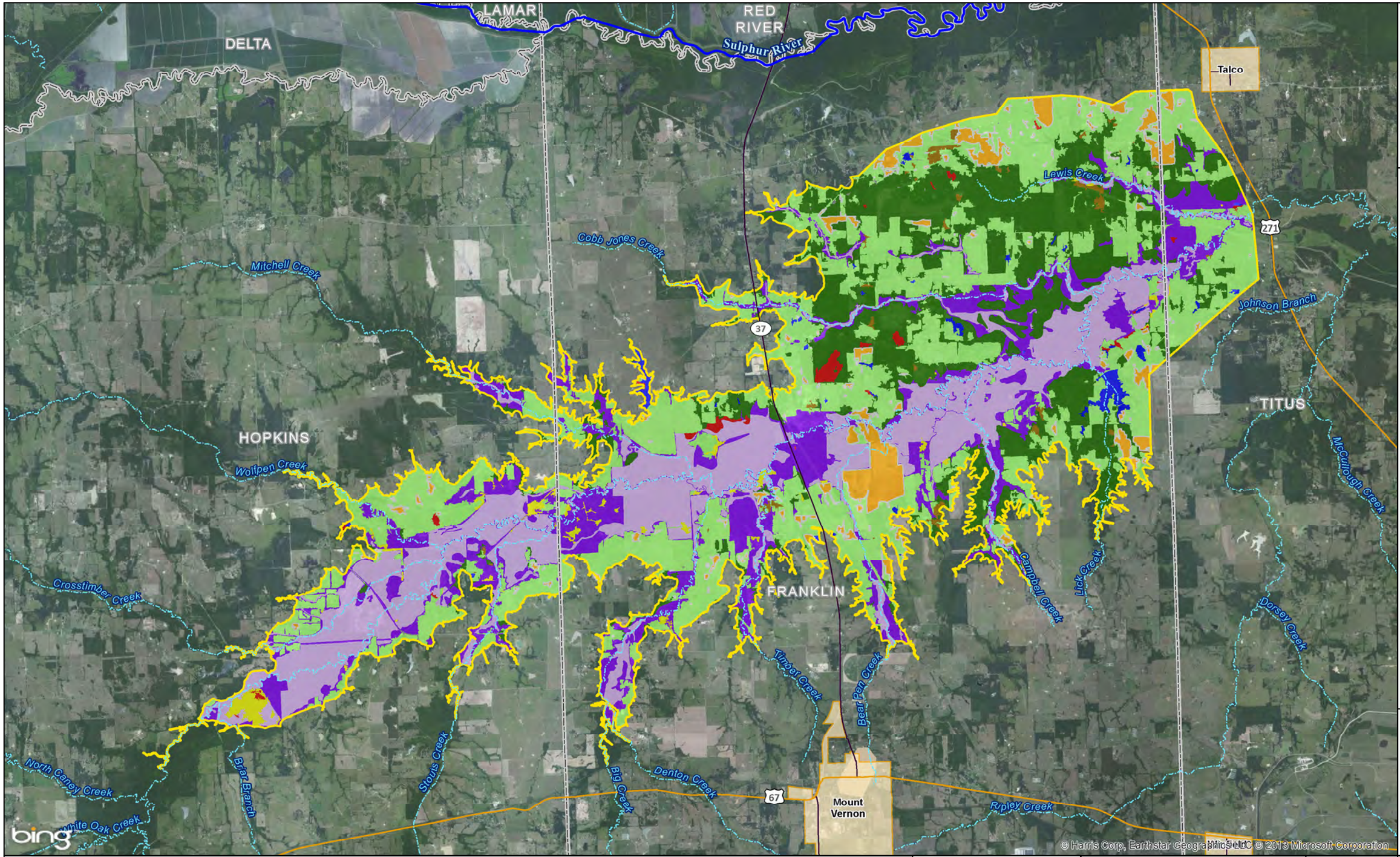


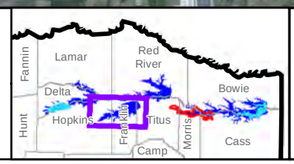
County Boundary
City Boundaries
Sulphur River
Streams

Talco
Alternative Reservoir Site
(328 ft. msl)

Barren
Bottomland Hardwood Forest
Forested Wetland
Grassland/Oldfield

Herbaceous Wetland
Open Water
Row Crops
Shrub Wetland

Shrubland
Upland Forest
Urban



1:100,340
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W E
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5
FIGURE

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT
Sulphur River Basin
Talco Alternative Reservoir Site
Land Cover Types

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	5_Talco_Cover_Types
PREPARED BY	SSJ

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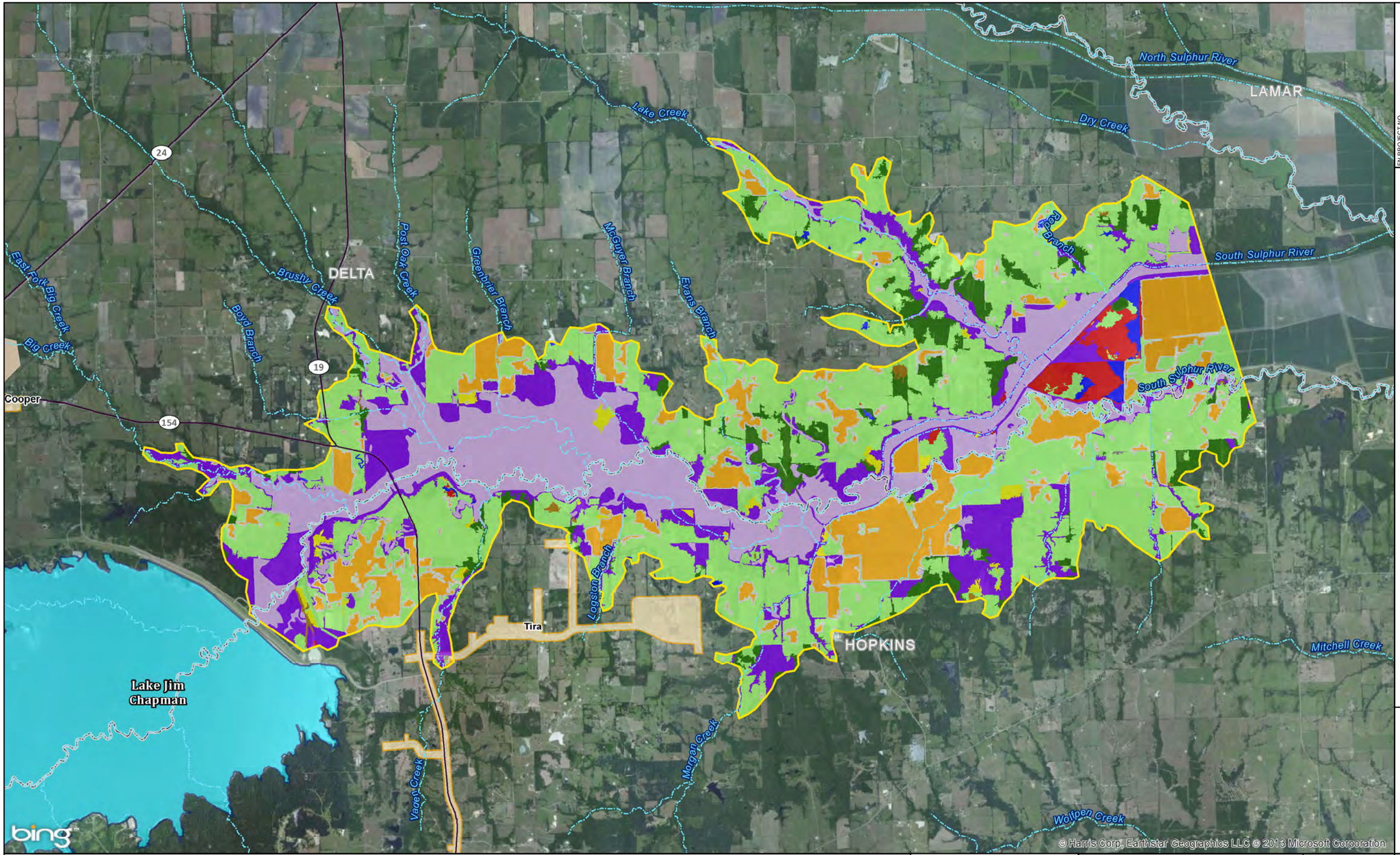


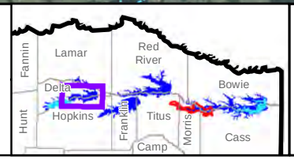
County Boundary
City Boundaries
Streams

Parkhouse I Alternative Reservoir Site (401 ft. msl)
Existing Reservoir Site

Barren
Bottomland Hardwood Forest
Forested Wetland
Grassland/Oldfield

Herbaceous Wetland
Open Water
Row Crops
Shrub Wetland

Shrubland
Upland Forest
Urban



1:72,410
0 1 2 Miles

N W E S

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin
Parkhouse I Alternative Reservoir Site
Land Cover Types

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	6_PH1_Cover_Types
PREPARED BY	SSJ

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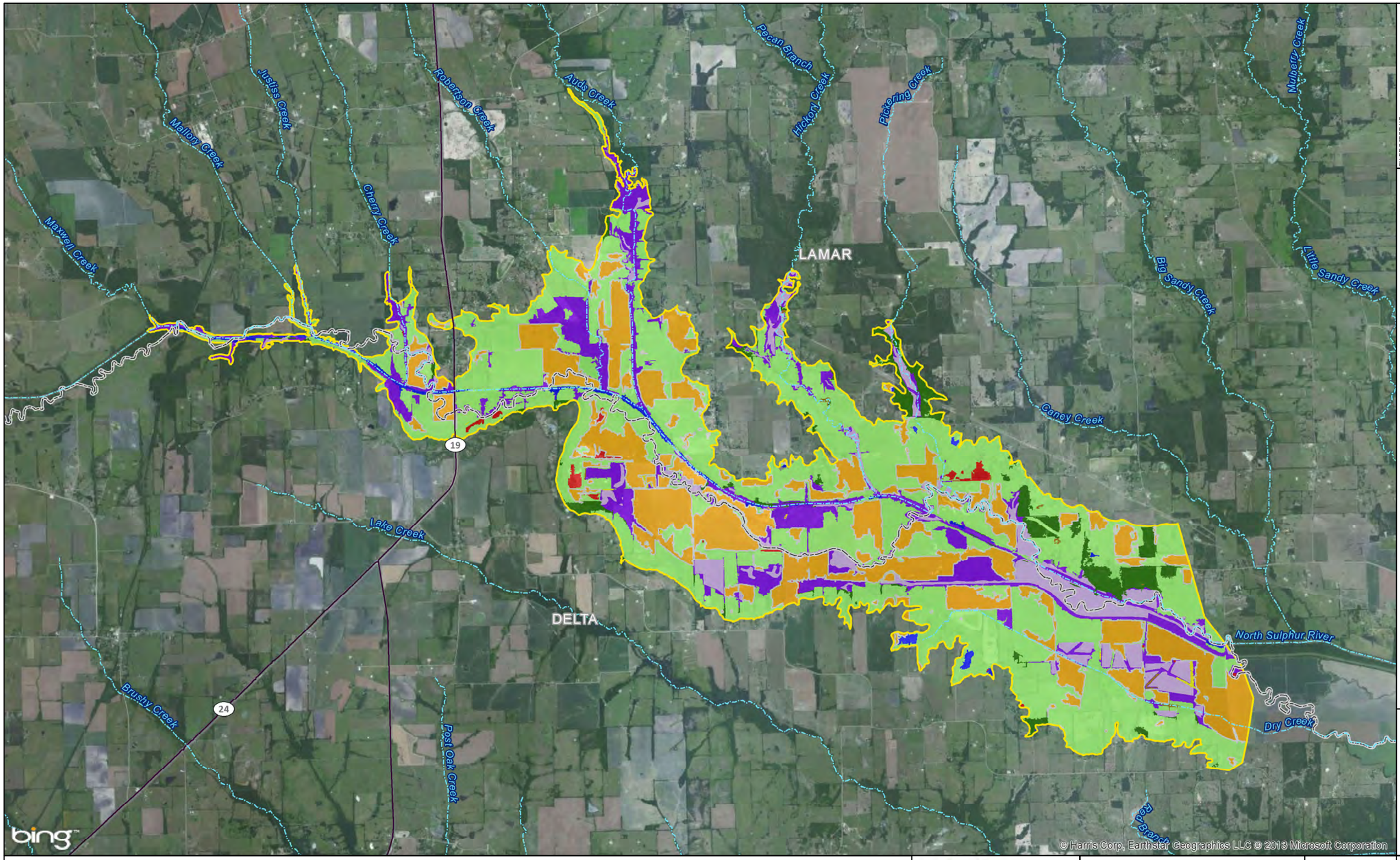
Fort Worth, Texas 76109-4895
(817) 735-7300

6

FIGURE

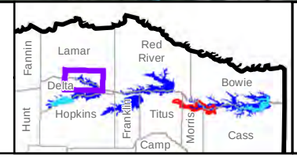
Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\2-8_23-24_Land_Cover_Types\6_PH1_Cover_Types.mxd



County Boundary
City Boundaries
Streams

Parkhouse II Alternative Reservoir Site (410 ft. msl)

Barren
Bottomland Hardwood Forest
Forested Wetland
Grassland/Oldfield
Herbaceous Wetland
Open Water
Row Crops
Shrub Wetland
Shrubland
Upland Forest
Urban



1:67,800
0 1 2 Miles

N W E S

7

FIGURE

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

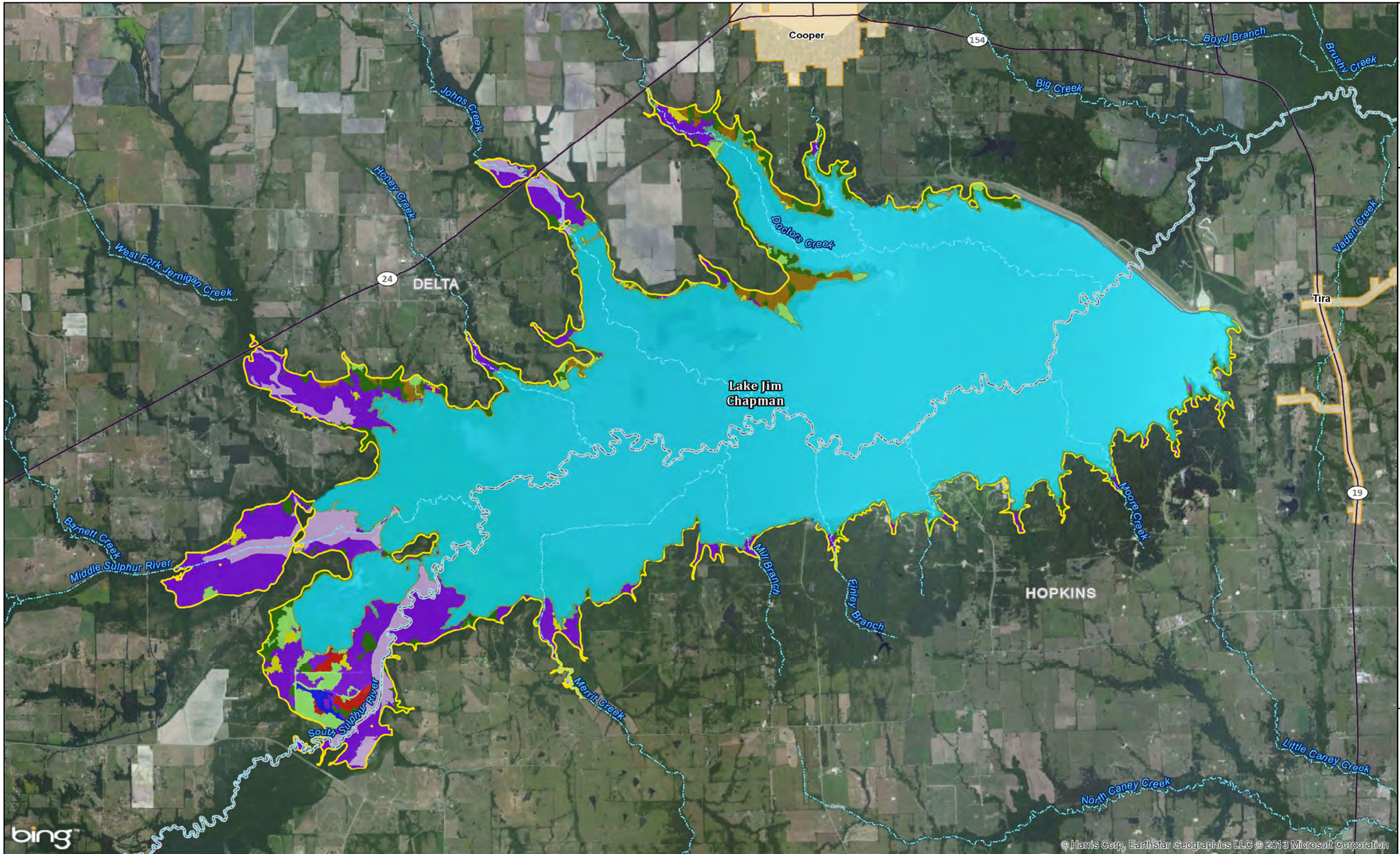
Parkhouse II Alternative Reservoir Site

Land Cover Types

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	7_PH2_Cover_Types
PREPARED BY	SSJ

FREESE NICHOLS
4500 International Plaza Suite 200
Fort Worth, Texas 76109-4895
(817) 735-7300

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\2-8_23-24_Land_Cover_Types\7_PH2_Cover_Types.mxd



U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

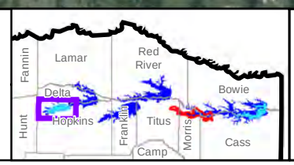
Proposed Jim Chapman Reallocation (446.2 ft. msl)

Land Cover Types

FN PROJECT NO.	MHP11453
DATE CREATED	6/13/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	8_JC_Cover_Types
PREPARED BY	SSJ

FREESE NICHOLS
4500 International Plaza Suite 200
Fort Worth, Texas 76109-4895
(817) 735-7300

- County Boundary
- City Boundaries
- Streams
- Sulphur River
- Proposed Jim Chapman Reallocation (446.2 ft. msl)
- Existing Reservoir Site
- Barren
- Bottomland Hardwood Forest
- Forested Wetland
- Grassland/Oldfield
- Herbaceous Wetland
- Open Water
- Row Crops
- Shrub Wetland
- Shrubland
- Upland Forest
- Urban



1:66,970

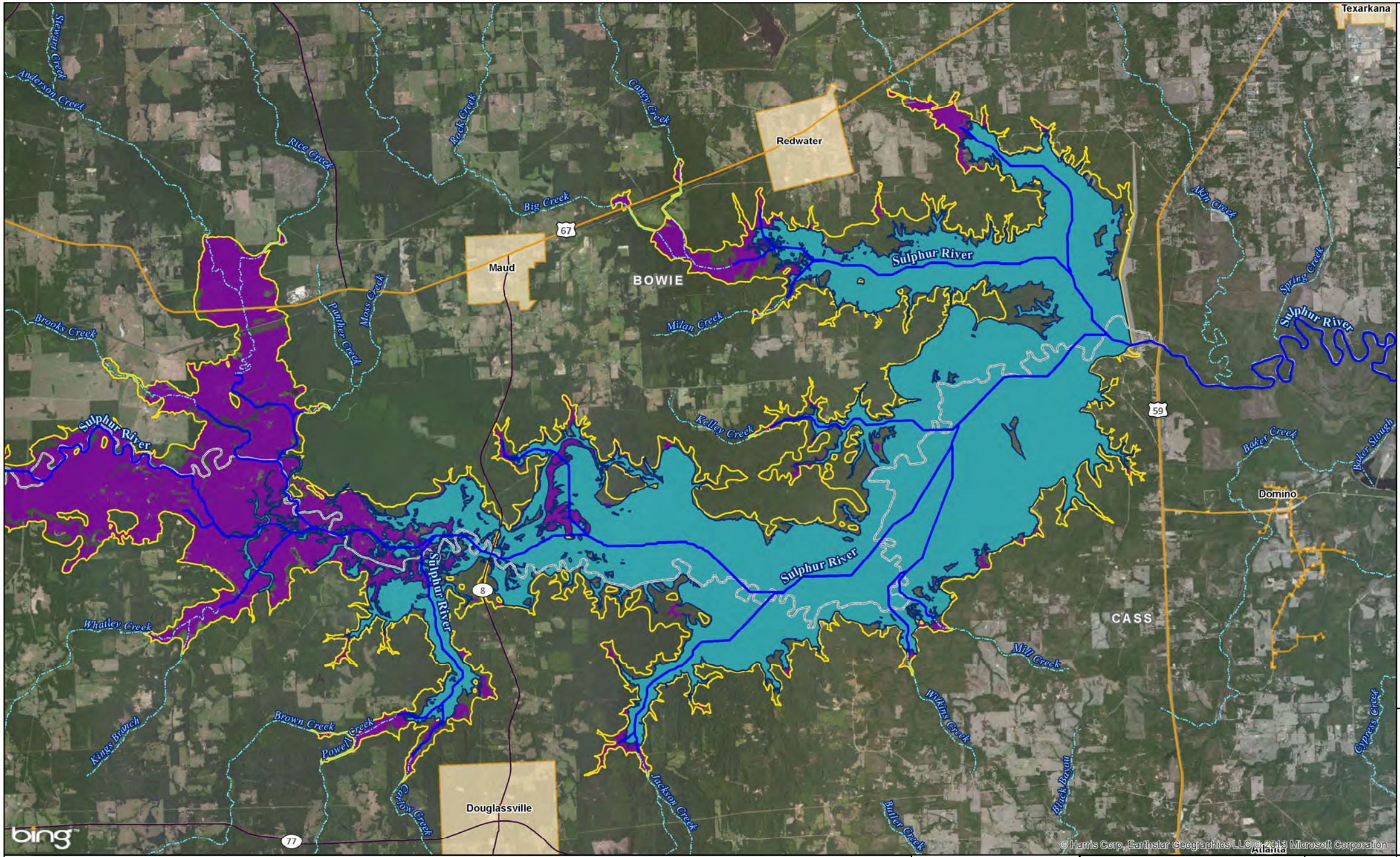
0 1 2 Miles

N W E S

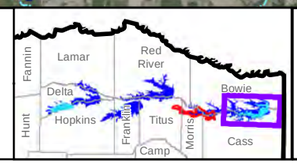
8

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\2-8_23-24_Land_Cover_Types\8_JC_Cover_Types.mxd



County Boundary
City Boundaries
Streams
Sulphur River
White Oak Creek Mitigation Area
Proposed Wright Patman Reallocation (237.5 ft. msl)
Existing Reservoir
Bottomland Hardwood Forest



1:100,000
0 1.5 3 Miles

N W E S

9.1

FIGURE

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Proposed Wright Patman Reallocation (237.5 ft. msl)

Bottomland Hardwood Forest

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	9_BLHWF_WP_237.5
PREPARED BY	SSJ

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4500 International Plaza Suite 200
Fort Worth, Texas 76109-4895
(817) 735-7300

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\9-15_Bottomland_Hardwoods\9_BLHWF_WP_237.5.mxd

Bottomland Hardwood Forest
Proposed Wright Patman Reallocation (237.5 ft. msl)
Sulphur River Basin
U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	9_BLHWF_WP_237.5
PREPARED BY	SSJ

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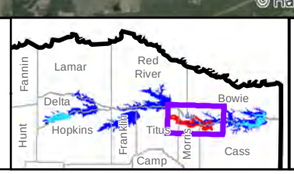
RED RIVER
BOWIE
TITUS
MORRIS
CASS
Naples
Omaha

Sulphur River
Dillard Creek
Cedar Creek
Dalby Creek
Holly Creek
Boothe Creek
Lacy Creek
Snake Creek
Calvert Creek
Ward Creek
Kruse Branch
Eds Creek
Anderson Creek
Brooks Creek
Bassett Creek
Crow Creek
Mill Creek
Whatley Creek
Elliot Creek
Caney Creek
Village Creek
Buck Creek
Bear Creek
Sand Springs Branch
Horse Creek

98
30
259
67
77

- County Boundary
- City Boundaries
- Streams
- Sulphur River
- White Oak Creek Mitigation Area
- Proposed Wright Patman Reallocation (237.5 ft. msl)
- Existing Reservoir
- Bottomland Hardwood Forest



1:100,000
0 1.5 3 Miles

N W E S

9.2
FIGURE

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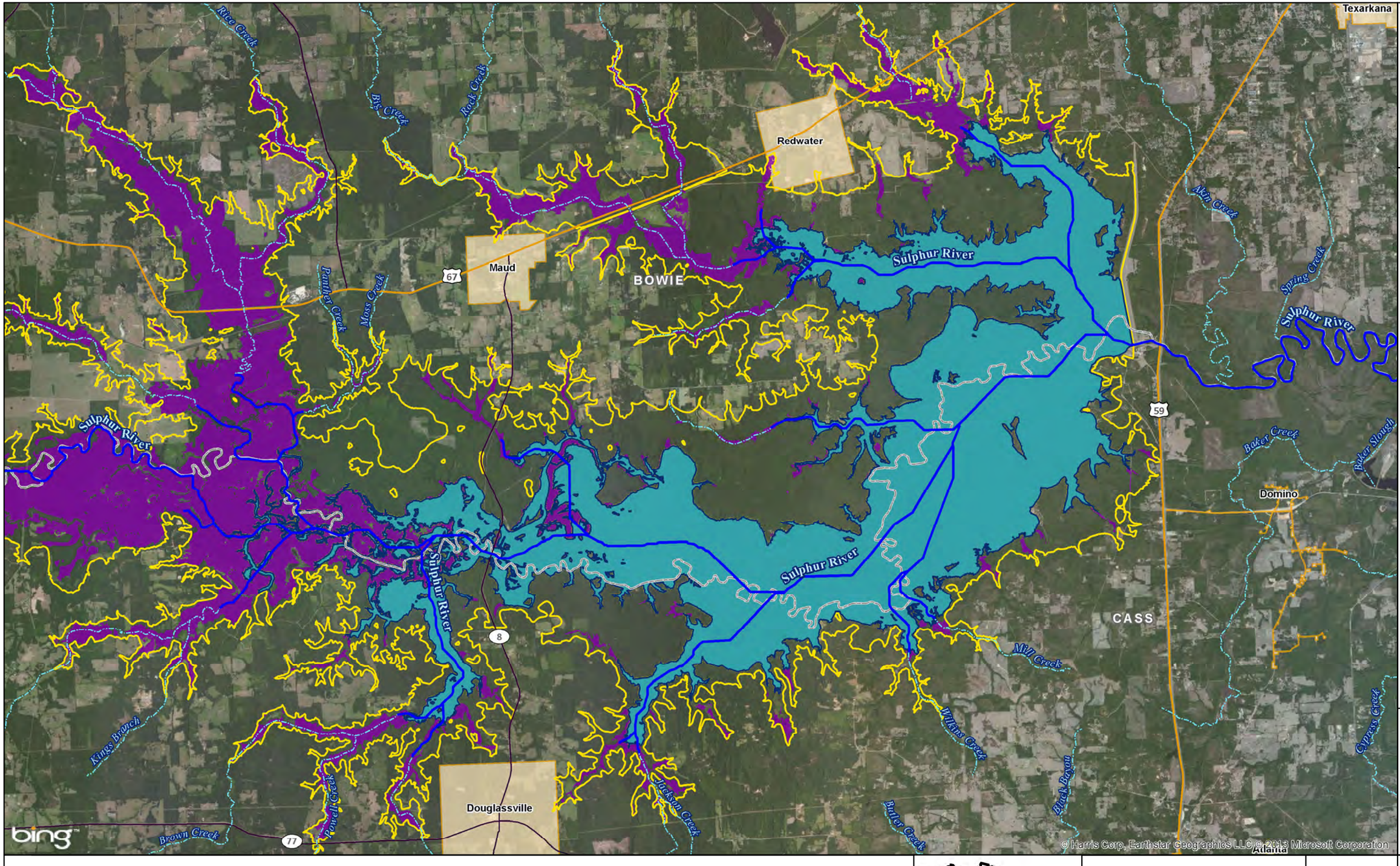


U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

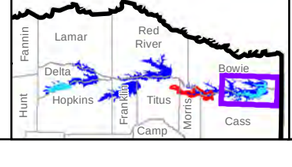
Proposed Wright Patman Reallocation (259.5 ft. msl)

Bottomland Hardwood Forest

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	10_BLHWF_WP_259.5
PREPARED BY	SSJ

FREESE NICHOLS
4500 International Plaza Suite 200
Fort Worth, Texas 76109-4895
(817) 735-7300

County Boundary
City Boundaries
Streams
Sulphur River
White Oak Creek Mitigation Area
Proposed Wright Patman Reallocation (259.5 ft. msl)
Existing Reservoir
Bottomland Hardwood Forest



1:100,000

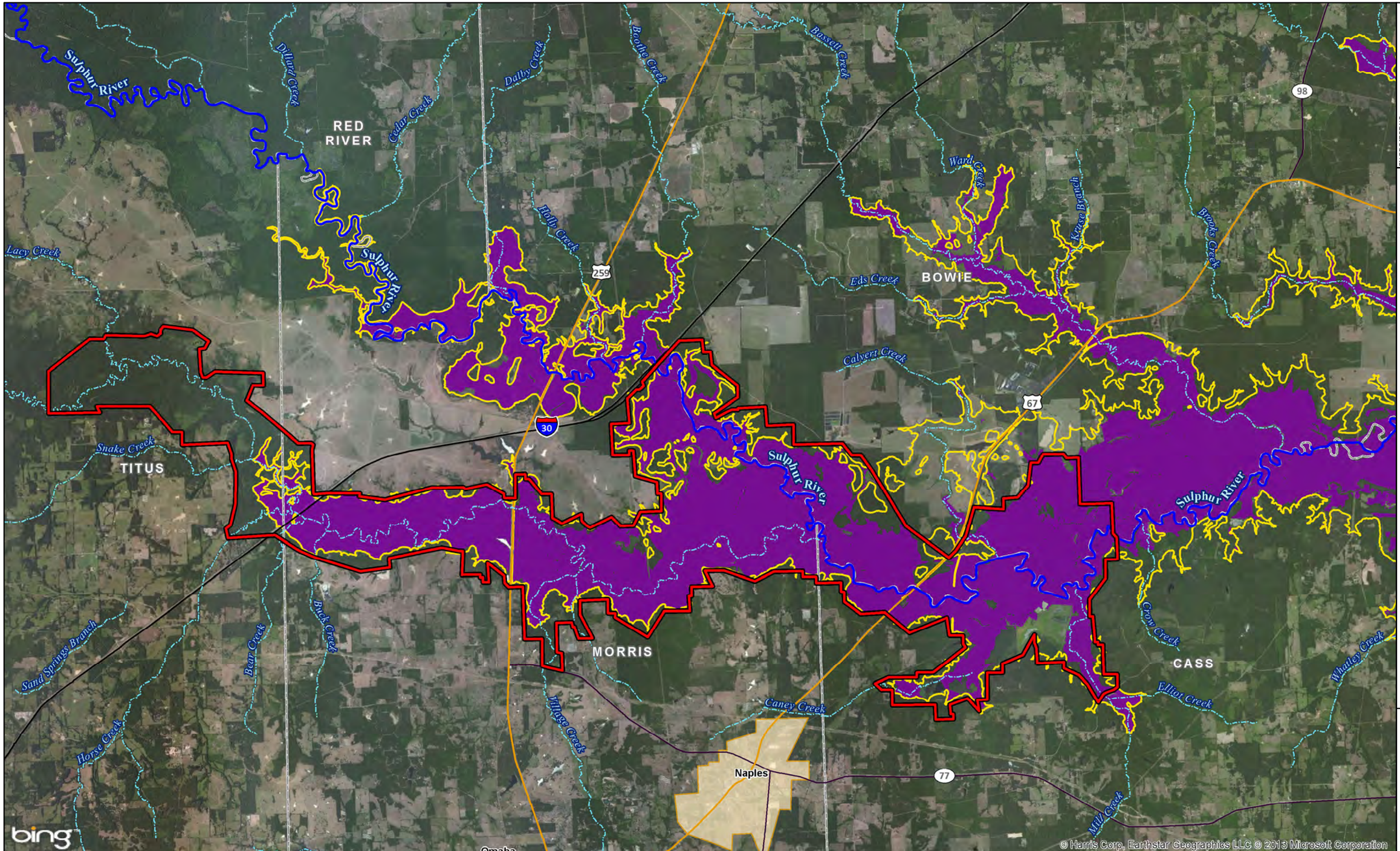
0 1.5 3 Miles

N W E S

10.1

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\9-15_Bottomland_Hardwoods\10_BLHWF_WP_259.5.mxd



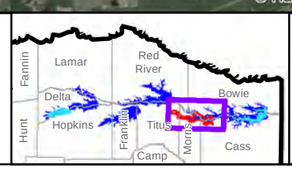
County Boundary
City Boundaries

Streams
Sulphur River

White Oak Creek Mitigation Area
Proposed Wright Patman Reallocation (259.5 ft. msl)

Existing Reservoir

Bottomland Hardwood Forest



1:100,000
0 1.5 3 Miles

N
W E
S

10.2

FIGURE

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Proposed Wright Patman Reallocation (259.5 ft. msl)

Bottomland Hardwood Forest

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	10_BLHWF_WP_259.5
PREPARED BY	SSJ

FREESE NICHOLS
4500 International Plaza Suite 200
Fort Worth, Texas 76109-4895
(817) 735-7300

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\9-15_Bottomland_Hardwoods\10_BLHWF_WP_259.5.mxd

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Marvin Nichols1A Alternative Reservoir Site

Bottomland Hardwood Forest

FN PROJECT NO.	MHP11453
DATE CREATED	6/13/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	11 MN BLHWF
PREPARED BY	SSJ

FREESE NICHOLS
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Fort Worth, Texas 76109-4895
(817) 735-7300

County Boundary
City Boundaries

Streams
Sulphur River

Marvin Nichols 1A Alternative Reservoir Site (328 ft. msl)

White Oak Creek Mitigation Area

Bottomland Hardwood Forest

1:128,570

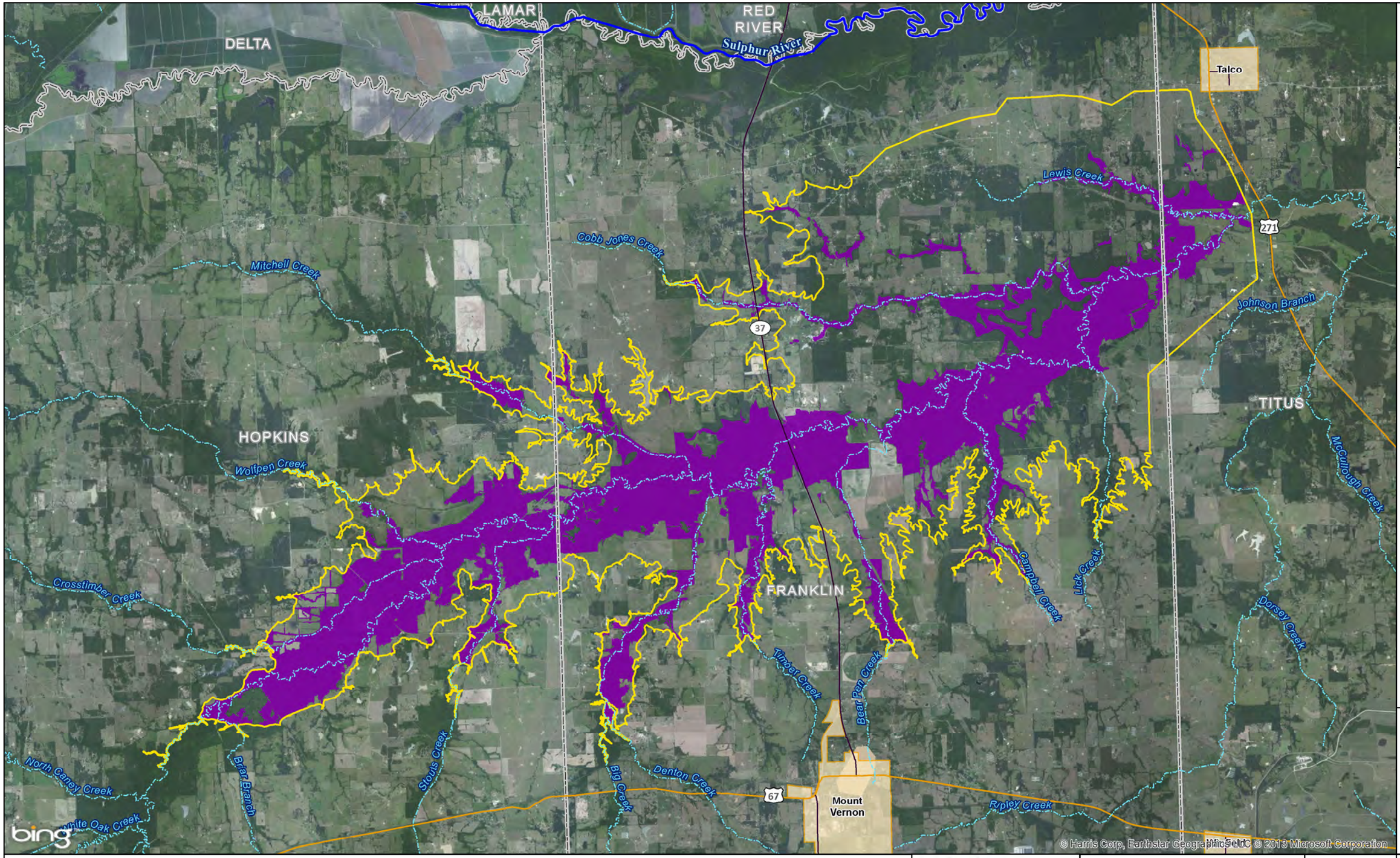
0 2 4 Miles

N W E S

11

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\9-15_Bottomland_Hardwoods\11_MN_BLHWF.mxd

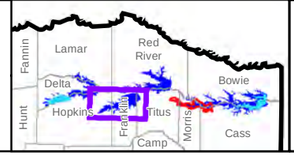


County Boundary
City Boundaries

Sulphur River
Streams

Talco
Alternative Reservoir Site
(328 ft. msl)

Bottomland Hardwood Forest



1:100,340

0 1.5 3 Miles

N
W E
S

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Talco Alternative Reservoir Site

Bottomland Hardwood Forest

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	12_Talco_BLHWF
PREPARED BY	SSJ

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Fort Worth, Texas 76109-4895
(817) 735-7300

12

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\9-15_Bottomland_Hardwoods\12_Talco_BLHWF.mxd

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Parkhouse I Alternative Reservoir Site

Bottomland Hardwood Forest

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	13_PH1_BLHWF
PREPARED BY	SSJ

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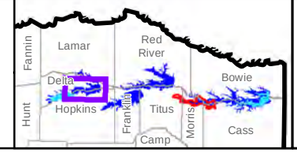
Fort Worth, Texas 76109-4895
(817) 735-7300

County Boundary
City Boundaries
Streams
Existing Reservoir Site
Parkhouse 1
Alternative Reservoir Site
(401 ft. msl)



1:72,410
0 1 2 Miles

N W E S

13

FIGURE

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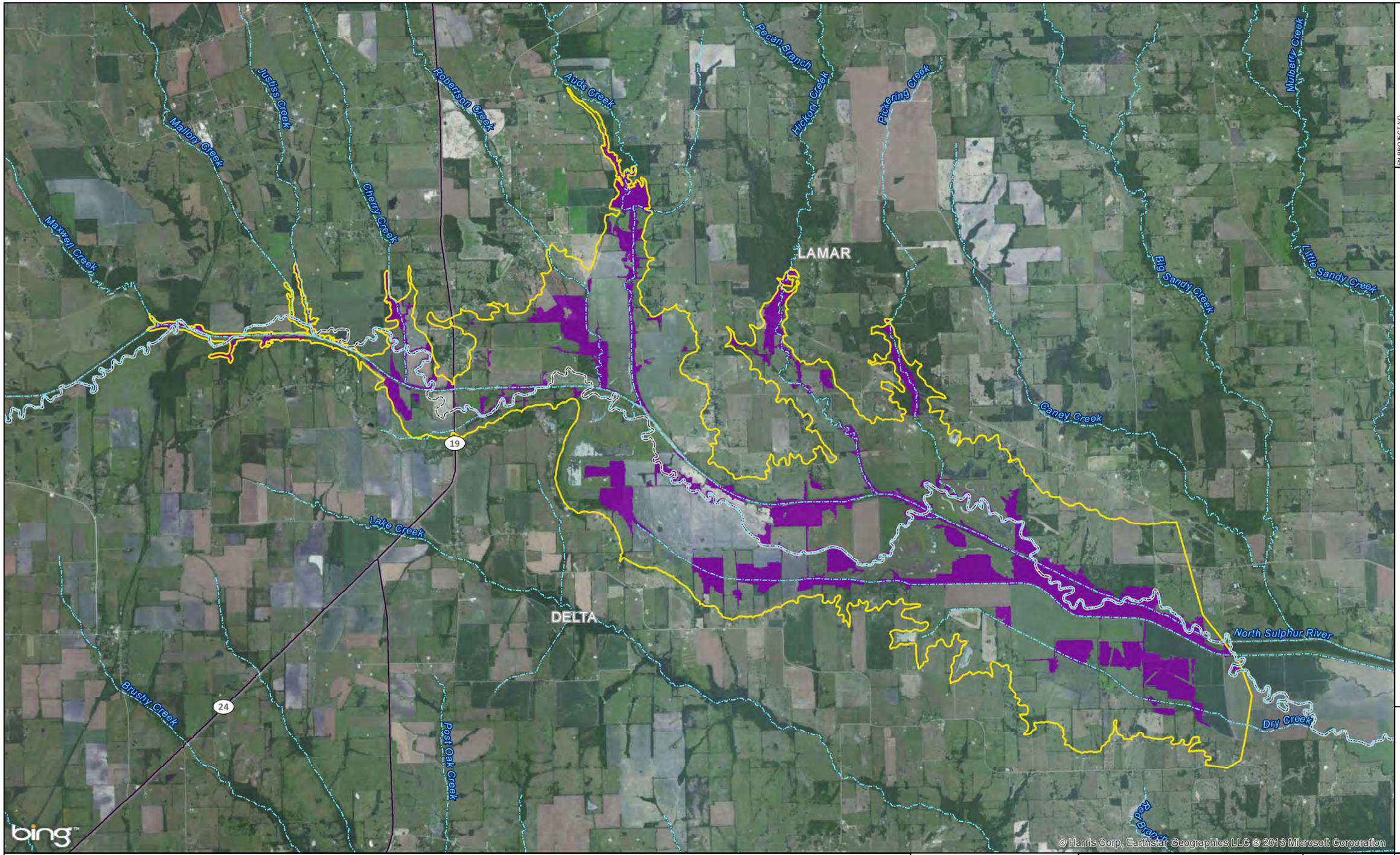
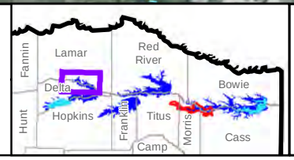


County Boundary
City Boundaries

Streams

Parkhouse II
Alternative Reservoir Site
(410 ft. msl)

Bottomland Hardwood Forest



1:67,800

0 1 2 Miles

N W E S

14

FIGURE

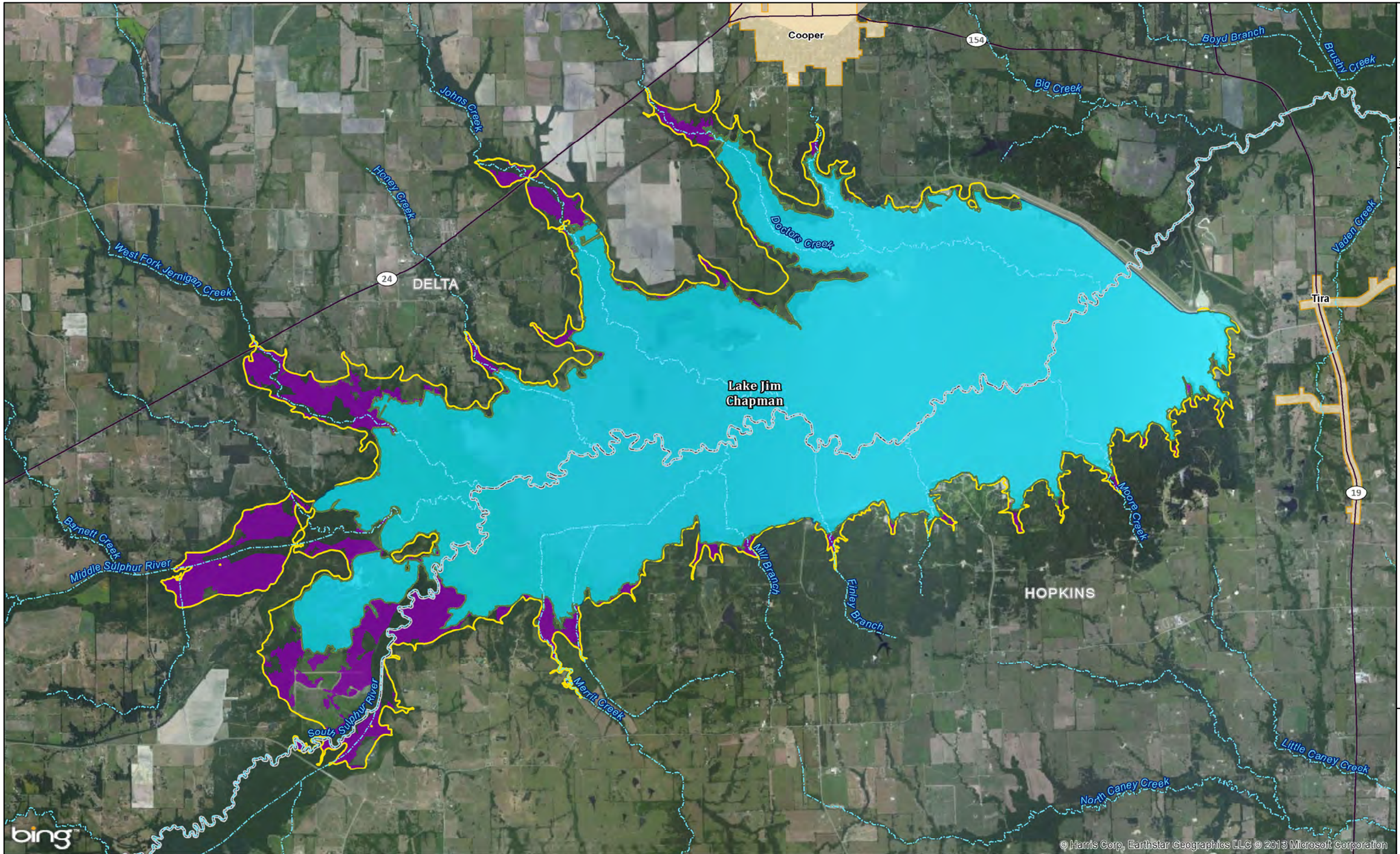
U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin
Parkhouse II Alternative Reservoir Site
Bottomland Hardwood Forest

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	14_PH2_BLHWF
PREPARED BY	SSJ

FREESE NICHOLS
4500 International Plaza Suite 200
Fort Worth, Texas 76109-4895
(817) 735-7300

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\9-15_Bottomland_Hardwoods\14_PH2_BLHWF.mxd



U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Proposed Jim Chapman Reallocation (446.2 ft. msl)

Bottomland Hardwood Forest

FN PROJECT NO.	MHP11453
DATE CREATED	6/13/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	15_JC_BLHWF
PREPARED BY	SSJ

FREESE NICHOLS
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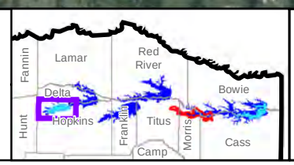
Fort Worth, Texas 76109-4895
(817) 735-7300

County Boundary
City Boundaries
Streams
Proposed Jim Chapman Reallocation (446.2 ft. msl)
Existing Reservoir Site
Bottomland Hardwood Forest



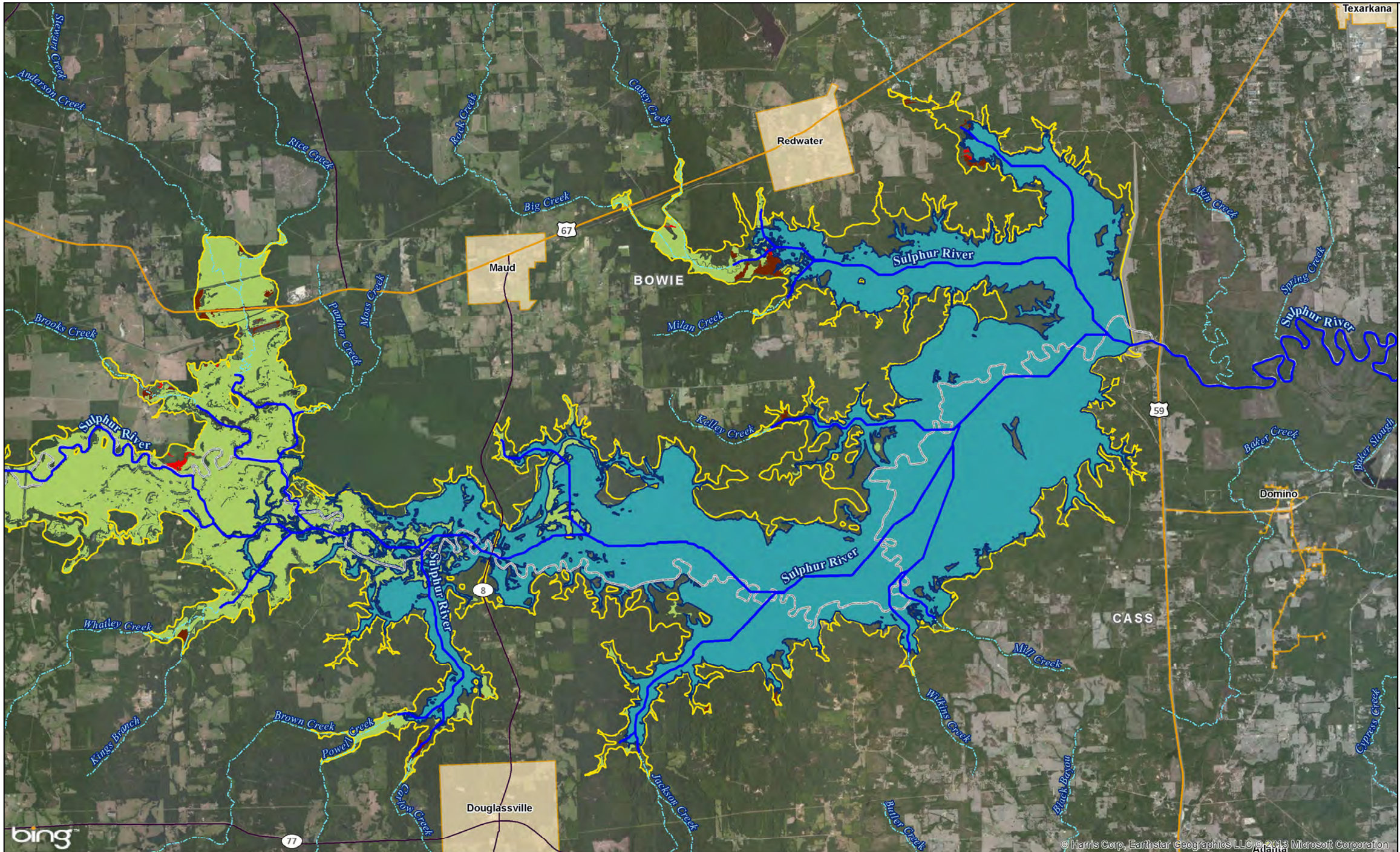
1:66,970
0 1 2 Miles

N W E S

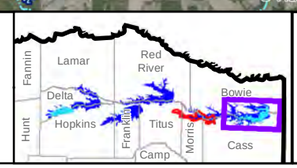
15

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\9-15_Bottomland_Hardwoods\15_JC_BLHWF.mxd



County Boundary
City Boundaries
Streams
Sulphur River
White Oak Creek Mitigation Area
Proposed Wright Patman Reallocation (237.5 ft. msl)
Existing Reservoir
Forested Wetland
Herbaceous Wetland
Shrub Wetland



1:100,000
0 1.5 3 Miles

N W E S

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Proposed Wright Patman Reallocation (237.5 ft. msl)

Wetlands

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	16_Wetlands_WP_237.5
PREPARED BY	SSJ

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Fort Worth, Texas 76109-4895
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16.1

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\16-22_Wetlands\16_Wetlands_WP_237.5.mxd

Wetlands

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Proposed Wright Patman Reallocation (237.5 ft. msl)

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	16_Wetlands_WP_237.5
PREPARED BY	SSJ

FREESE NICHOLS
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Fort Worth, Texas 76109-4895
(817) 735-7300

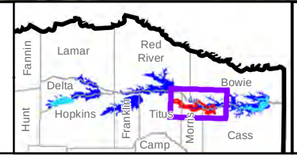
County Boundary
City Boundaries

Streams
Sulphur River

White Oak Creek Mitigation Area
Proposed Wright Patman Reallocation (237.5 ft. msl)

Existing Reservoir

Forested Wetland
Herbaceous Wetland
Shrub Wetland



1:100,000
0 1.5 3 Miles

N W E S

16.2

FIGURE

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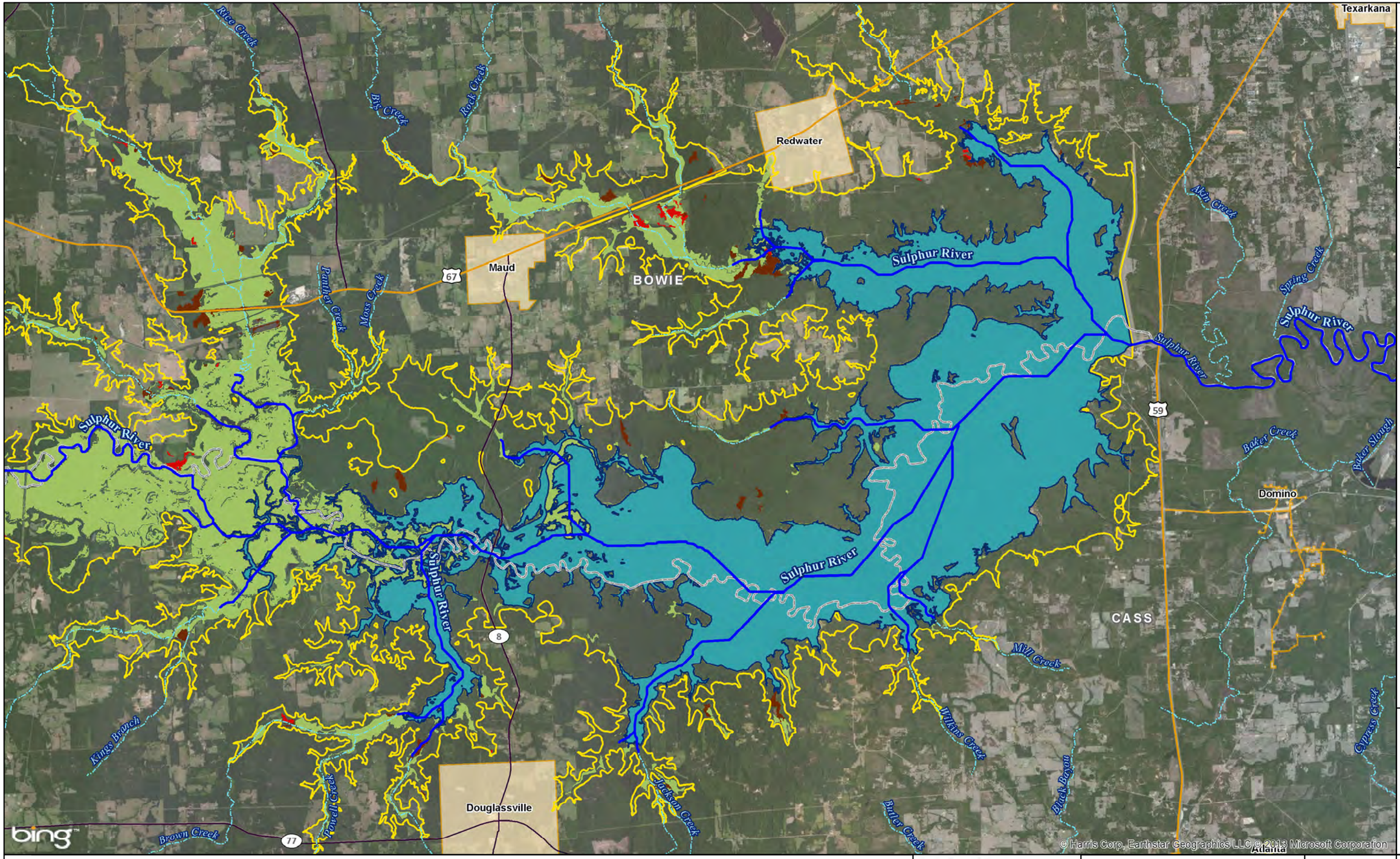

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Proposed Wright Patman Reallocation (259.5 ft. msl)

Wetlands

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	17_Wetlands_WP_259.5
PREPARED BY	SSJ

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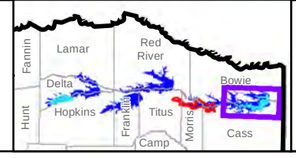
Fort Worth, Texas 76109-4895
(817) 735-7300

- County Boundary
- City Boundaries
- Streams
- Sulphur River
- White Oak Creek Mitigation Area
- Proposed Wright Patman Reallocation (259.5 ft. msl)
- Existing Reservoir
- Forested Wetland
- Herbaceous Wetland
- Shrub Wetland



1:100,000

0 1.5 3 Miles

N W E S

17.1

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\16-22_Wetlands\17_Wetlands_WP_259.5.mxd

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Proposed Wright Patman Reallocation (259.5 ft. msl)

Wetlands

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	17_Wetlands_WP_259.5
PREPARED BY	SSJ

FREESE NICHOLS
4500 International Plaza Suite 200
Fort Worth, Texas 76109-4895
(817) 735-7300

County Boundary
City Boundaries
Streams
Sulphur River
White Oak Creek Mitigation Area
Proposed Wright Patman Reallocation (259.5 ft. msl)
Existing Reservoir
Forested Wetland
Herbaceous Wetland
Shrub Wetland

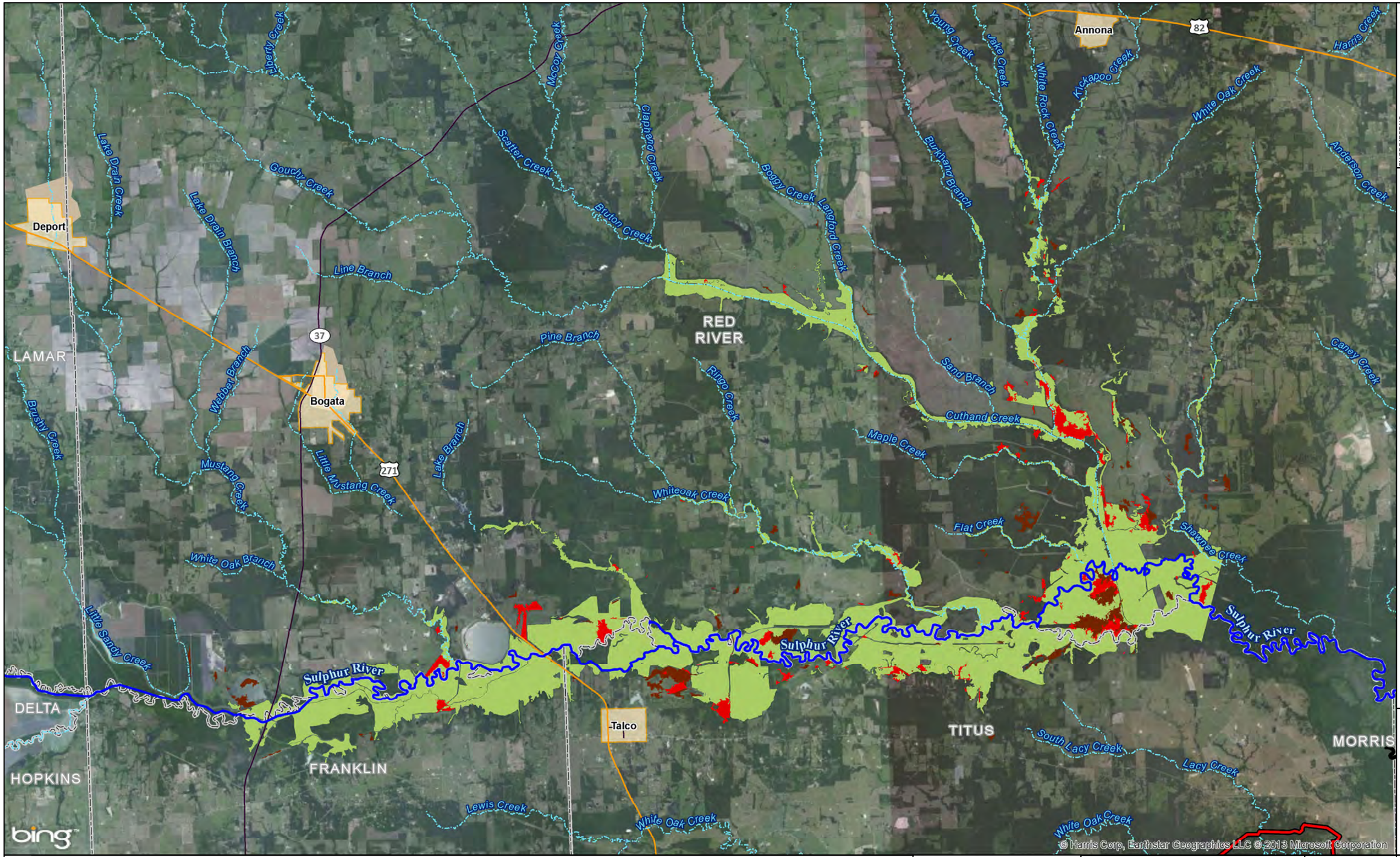
1:100,000
0 1.5 3 Miles

N W E S

17.2

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\16-22_Wetlands\17_Wetlands_WP_259.5.mxd

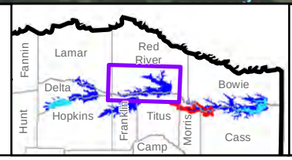


County Boundary
City Boundaries

Streams
Sulphur River

Marvin Nichols 1A Alternative Reservoir Site (328 ft. msl)
White Oak Creek Mitigation Area

Forested Wetland
Herbaceous Wetland
Shrub Wetland



1:128,570
0 2 4 Miles

N W E S

18

FIGURE

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Marvin Nichols1A Alternative Reservoir Site

Wetlands

FN PROJECT NO.	MHP11453
DATE CREATED	6/13/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	18_MN_Wetlands
PREPARED BY	SSJ

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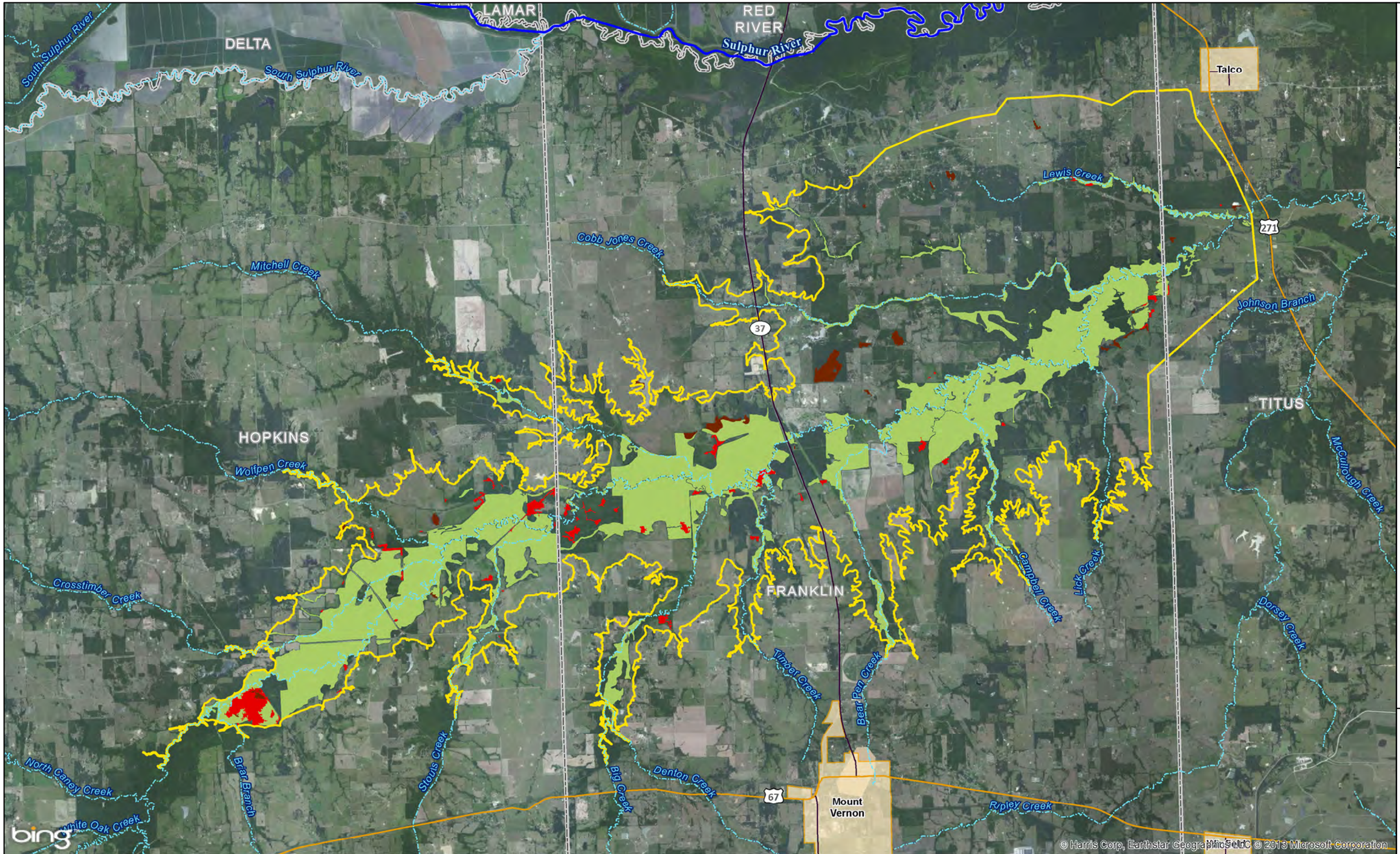
4500 International Plaza Suite 200
Fort Worth, Texas 76109-4895
(817) 735-7300

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\16-22_Wetlands\18_MN_Wetlands.mxd

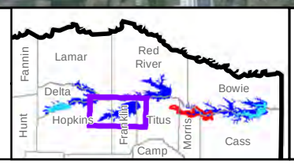


County Boundary
City Boundaries

Sulphur River
Streams

Talco
Alternative Reservoir Site
(328 ft. msl)

Forested Wetland
Herbaceous Wetland
Shrub Wetland



1:100,340

0 1.5 3 Miles

N W E S

19

FIGURE

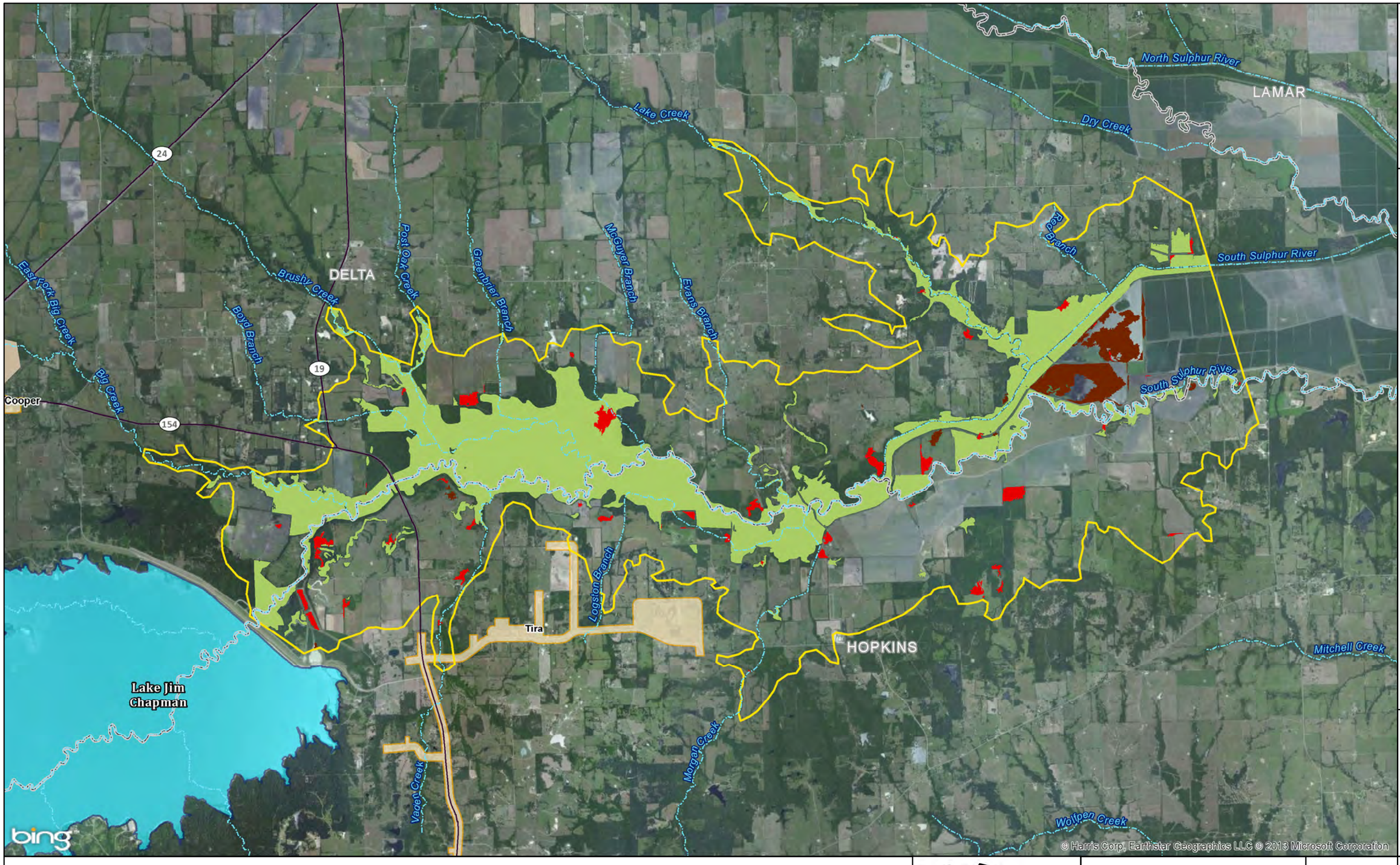
U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin
Talco Alternative Reservoir Site
Wetlands

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	19_Talco_Wetlands
PREPARED BY	SSJ

FREESE NICHOLS
4500 International Plaza Suite 200
Fort Worth, Texas 76109-4895
(817) 735-7300

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\16-22_Wetlands\19_Talco_Wetlands.mxd

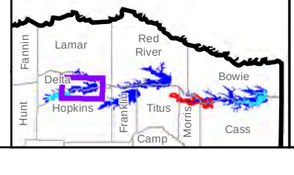


County Boundary
City Boundaries

Streams

Parkhouse I Alternative Reservoir Site (401 ft. msl)
Existing Reservoir Site

Forested Wetland
Herbaceous Wetland
Shrub Wetland



1:72,410
0 1 2 Miles

N W E S

20
FIGURE

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin
Parkhouse I Alternative Reservoir Site
Wetlands

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	20_PH1_Wetlands
PREPARED BY	SSJ

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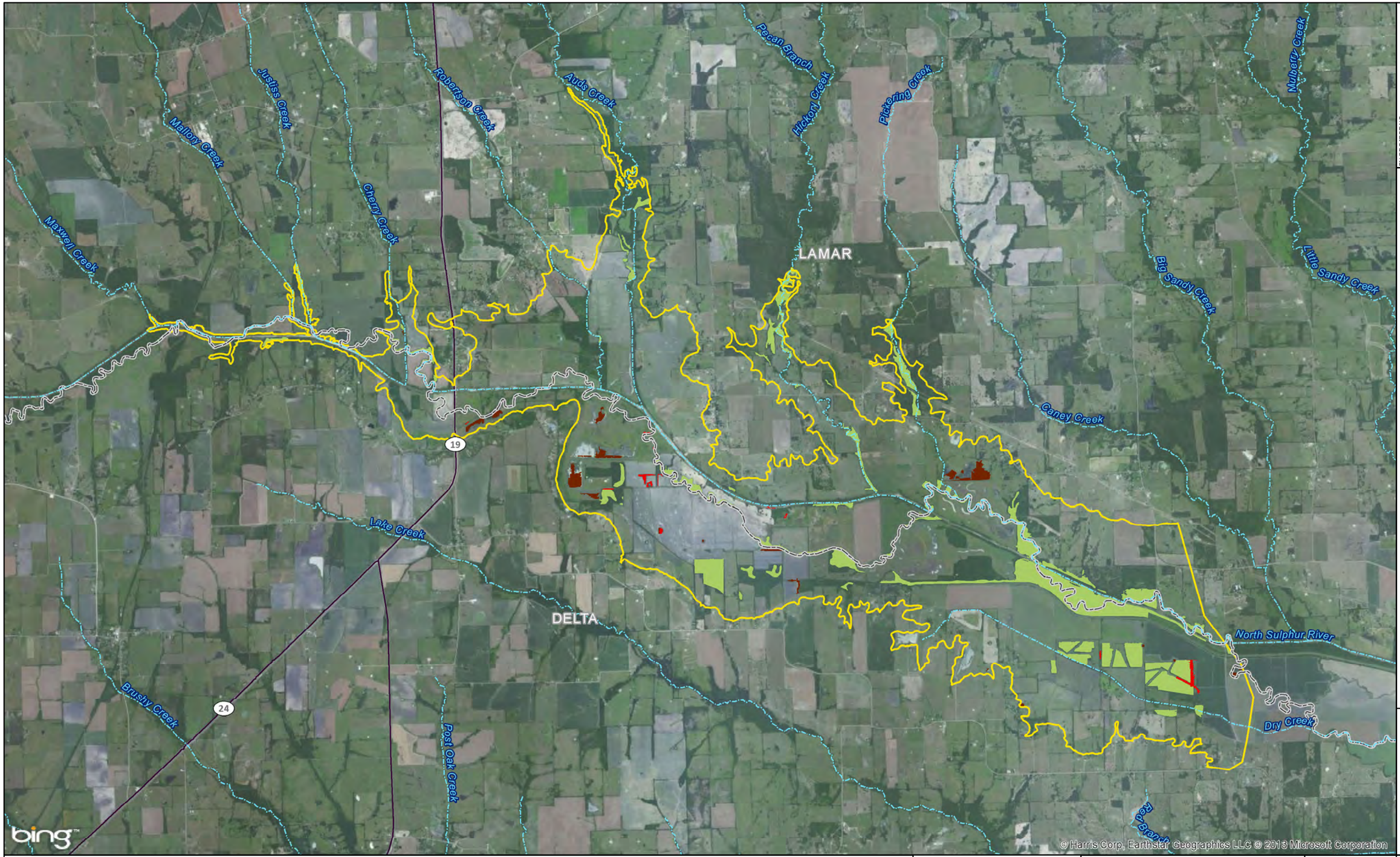
Fort Worth, Texas 76109-4895
(817) 735-7300

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\16-22_Wetlands\20_PH1_Wetlands.mxd



U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Parkhouse II Alternative Reservoir Site

Wetlands

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	21_PH2_Wetlands
PREPARED BY	SSJ

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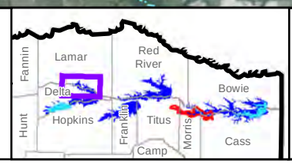
County Boundary
City Boundaries

Streams

Parkhouse II
Alternative Reservoir Site
(410 ft. msl)

Forested Wetland
Herbaceous Wetland
Shrub Wetland



1:67,800

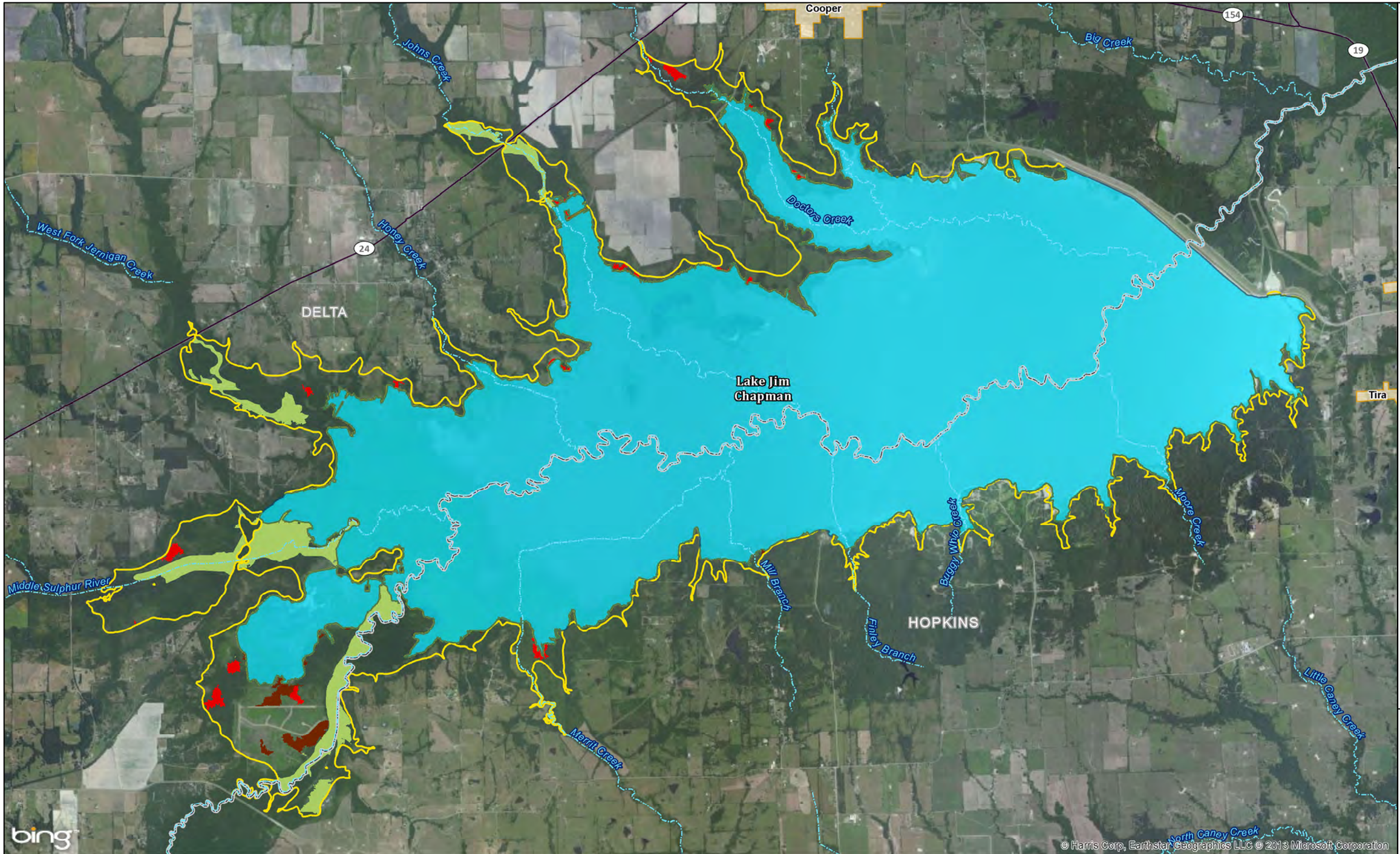
0 1 2 Miles

N W E S

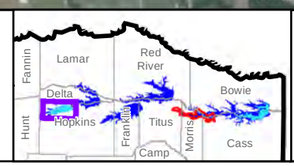
21

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\16-22_Wetlands\21_PH2_Wetlands.mxd



County Boundary
City Boundaries
Streams
Proposed Jim Chapman Reallocation (446.2 ft. msl)
Existing Reservoir Site
Forested Wetland
Herbaceous Wetland
Shrub Wetland



1:58,858
0 0.75 1.5
Miles

N
W E
S

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT
Sulphur River Basin
Proposed Jim Chapman Reallocation (446.2 ft. msl)
Wetlands

FN PROJECT NO.	MHP11453
DATE CREATED	6/13/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	22_JC_Wetlands
PREPARED BY	SSJ

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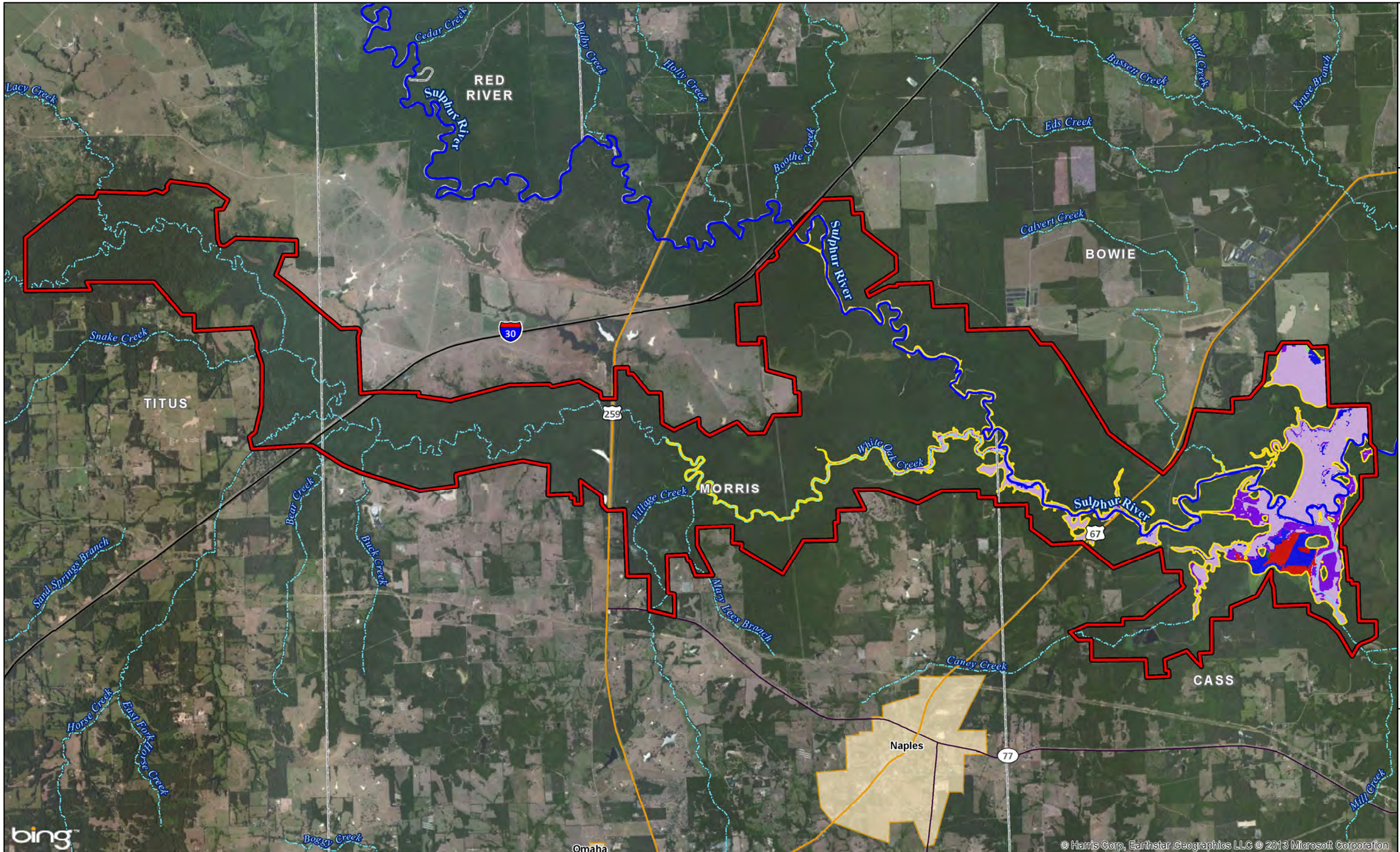
22

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\16-22_Wetlands\22_JC_Wetlands.mxd



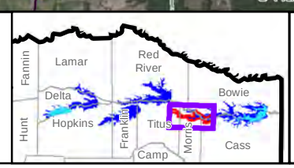
County Boundary
City Boundaries
Streams
Sulphur River

White Oak Creek Mitigation Area
Proposed Wright Patman Reallocation (237.5 ft msl)

Barren
Bottomland Hardwood Forest
Forested Wetland
Grassland/Oldfield

Herbaceous Wetland
Open Water
Row Crops
Shrub Wetland

Shrubland
Upland Forest
Urban



1:79,200
0 1.25 2.5 Miles

N W E S

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT
Sulphur River Basin

Cover Type Impacts at White Oak Creek Mitigation Area
Wright Patman Reallocation Inside (237.5 ft. msl)
Land Cover Types

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	23_Cover_Types_WOCWMA_237.5
PREPARED BY	SSJ

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23

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\2-8_23-24_Land_Cover_Types\23_Cover_Types_WOCWMA_237.5.mxd

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Cover Type Impacts at White Oak Creek Mitigation Area

Wright Patman Reallocation Inside (259.5 ft. msl)

Land Cover Types

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	24_Cover_Types_WOCWMA_259.5
PREPARED BY	SSJ

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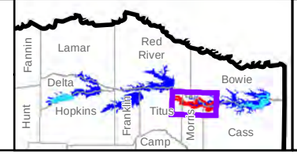
RED RIVER
BOWIE
TITUS
MORRIS
CASS
Omaha
Naples

Cedar Creek
Dalby Creek
Holly Creek
Boothe Creek
Bosser Creek
Ward Creek
Kruse Branch
Eds Creek
Calvert Creek
Lacy Creek
Snake Creek
Bear Creek
Buck Creek
Sand Springs Branch
Horse Creek
East Fork Horse Creek
Village Creek
White Oak Creek
Mary Lees Branch
Caney Creek
Mill Creek
Sulphur River

30
259
67
77

- County Boundary
- City Boundaries
- Streams
- Sulphur River
- White Oak Creek Wildlife Managment Area
- Proposed Wright Patman Reallocation (259.5 ft msl)
- Barren
- Bottomland Hardwood Forest
- Forested Wetland
- Grassland/Oldfield
- Herbaceous Wetland
- Open Water
- Row Crops
- Shrub Wetland
- Shrubland
- Upland Forest
- Urban



1:79,200

0 1.25 2.5 Miles

N W E S

24

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\2-8_23-24_Land_Cover_Types\24_Cover_Types_WOCWMA_259.5.mxd

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Proposed Wright Patman Reallocation (237.5 ft. msl)

Threatened and Endangered Species Potential Habitat: North Scarlet Snake

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	25_NSS_Habitat_WP_237.5
PREPARED BY	SSJ

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Texarkana
Redwater
Maud
BOWIE
Douglassville
Domino
Atlanta
CASS
MATCHLINE
Stewart Creek
Anderson Creek
Rice Creek
Rock Creek
Caney Creek
Big Creek
Akin Creek
Spring Creek
Sulphur River
Brooks Creek
Panther Creek
Moss Creek
Milan Creek
Kelley Creek
Baker Creek
Baker Slough
Whaley Creek
Kings Branch
Brown Creek
Powell Creek
Cedar Creek
Jackson Creek
Mill Creek
Wilkins Creek
Black Bayou
Butler Creek
Cypress Creek
67
59
8
77
bing
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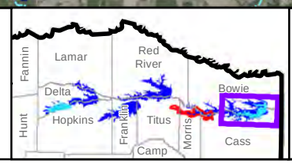
County Boundary
City Boundaries
Streams
Sulphur River
White Oak Creek Mitigation Area
Proposed Wright Patman Reallocation (237.5 ft. msl)
Existing Reservoir
North Scarlet Snake Potential Habitat



1:100,000
0 1.5 3 Miles

N W E S

25.1

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\25-28_NSS_Habitat\25_NSS_Habitat_WP_237.5.mxd

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Proposed Wright Patman Reallocation (237.5 ft. msl)

Sulphur River Basin

Threatened and Endangered Species Potential Habitat: North Scarlet Snake

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	25_NSS_Habitat_WP_237.5
PREPARED BY	SSJ

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25.2

FIGURE

RED RIVER
BOWIE
TITUS
MORRIS
CASS
Naples
Omaha
MATCHLINE

Sulphur River
Dillard Creek
Cedar Creek
Dalby Creek
Holly Creek
Boothe Creek
Lacy Creek
Snake Creek
Sand Springs Branch
Bear Creek
Buck Creek
Horse Creek
Village Creek
Caney Creek
Calvert Creek
Ward Creek
Kruse Branch
Eds Creek
Brooks Creek
Anderson Creek
Bussell Creek
Crow Creek
Mill Creek
Elliot Creek
Whatley Creek

98
30
259
67
77

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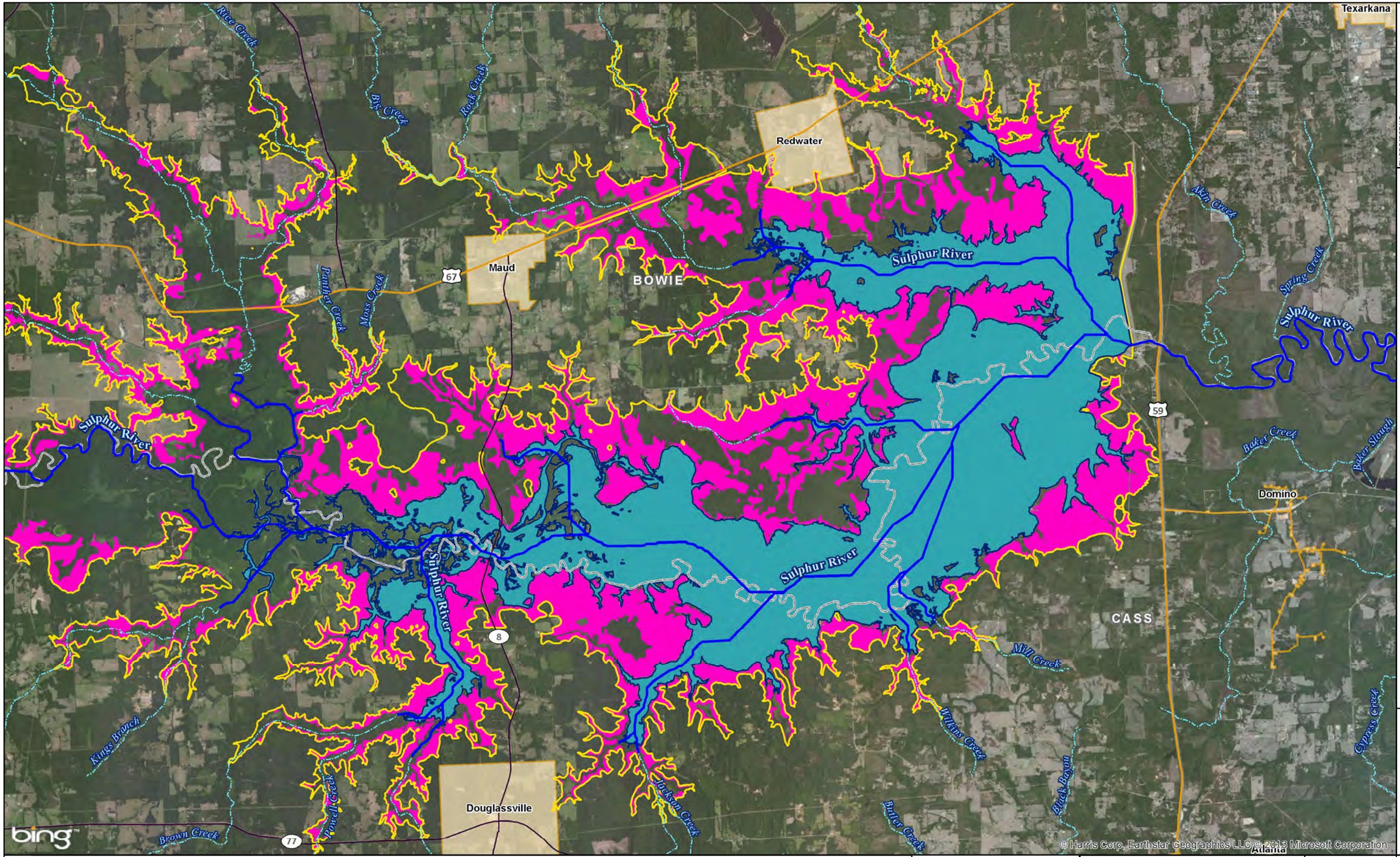
- County Boundary
- City Boundaries
- Streams
- Sulphur River
- White Oak Creek Mitigation Area
- Proposed Wright Patman Reallocation (237.5 ft. msl)
- Existing Reservoir
- North Scarlet Snake Potential Habitat

1:100,000

0 1.5 3 Miles

N W E S

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\25-28_NSS_Habitat\25_NSS_Habitat_WP_237.5.mxd



U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Proposed Wright Patman Reallocation (259.5 ft. msl)

Threatened and Endangered Species Potential Habitat: North Scarlet Snake

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	26_NSS_Habitat_259.5
PREPARED BY	SSJ

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Fort Worth, Texas 76109-4895
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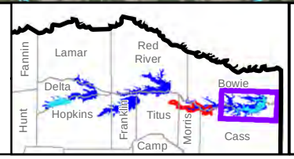
- County Boundary
- City Boundaries
- Streams
- Sulphur River
- White Oak Creek Mitigation Area
- Proposed Wright Patman Reallocation (259.5 ft. msl)
- Existing Reservoir
- North Scarlet Snake Potential Habitat



1:100,000

0 1.5 3 Miles

N W E S

26.1

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\25-28_NSS_Habitat\26_NSS_Habitat_259.5.mxd

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Proposed Wright Patman Reallocation (259.5 ft. msl)

Threatened and Endangered Species Potential Habitat: North Scarlet Snake

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	26_NSS_Habitat_259.5
PREPARED BY	SSJ

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County Boundary
City Boundaries
Streams
Sulphur River
White Oak Creek Mitigation Area
Proposed Wright Patman Reallocation (259.5 ft. msl)
Existing Reservoir
North Scarlet Snake Potential Habitat

1:100,000
0 1.5 3 Miles

N W E S

26.2

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\25-28_NSS_Habitat\26_NSS_Habitat_259.5.mxd

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Marvin Nichols1A Alternative Reservoir Site

Threatened and Endangered Species Potential Habitat: North Scarlet Snake

FN PROJECT NO.	MHP11453
DATE CREATED	6/13/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	27_NSS_Habitat
PREPARED BY	SSJ

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Fort Worth, Texas 76109-4895
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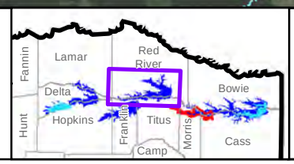
Deport
LAMAR
Bogata
RED RIVER
Annona
TITUS
MORRIS
DELTA
HOPKINS
FRANKLIN
Talco

Liberty Creek, McCoy Creek, Young Creek, Jake Creek, White Rock Creek, Harris Creek, Cuthand Creek, Scatter Creek, Clapherd Creek, Boggy Creek, Langford Creek, Kickapoo Creek, White Oak Creek, Lake Drain Creek, Gouch Creek, Lake Drain Branch, Bruton Creek, Burkhang Branch, Anderson Creek, Line Branch, Sand Branch, Shawnee Creek, Pine Branch, Caney Creek, Webbet Branch, Ringo Creek, Brushy Creek, Maple Creek, Mustang Creek, Little Mustang Creek, Lake Branch, Whiteoak Creek, Flat Creek, White Oak Branch, Little Sandy Creek, Sulphur River, South Lacy Creek, Lacy Creek, Lewis Creek, White Oak Creek

37, 82, 271

- County Boundary
- City Boundaries
- Streams
- Sulphur River
- Marvin Nichols 1A Alternative Reservoir Site (328 ft. msl)
- White Oak Creek Mitigation Area
- North Scarlet Snake Potential Habitat



1:128,570

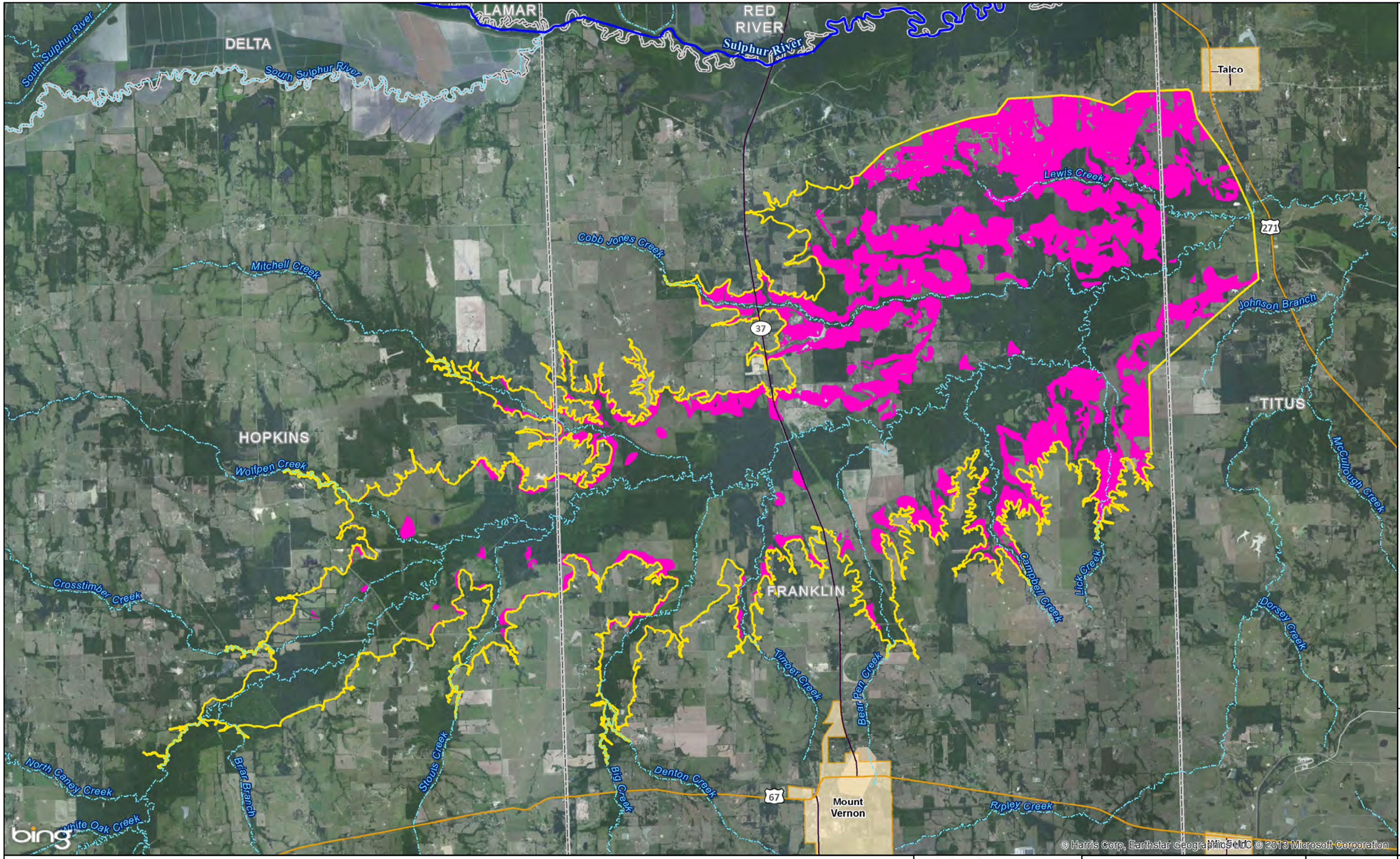
0 2 4 Miles

N W E S

27

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\25-28_NSS_Habitat\27_NSS_Habitat.mxd



U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Talco Alternative Reservoir Site

Threatened and Endangered Species Potential Habitat: North Scarlet Snake

FN PROJECT NO.	MHP11453
DATE CREATED	6/12/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	28_NSS_Habitat
PREPARED BY	SSJ

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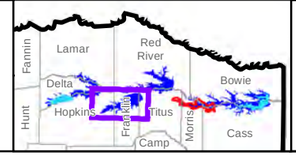
County Boundary
City Boundaries
Sulphur River
Streams
Talco
Alternative Reservoir Site
(328 ft. msl)
North Scarlet Snake
Potential Habitat



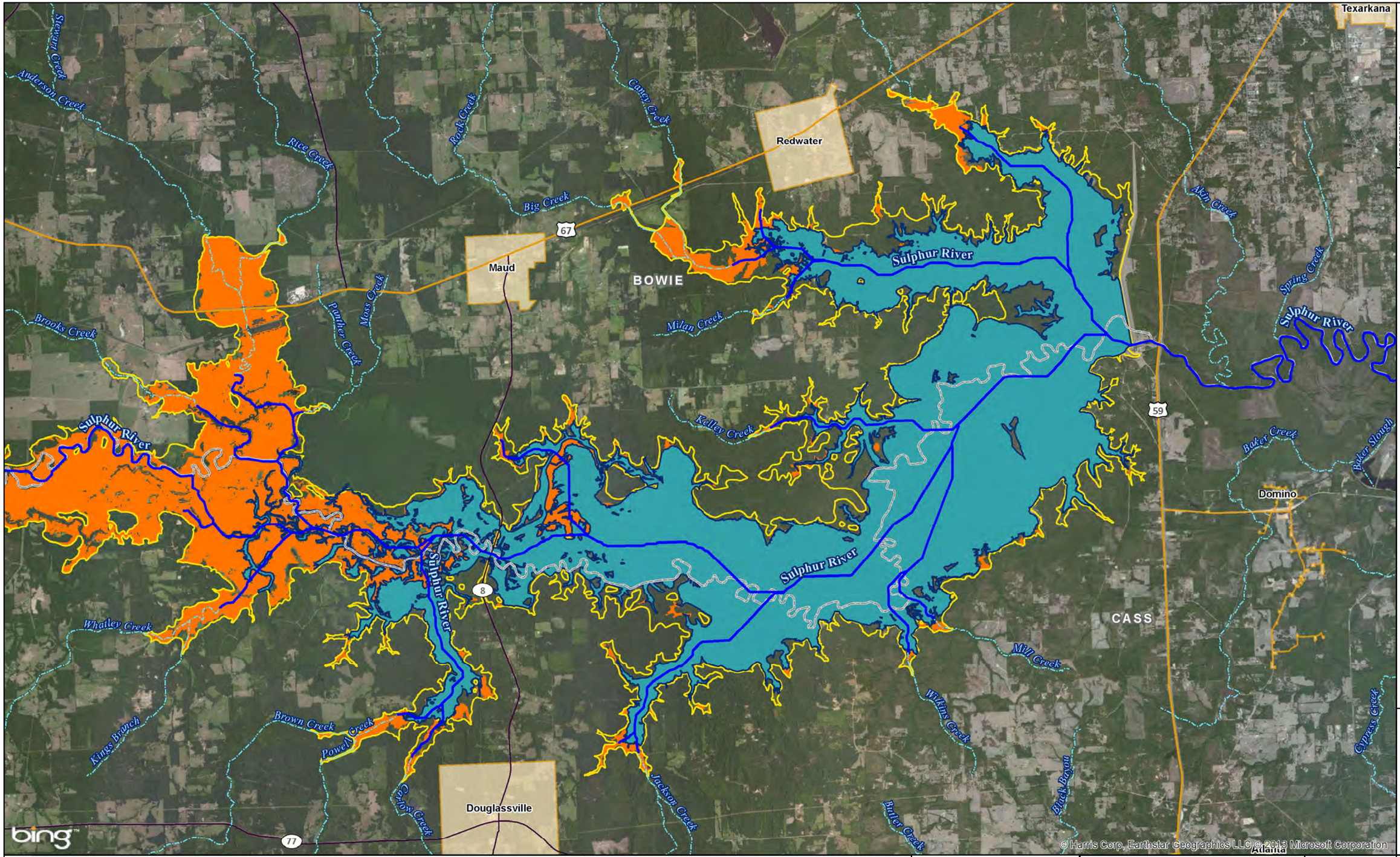
1:100,340
0 1.5 3 Miles

N W E S

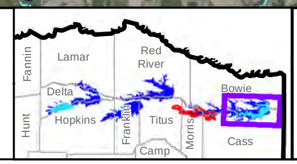
28

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\25-28_NSS_Habitat\28_NSS_Habitat.mxd



County Boundary
City Boundaries
Streams
Sulphur River
White Oak Creek Mitigation Area
Proposed Wright Patman Reallocation (237.5 ft. msl)
Existing Reservoir
Timber Rattlesnake Potential Habitat



1:100,000
0 1.5 3 Miles

N W E S

29.1

FIGURE

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Proposed Wright Patman Reallocation (237.5 ft. msl)

Threatened and Endangered Species Potential Habitat: Timber Rattlesnake

FN PROJECT NO.	MHP11453
DATE CREATED	6/13/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	29_TR_Habitat_WP_237.5
PREPARED BY	SSJ

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Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\29-35_TR_Habitat\29_TR_Habitat_WP_237.5.mxd

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Proposed Wright Patman Reallocation (237.5 ft. msl)

Threatened and Endangered Species Potential Habitat: Timber Rattlesnake

FN PROJECT NO.	MHP11453
DATE CREATED	6/13/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	29_TR_Habitat_WP_237.5
PREPARED BY	SSJ

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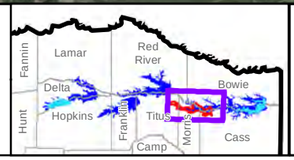
Fort Worth, Texas 76109-4895
(817) 735-7300

RED RIVER
BOWIE
TITUS
MORRIS
CASS
Naples
Omaha

Sulphur River
Dillard Creek
Cedar Creek
Dalby Creek
Holly Creek
Boothe Creek
Lacy Creek
Snake Creek
Sand Springs Branch
Bear Creek
Buck Creek
Horse Creek
Village Creek
Caney Creek
Calvert Creek
Ward Creek
Kruse Branch
Eds Creek
Anderson Creek
Brooks Creek
Bisset Creek
Mill Creek
Crow Creek
Elliot Creek
Whatley Creek

98
30
259
67
77



1:100,000
0 1.5 3 Miles

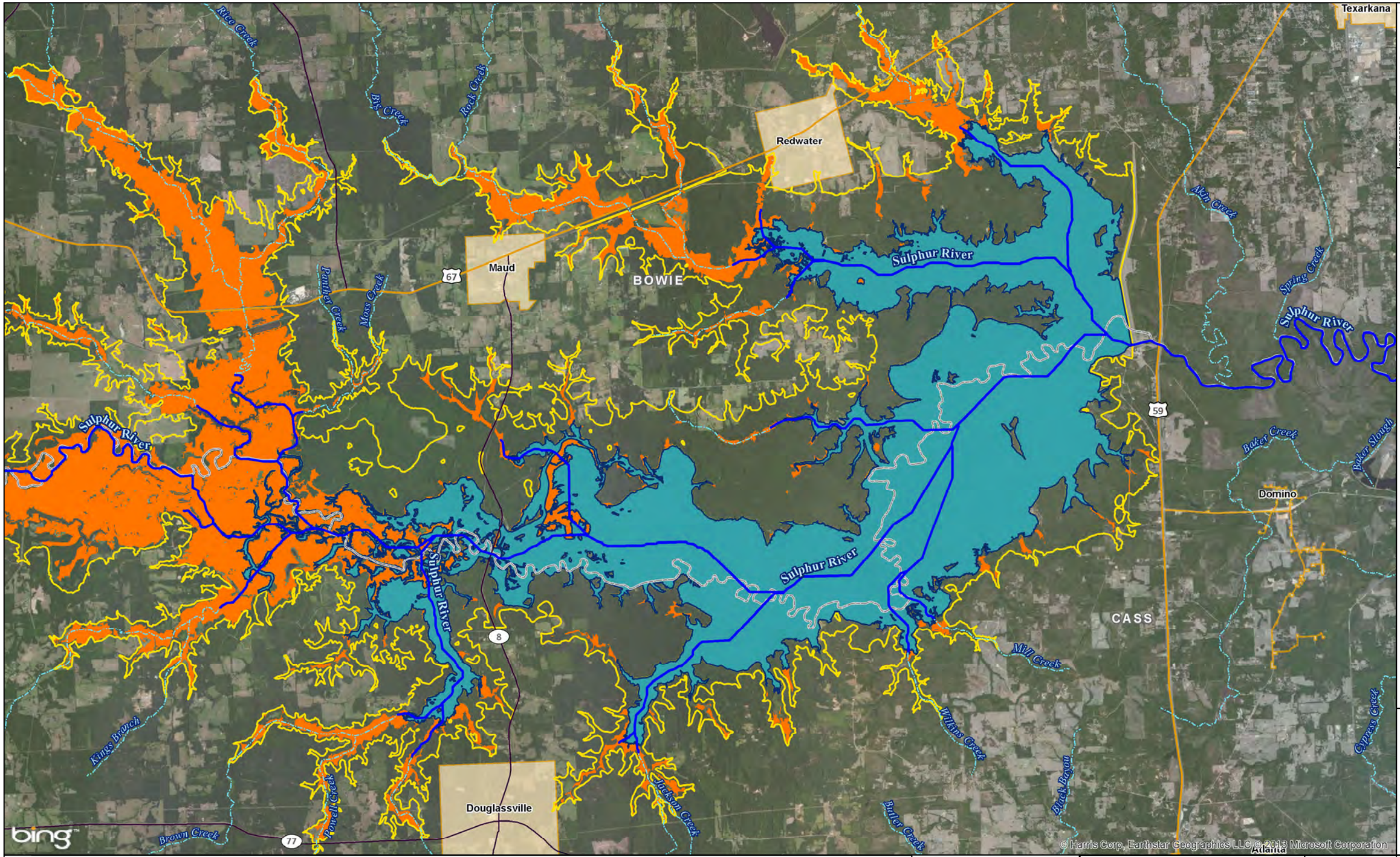
N W E S

- County Boundary
- City Boundaries
- Streams
- Sulphur River
- White Oak Creek Mitigation Area
- Proposed Wright Patman Reallocation (237.5 ft. msl)
- Existing Reservoir
- Timber Rattlesnake Potential Habitat

29.2

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\29-35_TR_Habitat\29_TR_Habitat_WP_237.5.mxd



U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Wright Patman Proposed Reallocation (259.5 ft. msl)

Threatened and Endangered Species Potential Habitat: Timber Rattlesnake

FN PROJECT NO.	MHP11453
DATE CREATED	6/13/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	30_TR_Habitat_WP_259.5
PREPARED BY	SSJ

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Fort Worth, Texas 76109-4895
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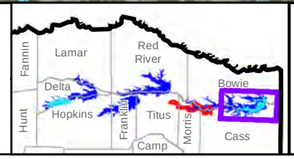
- County Boundary
- City Boundaries
- Streams
- Sulphur River
- White Oak Creek Mitigation Area
- Proposed Wright Patman Reallocation (259.5 ft. msl)
- Existing Reservoir
- Timber Rattlesnake Potential Habitat



1:100,000

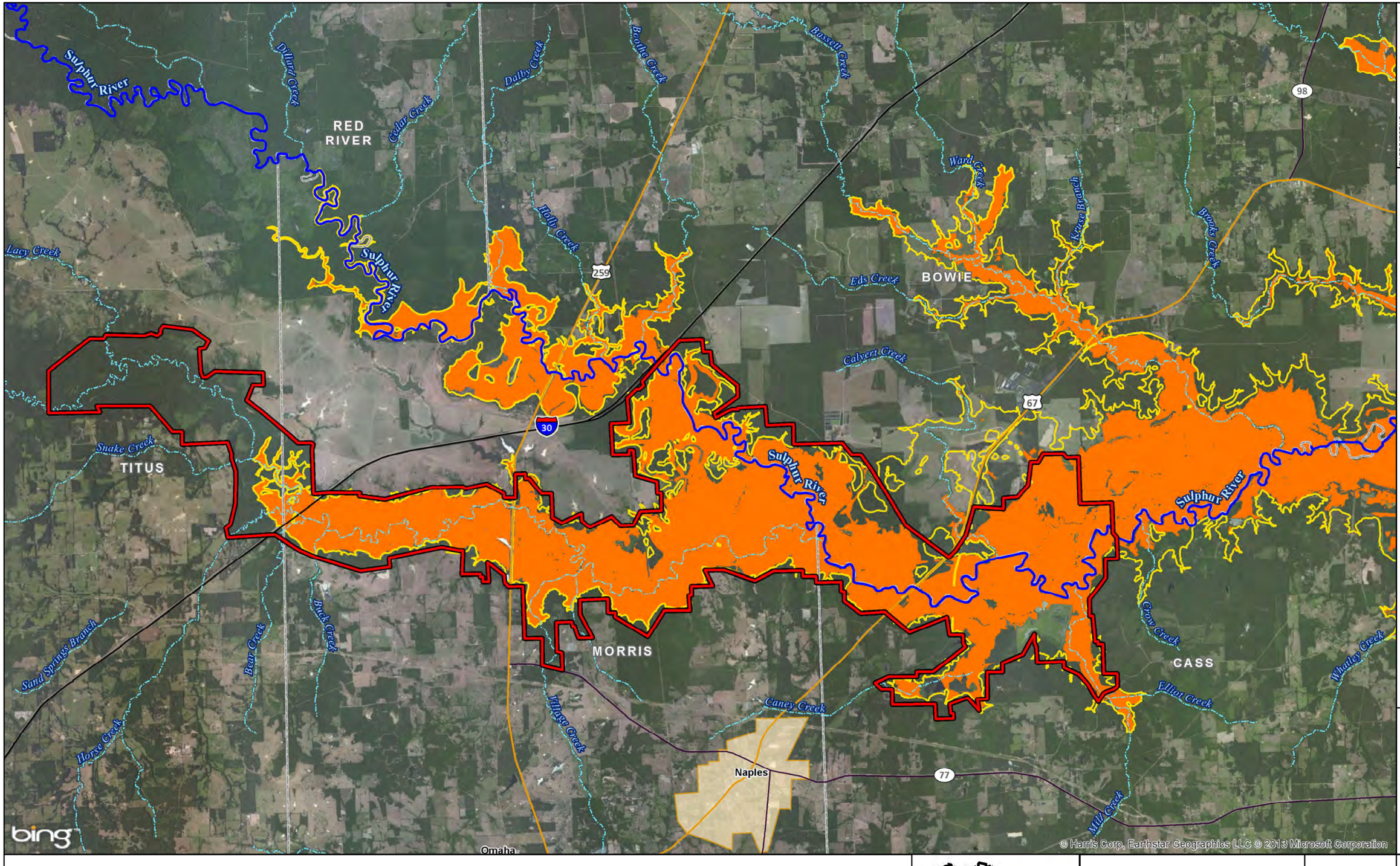
0 1.5 3 Miles

N W E S

30.1

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\29-35_TR_Habitat\30_TR_Habitat_WP_259.5.mxd



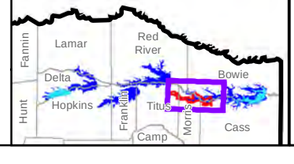
County Boundary
City Boundaries

Streams
Sulphur River

White Oak Creek Mitigation Area
Proposed Wright Patman Reallocation (259.5 ft. msl)

Existing Reservoir

Timber Rattlesnake Potential Habitat



1:100,000
0 1.5 3 Miles

N W E S

30.2

FIGURE

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Wright Patman Proposed Reallocation (259.5 ft. msl)

Threatened and Endangered Species Potential Habitat: Timber Rattlesnake

FN PROJECT NO.	MHP11453
DATE CREATED	6/13/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	30_TR_Habitat_WP_259.5
PREPARED BY	SSJ

FREESE NICHOLS
4500 International Plaza Suite 200
Fort Worth, Texas 76109-4895
(817) 735-7300

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\29-35_TR_Habitat\30_TR_Habitat_WP_259.5.mxd

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Marvin Nichols1A Alternative Reservoir Site

Threatened and Endangered Species Potential Habitat: Timber Rattlesnake

FN PROJECT NO.	MHP11453
DATE CREATED	6/13/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	31_MN_TR_Habitat
PREPARED BY	SSJ

FREESE NICHOLS
4500 International Plaza Suite 200
Fort Worth, Texas 76109-4895
(817) 735-7300

County Boundary
City Boundaries
Streams
Sulphur River
Proposed Marvin Nichols 1A Alternative Reservoir Site (328 ft. msl)
White Oak Creek Mitigation Area
Timber Rattlesnake Potential Habitat

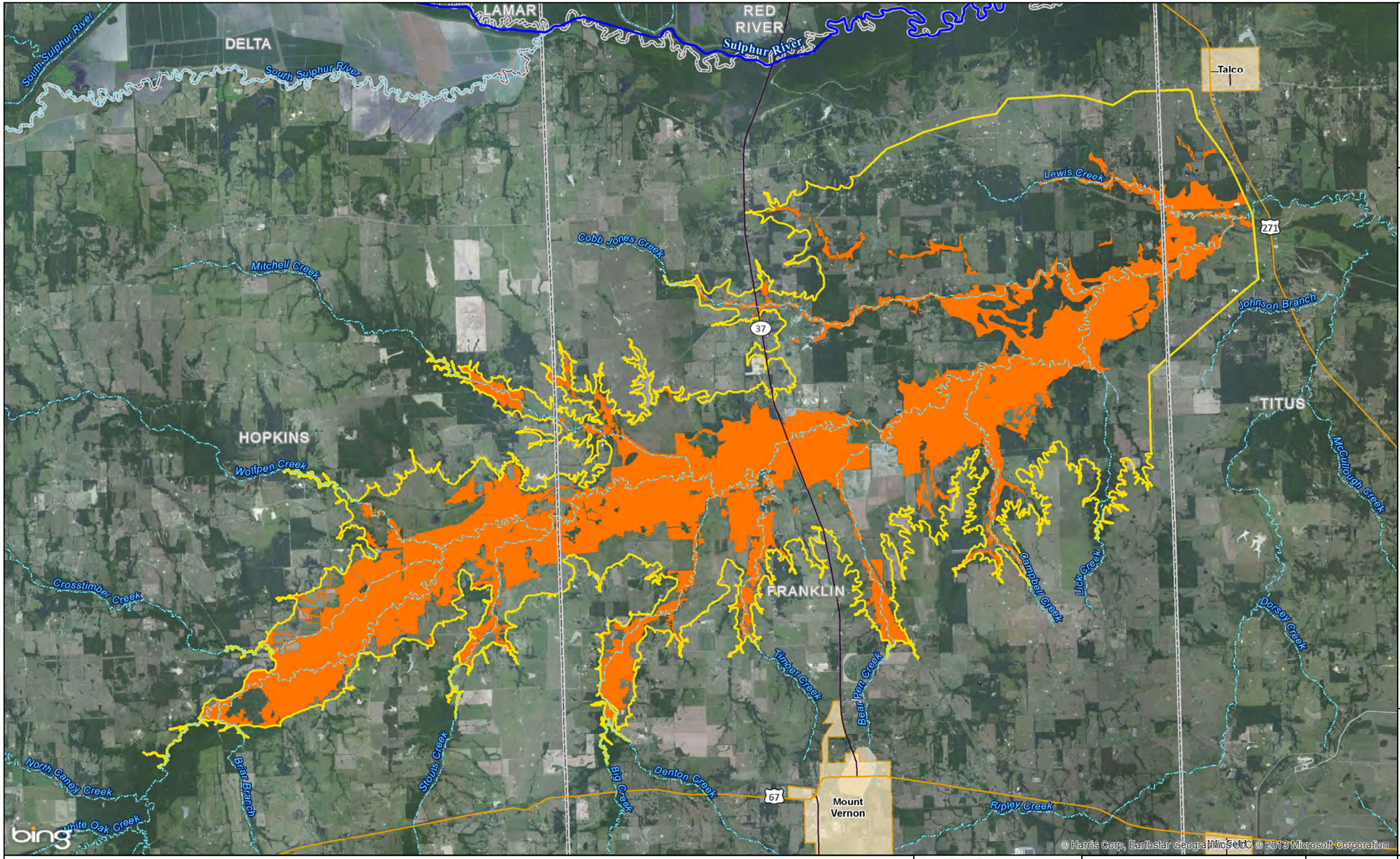
1:128,570
0 2 4 Miles

N W E S

31

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\29-35_TR_Habitat\31_MN_TR_Habitat.mxd

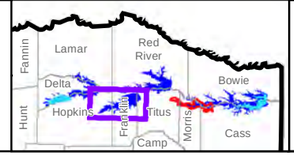


County Boundary
City Boundaries

Sulphur River
Streams

Talco
Alternative Reservoir Site
(328 ft. msl)

Timber Rattlesnake
Potential Habitat



1:100,340
0 1.5 3 Miles

N
W E
S

32

FIGURE

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Talco Alternative Reservoir Site

Threatened and Endangered Species Potential Habitat: Timber Rattlesnake

FN PROJECT NO.	MHP11453
DATE CREATED	6/13/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	32_Talco_TR_Habitat
PREPARED BY	SSJ

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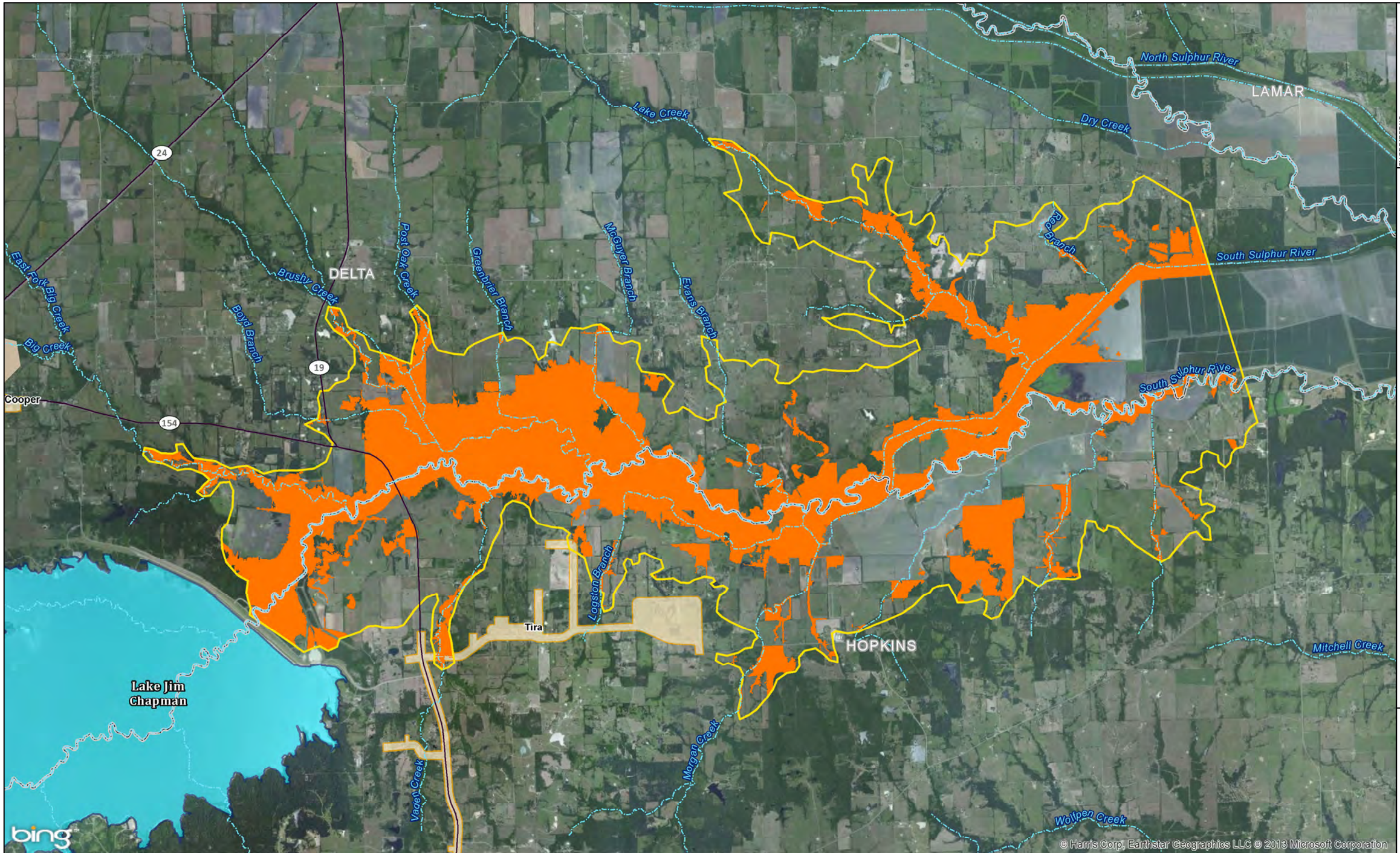
4500 International Plaza Suite 200
Fort Worth, Texas 76109-4895
(817) 735-7300

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\29-35_TR_Habitat\32_Talco_TR_Habitat.mxd



U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

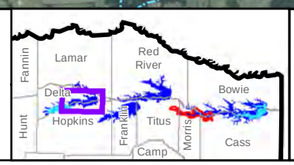
Parkhouse I Alternative Reservoir Site

Threatened and Endangered Species Potential Habitat: Timber Rattlesnake

FN PROJECT NO.	MHP11453
DATE CREATED	6/13/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	33_PH1_TR_Habitat
PREPARED BY	SSJ

FREESE NICHOLS
4500 International Plaza Suite 200
Fort Worth, Texas 76109-4895
(817) 735-7300

County Boundary
City Boundaries
Streams
Parkhouse I Alternative Reservoir Site (401 ft. msl)
Existing Reservoir Site
Timber Rattlesnake Potential Habitat



1:72,410

0 1 2 Miles

N W E S

33

FIGURE

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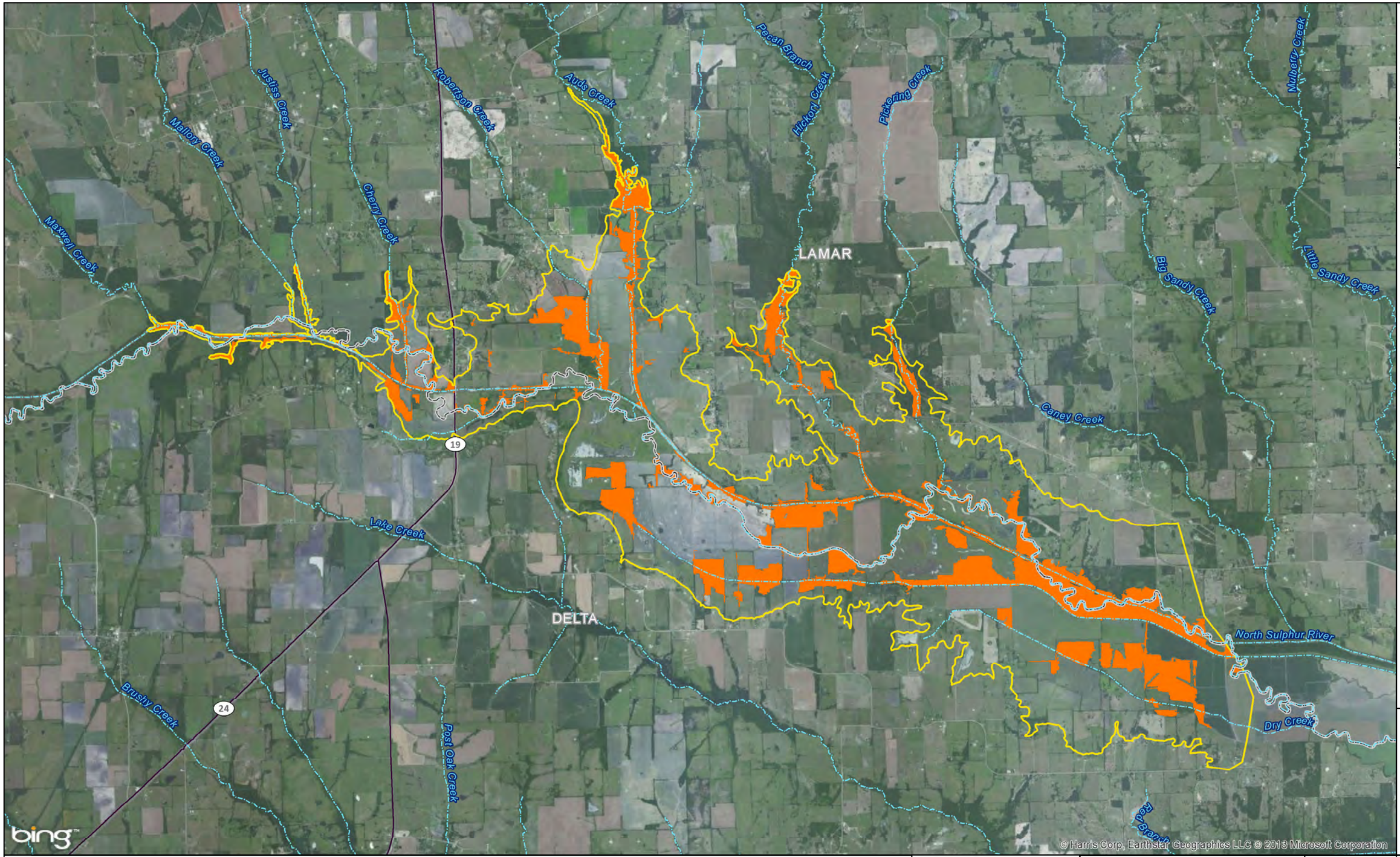

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Parkhouse II Alternative Reservoir Site

Threatened and Endangered Species Potential Habitat: Timber Rattlesnake

FN PROJECT NO.	MHP11453
DATE CREATED	6/13/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	34_PH2_TR_Habitat
PREPARED BY	SSJ

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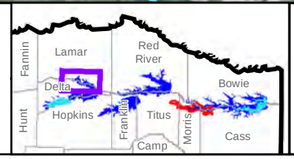
Fort Worth, Texas 76109-4895
(817) 735-7300

County Boundary
City Boundaries

Streams

Parkhouse II
Alternative Reservoir Site
(410 ft. msl)

Timber Rattlesnake
Potential Habitat



1:67,800

0 1 2 Miles

N W E S

34

FIGURE

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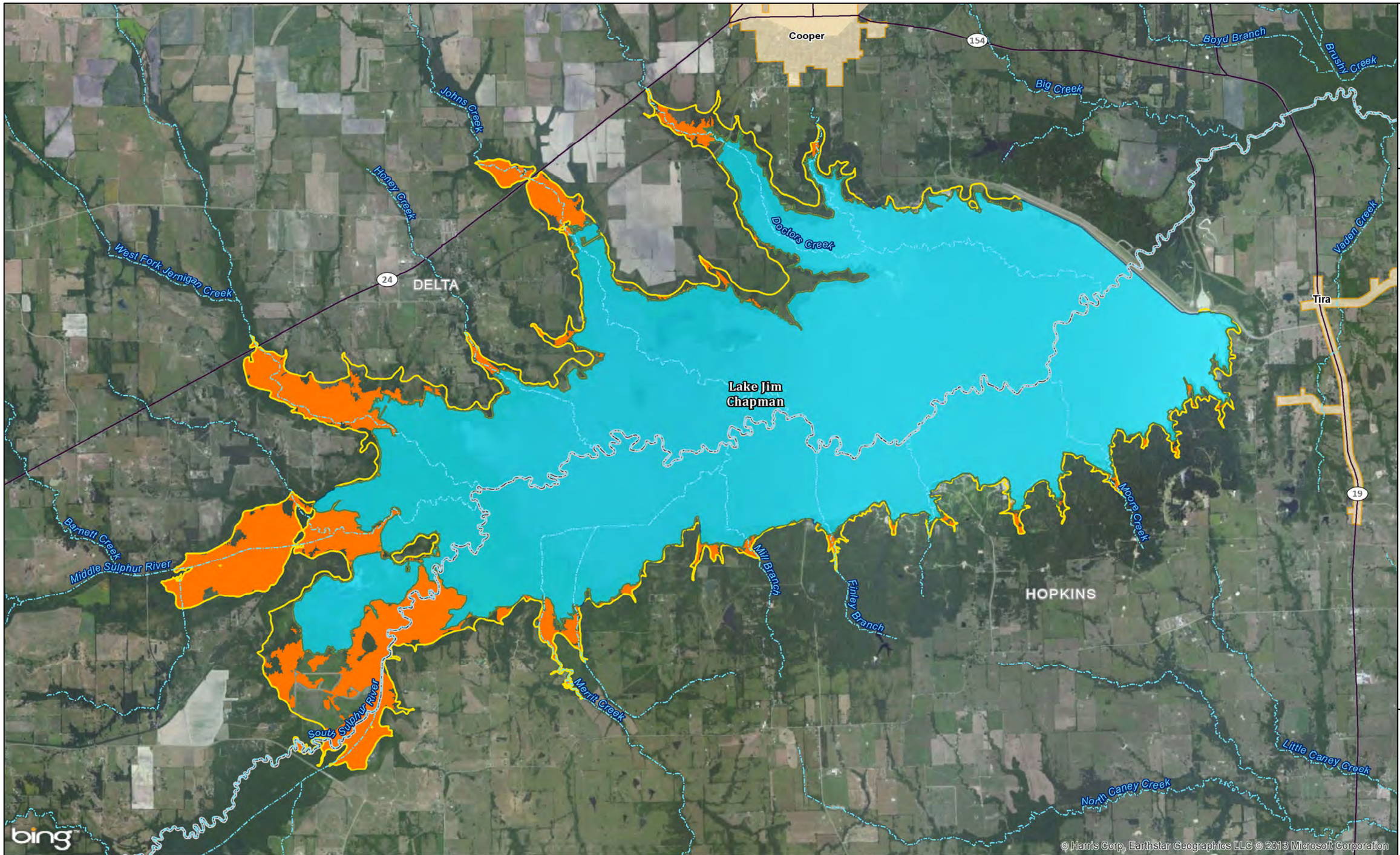


U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

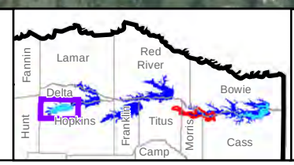
Proposed Jim Chapman Reallocation (446.2 ft. msl)

Threatened and Endangered Species Potential Habitat: Timber Rattlesnake

FN PROJECT NO.	MHP11453
DATE CREATED	6/13/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	35_JC_TR_Habitat
PREPARED BY	SSJ

FREESE NICHOLS
4500 International Plaza Suite 200
Fort Worth, Texas 76109-4895
(817) 735-7300

County Boundary
City Boundaries
Streams
Proposed Jim Chapman Reallocation (446.2 ft. msl)
Existing Reservoir Site
Timber Rattlesnake Potential Habitat



1:66,970
0 1 2 Miles

N W E S

35

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\29-35_TR_Habitat\35_JC_TR_Habitat.mxd

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Proposed Wright Patman Reallocation (237.5 ft. msl)

Threatened and Endangered Species Potential Habitat: Creek Chubsucker White Oak Creek Mitigation Area

FN PROJECT NO.	MHP11453
DATE CREATED	6/13/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	36_CCS_Habitat_WP_237.5
PREPARED BY	SSJ

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Fort Worth, Texas 76109-4895
(817) 735-7300

Texarkana
Redwater
Maud
67
BOWIE
59
Domino
8
CASS
Douglassville
77
Atlanta
bing
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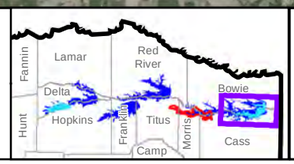
County Boundary
City Boundaries
Proposed Wright Patman Reallocation (237.5 ft. msl)
Existing Reservoir
White Oak Creek Mitigation Area
Creek Chubsucker Potential Habitat



1:100,000
0 1.5 3 Miles

N W E S

36.1

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\36-42_CS_Habitat\36_CCS_Habitat_WP_237.5.mxd

RED RIVER

BOWIE

TITUS

MORRIS

CASS

Naples

Omaha

30

259

67

98

77

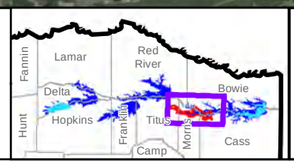
bing™

County Boundary
City Boundaries

Proposed Wright Patman Reallocation (237.5 ft. msl)
Existing Reservoir

White Oak Creek Mitigation Area

Creek Chubsucker Potential Habitat



1:100,000

0 1.5 3 Miles

N W E S

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Proposed Wright Patman Reallocation (237.5 ft. msl)

Threatened and Endangered Species Potential Habitat: Creek Chubsucker

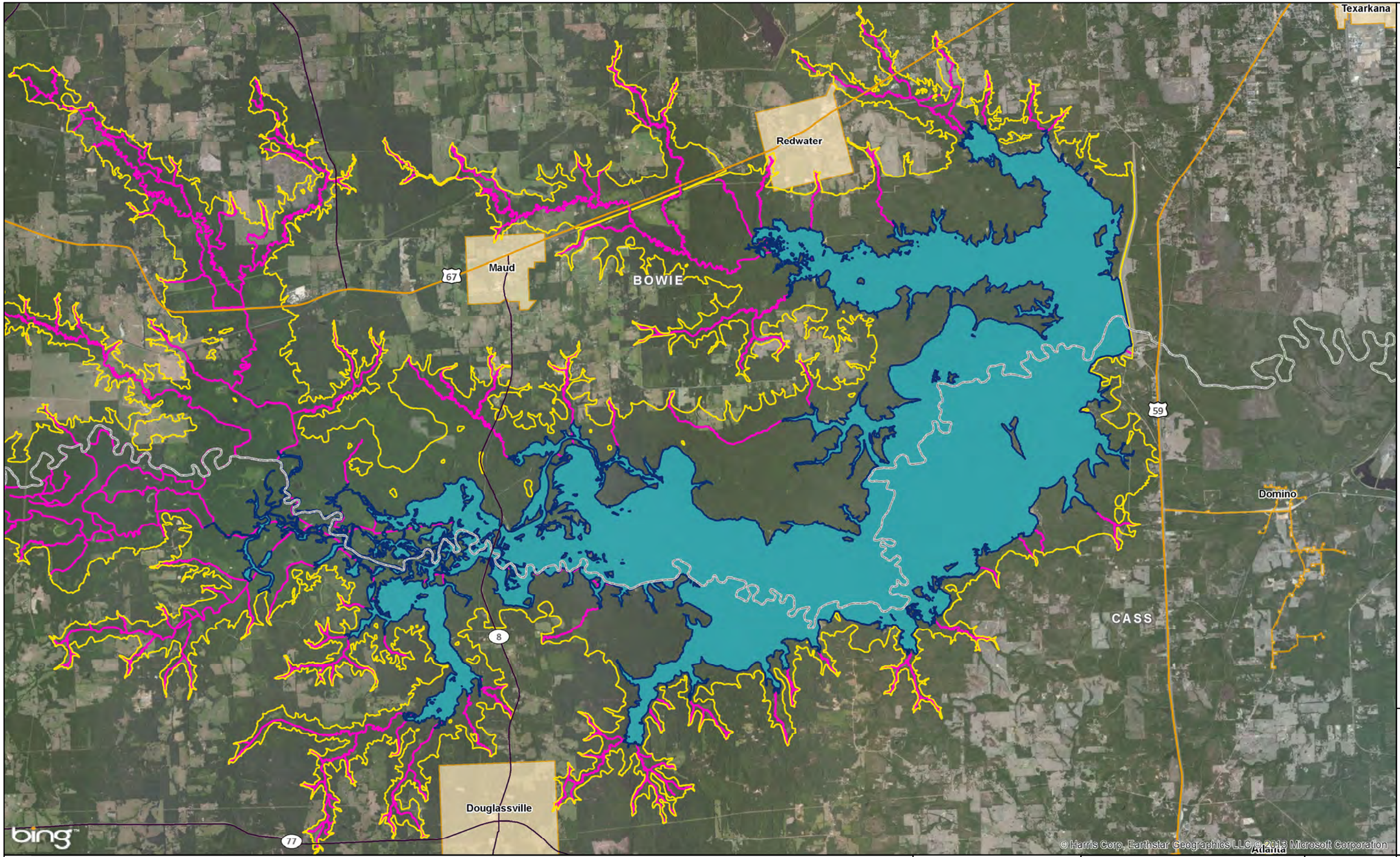
FN PROJECT NO.	MHP11453
DATE CREATED	6/13/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	36_CCS_Habitat_WP_237.5
PREPARED BY	SSJ

FREESE NICHOLS
4500 International Plaza Suite 200
Fort Worth, Texas 76109-4895
(817) 735-7300

36.2

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\36-42_CS_Habitat\36_CCS_Habitat_WP_237.5.mxd



U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Proposed Wright Patman Reallocation (259.5 ft. msl)

Threatened and Endangered Species Potential Habitat: Creek Chubsucker

FN PROJECT NO.	MHP11453
DATE CREATED	6/13/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	37_CCS_Habitat_WP_259.5
PREPARED BY	SSJ

FREESE NICHOLS
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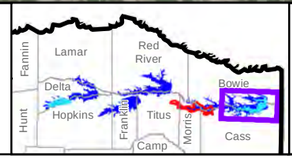
Fort Worth, Texas 76109-4895
(817) 735-7300

- County Boundary
- City Boundaries
- Proposed Wright Patman Reallocation (259.5 ft. msl)
- Existing Reservoir
- White Oak Creek Mitigation Area
- Creek Chubsucker Potential Habitat



1:100,000

0 1.5 3 Miles

N W E S

37.1

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\36-42_CS_Habitat\37_CCS_Habitat_WP_259.5.mxd

RED RIVER

BOWIE

TITUS

MORRIS

CASS

Naples

Omaha

259

30

67

98

77

bing™

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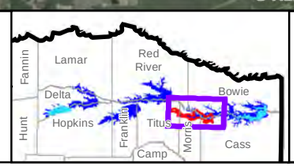
County Boundary
City Boundaries

Proposed Wright Patman Reallocation (259.5 ft. msl)
Existing Reservoir

White Oak Creek Mitigation Area

Creek Chubsucker Potential Habitat



1:100,000

0 1.5 3 Miles

N
W E
S

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Proposed Wright Patman Reallocation (259.5 ft. msl)

Threatened and Endangered Species Potential Habitat: Creek Chubsucker

FN PROJECT NO.	MHP11453
DATE CREATED	6/13/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	37_CCS_Habitat_WP_259.5
PREPARED BY	SSJ

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Fort Worth, Texas 76109-4895
(817) 735-7300

37.2

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\36-42_CS_Habitat\37_CCS_Habitat_WP_259.5.mxd

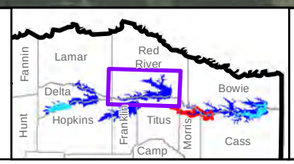
Deport
LAMAR
Bogata
37
271
RED
RIVER
Annona
82
DELTA
HOPKINS
FRANKLIN
Talco
TITUS
MORRIS
bing

County Boundary
City Boundaries

Marvin Nichols 1A
Alternative Reservoir Site
(328 ft. msl)

White Oak Creek
Mitigation Area

Creek Chubsucker
Potential Habitat



1:128,460
0 2 4 Miles

N
W E
S

38
FIGURE

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

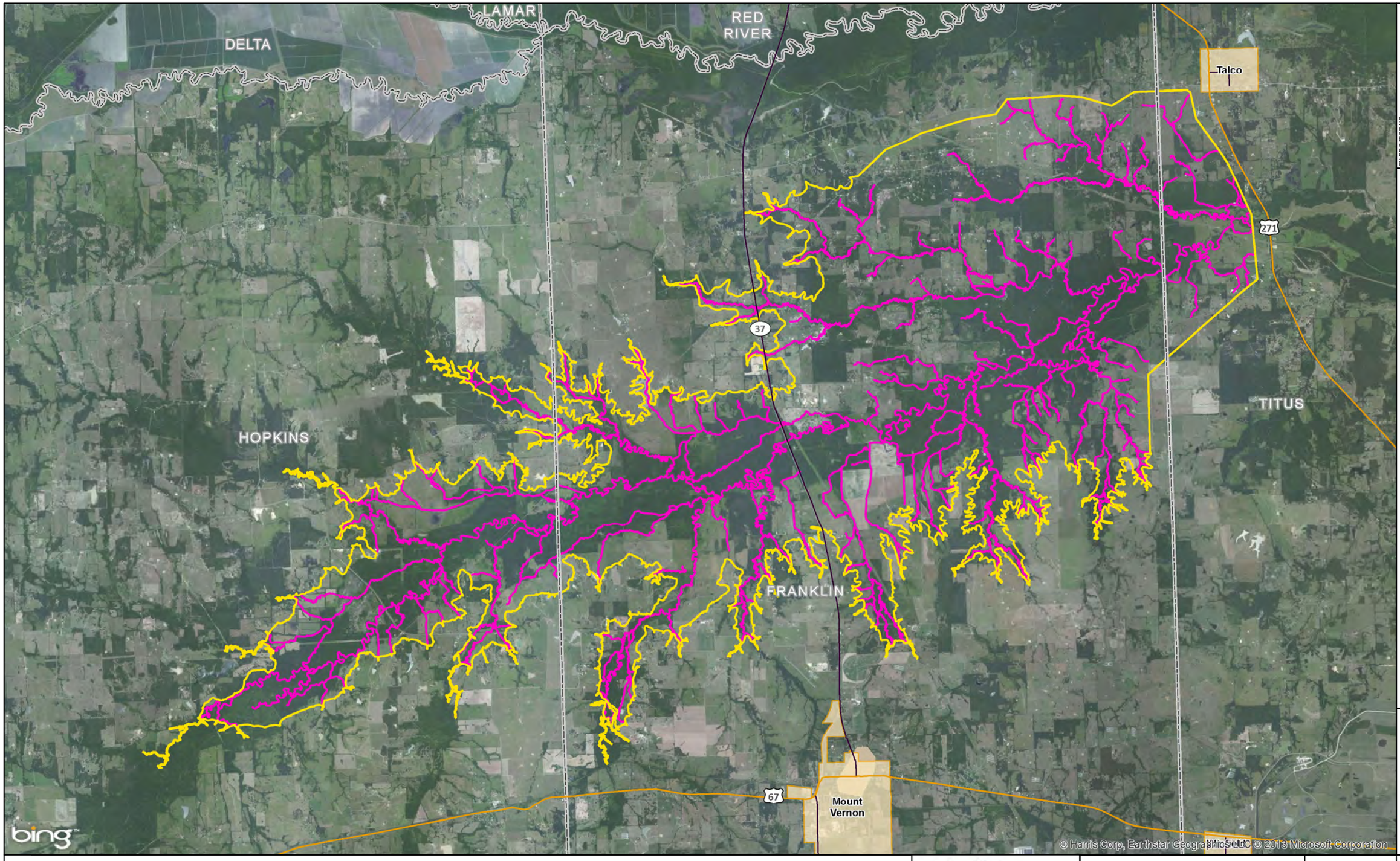
Sulphur River Basin
Marvin Nichols1A Alternative Reservoir Site

Threatened and Endangered Species Potential Habitat: Creek Chubsucker

FN PROJECT NO.	MHP11453
DATE CREATED	6/13/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	38_MN_CCS_Habitat
PREPARED BY	SSJ

FREESE NICHOLS
4500 International Plaza Suite 200
Fort Worth, Texas 76109-4895
(817) 735-7300

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\36-42_CS_Habitat\38_MN_CCS_Habitat.mxd



U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Talco Alternative Reservoir Site

Threatened and Endangered Species Potential Habitat: Creek Chubsucker

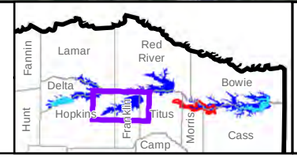
FN PROJECT NO.	MHP11453
DATE CREATED	6/13/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	39_Talco_CCS_Habitat
PREPARED BY	SSJ

FREESE NICHOLS
4500 International Plaza Suite 200
Fort Worth, Texas 76109-4895
(817) 735-7300

County Boundary
City Boundaries

Talco
Alternative Reservoir Site
(328 ft. msl)

Creek Chubsucker
Potential Habitat



1:100,340

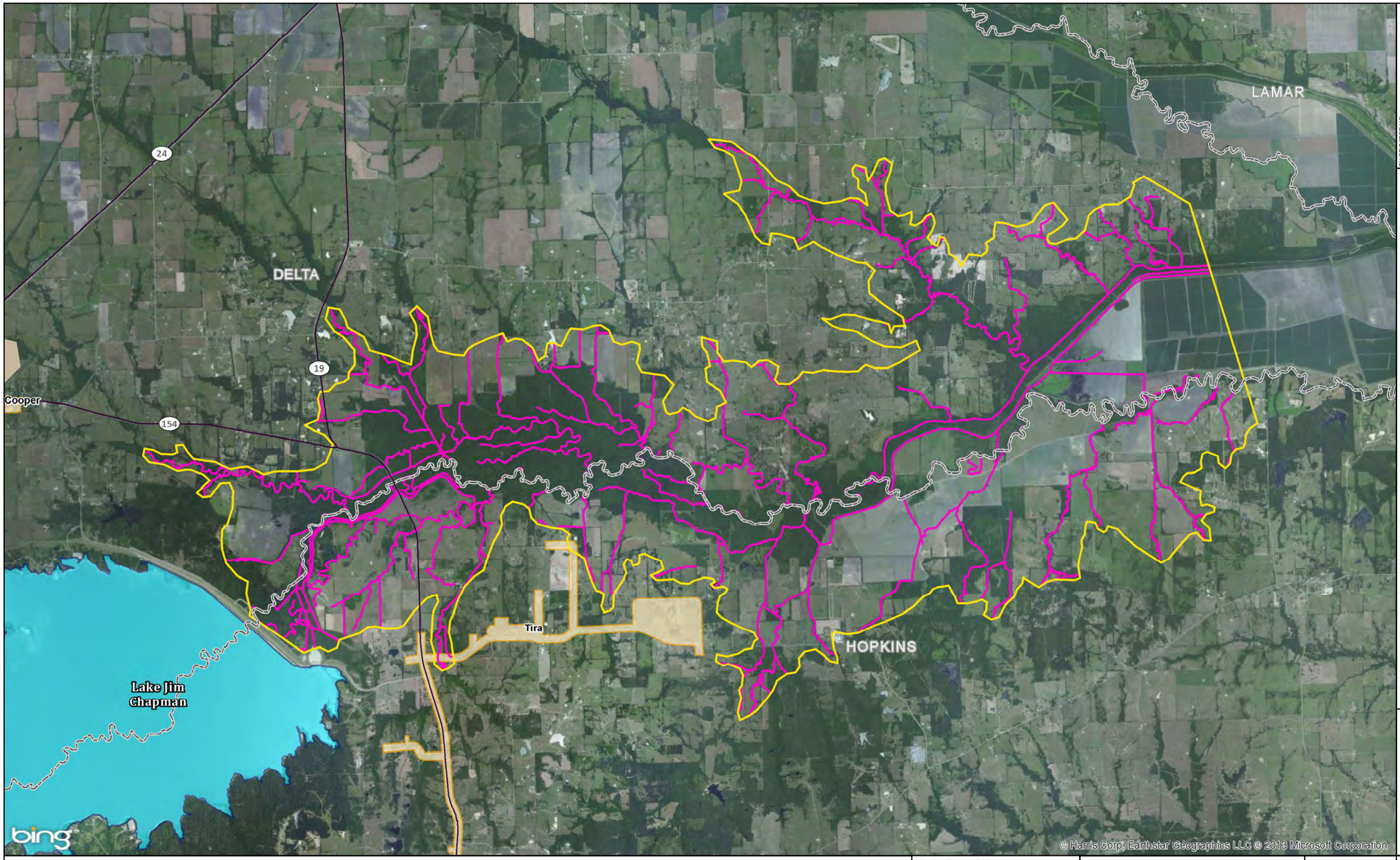
0 1.5 3 Miles

N
W E
S

39

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\36-42_CS_Habitat\39_Talco_CCS_Habitat.mxd



U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Parkhouse I Alternative Reservoir Site

Threatened and Endangered Species Potential Habitat: Creek Chubsucker

FN PROJECT NO.	MHP11453
DATE CREATED	6/13/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	40_PH1_CCS_Habitat
PREPARED BY	SSJ

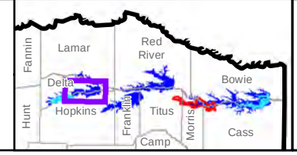
FREESE NICHOLS
4500 International Plaza Suite 200
Fort Worth, Texas 76109-4895
(817) 735-7300

County Boundary
City Boundaries

Parkhouse I
Alternative Reservoir Site
(401 ft. msl)

Existing Reservoir Site

Creek Chubsucker
Potential Habitat



1:72,410

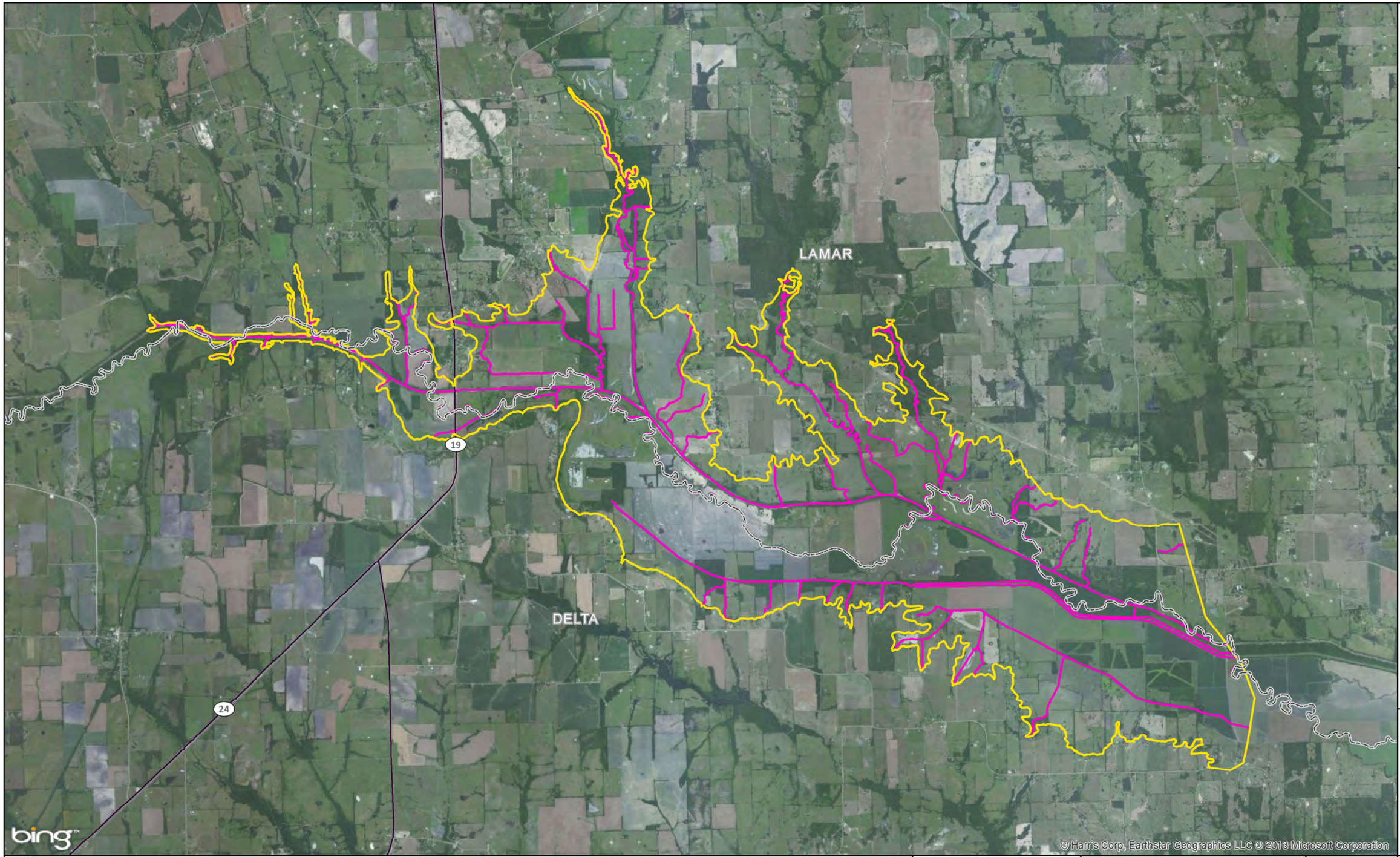
0 1 2 Miles

N
W E
S

40

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\36-42_CS_Habitat\40_PH1_CCS_Habitat.mxd



U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Parkhouse II Alternative Reservoir Site

Threatened and Endangered Species Potential Habitat: Creek Chubsucker

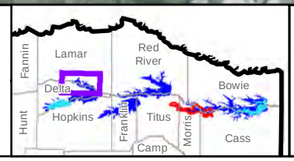
FN PROJECT NO.	MHP11453
DATE CREATED	6/13/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	41_PH2_CCS_Habitat
PREPARED BY	SSJ

FREESE NICHOLS
4500 International Plaza Suite 200
Fort Worth, Texas 76109-4895
(817) 735-7300

County Boundary
City Boundaries

Parkhouse II
Alternative Reservoir Site
(410 ft. msl)

Creek Chubsucker
Potential Habitat



1:67,800

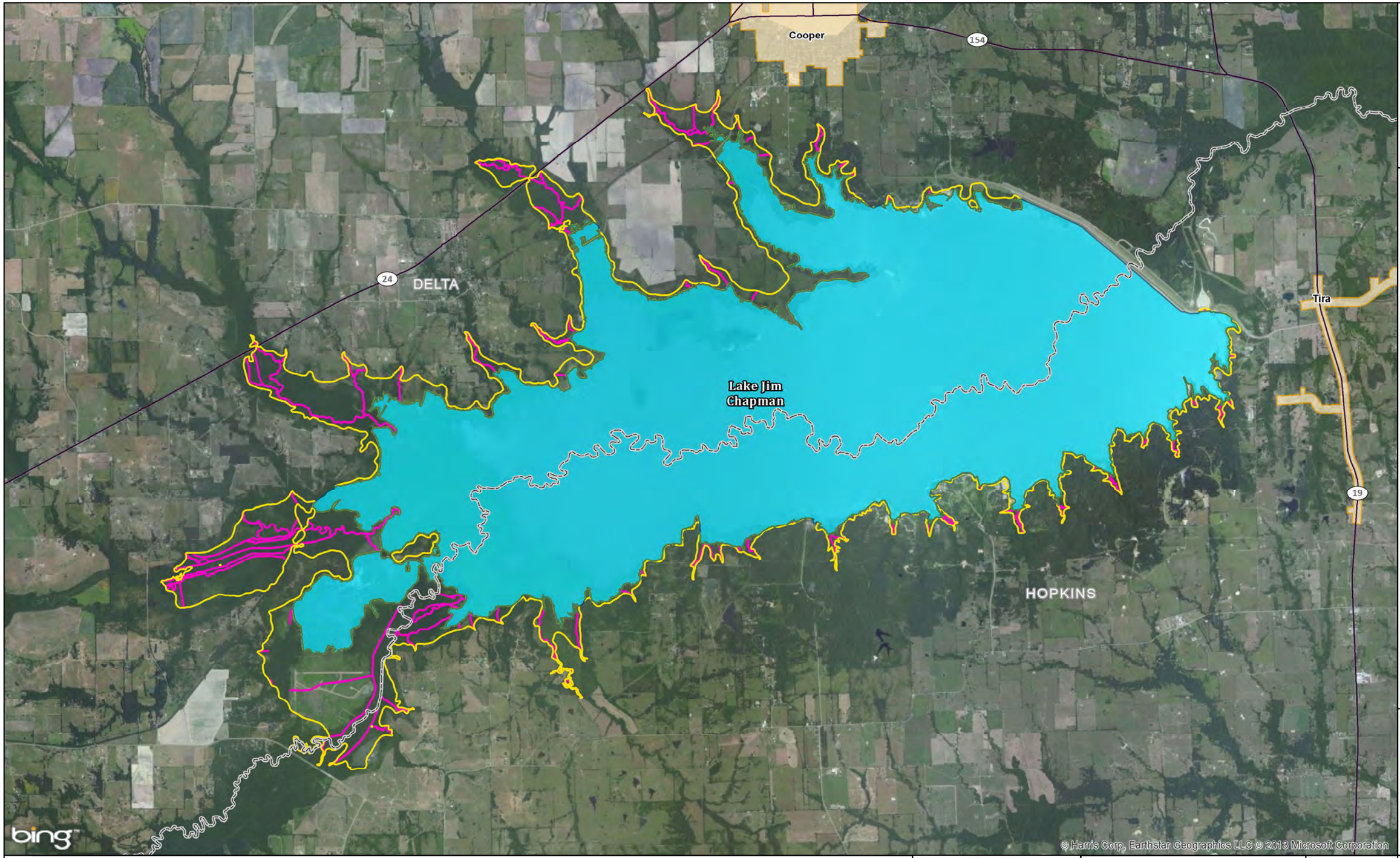
0 1 2 Miles

N W E S

41

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\36-42_CS_Habitat\41_PH2_CCS_Habitat.mxd



U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Sulphur River Basin

Proposed Jim Chapman Reallocation (446.2 ft. msl)

Threatened and Endangered Species Potential Habitat: Creek Chubsucker

FN PROJECT NO.	MHP11453
DATE CREATED	6/13/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	42_JC_CCS_Habitat
PREPARED BY	SSJ

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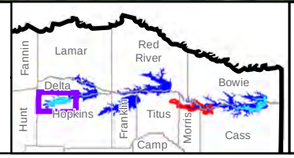
4500 International Plaza Suite 200
Fort Worth, Texas 76109-4895
(817) 735-7300

County Boundary
City Boundaries

Proposed Jim Chapman Reallocation (446.2 ft. msl)

Existing Reservoir Site

Creek Chubsucker Potential Habitat



1:66,970

0 1 2 Miles

N W E S

42

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\36-42_CS_Habitat\42_JC_CCS_Habitat.mxd

Oklahoma
Texas
Oklahoma
Arkansas
FANNIN
LAMAR
RED RIVER
BOWIE
DELTA
HUNT
HOPKINS
FRANKLIN
TITUS
MORRIS
CASS
CAMP
RAINS
WOOD
Honey Grove
Roxton
Pecan Gap
Ladonia
Toco
Paris
Reno
Sun Blossom Valley
Detroit
Clarksville
Annona
Avery
De Kalb
Deport
Bogata
Talco
Tira
Cooper
Commerce
Campbell
Cumby
Sulphur Springs
Mount Vernon
Winfield
Miller's Cove
Mount Pleasant
Como
Rocky Mound
Pittsburg
Winnsboro
Point
Yantis
New Boston
Hooks
Leary
Red Lick
Texarkana
Nash
Wake Village
Redwater
Maud
Domino
Douglassville
Naples
Omaha
Marietta
Queen City
Atlanta
Daingerfield
Hughes Springs
Linden
Lone Star
Avinger
27
317
3
234
41
108
70
87
32
71
82
259
86
98
271
37
19
24
67
77
8
338
49
59
43
11
155
154
69

FN PROJECT NO.	UFH12387
DATE CREATED	6/13/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	Fig 43 ZAPs
PREPARED BY	SVC

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT

Comparative Analysis Sulphur River

Zones of Archaeological Potential (ZAP) Outside of Previous Survey

FREESE NICHOLS
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Fort Worth, Texas 76109-4895
(817) 735-7300

NHD Flowline
Existing Reservoir
0.5 KM Buffer
Alternative Reservoir Site

Zones of Archaeological Potential

0 (Lowest) 1 2 3 4 (Highest)

PROJECT LOCATION

1:450,000
0 5 10 Miles

N W E S

43

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\43-\Fig 43 ZAPs.mxd

Upper Sulphur Basin	
Segment ID	**Segment Name**
0303	Sulphur/South Sulphur River
0303A	Big Creek Lake (unclassified water body)
0303H	Big Creek (unclassified water body)
0305	North Sulphur River
0305A	Rowdy Creek (unclassified water body)
0305B	Auds Creek (unclassified water body)
0305C	Hickory Creek (unclassified water body)
0305D	Big Sandy Creek (unclassified water body)
0306	Upper South Sulphur River
0307	Cooper Lake
0307A	Middle Sulphur River (unclassified water body)
0307B	Jernigan Creek (unclassified water body)
0307C	Pecan Creek (unclassified water body)

Paris
Reno
Blossom
Detroit
Clarksville
Toco
LAMAR
RED RIVER
Dodd City
Windom
Deport
Whitewright
Future Ralph Hall Reservoir
Parkhouse II 410 ft.msl
Bogata
Parkhouse I 401 ft. msl
Upper Sulphur Basin
Trenton
Leonard
DELTA
Proposed Jim Chapman Reallocation 446.2 ft. msl
Talco
Blue Ridge
Celeste
HUNT
COLLIN
TITUS
FRANKLIN
HOPKINS
Mount Vernon
Winfield
Miller's Cove
Princeton
Farmersville
Campbell
Sulphur Springs
Cumby
Greenville
Caddo Mills
Nevada
Como

0305A 0305B 0305C 0305D 0305 0303J 0303C 0303K 0303 0303A 0303H 0307 0307C 0307B 0307A 0306 0303G 0303B 0303F 0303D 0303I 0303E

82 121 11 160 69 78 34 224 380 462 66 271 37 67 19 30 154 11

County Boundary
City Boundary
Upper Sulphur Basin
Existing Reservoir
Evaluated TCEQ Segments
NHD Flowline
Alternative Reservoir Sites
Future Ralph Hall (Not in Project)

1:325,000
0 2.5 5 10 Miles

N W E S

44

FIGURE

FN PROJECT NO. MHP11453
DATE CREATED 6/14/2013
DATUM & COORDINATE SYSTEM NAD83 State Plane (feet) Texas North Central
FILE NAME 44_Upper_Sulphur
PREPARED BY SSJ

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT
Comparative Water Quality Analysis

Upper Sulphur Basin

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Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\44\44_Upper_Sulphur.mxd

Middle Sulphur Basin	
Segment ID	Segment Name
0303	Sulphur/South Sulphur River
0303B	White Oak Creek (unclassified water body)
0303C	Morrison Branch (unclassified water body)
0303D	Rock Creek (unclassified water body)
0303E	East Caney Creek (unclassified water body)
0303F	Stouts Creek (unclassified water body)
0303G	North Caney Creek (unclassified water body)
0303I	Big Creek (unclassified water body)
0303J	Cuthand Creek (unclassified water body)
0303K	Little Mustang Creek (unclassified water body)
0303L	Kickapoo Creek (unclassified water body)

Paris
Reno
Sun Valley
Blossom
LAMAR
RED RIVER
BOWIE
Avery
Deport
Marvin Nichols 1A
328 ft. msl
0303L
0303J
0303C
0303K
0305B
0305C
0305D
0302C
Ladonia
Pecan Gap
0305
Upper Sulphur Basin
0303A
0303H
DELTA
Cooper
Tira
0307
0307B
0307C
0307A
HUNT
Commerce
HOPKINS
0306
0303G
Middle Sulphur Basin
0303B
0303
Talco
370 ft. msl
TITUS
Mount Pleasant
Winfield
Miller's Cove
Omaha
Naples
MORRIS
Campbell
Cumby
0303D
0303I
FRANKLIN
Como
0303E
CAMP
Rocky Mound
Daingerfield

County Boundary
City Boundary
Middle Sulphur Basin
Existing Reservoir
Evaluated TCEQ Segments
NHD Flowline
Alternative Reservoir Sites
Future Ralph Hall (Not in Project)

1:325,000
0 2.5 5 10 Miles

N W E S

45
FIGURE

FN PROJECT NO. MHP11453
DATE CREATED 6/14/2013
DATUM & COORDINATE SYSTEM NAD83 State Plane (feet) Texas North Central
FILE NAME 45_Middle_Sulphur
PREPARED BY SSJ

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT
Comparative Water Quality Analysis

Middle Sulphur Basin

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Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\44\45_Middle_Sulphur.mxd

Lower Sulphur Basin	
Segment ID	**Segment Name**
0302	Wright Patman Lake
0302A	Big Creek (unclassified water body)
0302B	Boone Creek (unclassified water body)
0302C	Anderson Creek (unclassified water body)
0302D	Caney Creek (unclassified water body)
0302E	Rice Creek (unclassified water body)
0303	Sulphur/South Sulphur River
0303B	White Oak Creek (unclassified water body)

Oklahoma

RED RIVER

BOWIE

FRANKLIN

TITUS

MORRIS

CASS

CAMP

Arkansas

Louisiana

Texas

Avery

De Kalb

New Boston

Red Lick

Texarkana

Hooks

Leary

Nash

Wake Village

Bogata

Talco

Mount Vernon

Winfield

Miller's Cove

Mount Pleasant

Omaha

Naples

Marietta

Queen City

Atlanta

Bloomburg

Domino

Rocky Mound

Daingerfield

Linden

0303J

0303C

0303K

0303

0303B

0302C

0302A

0302D

0302E

0302B

0302

0303B

0303

Proposed Wright Patman Reallocation 237.5 ft. msl

Proposed Wright Patman Reallocation 259.5 ft. msl

Lower Sulphur Basin

Middle Sulphur Basin

87 32 41 380 108 259 82 86 296 245 49 196 271 30 67 338 77 8 59 249 160 43 237 71 134 11 1 168

County Boundary
City Boundary
Lower Sulphur Basin
Existing Reservoir
Evaluated TCEQ Segments
NHD Flowline
Alternative Reservoir Sites

1:325,000
0 2.5 5 10 Miles

N W E S

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT
Comparative Water Quality Analysis

Lower Sulphur Basin

FN PROJECT NO.	MHP11453
DATE CREATED	6/14/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	46_Lower_Sulphur_Basin
PREPARED BY	SSJ

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46

FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\44\46_Lower_Sulphur_Basin.mxd

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT
Comparative Water Quality Analysis
Major Aquifers within the Sulphur Basin

FN PROJECT NO.	UFH12387
DATE CREATED	6/14/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	Fig47_Major_Aquifers
PREPARED BY	SVC

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Fort Worth, Texas 76109-4895
(817) 735-7300

LAMAR
RED RIVER
TRINITY AQUIFER
FANNIN
DELTA
Upper Sulphur Basin
Middle Sulphur Basin
Lower Sulphur Basin
BOWIE
COLLIN
HUNT
HOPKINS
CARRIZO AQUIFER
FRANKLIN
TITUS
MORRIS
CASS
CAMP
RAINS
WOOD
UPSHUR
MARION
ROCKWALL
KAUFMAN
VAN ZANDT
HARRISON

Oklahoma
Texas
Oklahoma
Arkansas
Arkansas
Texas
Louisiana

Ravenna, Savoy, Ector, Bonham, Dodd City, Windom, Trenton, Leonard, Blue Ridge, Celeste, Farmersville, Josephine, Nevada, Caddo Mills, Greenville, Campbell, Cumby, Royse City, Fate, Union Valley, Rockwall, Quinlan, Hawk Cove, West Tawakoni, East Tawakoni, Point, Lone Oak, McLendon-Chisholm, Alba, Quitman, Emory, Yantis, Winnsboro, Como, Paris, Reno, Toco, Detroit, Miller's Cove, Winfield, Mount Pleasant, Omaha, Rocky Mound, Pittsburg, Daingerfield, Lone Star, Hughes Springs, Avinger, Ore City, Gilmer, Jefferson, Linden, Atlanta, Queen City, Bloomburg, Domino, Wake Village, Nash, Red Lick, Leary, Hooks, Texarkana

PROJECT LOCATION

1:600,000
0 4.5 9 18 Miles

N W E S

NHD Flowline
Evaluated TCEQ Segments
Existing Reservoir
Alternative Reservoir Sites
Carrizo Aquifer
Trinity Aquifer
Sulphur River Basin

47
FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\44\Fig47_Major_Aquifers.mxd

Minor Aquifers within the Sulphur Basin

U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT
Comparative Water Quality Analysis

FN PROJECT NO.	UFH12387
DATE CREATED	6/14/2013
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas North Central
FILE NAME	Fig48_Minor_Aquifers
PREPARED BY	SVC

FREESE NICHOLS
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WOODBINE AQUIFER
BLOSSOM AQUIFER
NACATOCH AQUIFER
QUEEN CITY AQUIFER

LAMAR
RED RIVER
FANNIN
BOWIE
DELTA
COLLIN
HUNT
HOPKINS
FRANKLIN
TITUS
MORRIS
CASS
CAMP
ROCKWALL
KAUFMAN
VAN ZANDT
RAINS
WOOD
UPSHUR
MARION
HARRISON

Upper Sulphur Basin
Middle Sulphur Basin
Lower Sulphur Basin

Oklahoma
Texas
Oklahoma
Arkansas
Arkansas
Texas
Louisiana

Ravenna, Paris, Reno, Detroit, Toco, Savoy, Ector, Bonham, Dodd City, Windom, Trenton, Leonard, Blue Ridge, Celeste, Farmersville, Campbell, Cumby, Greenville, Caddo Mills, Josephine, Nevada, Royse City, Fate, Union Valley, Rockwall, Quinlan, Hawk Cove, West Tawakoni, East Tawakoni, Point, Lone Oak, Como, Winnsboro, Yantis, Emory, Quitman, Alba, McLendon-Chisholm, Mount Pleasant, Winfield, Miller's Cove, Omaha, Rocky Mound, Pittsburg, Daingerfield, Hughes Springs, Lone Star, Avinger, Linden, Queen City, Atlanta, Bloomburg, Domino, Hooks, Leary, Red Lick, Texarkana, Nash, Wake Village, Ore City, Gilmer, Jefferson

NHD Flowline
Evaluated TCEQ Segments
Existing Reservoir
Alternative Reservoir Sites
Sulphur River Basin
Blossom Aquifer
Nacatoch Aquifer
Queen City Aquifer
Woodbine Aquifer

PROJECT LOCATION

1:600,000
0 4.5 9 18 Miles

N W E S

48
FIGURE

Path: H:\ENVIRONMENTAL\FINAL_EXHIBITS\44\Fig48_Minor_Aquifers.mxd

APPENDIX I

PERTINENT CULTURAL RESOURCE REPORTS

Appendix I
Pertinent Cultural Resource Reports

Lake Wright Patman

Title	Author	Year	Company
Cultural Resource Inventory of 1,394 Acres at Wright Patman Lake and Lake O' the Pines, Bowie, Camp, Cass, Marion, and Upshur Counties, Texas -APPENDIX E only, see final report, separate document	Rose, Daniel and Richard Jones	2009	Ecological Communications Corporation
Cultural Resource Inventory of 1,070 Acres at Lake Wright Patman, Cass County, Texas	Jones, Richard S. and W. Nicholas Trierweiler	2007	Ecological Communications Corporation
An Archeological Inventory of 99 Acres at Lake Wright Patman Cass County, Texas	Trierweiler, W. Nicholas	2004	Ecological Communications Corporation
Cultural Resources Letter Report on Proposed Modifications to Existing Loop Road and Construction of Additional New Loop Road at Jackson Creek Park, Lake Wright Patman, Texarkana, Texas	Austin, Stephen P.	2002	
Intensive Pedestrian Survey at Lake O' the Pines and Wright Patman Lake, Bowie, Cass and Marion Counties, Texas: 1997	Cliff, Maynard B. and Steven M. Hunt	1998	Geo-Mairne, Inc.
Cultural Resources Survey of 245 Acres at the White Oak Creek Wildlife Management Area, Cass, Morris, and Titus Counties, Texas	Hunt, Stephen M., and Cliff, Maynard B.	1998	Geo-Mairne, Inc.
Cultural Resources Survey 1996: Wright Patman Lake and Lake O' the Pines, Bowie, Cass and Marion Counties, Texas	Lindsey, Sue E. Linder and Linda D. Lindsay	1997	LL Consultants
Cultural Resources Testing of Two Sites Within The White Oak Creek Wildlife Management Area, Bowie And Titus Counties, Texas	Largent, B.Floyd, Debra L. Beene, Maynard B.Cliff, and Steven M. Hunt	1997	Geo-Mairne, Inc.
Geoporphological Investigations and Inventory of Cultural Resources Along And Near the Bowie County Levee, Bowie County, Texas: 1996	Cliff, Maynard, Steven Hunt, Melissa Green, Rebecca Procter, Floyd Largent Jr.,& Whitney Autin	1997	Geo-Mairne, Inc.
Cultural Resources Survey of 1,342 Hectares (3,317 Acres) Within the Red River Army Depot and Lone Star Army Ammunition Plant	Cliff, Maynard D., S. Hunt, M. Green, D. Peter and F. Kent	1996	Geo-Mairne, Inc.
Cultural Resources Survey of 600 Acres at Wright Patman Lake, Bowie and Cass Counties,	Cliff, M. B., S. M. Hunt, D. Pleasant, R. Procter, and H. B. Ensor	1996	Geo-Mairne, Inc.

This is not intended to be an exhaustive literature review. Additional report references are available for this area.

Appendix I
Pertinent Cultural Resource Reports

Lake Wright Patman

Title	Author	Year	Company
An Archeological Survey of the Texarkana Reservoir Enlargement Area: Report on the First Season	Briggs, A. and J. Malone	1970	Texas State Historical Survey Committee.
An Archaeological Survey of the Texarkana Reservoir Enlargement Area. Archaeological Survey Report No. 7	Briggs, A. K., and J. Malone	1970	Texas State Historical Survey Committee.

Parkhouse I Reservoir

Title	Author	Year	Company
Archeological Survey of the City Lakes Area and Geomorphological and Magnetometer Surveys, Cooper Lake Project, Delta and Hopkins Counties, Texas	Bailey, Gail L., Douglas K. Boyd, and C. Britt Bousman	1991	Prewitt and Associates
Review of Cultural Resources Investigations at Cooper Lake, Delta and Hopkins Counties, Texas	Fields, Ross C., Douglas K. Boyd, C. Britt Bousman, and Jerrilyn B. McLerran	1991	Prewitt & Associates
The James Franks Site (41DT97): Excavations at a Mid-Nineteenth Century Farmstead in the South Sulphur River Valley, Cooper Lake Project, Texas	Perttula, Timothy K., ed.	1989	Institute of Applied Science, Univ. of North Texas
Quaternary Geomorphology at Cooper Basin: A Framework for Archeological Inquiry, Delta and Hopkins Counties, Texas	Bousman, C. Britt, Michael B. Collins, and Timothy K. Perttula	1988	Prewitt & Associates, Inc.
Evaluation of the Archaeology at the Proposed Cooper Lake	Doehner, K., D. Peter, and S. A. Skinner w/ J. Saunders, J. Morris, A. Cleveland & J. Henderson	1978	Southern Methodist University
Archaeological Research at Cooper Lake 1970 - 1972.	Hyatt, R., B. Butler, and H. Mosca, III	1974	Southern Methodist University

This is not intended to be an exhaustive literature review. Additional report references are available for this area.

Appendix I
Pertinent Cultural Resource Reports

Parkhouse I Reservoir

Title	Author	Year	Company
Preliminary Report on the Archaeological Resources of the Cooper Reservoir, Delta and Hopkins Counties, Texas	Skinner, S. Alan and Robert D. Hyatt	1973	Southern Methodist University
Archaeological Resources of the Cooper Reservoir, Texas	Hyatt, Robert D. and S. Alan Skinner	1971	Southern Methodist University
Archeological Reconnaissance at Cooper Reservoir, Delta and Hopkins Counties, Texas,	Duffield, L. F.	1959	University of Texas, Austin

Parkhouse II and Talco Reservoirs

Title	Author	Year	Company
Cultural Resources Survey of the Natural Gas Pipeline Company of America Southern Interconnect Pipeline, Lamar, Red River, Franklin, Morris, and Cass Counties, Texas	Perttula, Timothy K., and Randy Nathan	1988	Institute of Applied Sciences, Univ. of North Texas

Marvin Nichols 1A Reservoir

Title	Author	Year	Company
Cultural Resources Letter Report on Proposed Modifications to Existing Loop Road and Construction of Additional New Loop Road at Jackson Creek Park, Lake Wright Patman, Texarkana, Texas	Austin, Stephen P.	2002	Prewitt and Associates
County Road 347: Bridge Replacement at Sulphur River	Frank A. Weir	1989	SDHPT
Cultural Resources Survey of the Natural Gas Pipeline Company of America Southern Interconnect Pipeline, Lamar, Red River, Franklin, Morris, and Cass Counties, Texas	Perttula, Timothy K., and Randy Nathan	1988	Institute of Applied Sciences, Univ. of North Texas

This is not intended to be an exhaustive literature review. Additional report references are available for this area.

Appendix I
Pertinent Cultural Resource Reports

Marvin Nichols 1A Reservoir

Title	Author	Year	Company
Archaeological Site Evaluations: Monticello-Winfield Mine, Titus and Franklin Counties, Texas	Bond, Clell	1984	Espey, Huston & Associates, Inc.
Final Report: A Cultural Resources Survey of Portions of Harts Bluff Ranch in Connection with Corps of Engineers Permit No. SWF-81-TITUS-396	Heartfield, L.	1982	Heartfield, Price and Greene, Inc.
Draft Final Report: Appendix A: A Cultural Resources Survey of High Site Probability Locations Which Will Be Affected by Proposed Levee Construction within Angelina Farms, Red River County, Texas	Heartfield, L.	1982	Heartfield, Price and Greene, Inc.
Survey of Cultural Resources of the Proposed Big Pine Lake.	Hyatt, R. and H. Mosca	1972	Southern Methodist University

Lake Jim Chapman

Title	Author	Year	Company
Archeological investigations at 41DT11, 41DT21, 41DT50, 41DT54, and 41DT63 at Cooper Lake, Delta County, Texas (Reports of investigations)	Eloise F Gadus	1992	Prewitt and Associates
Review of Cultural Resources Investigations at Cooper Lake, Delta and Hopkins Counties, Texas	Fields, Ross C., Douglas K. Boyd, C. Britt Bousman, and Jerrilyn B. McLerran	1991	Prewitt & Associates
Archeological Survey of the City Lakes Area and Geomorphological and Magnetometer Surveys, Cooper Lake Project, Delta and Hopkins Counties, Texas	Bailey, Gail L., Douglas K. Boyd, and C. Britt Bousman	1991	Prewitt and Associates, Inc.
The James Franks Site (41DT97): Excavations at a Mid-Nineteenth Century Farmstead in the South Sulphur River Valley, Cooper Lake Project, Texas	Perttula, Timothy K., ed.	1989	Institute of Applied Science, Univ. of North Texas

This is not intended to be an exhaustive literature review. Additional report references are available for this area.

Appendix I
Pertinent Cultural Resource Reports

Lake Jim Chapman

Title	Author	Year	Company
Quaternary Geomorphology at Cooper Basin: A Framework for Archeological Inquiry, Delta and Hopkins Counties, Texas	Bousman, C. Britt, Michael B. Collins, and Timothy K. Perttula	1988	Prewitt & Associates, Inc.
Evaluation of the Archaeology at the Proposed Cooper Lake	Doehner, K., D. Peter, and S. A. Skinner w/ J. Saunders, J. Morris, A. Cleveland & J. Henderson	1978	Southern Methodist University
Archaeological Research at Cooper Lake 1970 - 1972.	Hyatt, R., B. Butler, and H. Mosca, III	1974	Southern Methodist University
Archaeological Resources of the Cooper Reservoir, Texas	Hyatt, Robert D. and S. Alan Skinner	1971	Southern Methodist University
Archeological Reconnaissance at Cooper Reservoir, Delta and Hopkins Counties, Texas,	Duffield, L. F.	1959	University of Texas, Austin

APPENDIX II

DEVELOPMENT OF THE ZONES OF ARCHAEOLOGICAL SITE POTENTIAL FOR THE SULPHUR RIVER BASIN

Appendix II
Development of the Zones of Archaeological Site Potential for the Sulphur River Basin

Cultural Site Distribution and Predictive Analysis Methodology

To determine cultural resource potential outside of previous archaeological work, five physiographic criteria were used to assess the project area based on accepted predictive model elements, including geomorphic setting, slope aspect, soil development, land cover and distance to a water source (Mehrer and Wescott, 2006). These criteria are based on the United States Department of Agriculture's (USDA) soil surveys for Bowie, Cass, Delta, Franklin, Hopkins, Lamar, Morris, Red River, and Titus counties, the National Hydrography Dataset (NHD) flow lines collected from the United States Geological Survey (USGS), ten meter digital elevation models (DEM) produced by the USGS, and land use/cover from the National Land Cover Database (NLCD) collected from the Multi-Resolution Land Characteristics Consortium. Analyses of these data where conducted using ArcGIS to produce a layer depicting Zones of Archaeological Potential (ZAP) for assessing the extent of area that may contain the largest concentration of unrecorded resources within each of the alternative reservoir sites. An explanation of the assumptions associated with each of the five criteria used in the ZAP layer is presented in the following paragraphs.

Geomorphic Setting

Geomorphic setting is an important factor in site distribution, as available food/material sources and climatic/environmental risks associated with land form development affect human survival strategy. It is expected that settings perceived as advantageous by one culture are often the ones used by subsequent cultures, particularly in the same geographic area. This principle results in reoccurring patterns associated with site environments. Aside from reoccurring use, the geomorphic setting is also a potential factor in site preservation, as settings dominated by erosion and weathering tend to degrade sites but leave them visible on the surface while those dominated by sedimentation/deposition tend to preserve sites but obscure them at the surface. It is therefore expected that, at least on a smaller scale, differences between geomorphic settings can affect site research potential. To evaluate site distribution across geomorphic settings, a portion of previously recorded sites (n = 757) were tallied for associated geomorphic description in each USDA soil unit across the nine county area. Site counts associated with the USDA geomorphic description were evaluated based on age (Prehistoric or Historic). Nine geomorphic groups were represented in the site counts across all six project areas including:

1. **Interfluves on Coastal Plains:** Local rises between drainages
2. **Ridges on Coastal Plains:** Elevation rises above plains
3. **Stream Terraces on Coastal Plains:** Former floodplains abandoned due to historic/prehistoric stream degradation
4. **Floodplains on Coastal Plains:** Relatively flat areas along stream dominated by overbank flood deposits
5. **Marine Terraces on Coastal Plains:** Remnant marine platform developed earlier in geologic history
6. **Circular Gilgai on Floodplains:** Subsequent shallow depressions and mounds due to dynamic soil movement (gilgai) on geomorphic floodplains
7. **Depressions on Stream Terraces:** Gilgai and erosional features on terraces
8. **Borrow Pits on Interfluves:** Interfluves typically composed of sand or stream gravels that may contain material for industrial use
9. **Natural Levees on Floodplains:** Berms or areas protected by natural berms deposited by channel over bank deposits.

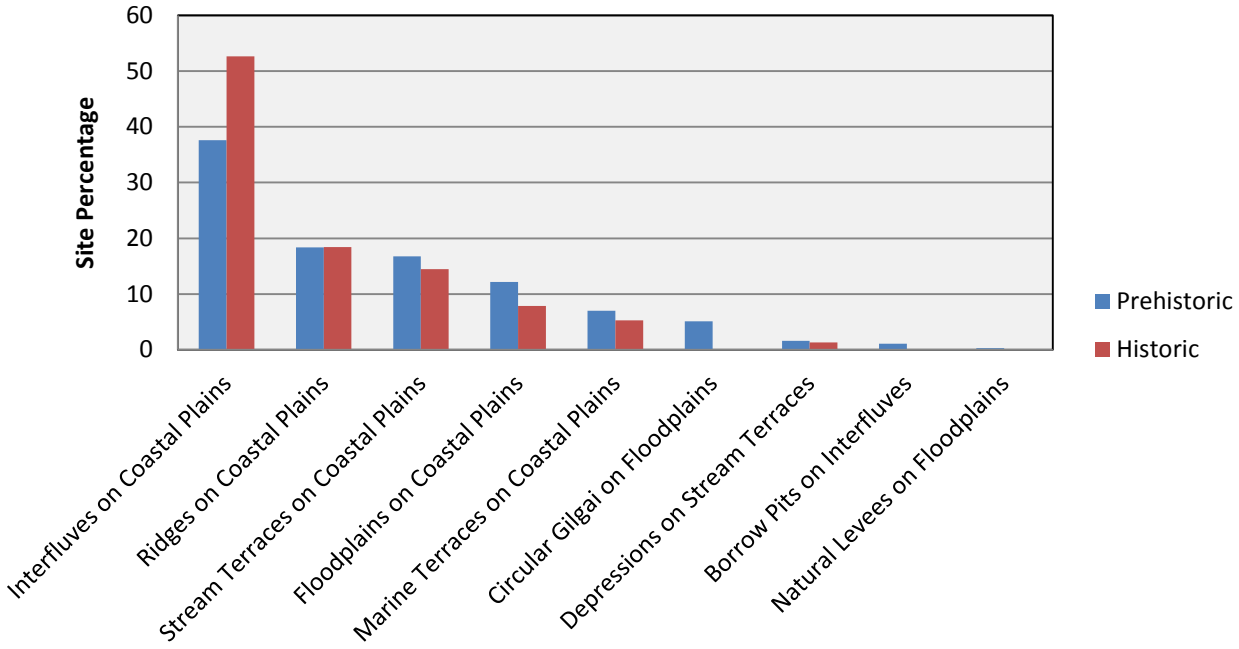


Figure 1: Site occurrence frequency for nine geomorphic landforms by age category

As Figure 1 shows, the percentage of sites is greatest for Interfluves on Coastal Plains. To be as representative as possible, all landforms with site counts totaling ten percent or greater were included as favorable areas for site occurrence. This criterion resulted in four higher probability landforms used in this analysis; Interfluves on Coastal Plains, Ridges on Coastal Plains, Stream Terraces on Coastal Plains and Floodplains on Coastal Plains.

Soil Taxa

Soil taxonomy is an important classification that categorizes soils based on developmental and environmental factors. The soil order, in the taxonomic classification, groups soil types based on physical and chemical characteristics that can be used to understand recent geologic history and landscape development. Similar to the previous assessment, sites were evaluated within the USDA soil survey based on the soil taxonomic order. Five soil orders were represented including:

1. **Inceptisols:** Soils typically formed quickly in parent material with little to no accumulation of illuvial clays or oxides and poor horizon development
2. **Entisols:** Poorly formed soils with no horizonation
3. **Vertisols:** Soils developing with expansive clays, often resulting in pedoturbation that prevents or obscures clear horizonation
4. **Ultisols:** Soils forming clear horizons with high acidity and no pedogenic carbonates
5. **Alfisols:** Soils typically formed in forested regions with clear horizonation, illuvial clays and oxides, often with pedogenic carbonates.

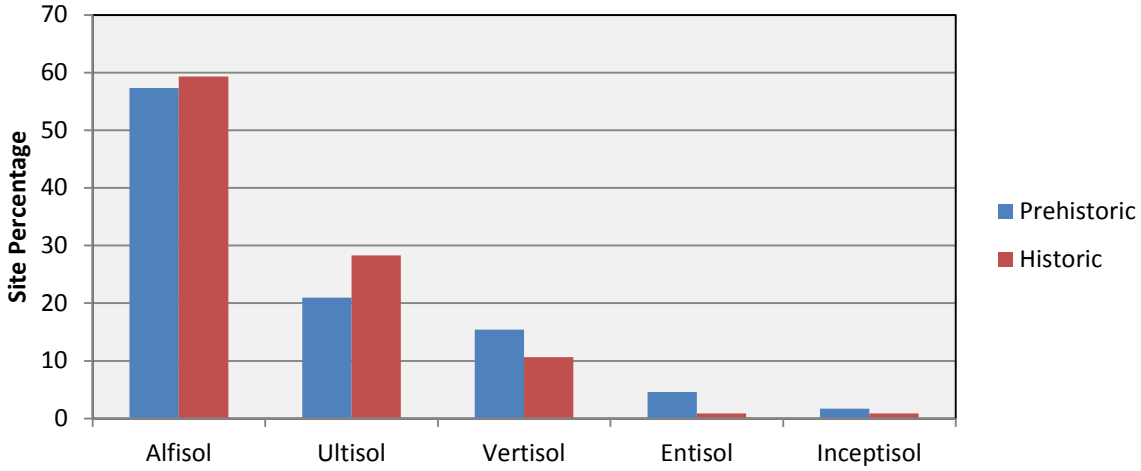


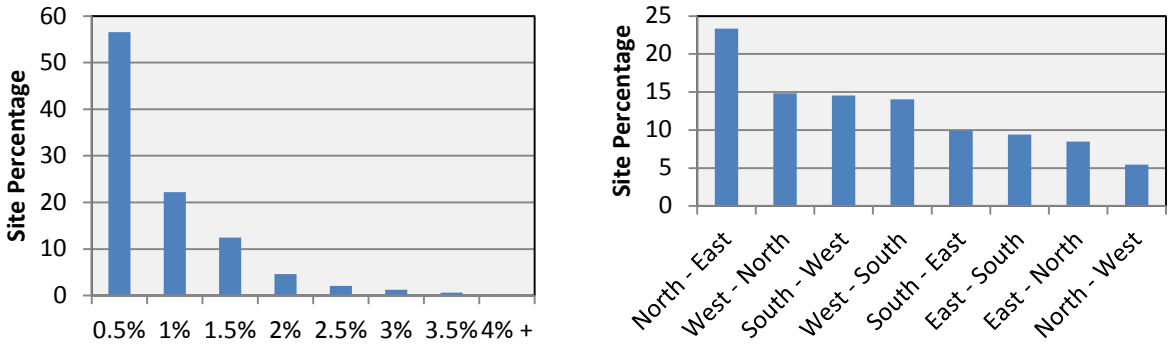
Figure 2: Site occurrence frequency for USDA Soil Taxa order categorized by age

Based on Figure 2 Alfisols, Ultisols, and Vertisols make up the predominant (>/= 10%) soil orders with which sites in the project area are associated. It should be noted that these counts have the potential to be skewed as Entisols and Inceptisols can represent dynamic sedimentary environments that can obscure cultural resources at the surface. Despite this possibility, Alfisols, Ultisols, and Vertisols are considered to have the greatest potential for cultural resources base on the current data.

Slope and Aspect

Slope is a potential factor in site occurrence, as this affects mobility and stability of occupants during site development and determines the degree and direction of dispersal for eroding materials. Associated

with slope is the aspect or direction of the slope face. Slope aspect is often more important in mountainous regions with differential sun and wind exposure, but river valleys are also subject to site location patterns with regards to slope face direction due to slope steepness, vegetation differences and channel migrations. Using ten-meter DEMs for the project area, the percent slope and aspect was calculated for the 757 sites used in the previous analyzes. The results are shown in Figure VII.3.



A. **B.**

Figure 3A. Percentage of sites by slope percent. Figure 3B. Percentage of sites by slope aspect group. North – East ranged from 0 to 45 degrees, East – North ranged from 45 to 90 degrees, East – South ranged from 90 to 135 degrees, South – East ranged from 135 to 180, South – West ranged from 180 to 225 degrees, West – South ranged from 225 to 270, West – North ranged from 270 to 315 degrees, North – West ranged from 315 to 360 degrees.

Based on Figure 3, the predominant site slope criteria (>/= 10%) suggest that slopes between 0 and 1.5% grade with an aspect trending west (between 180 and 315 degrees) to northeast (between 0 and 45 degrees) provide the most favorable site conditions and were used as a combined slope factor for the ZAP model.

Land Cover

An assessment of land cover can provide indications of the distribution of animal habitats, vegetative communities and modern land use that is beneficial in assessing historic conditions and the degree of ground disturbance. Using the National Land Cover Dataset (NLCD), site locations were assessed based on eight simplified classes. The results of this analysis are shown in Figure 4.

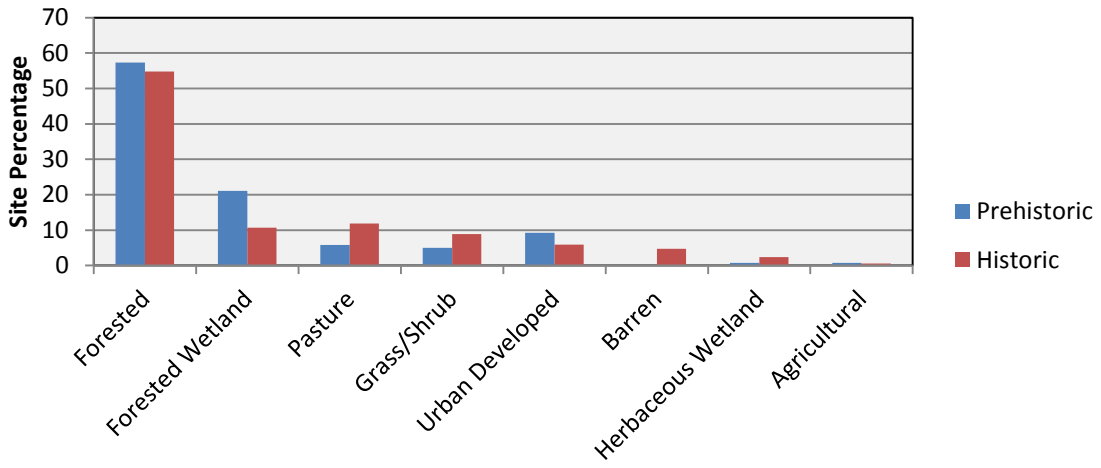
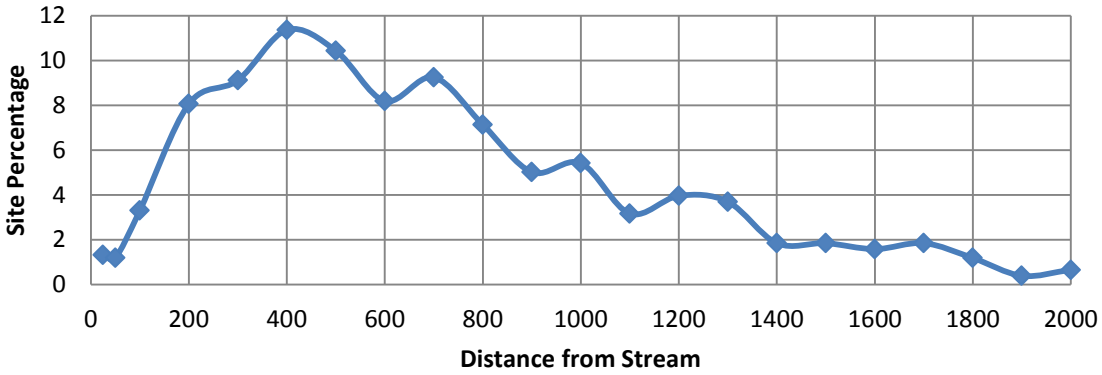


Figure 4: Percentage of sites across land cover types.

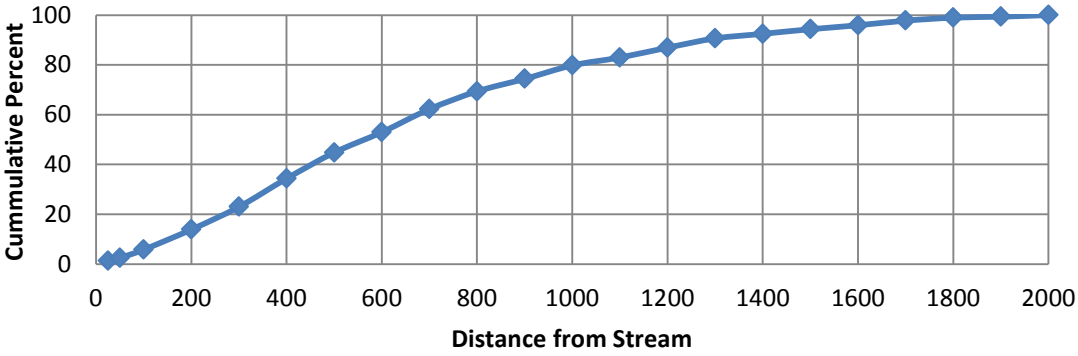
Based on the data in Figure 4, land with tree cover tends to have the highest concentration of sites. Percentage rank order differences between historic and prehistoric sites were noted with pastureland pushing the historic site occurrence beyond the 10% threshold. Forested land, forested wetlands, and pastureland are expected to be the most favorable land covers for cultural resources in this area.

Hydrologic Proximity

The last consideration is based on site relation to available water. As water is a draw for food sources and is a necessity for survival, it is expected that human occupation will be based on the dispersion of fresh water. To evaluate site frequency and its relation to water sources, site tallies were conducted at 100-ft. intervals from the NHD stream flow lines. Figure 5 presents these results with the percentage of sites within 100-ft. intervals in Part A and the cumulative percentage of sites in Part B. As these graphs show, the largest occurrence of sites is between 200 and 700 feet from a water source with 80% being located at or less than 1000 feet from NHD flow lines. Using this information it is expected that the highest percentage of cultural properties will be identified within 1,000 feet of stream features.



A.



B.

Figure 5: Site occurrences by distance from the NHD streams. A. Percentage of sites by distance from a stream at 100-ft. intervals 5B. Cumulative percent of sites for each 100-ft. interval.

Building the Zone of Archaeological Potential layer for the Sulphur River Basin

The favorable characteristics discussed previously were combined to create a layer representing areas with a higher probability for containing cultural resources (Figure 43 within the report), discussed here as Zones of Archaeological Potential (ZAP). This layer was developed by creating a 1,000-ft. buffer around the NHD flow lines within the proposed project areas. Next, the USDA soils data was extracted for each alternative reservoir and a value was given for each soil unit based on the presence (1) or absence (0) of the favorable soil characteristics. Next the favorable slope and land cover data was joined to the soils data within the alternative reservoir areas. The values for the resulting polygon layer were summed to create a tiered priority index for each soil unit within 1,000 feet of the NHD flow lines. To reduce the potential coverage area for the ZAP layer, locations currently inundated by water bodies and area covered in previous survey were removed from the dataset. The maximum for the priority index is 4 with a minimum value of 0 (Table 1). Soil units with a value of 4 are expected to have the greatest chance for cultural resource discoveries.

Table 1: Method for assigning zones of archaeological site potential

Setting Criteria	Slope Criteria	Order Criteria	Land Criteria	Calculation
One of Landforms 1 - 4	</= 1.5 Degrees/ West – Northeast Aspect	One of Taxa 1 -3	Forests and Pasture	Setting + Slope + Order + Cover

	Geomorphic Setting	Slope Aspect	Taxa Order	Cover Type	Priority Level/Zone
Met Criteria	1	1	1	1	4 (Maximum)
Did Not Meet Criteria	0	0	0	0	0 (Minimum)

APPENDIX III

WRIGHT PATMAN CULTURAL RESOURCES

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Wright Patman Cultural Resources

THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41BW15	Bowie	Prehistoric	Artifact Scatter	Likely Not	4	Investigators Recommendation	Gary Shaw	11/2/2000
41BW19	Bowie	Prehistoric	Semi-Permanent Occupation/Habitation	Possibly	3	Insufficient data	R.L. Stephenson	10/6/1949
41BW20	Bowie	Prehistoric	Artifact Scatter	Likely Not	4	Low density artifacts and disturbance	Frank King	8/14/2001
41BW21	Bowie	Prehistoric	Artifact Scatter	Likely	1	Moderate Artifact density and good context	Frank King	8/9/2001
41BW22	Bowie	Prehistoric	Artifact Scatter	Likely Not	4	Investigator Recommendation	Richard S. Jones	11/24/2004
41BW23	Bowie	Prehistoric	Semi-Permanent Occupation/Habitation	Possibly	3	1940's Arch, limited info	R.L. Stephenson	9/21/1949
41BW26	Bowie	Prehistoric	Semi-Permanent Occupation/Habitation	Likely	1	Type listed as village with midden features	R.L. Stephenson and H.C. Taylor	9/14/1949
41BW27	Bowie	Prehistoric	Semi-Permanent Occupation/Habitation	Possibly	3	Site needs to be defined	R.L. Stephenson and H.C. Taylor	9/17/1949
41BW28	Bowie	Caddo	Semi-Permanent Occupation/Habitation	Likely	1	Site type	Gary L. Shaw	
41BW29	Bowie	Prehistoric	Semi-Permanent Occupation/Habitation	Likely	1	Site size and feature types	R.L. Stephenson	9/21/1949
41BW30	Bowie	Prehistoric	Semi-Permanent Occupation/Habitation	Possibly	3	Site type with shallow context	R.L. Stephenson	9/28/1949
41BW31	Bowie	Prehistoric	Semi-Permanent Occupation/Habitation	Likely Not	4	Investigator Comments	R.L. Stephenson	9/28/1949
41BW32	Bowie	Prehistoric	Semi-Permanent Occupation/Habitation	Likely Not	4	Investigator Recommendation	R.L. Stephenson	10/7/1949

*Priority Preservation Values: 1 (High Research Value) - 4 (Poor Research Value), NRHP Eligibility of Flooded = sites within the 227.5 ft pool limits

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THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41BW33	Bowie	Prehistoric	Semi-Permanent Occupation/Habitation	Possibly	2	Site type with unknown context	H.C. Taylor and M.P. Miroir later by R.L. Stephenson	9/14/1949
41BW34	Bowie	Prehistoric	Semi-Permanent Occupation/Habitation	Flooded	2	Site type with unknown context	R.L. Stephenson and H.C. Taylor	9/27/1949
41BW35	Bowie	Prehistoric	Semi-Permanent Occupation/Habitation	Possibly	2	deep fill but sounds like channel cut	R.L. Stephenson	9/23/1949
41BW42	Bowie	Prehistoric	Artifact Scatter	Likely	1	Artifact density and type	Alton K. Briggs	1/28/1970
41BW43	Bowie	Prehistoric	Artifact Scatter	Possibly	2	Artifact density and type	Alton K. Briggs	1/28/1970
41BW44	Bowie	Prehistoric	Artifact Scatter	Possibly	2	Discreet Artifact concentrations	James M. Malone	1/28/1970
41BW45	Bowie	Prehistoric	Artifact Scatter	Flooded	3	Artifact density and type	Alton K. Briggs	1/28/1970
41BW46	Bowie	Prehistoric	Temporary Use/Camp	Likely	1	Potential for datable subsurface	James M. Malone	1/29/1970
41BW47	Bowie	Prehistoric	Artifact Scatter	Flooded	2	Dense artifact scatter possibly destroyed by lake	Alton K. Briggs	1/28/1970
41BW48	Bowie	Prehistoric	Artifact Scatter	Likely Not	4	Likely too disturbed	James M. Malone	1/30/1970
41BW49	Bowie	Prehistoric	Artifact Scatter	Likely Not	4	Investigator Recommendation	Steven Hunt	12/3/1997
41BW50	Bowie	Prehistoric	Semi-Permanent Occupation/Habitation	Possibly	2	Burials excavated, Camp impacts	Steven Ahr	1/21/2002
41BW51	Bowie	Prehistoric	Artifact Scatter	Flooded	3	Site type with unknown context	Alton K. Briggs	1/30/1970

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THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41BW52	Bowie	Prehistoric	Artifact Scatter	Likely Not	4	Investigator Recommendation	Tim Everette	8/13/2001
41BW53	Bowie	Prehistoric	Semi-Permanent Occupation/Habitation	Flooded	1	Investigator Recommendation	Richard Jones	11/24/2004
41BW54	Bowie	Multi-Component	Artifact Scatter	Likely Not	4	Poor context	Alton K. Briggs	
41BW55	Bowie	Prehistoric	Artifact Scatter	Possibly	2	Depth of material	James M. Malone	2/21/1970
41BW56	Bowie	Prehistoric	Semi-Permanent Occupation/Habitation	Likely	1	Artifact density and midden features	Alton K. Briggs	2/21/1970
41BW57	Bowie	Prehistoric	Semi-Permanent Occupation/Habitation	Possibly	2	Reported Burials	Alton K. Briggs	2/21/1970
41BW58	Bowie	Prehistoric	Artifact Scatter	Likely Not	4	Disturbed by recreation area	James M. Malone	2/21/1970
41BW59	Bowie	Prehistoric	Artifact Scatter	Flooded	4	Low Diversity	James M. Malone	2/11/1970
41BW59	Bowie	Prehistoric	Artifact Scatter	Flooded	4	Low Diversity	James M. Malone	2/11/1970
41BW60	Bowie	Prehistoric	Artifact Scatter	Possibly	3	Setting	James M. Malone	2/11/1970
41BW61	Bowie	Prehistoric	Artifact Scatter	Possibly	3	Setting	James M. Malone	2/11/1970
41BW61	Bowie	Prehistoric	Artifact Scatter	Possibly	3	Setting	James M. Malone	2/11/1970
41BW62	Bowie	Prehistoric	Artifact Scatter	Likely Not	4	Investigator Recommendation	Richard S. Jones	11/24/2004

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THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41BW65	Bowie	Prehistoric	Semi-Permanent Occupation/Habitation	Likely	1	Investigator Recommendation	James M. Malone and Alton K. Briggs	2/21/1970
41BW66	Bowie	Prehistoric	Temporary Use/Camp	Likely Not	4	Investigator Recommendation	Tim Everette	8/19/2001
41BW67	Bowie	Prehistoric	Artifact Scatter	Likely Not	4	Investigator Recommendation	Alton K. Briggs	2/12/1970
41BW68	Bowie	Prehistoric	Temporary Use/Camp	Possibly	2	Feature type	Alton K. Briggs and James M. Malone	2/21/1970
41BW69	Bowie	Prehistoric	Artifact Scatter	Likely Not	4	Investigator Recommendation	Richard Jones	11/24/2004
41BW70	Bowie	Prehistoric	Artifact Scatter	Likely Not	4	In rail ROW, likely disturbed	James M. Malone	3/1/1970
41BW71	Bowie	Prehistoric	Artifact Scatter	Flooded	3	Unknown Context	James M. Malone	3/1/1970
41BW73	Bowie	Prehistoric	Temporary Use/Camp	Possibly	3	Subsurface artifacts in secondary context	James M. Malone	3/4/1970
41BW75	Bowie	Prehistoric	Artifact Scatter	Likely Not	4	Shore eroding context	James M. Malone	3/4/1970
41BW77	Bowie	Prehistoric	Artifact Scatter	Possibly	3	Setting	James M. Malone	3/5/1970
41BW78	Bowie	Prehistoric	Temporary Use/Camp	Possibly	2	Artifact types and setting	James M. Malone	3/5/1970
41BW79	Bowie	Prehistoric	Artifact Scatter	Possibly	3	Setting	James M. Malone	3/5/1970
41BW80	Bowie	Prehistoric	Artifact Scatter	Flooded	4	Shore eroding context	James M. Malone	3/5/1970

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THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41BW81	Bowie	Prehistoric	Artifact Scatter	Flooded	4	Shallow context	James M. Malone	3/7/1970
41BW82	Bowie	Prehistoric	Artifact Scatter	Possibly	3	Setting	James M. Malone	3/7/1970
41BW83	Bowie	Prehistoric	Temporary Use/Camp	Likely	1	Datable subsurface deposits	James M. Malone	3/7/1970
41BW84	Bowie	Prehistoric	Artifact Scatter	Possibly	3	Setting but highly disturbed	James M. Malone	3/8/1970
41BW85	Bowie	Historic	Semi-Permanent Occupation/Habitation	Likely Not	4	Site destroyed	Randy Nathan	12/6/1988
41BW86	Bowie	Multi-Component	Semi-Permanent Occupation/Habitation	Possibly	3	Unknown extent of prehistoric	James M. Malone	3/9/1970
41BW87	Bowie	Prehistoric	Artifact Scatter	Likely Not	4	Poor Context	Alton K. Briggs	3/4/1970
41BW88	Bowie	Prehistoric	Artifact Scatter	Likely Not	4	Shore eroding context	alton K. Briggs	3/4/1970
41BW89	Bowie	Prehistoric	Artifact Scatter	Likely Not	4	Disturbed Context	Alton K. Briggs	3/6/1970
41BW90	Bowie	Prehistoric	Artifact Scatter	Likely Not	4	Shore eroding context	Alton K. Briggs	3/5/1970
41BW91	Bowie	Prehistoric	Artifact Scatter	Possibly	3	Setting	Alton K. Briggs	3/9/1970
41BW93	Bowie	Prehistoric	Semi-Permanent Occupation/Habitation	Flooded	1	Site Type	H.C. Taylor	9/14/1949
41BW94	Bowie	Prehistoric	Temporary Use/Camp	Possibly	3	Insufficient information	R.L. Stephenson	9/23/1949

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THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41BW95	Bowie	Prehistoric	Semi-Permanent Occupation/Habitation	Flooded	1	Site Type	B.L. Stephenson	9/27/1949
41BW101	Bowie	Prehistoric	Temporary Use/Camp	Possibly	3	Little information	John Carroll	6/15/1971
41BW105	Bowie	Prehistoric	Artifact Scatter	Flooded	2	Setting and Artifact type	H.C. Taylor	9/14/1949
41BW108	Bowie	Prehistoric	Artifact Scatter	Likely Not	4	Local materal testing only and shore erosion	Larry Head (form memory)	2/19/1974
41BW109	Bowie	Prehistoric	Artifact Scatter	Possibly	3	Setting and Artifact type	Larry Head (form memory)	2/19/1974
41BW110	Bowie	Caddo	Artifact Scatter	Flooded	4	Disturbed and frequently submerged	Larry Head (form memory)	2/19/1974
41BW111	Bowie	Caddo	Artifact Scatter	Flooded	4	Disturbed and frequently submerged	Larry Head (from memory)	2/19/1974
41BW112	Bowie	Caddo	Artifact Scatter	Flooded	4	Low density artifacts	Larry Head (from memory)	2/20/1974
41BW113	Bowie	Prehistoric	Temporary Use/Camp	Likely	1	Some subsurface artifacts recovered	Darryl Pleasant	3/9/1995
41BW114	Bowie	Prehistoric	Artifact Scatter	Likely Not	4	Poor site information	Larry Head (from memory)	2/19/1974
41BW115	Bowie	Prehistoric	Artifact Scatter	Likely Not	4	Poorly preserved artifact scatter	Larry Head (from memory)	2/19/1974
41BW116	Bowie	Multi-Component	Semi-Permanent Occupation/Habitation	Possibly	2	artifact density and midden features	Larry Head (from memory)	2/20/1974
41BW117	Bowie	Prehistoric	Artifact Scatter	Flooded	3	Setting and Artifact type	Larry Head (from memory)	2/19/1974

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THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41BW118	Bowie	Prehistoric	Semi-Permanent Occupation/Habitation	Flooded	2	Site type	B.Baskin for Larry Head	2/20/1974
41BW122	Bowie	Prehistoric	Temporary Use/Camp	Flooded	3	Artifact types but disturbance unknown	Olin F. McCormick	8/16/2002
41BW123	Bowie	Prehistoric	Artifact Scatter	Possibly	3	Setting	Olin F. McCormick	8/16/2004
41BW212	Bowie	Historic	Semi-Permanent Occupation/Habitation	Likely Not	4	Site has been bulldozed	Robert Cast	1/17/1989
41BW397	Bowie	Multi-Component	Semi-Permanent Occupation/Habitation	Likely Not	4	Poor integrity	S. Hunt	6/11/1990
41BW398	Bowie	Prehistoric	Temporary Use/Camp	Likely Not	4	Low density/diversity	S. Hunt	6/12/1990
41BW399	Bowie	Prehistoric	Temporary Use/Camp	Possibly	3	Not completely defined	S. Hunt	6/12/1990
41BW403	Bowie	Caddo	Temporary Use/Camp	Likely Not	4	Low Density/Diversity	S. Hunt	6/18/1990
41BW411	Bowie	Prehistoric	Artifact Scatter	Likely Not	4	Low diversity	Gary L. Shaw	9/25/1990
41BW413	Bowie	Prehistoric	Temporary Use/Camp	Possibly	3	Diagnostics, possible charcoal	Gary L. Shaw	9/27/1990
41BW414	Bowie	Prehistoric	Artifact Scatter	Likely Not	4	Low density/diversity	Gary L. shaw	10/2/1990
41BW415	Bowie	Prehistoric	Temporary Use/Camp	Likely Not	4	Low Density	Gary L. shaw	10/3/1990
41BW416	Bowie	Caddo	Semi-Permanent Occupation/Habitation	Likely	1	Site Type, Investigator may not be natural	Gary L. Shaw	10/5/1990

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41BW487	Bowie	Multi-Component	Semi-Permanent Occupation/Habitation	Possibly	2	Subsurface prehistoric, unknown Historic pres	Gary L. Shaw	4/9/1991
41BW488	Bowie	Multi-Component	Semi-Permanent Occupation/Habitation	Possibly	2	Investigators Comment	Gary L. Shaw	4/10/1991
41BW489	Bowie	Multi-Component	Temporary Use/Camp	Possibly	3	Subsurface cultural	Gary L. Shaw	1/10/1991
41BW491	Bowie	Prehistoric	Temporary Use/Camp	Likely Not	4	Investigators Comments	Gary L. Shaw	4/3/1991
41BW510	Bowie	Prehistoric	Temporary Use/Camp	Possibly	3	Subsurface but low diversity and density	Gary L. Shaw	10/25/1990
41BW511	Bowie	Prehistoric	Temporary Use/Camp	Possibly	2	Potential for Burials	Melton Bell	8/8/1990
41BW550	Bowie	Prehistoric	Artifact Scatter	Possibly	3	Investigators Recommendation	Darryl Pleasant	9/30/1993
41BW551	Bowie	Caddo	Temporary Use/Camp	Possibly	2	Investigators Recommendation	Darryl Pleasant	9/30/1993
41BW552	Bowie	Multi-Component	Semi-Permanent Occupation/Habitation	Likely Not	4	Too recent or too disturbed	Darryl Pleasant	10/4/1994
41BW553	Bowie	Caddo	Temporary Use/Camp	Likely	1	Determined Eligible	Steven Hunt	5/5/1997
41BW555	Bowie	Prehistoric	Temporary Use/Camp	Likely	1	Investigators Recommendation	Darryl Pleasant	10/15/1993
41BW556	Bowie	Prehistoric	Semi-Permanent Occupation/Habitation	Likely	1	Investigator Recommendation	Gary L. Shaw	7/20/1994
41BW564	Bowie	Historic	Semi-Permanent Occupation/Habitation	Likely Not	4	Investigator Recommendation	Gary L. Shaw	7/29/1994

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THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41BW565	Bowie	Prehistoric	Artifact Scatter	Likely Not	4	Investigator Recommendation	Gary L. Shaw	7/29/1994
41BW566	Bowie	Prehistoric	Temporary Use/Camp	Likely	1	Artifact density and type	Gary L. Shaw	8/1/1994
41BW567	Bowie	Prehistoric Multi-Component	Temporary Use/Camp	Possibly	2	Investigators recommendation	Gary L. Shaw	8/1/1994
41BW584	Bowie	Caddo	Semi-Permanent Occupation/Habitation	Likely	1	Investigator Recommendation	Daryl Pleasant	3/9/1995
41BW587	Bowie	Prehistoric	Temporary Use/Camp	Likely Not	4	Investigators Comments	Linda Lindsay, Jack Thompson, Gary Endsley	
41BW625	Bowie	Caddo	Artifact Scatter	Likely Not	4	Investigator Recommendation	Steven Hunt	8/12/1997
41BW627	Bowie	Prehistoric	Temporary Use/Camp	Likely	1	Investigators Recommendation	Steven Hunt	8/12/1997
41BW628	Bowie	Prehistoric	Temporary Use/Camp	Likely	1	Investigators Recommendation	Steven Hunt	8/12/1997
41BW635	Bowie	Prehistoric	Artifact Scatter	Likely	1	Investigators Recommendation	Steven Hunt	11/21/1997
41BW636	Bowie	Prehistoric	Artifact Scatter	Possibly	2	Investigators Recommendation	Steven Hunt	11/24/1997
41BW637	Bowie	Prehistoric	Artifact Scatter	Possibly	3	Investigators Recommendation	Steven Hunt	11/25/1997
41BW638	Bowie	Prehistoric	Artifact Scatter	Possibly	2	Investigator Recommendation	Steven Hunt	11/25/1997
41BW639	Bowie	Prehistoric	Artifact Scatter	Possibly	2	Investigator Recommendation	Steven Hunt	11/25/1997

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41BW641	Bowie	Prehistoric	Artifact Scatter	Likely	1	Investigators Recommendation	Steven Hunt	11/27/1997
41BW645	Bowie	Prehistoric	Artifact Scatter	Likely	1	Investigator Recommendation	Steven Hunt	12/2/1997
41BW646	Bowie	Multi-Component	Artifact Scatter	Likely	1	Investigator Recommendation	Steven Hunt	7/14/1998
41BW647	Bowie	Multi-Component	Artifact Scatter	Likely Not	4	Investigator Recommendation	Steven Hunt	7/14/1998
41BW648	Bowie	Prehistoric	Temporary Use/Camp	Likely	1	Investigator Recommendation	Steven Hunt	7/14/1998
41BW649	Bowie	Prehistoric	Temporary Use/Camp	Likely	1	Investigator Recommendation	Steven Hunt	7/14/1998
41BW650	Bowie	Prehistoric	Artifact Scatter	Likely	1	Investigator Recommendation	Steven Hunt	7/14/1998
41BW651	Bowie	Prehistoric	Artifact Scatter	Likely	1	Investigator Recommendation	Steven Hunt	7/14/1998
41BW652	Bowie	Prehistoric	Artifact Scatter	Likely	1	Investigator Recommendation	Steven Hunt	7/14/1998
41BW653	Bowie	Prehistoric	Temporary Use/Camp	Likely	1	Investigator Recommendation	Steven Hunt	7/15/1998
41BW654	Bowie	Prehistoric	Artifact Scatter	Likely	1	Investigator Recommendation	Steven Hunt	7/15/1998
41BW655	Bowie	Historic	Artifact Scatter	Likely Not	4	Investigator Recommendation	Steven M. Hunt	11/20/1998
41BW674	Bowie	Not Determined	Unknown	Unknown	0	Unknown		

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THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41BW677	Bowie	Multi-Component	Artifact Scatter	Likely Not	4	Investigators Recommendation	Gary Shaw	9/15/2000
41BW679	Bowie	Prehistoric	Semi-Permanent Occupation/Habitation	Likely Not	4	Investigator Recommendation	Gary Shaw	11/3/2000
41BW680	Bowie	Multi-Component	Artifact Scatter	Likely Not	4	Investigator Recommendation	Gary Shaw	11/3/2000
41BW683	Bowie	Caddo	Artifact Scatter	Likely Not	4	Investigator Recommendation	Tim Everette	8/17/2001
41BW684	Bowie	Multi-Component	Artifact Scatter	Likely Not	4	Investigator Recommendation	Kendy Rowe	8/9/2001
41BW708	Bowie	Historic	Artifact Scatter	Likely Not	4	Investigator Recommendation	Richard S. Jones	11/24/2004
41BW712	Bowie	Prehistoric	Artifact Scatter	Possibly	3	Site association	Richard Jones	11/24/2004
41BW763	Bowie	Historic	Semi-Permanent Occupation/Habitation	Likely Not	4	Site Destroyed	Bo Nelson	3/26/2010
41BW775	Bowie	Not Determined	Unknown	Unknown	0	Unknown		
41BW776	Bowie	Not Determined	Unknown	Unknown	0	Unknown		
41BW777	Bowie	Not Determined	Unknown	Unknown	0	Unknown		
41BW778	Bowie	Not Determined	Unknown	Unknown	0	Unknown		
41BW779	Bowie	Not Determined	Unknown	Unknown	0	Unknown		

*Priority Preservation Values: 1 (High Research Value) - 4 (Poor Research Value), NRHP Eligibility of Flooded = sites within the 227.5 ft pool limits

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THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41CS8	Cass	Prehistoric	Artifact Scatter	Possibly	3	diverse artifacts	R.L.S., N.C. Taylor and I.B. Price	9/12/1949
M9478	Cass	Marker	Marker	Likely	1	Marker		
41CS10	Cass	Prehistoric	Semi-Permanent Occupation/Habitation	Flooded	1	Mention of grave goods	R. L. Stephenson and I. B. Price	9/25/1949
41CS13	Cass	Prehistoric	Semi-Permanent Occupation/Habitation	Flooded	2	1940's arch Recorded it	H. C. taylor and M. P. Miroir	9/11/1949
41CS14	Cass	Caddo	Semi-Permanent Occupation/Habitation	Likely	1	Test excavations, site type	Kendy Rowe	8/7/2001
41CS16	Cass	Prehistoric	Temporary Use/Camp	Flooded	4	Poor Context	R.L. Stephenson, M.P. Miroir, I.B. Price, Jr.	10/2/1949
41CS19	Cass	Prehistoric	Temporary Use/Camp	Likely Not	4	Partially Submerged, Low density	Richard Jones	1/10/2007
41CS20	Cass	Prehistoric	Semi-Permanent Occupation/Habitation	Flooded	2	Site type but in poor context	R.L. Stephenson	9/20/1949
41CS33	Cass	Prehistoric	Semi-Permanent Occupation/Habitation	Likely	1	Subsurface datable material	Leoanrd L. Graham, 306 Texas City Hall, Texarkana, TX	5/4/1964
41CS35	Cass	Prehistoric	Burial	Possibly	2	Burials were excavated	James M. Malone	
41CS36	Cass	Prehistoric	Temporary Use/Camp	Possibly	3	Partially submerged, charcoal	James M. Malone	2/7/1970
41CS37	Cass	Caddo	Semi-Permanent Occupation/Habitation	Likely	1	Investigator Comments, Burials	Mindy Bonine	3/30/2004
41CS38	Cass	Caddo	Semi-Permanent Occupation/Habitation	Possibly	3	Partially Submerged, high density artifacts	Mindy Bonine	4/7/2004

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THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41CS39	Cass	Prehistoric	Temporary Use/Camp	Flooded	1	Potential for datable subsurface	James M. Malone	2/8/1970
41CS40	Cass	Prehistoric	Artifact Scatter	Flooded	4	No contextual information	James M. Malone	2/9/1970
41CS41	Cass	Prehistoric	Artifact Scatter	Likely Not	4	No contextual information	James M. Malone	2/9/1970
41CS42	Cass	Prehistoric	Temporary Use/Camp	Flooded	1	Potential for datable subsurface	James M. Malone	2/9/1970
41CS44	Cass	Prehistoric	Temporary Use/Camp	Flooded	3	Potential for subsurface datable material	James M. Malone1	2/20/1970
41CS45	Cass	Prehistoric	Temporary Use/Camp	Possibly	2	Potential for Subsurface Datable material	James M. Malone	2/10/1970
41CS46	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Setting-lake erosion	Mindy Bonine	4/15/2004
41CS47	Cass	Prehistoric	Artifact Scatter	Flooded	3	Insufficient information	James M. Malone	2/10/1970
41CS48	Cass	Prehistoric	Artifact Scatter	Possibly	2	Dense artifacts with feature	James M. Malone	2/10/1970
41CS49	Cass	Prehistoric	Artifact Scatter	Flooded	4	Insufficient information	James M. Malone	2/10/1970
41CS50	Cass	Prehistoric	Artifact Scatter	Likely Not	0	Setting - Lake Erosion	James M. Malone	2/10/1970
41CS51	Cass	Prehistoric	Temporary Use/Camp	Possibly	2	Setting, datable features	James M. Malone	2/10/1970
41CS52	Cass	Prehistoric	Temporary Use/Camp	Possibly	3	unknown shore erosion	James M. Malone	2/10/1970

*Priority Preservation Values: 1 (High Research Value) - 4 (Poor Research Value), NRHP Eligibility of Flooded = sites within the 227.5 ft pool limits

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Wright Patman Cultural Resources

THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41CS53	Cass	Prehistoric	Temporary Use/Camp	Flooded	2	Setting, datable features	James M. Malone	2/10/1970
41CS54	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Setting, few artifacts	James M. Malone	2/10/1970
41CS55	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Setting - submerged	James M. Malone	
41CS56	Cass	Prehistoric	Artifact Scatter	Flooded	4	No contextual information	James M. Malone	2/12/1970
41CS57	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Insufficent information	James M. Malone	2/14/1970
41CS58	Cass	Prehistoric	Artifact Scatter	Possibly	3	Setting	James M. Malone	2/14/1970
41CS59	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Few Artifacts, no features	James M. Malone	2/18/1970
41CS60	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Setting, few artifacts	James M. Malone	2/14/1970
41CS61	Cass	Prehistoric	Artifact Scatter	Flooded	3	Setting-lake erosion	James M. Malone	2/14/1970
41CS62	Cass	Prehistoric	Artifact Scatter	Possibly	3	Setting	James M. Malone	2/16/1970
41CS63	Cass	Prehistoric	Artifact Scatter	Flooded	4	Setting, few artifacts	James M. Malone	2/16/1970
41CS64	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Setting, few artifacts	James M. Malone	2/16/1970
41CS65	Cass	Prehistoric	Artifact Scatter	Flooded	3	Setting	James M. Malone	2/18/1970

*Priority Preservation Values: 1 (High Research Value) - 4 (Poor Research Value), NRHP Eligibility of Flooded = sites within the 227.5 ft pool limits

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THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41CS66	Cass	Prehistoric	Temporary Use/Camp	Possibly	3	Potential for datable subsurface	James M. Malone	2/17/1970
41CS67	Cass	Prehistoric	Temporary Use/Camp	Possibly	2	Potential for datable subsurface	James M. Malone	2/17/1970
41CS68	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Few Artifacts, poor description	James M. Malone	2/18/1970
41CS69	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Lithic artifacts only, setting	James M. Malone	2/18/1970
41CS70	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Low diversity, poorly described	James M. Malone	2/18/1970
41CS71	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Low diversity, poorly described	James M. Malone	2/18/1970
41CS72	Cass	Prehistoric	Artifact Scatter	Possibly	2	Artifact diversity	James M. Malone	2/18/1970
41CS73	Cass	Prehistoric	Artifact Scatter	Flooded	4	Setting, Poorly described	James M. Malone	2/18/1970
41CS74	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Setting, Low diversity, poorly described	James M. Malone	2/18/1970
41CS75	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Poor Context	Mindy Bonine	4/8/2004
41CS76	Cass	Prehistoric	Artifact Scatter	Possibly	3	Setting	James M. Malone	2/19/1970
41CS77	Cass	Prehistoric	Artifact Scatter	Flooded	4	Setting, few artifacts	James M. Malone	2/19/1970
41CS78	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Setting, few artifacts	James M. Malone	2/19/1970

*Priority Preservation Values: 1 (High Research Value) - 4 (Poor Research Value), NRHP Eligibility of Flooded = sites within the 227.5 ft pool limits

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THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41CS79	Cass	Prehistoric	Semi-Permanent Occupation/Habitation	Flooded	2	Site type but in poor context	James M. Malone	2/20/1970
41CS80	Cass	Prehistoric	Artifact Scatter	Flooded	4	Site is poorly preserved	James M. Malone	2/20/1970
41CS83	Cass	Prehistoric	Temporary Use/Camp	Flooded	3	Setting-lake erosion	James M. Malone	2/22/1970
41CS84	Cass	Prehistoric	Temporary Use/Camp	Likely Not	4	Setting-lake erosion	Larry Head and James M. Malone	2/22/1970
41CS85	Cass	Prehistoric	Artifact Scatter	Flooded	4	Setting-lake erosion	James M. Malone	2/22/1970
41CS86	Cass	Prehistoric	Temporary Use/Camp	Possibly	2	Setting	James M. Malone	2/23/1970
41CS87	Cass	Prehistoric	Temporary Use/Camp	Possibly	3	Setting-lake erosion	James M. Malone	2/22/1970
41CS88	Cass	Prehistoric	Semi-Permanent Occupation/Habitation	Flooded	1	Site type	Mindy Bonine	4/20/2004
41CS89	Cass	Prehistoric	Artifact Scatter	Flooded	4	Setting-lake erosion	Mindy Bonine	4/16/2004
41CS90	Cass	Prehistoric	Temporary Use/Camp	Possibly	3	Setting-lake erosion	James M. Malone	2/22/1970
41CS91	Cass	Prehistoric	Artifact Scatter	Flooded	4	Setting	James M. Malone	2/22/1970
41CS92	Cass	Prehistoric	Temporary Use/Camp	Flooded	3	Setting-lake erosion	James M. Malone	2/22/1970
41CS93	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Insufficient information	Alton K. Briggs	2/14/1970

*Priority Preservation Values: 1 (High Research Value) - 4 (Poor Research Value), NRHP Eligibility of Flooded = sites within the 227.5 ft pool limits

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THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41CS94	Cass	Prehistoric	Artifact Scatter	Flooded	2	Very dense artifact concentration	Alton K. Briggs	2/14/1970
41CS96	Cass	Prehistoric	Artifact Scatter	Flooded	4	Setting	Alton K. Briggs	2/14/1970
41CS97	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Setting, few artifacts	Alton K. Briggs	2/14/1970
41CS98	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Investigators Comments	Steve Ahr	1/22/2002
41CS99	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Setting, Submerged	Alton K. Briggs	2/16/1970
41CS100	Cass	Prehistoric	Artifact Scatter	Possibly	3	Chance of midden feature	Alton K. Briggs	2/16/1970
41CS101	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Setting - Lake Erosion	Alton K. Briggs	2/16/1970
41CS102	Cass	Prehistoric	Artifact Scatter	Flooded	4	Eroding into Lake	Alton K. Briggs	2/18/1970
41CS103	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Low diversity	ALton K. Briggs	2/19/1970
41CS104	Cass	Prehistoric	Artifact Scatter	Possibly	3	diverse artifacts, above water line	Alton K. Briggs	2/19/1970
41CS105	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Low diversity	Alton K. Briggs	2/19/1970
41CS106	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Eroding into Lake	Alton K. Briggs	2/19/1970
41CS107	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Eroding in Lake	Alton K. Briggs	2/19/1970

*Priority Preservation Values: 1 (High Research Value) - 4 (Poor Research Value), NRHP Eligibility of Flooded = sites within the 227.5 ft pool limits

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THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41CS108	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Low diversity, partially submerged	Alton K. Briggs	2/19/1970
41CS109	Cass	Prehistoric	Artifact Scatter	Possibly	3	Setting	Alton K. Briggs	2/22/1970
41CS110	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Eroding in Lake	Alton K. Briggs	2/19/1970
41CS111	Cass	Prehistoric	Artifact Scatter	Possibly	3	Partially Submerged, diverse artifacts	Alton K. Briggs	2/19/1970
41CS112	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Setting-lake erosion	Alton K. Briggs	2/20/1970
41CS113	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Highly disturbed	Alton K. Briggs	2/20/1970
41CS114	Cass	Prehistoric	Artifact Scatter	Flooded	4	Poor Context	Alton K. Briggs	2/22/1970
41CS115	Cass	Prehistoric	Temporary Use/Camp	Possibly	2	Above water, Potential subsurface	Alton K. Briggs	2/21/1970
41CS116	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Partially Submerged	Alton K. Briggs	2/22/1970
41CS117	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Partially Submerged, few artifacts	Alton K. Briggs	2/22/1970
41CS118	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Partially Submerged, few artifacts	Alton K. Briggs	2/22/1970
41CS125	Cass	Prehistoric	Burial	Possibly	2	Burial eroding in 1959	J.L. McVay	3/8/1966
41CS126	Cass	Prehistoric	Temporary Use/Camp	Possibly	3	Unknown context	Gary L. Shaw	10/10/1990

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THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41CS130	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Disturbed	Vance Langley and Leonard R. Voellinger, EH&A; Austin, Tx	10/28/1980
41CS145	Cass	Caddo	Artifact Scatter	Likely Not	4	Investigators comments	S. Hunt	2/19/1990
41CS146	Cass	Prehistoric	Artifact Scatter	Likely Not	4	historic junk intermixed...disturbed	S. Hunt	2/19/1990
41CS161	Cass	Prehistoric	Temporary Use/Camp	Likely Not	4	Investigator Recommendation	Gary L. Shaw	
41CS162	Cass	Prehistoric	Temporary Use/Camp	Likely Not	4	Investigator Recommendation	Gary L. Shaw	
41CS163	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Investigator Recommendation	Gary L. Shaw	
41CS164	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Investigators Recommendation	Gary L. Shaw	
41CS173	Cass	Not Determined	Unknown	Unknown	0	Unknown		
41CS175	Cass	Prehistoric	Temporary Use/Camp	Possibly	3	Deeply Buried but not much found	Maynard Cliff	12/18/1990
41CS195	Cass	Prehistoric	Artifact Scatter	Likely	1	Investigator Recommendation	Darryl Pleasant	3/1/1995
41CS196	Cass	Prehistoric	Artifact Scatter	Likely	1	Investigator Recommendation	Darryl Pleasant	3/1/1995
41CS198	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Investigator Recommendation	Darryl Pleasant	
41CS202	Cass	Prehistoric	Temporary Use/Camp	Likely	1	Investigators recommendation	Darryl Pleasant	3/1/1995

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THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41CS204	Cass	Prehistoric	Temporary Use/Camp	Likely	1	Investigator Recommendation	Darryl Pleasant	3/10/1995
41CS206	Cass	Prehistoric	Temporary Use/Camp	Likely Not	4	Investigator Recommendation	Darryl Pleasant	3/10/1995
41CS207	Cass	Prehistoric	Temporary Use/Camp	Flooded	4	Investigator Comments	Darryl Pleasant	3/11/1995
41CS208	Cass	Prehistoric	Artifact Scatter	Likely	1	Investigator Recommendation	Darryl Pleasant	3/11/1995
41CS210	Cass	Historic	Engineering/Structural	Likely	1	Investigator Recommendation	S. Hunt	3/10/1995
41CS211	Cass	Historic	Engineering/Structural	Likely Not	4	Investigators Recommendation	S. Hunt	3/10/1995
41CS212	Cass	Not Determined	Unknown	Unknown	0	Unknown		
41CS224	Cass	Not Determined	Unknown	Unknown	0	Unknown		
41CS225	Cass	Not Determined	Unknown	Unknown	0	Unknown		
41CS228	Cass	Not Determined	Unknown	Unknown	0	Unknown		
41CS229	Cass	Not Determined	Unknown	Unknown	0	Unknown		
41CS235	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Insufficient Information	Bo Nelson	5/1/1997
41CS236	Cass	Caddo	Temporary Use/Camp	Possibly	2	Density of artifacts	Steven Hunt	8/12/1997

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THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41CS237	Cass	Prehistoric	Temporary Use/Camp	Likely Not	4	Construction disturbance	Steven Hunt	8/12/1997
41CS238	Cass	Caddo	Temporary Use/Camp	Possibly	2	Density of artifacts	Steven Hunt	8/13/1997
41CS239	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Investigators Comments	Steven Hunt	8/13/1997
41CS269	Cass	Caddo	Artifact Scatter	Possibly	2	Artifact types	Gilbert Borrego	8/7/2001
41CS290	Cass	Caddo	Semi-Permanent Occupation/Habitation	Likely	1	Subsurface datable material	Mindy Bonine	4/12/2004
41CS291	Cass	Caddo	Semi-Permanent Occupation/Habitation	Likely	1	Subsurface datable material	Mindy Bonine	4/12/2004
41CS292	Cass	Caddo	Artifact Scatter	Likely Not	4	Investigator Comments	Mindy Bonine	4/13/2004
41CS295	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Low density/diversity	Mindy Bonine	4/14/2004
41CS297	Cass	Caddo	Semi-Permanent Occupation/Habitation	Possibly	2	Setting-lake erosion	Mindy Bonine	4/20/2004
41CS301	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Insufficient information	Mindy Bonine	4/23/2004
41CS302	Cass	Caddo	Artifact Scatter	Likely Not	4	Poor Preservation	Mindy Bonine	4/23/2004
41CS303	Cass	Prehistoric	Artifact Scatter	Possibly	3	Low diversity, density	Richard Jones	11/23/2005
41CS310	Cass	Multi-Component	Semi-Permanent Occupation/Habitation	Possibly	2	Subsurface Artifacts	Richard S. Jones	11/10/2005

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THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41CS311	Cass	Prehistoric	Artifact Scatter	Possibly	2	Setting, Subsurface Deposits	Richard S. Jones	11/23/2005
41CS317	Cass	Prehistoric	Temporary Use/Camp	Likely Not	4	Few Subsurface artifacts	Richard S. Jones	4/13/2006
41CS320	Cass	Prehistoric	Temporary Use/Camp	Possibly	2	Subsurface Deposits	Richard S. Jones	4/12/2006
41CS321	Cass	Prehistoric	Temporary Use/Camp	Likely Not	4	Few Subsurface artifacts	Richard S. Jones	4/12/2006
41CS324	Cass	Prehistoric	Temporary Use/Camp	Possibly	2	Subsurface artifacts	Richard S. Jones	4/11/2006
41CS332	Cass	Prehistoric	Artifact Scatter	Likely Not	4	Low diversity, density	Richard S. Jones	4/11/2006
41CS334	Cass	Historic	Semi-Permanent Occupation/Habitation	Likely Not	4	Not a significant style	Richard Jones	1/10/2007
41MX42	Morris	Prehistoric	Artifact Scatter	Possibly	3	Investigators Comments, site deflation	R. Martynec	10/25/1990
41MX48	Morris	Prehistoric	Temporary Use/Camp	Likely	1	Investigators Recommendation	Darryl Pleasant	
41MX51	Morris	Caddo	Temporary Use/Camp	Likely	1	Investigators Recommendation	Darryl Pleasant	
41MX74	Morris	Prehistoric	Temporary Use/Camp	Likely	1	Investigators Recommendation	Gary L. Shaw	
41MX75	Morris	Prehistoric	Artifact Scatter	Possibly	3	Investigators Comments	Darryl Pleasant	
41MX76	Morris	Prehistoric	Artifact Scatter	Possibly	3	Investigators Comments	Gary L. Shaw	

*Priority Preservation Values: 1 (High Research Value) - 4 (Poor Research Value), NRHP Eligibility of Flooded = sites within the 227.5 ft pool limits

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THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41MX77	Morris	Caddo	Temporary Use/Camp	Likely	1	Investigators Recommendation, Faunal Material	Darryl Pleasant	
41MX78	Morris	Prehistoric	Artifact Scatter	Possibly	3	Investigators Comments	Gary L. Shaw	
41MX79	Morris	Prehistoric	Semi-Permanent Occupation/Habitation	Likely	1	Investigators Recommendation	Darryl Pleasant	
41MX85	Morris	Prehistoric	Temporary Use/Camp	Possibly	2	Investigators Recommendation	Darryl Pleasant	
41MX89	Morris	Prehistoric	Artifact Scatter	Possibly	3	Investigators Recommendation	Darryl Pleasant	
41MX90	Morris	Caddo	Semi-Permanent Occupation/Habitation	Likely	1	Investigators Recommendation	Gary L. Shaw	
41MX91	Morris	Prehistoric	Temporary Use/Camp	Possibly	3	Investigators Recommendation	Darryl Pleasant	
41MX92	Morris	Prehistoric	Semi-Permanent Occupation/Habitation	Likely	1	Investigators Recommendation	Darryl Pleasant	
41MX93	Morris	Prehistoric	Artifact Scatter	Possibly	3	Investigators Recommendation	Darryl Pleasant	
41TT772	Titus	Prehistoric	Artifact Scatter	Likely	1	Investigator Recommendation	Gary L Shaw	8/5/1994
41TT773	Titus	Prehistoric	Artifact Scatter	Likely	1	Investigator Recommendation	Gary L Shaw	8/5/1994
41TT777	Titus	Caddo	Temporary Use/Camp	Likely	1	Investigator Recommendation	Gary L Shaw	8/11/1994

*Priority Preservation Values: 1 (High Research Value) - 4 (Poor Research Value), NRHP Eligibility of Flooded = sites within the 227.5 ft pool limits

APPENDIX IV

PARKHOUSE I CULTURAL RESOURCES

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Parkhouse I Cultural Resources

THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41HP116	Hopkins	Prehistoric	Temporary Use/Camp	Likely	1	Buried site component	Timothy K. Perttula	10/11/1986
41HP118	Hopkins	Prehistoric	Artifact Scatter	Likely Not	4	Site Not relocated	Timothy K. Perttula	10/12/1986
41HP148	Hopkins	Prehistoric	Artifact Scatter	Likely Not	4	Investigator Recommendation	Dan McGregor	6/7/1988
41HP25	Hopkins	Prehistoric	Semi-Permanent Occupation/Habitation	Likely	1	Site Type	Edward H. Moorman	11/27/1951
41HP8	Hopkins	Prehistoric	Semi-Permanent Occupation/Habitation	Possibly	2	Potential Mound Site	Hyatt	7/6/1970
41HP241	Hopkins	Prehistoric	Temporary Use/Camp	Likely Not	4	Low density	Cindy Ponder	8/28/2008
41DT269	Delta	Prehistoric	Artifact Scatter	Likely Not	4	Investigators Recommendation	John Lowe	
41DT276	Delta	Prehistoric	Semi-Permanent Occupation/Habitation	Possibly	2	Subsurface Potential	M. Stotts	

*Priority Preservation Values: 1 (High Research Value) - 4 (Poor Research Value)

APPENDIX V

PARKHOUSE II CULTURAL RESOURCES

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Parkhouse II Cultural Resources

THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41DT3	Delta	Prehistoric	Burial	Possibly	2	Burial removed	G.D. Albright	6/1/1981
41DT23	Delta	Prehistoric	Artifact Scatter	Possibly	3	Insufficent data	G.D. Albright	6/1/1981
41DT267	Delta	Caddo	Semi-Permanent Occupation/Habitation	Likely	1	Investigator comments	Owen Ford	
41LR4	Lamar	Prehistoric	Temporary Use/Camp	Possibly	3	Site not Located		
41LR123	Lamar	Caddo	Temporary Use/Camp	Likely	1	Datable material present	Randy Nathan/ Heather Brown	7/18/1988
41LR125	Lamar	Prehistoric	Artifact Scatter	Likely Not	4	Low Density and Diversity	H. Brown/ R. Nathan	7/20/1988
41LR126	Lamar	Prehistoric	Temporary Use/Camp	Likely Not	4	Low Density, Disturbed Context	Timothy K. Perttula	8/5/1988

*Priority Preservation Values: 1 (High Research Value) - 4 (Poor Research Value)

APPENDIX VI

TALCO CULTURAL RESOURCES

Appendix VI
Talco Cultural Resources

THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibilty Recommendation	Site Recorder	Recording Date
41FK1	Franklin	Not Determined	Unknown	Unknown	0	Unknown		
41FK9	Franklin	Not Determined	Unknown	Unknown	0	Unknown		
41FK85	Franklin	Prehistoric	Temporary Use/Camp	Likely	1	Investigators Comments	A. Kalina	7/28/1988
41FK86	Franklin	Caddo	Temporary Use/Camp	Likely	1	Investigators Comments	A. Kalina	7/28/1988
41FK87	Franklin	Prehistoric	Temporary Use/Camp	Possibly	2	Investigators Comments	A. Kalina	7/28/1988
41FK88	Franklin	Caddo	Temporary Use/Camp	Likely	1	Subsurface datable material	Peter Cropley	5/11/2007
41FK89	Franklin	Prehistoric	Artifact Scatter	Possibly	3	Investigators Comments	A. Kalilna	7/28/1988
41FK90	Franklin	Prehistoric	Artifact Scatter	Likely Not	4	Low artifact density/diversity, no depth	Peter Cropley	5/23/2007
41FK91	Franklin	Prehistoric	Temporary Use/Camp	Likely Not	4	In pipe corridor, likely disturbed	Peter Cropley	5/23/2007
41FK126	Franklin	Prehistoric	Artifact Scatter	Likely Not	4	Low diversity, highly disturbed	W. Duckworth, TRC	11/26/2007
41FK128	Franklin	Caddo	Temporary Use/Camp	Likely	1	Investigators Recommendation	Ashley Sanders	12/26/2007
41TT10	Titus	Prehistoric	Burial	Possibly	2	Human remains possible		
41TT557	Titus	Prehistoric	Temporary Use/Camp	Likely	1	Investigators Comments	A Kalina	7/29/1988

*Priority Preservation Values: 1 (High Research Value) - 4 (Poor Research Value)

Appendix VI
Talco Cultural Resources

THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibilty Recommendation	Site Recorder	Recording Date
41TT562	Titus	Caddo	Semi-Permanent Occupation/Habitation	Likely	1	Investigator Recommendation	R Nathan	9/23/1988
41TT880	Titus	Multi-Component	Semi-Permanent Occupation/Habitation	Likely	1	Investigators Recommendation	M. Terkhorn, TRC	8/3/2007
41TT881	Titus	Prehistoric	Artifact Scatter	Likely Not	4	Low Diversity	M. Terkhorn, TRC	8/3/2007

*Priority Preservation Values: 1 (High Research Value) - 4 (Poor Research Value)

APPENDIX VII

MARVIN NICHOLS 1A CULTURAL RESOURCES

Appendix VII
Marvin Nichols 1A Cultural Resources

THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41FK77	Franklin	Prehistoric	Temporary Use/Camp	Likely	1	Investigators Recommendation	A. Kalina, R. Perales, R. Nathan	7/27/1988
41FK78	Franklin	Prehistoric	Artifact Scatter	Likely	1	Investigators Recommendation	A. Kalina	7/27/1988
41FK81	Franklin	Prehistoric	Artifact Scatter	Possibly	2	Investigators Recommendation, Low Diversity	A. Kalina, R. Perales, R. Nathan	7/27/1988
41FK82	Franklin	Prehistoric	Artifact Scatter	Possibly	3	Investigators Comments	A. Kalina	7/28/1988
41FK83	Franklin	Prehistoric	Artifact Scatter	Likely	1	Investigators Recommendation	A. Kalina	7/28/1988
41FK94	Franklin	Prehistoric Multi-Component	Temporary Use/Camp	Likely	1	Investigators Recommendation	Timothy K. Perttula	8/1/1988
41FK95	Franklin	Prehistoric	Artifact Scatter	Possibly	2	Investigators Recommendation, Low Diversity	R. Nathan	9/16/1988
41FK121	Franklin	Prehistoric	Temporary Use/Camp	Likely Not	4	Poor Context	Tiffany Osburn & Lisa Shaddox	8/31/2006
41FK122	Franklin	Multi-Component	Artifact Scatter	Likely Not	4	Poor Context	Tiffany Osburn and Lisa Shaddox	9/1/2006
41FK127	Franklin	Prehistoric	Temporary Use/Camp	Likely	1	Investigators Recommendation	T. Copeland, TRC	11/27/2007
41RR3	Red River	Prehistoric	Semi-Permanent Occupation/Habitation	Possibly	2	Site may have been excavated		
41RR18	Red River	Prehistoric	Temporary Use/Camp	Likely	1	Subsurface cultural material	Milton Bell	4/21/1971
41RR19	Red River	Prehistoric	Temporary Use/Camp	Possibly	3	Setting, Vague description	John Carroll, Jennifer jack	6/17/1971

*Priority Preservation Values: 1 (High Research Value) - 4 (Poor Research Value)

Appendix VII
Talco Cultural Resources

THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41RR20	Red River	Caddo	Temporary Use/Camp	Likely Not	4	Destroyed	Tony Dieste-Heartfield, Price and Greene, Inc.	9/16/1981
41RR26	Red River	Prehistoric	Temporary Use/Camp	Likely Not	4	Low density, diversity	John Carroll, Jennifer Jack	6/21/1971
41RR27	Red River	Prehistoric	Artifact Scatter	Likely Not	4	Low density	Jennifer Jack, John Carroll	6/21/1971
41RR28	Red River	Prehistoric	Temporary Use/Camp	Likely Not	4	Low Diversity	Jennifer Jack, John Carroll	6/22/1971
41RR29	Red River	Caddo	Temporary Use/Camp	Possibly	3	Poor context	John Carroll, Jennifer Jack	6/22/1971
41RR30	Red River	Prehistoric	Artifact Scatter	Likely Not	4	Low Density	John Carroll, Jennifer Jack	6/22/1971
41RR31	Red River	Prehistoric	Artifact Scatter	Likely Not	4	Low Density	John Carroll, Jennifer Jack	6/22/1971
41RR32	Red River	Prehistoric	Artifact Scatter	Likely Not	4	Low Density	John Carroll, Jennifer Jack	6/22/1971
41RR33	Red River	Prehistoric	Artifact Scatter	Likely Not	4	Low Density	Jennifer Jack, John Carroll	6/22/1971
41RR34	Red River	Multi-Component	Artifact Scatter	Likely Not	4	Low diversity	John Carroll, Jennifer Jack	6/22/1971
41RR35	Red River	Prehistoric	Artifact Scatter	Likely Not	4	Low diversity	Jennifer Jack, John Carroll	6/23/1971
41RR36	Red River	Prehistoric	Temporary Use/Camp	Likely Not	4	Very Disturbed	John Carroll, Jennifer Jack	6/23/1971
41RR37	Red River	Prehistoric	Artifact Scatter	Likely Not	4	Low Diversity	John Carroll	6/25/1971

*Priority Preservation Values: 1 (High Research Value) - 4 (Poor Research Value)

Appendix VII
Talco Cultural Resources

THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41RR38	Red River	Caddo	Temporary Use/Camp	Possibly	2	Site type, comments	John Carroll	6/25/1971
41RR39	Red River	Caddo	Semi-Permanent Occupation/Habitation	Possibly	2	Investigators Comments	John Carroll	6/25/1971
41RR40	Red River	Prehistoric	Artifact Scatter	Likely Not	4	Low Diversity	John Carroll	6/25/1971
41RR50	Red River	Caddo	Semi-Permanent Occupation/Habitation	Likely	1	Site Type, Density	Dieste-Heartfield, Price and Greene, Inc.	8/29/1981
41RR52	Red River	Prehistoric	Temporary Use/Camp	Possibly	3	Dense Artifacts Subsurface	Dieste-Heartfield, Price and Greene, Inc.	8/31/1981
41RR53	Red River	Prehistoric	Temporary Use/Camp	Possibly	3	Setting	Dieste-Heartfield, Price and Greene, Inc.	8/31/1981
41RR170	Red River	Caddo	Semi-Permanent Occupation/Habitation	Likely	1	Investigator Recommendation	Timothy Perttula	11/4/1988
41RR171	Red River	Prehistoric Multi-Component	Temporary Use/Camp	Likely	1	Investigator Recommendation	Perttula, Cheatwood, Nathan	10/21/1988
41RR172	Red River	Caddo	Temporary Use/Camp	Likely	1	Investigator Recommendation	Perttula, Cheatwood, R. Nathan	10/21/1988
41RR173	Red River	Caddo	Temporary Use/Camp	Likely	1	Investigator Recommendation	Timothy K. Perttula	11/7/1988
41RR174	Red River	Prehistoric	Temporary Use/Camp	Likely	1	Investigator Recommendation	Timothy K. Perttula	11/7/1988
41RR175	Red River	Prehistoric	Temporary Use/Camp	Likely	1	Investigator Recommendation	Timothy K. Perttula	11/7/1988
41RR176	Red River	Multi-Component	Semi-Permanent Occupation/Habitation	Likely	1	Investigator Recommendation		

*Priority Preservation Values: 1 (High Research Value) - 4 (Poor Research Value)

Appendix VII
Talco Cultural Resources

THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41RR177	Red River	Caddo	Temporary Use/Camp	Likely	1	Investigator Recommendation	Timothy K. Perttula	11/7/1988
41RR180	Red River	Prehistoric Multi-Component	Temporary Use/Camp	Likely	1	Investigator Recommendation	Timothy K. Perttula	11/7/1988
41RR181	Red River	Caddo	Semi-Permanent Occupation/Habitation	Likely	1	Investigator Recommendation	Perttula, Nathan, Cheatwood	11/4/1988
41RR182	Red River	Multi-Component	Semi-Permanent Occupation/Habitation	Likely	1	Investigator Recommendation	Timothy K. Perttula	11/7/1988
41RR184	Red River	Prehistoric	Temporary Use/Camp	Likely	1	Investigator Recommendation	Timothy K. Perttula	11/8/1988
41RR185	Red River	Prehistoric	Temporary Use/Camp	Likely	1	Investigator Recommendation	Timothy K. Perttula	11/8/1988
41RR186	Red River	Caddo	Semi-Permanent Occupation/Habitation	Likely	1	Investigator Recommendation	Perttula, Nathan, Cheatwood	11/7/1988
41RR187	Red River	Prehistoric	Temporary Use/Camp	Likely	1	Investigator Recommendation	Perttula, Cheatwood, Nathan	11/7/1988
41RR188	Red River	Prehistoric	Temporary Use/Camp	Likely	1	Investigator Recommendation	Perttula and Cast	11/8/1988
41RR189	Red River	Prehistoric	Temporary Use/Camp	Likely	1	Investigator Comments	Perttula and Cast	11/8/1988
41RR190	Red River	Prehistoric	Temporary Use/Camp	Likely	1	Investigator Recommendation	Perttula, Cheatwood. Nathan	10/21/1988
41RR191	Red River	Prehistoric	Semi-Permanent Occupation/Habitation	Likely	1	Investigator Recommendation	Perttula, Cheatwood, Nathan	11/7/1988
41RR192	Red River	Prehistoric	Semi-Permanent Occupation/Habitation	Likely	1	Investigator Comments	Timothy K. Perttula	11/8/1988

*Priority Preservation Values: 1 (High Research Value) - 4 (Poor Research Value)

Appendix VII
Talco Cultural Resources

THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41RR193	Red River	Prehistoric	Temporary Use/Camp	Likely	1	Investigator Recommendation	Timothy K. Perttula and Gary Cheatwood	11/8/1988
41RR194	Red River	Prehistoric	Temporary Use/Camp	Likely	1	Investigator Recommendation	T. Perttula, G. Cheatwood, R. Nathan	10/21/1988
41RR196	Red River	Not Determined	Unknown	Unknown	0	Unknown		
41RR197	Red River	Not Determined	Unknown	Unknown	0	Unknown		
41RR198	Red River	Not Determined	Unknown	Unknown	0	Unknown		
41RR200	Red River	Prehistoric	Semi-Permanent Occupation/Habitation	Likely	1	Investigator Recommendation	Timothy K. Perttula	10/19/1988
41RR314	Red River	Prehistoric	Artifact Scatter	Likely Not	4	Investigators Comments	Angela Tine	10/14/2004
41TT1	Titus	Prehistoric	Semi-Permanent Occupation/Habitation	Possibly	2	1930's arch bothered to excavate		
41TT2	Titus	Prehistoric	Artifact Scatter	Likely Not	4	Low Density and road disturbance		
41TT5	Titus	Caddo	Semi-Permanent Occupation/Habitation	Likely	1	Site Type	Tony Dieste-Heartfield,Price &Greene, Inc	9/18/1981
41TT8	Titus	Prehistoric	Artifact Scatter	Likely Not	4	Investigator Recommendation		
41TT40	Titus	Prehistoric	Temporary Use/Camp	Likely	1	Mound Features	John Carroll, Jennifer Jack	6/19/1971
41TT41	Titus	Caddo	Semi-Permanent Occupation/Habitation	Likely	1	Site Type	John Carroll, Jennifer Jack	6/24/1971

*Priority Preservation Values: 1 (High Research Value) - 4 (Poor Research Value)

Appendix VII
Talco Cultural Resources

THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41TT42	Titus	Prehistoric	Semi-Permanent Occupation/Habitation	Likely	1	Feature types	John Carroll	6/24/1971

*Priority Preservation Values: 1 (High Research Value) - 4 (Poor Research Value)

APPENDIX VIII

LAKE JIM CHAPMAN CULTURAL RESOURCES

Appendix VIII
Lake Jim Chapman Cultural Resources

THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41DT1	Delta	Prehistoric	Semi-Permanent Occupation/Habitation	Flooded	1	Human remains	Edward H. Moorman	11/28/1951
41DT100	Delta	Historic	Semi-Permanent Occupation/Habitation	Destroyed by dam	4	Possibly destroyed	Timothy K. Perttula	10/12/1986
41DT103	Delta	Prehistoric	Temporary Use/Camp	Destroyed by dam	4	Low density, shallow	Timothy K. Perttula	10/12/1986
41DT104	Delta	Historic	Burial	Destroyed by dam	1	Human remains	S. A. Lebo and S. J. Kooren	9/1/1986
41DT105	Delta	Historic	Burial	Flooded	1	Human Remains	S. A. Lebo and S. J. Kooren	9/1/1986
41DT106	Delta	Prehistoric	Semi-Permanent Occupation/Habitation	Flooded	1	Subsurface deposits	Bill Martin;	3/10/1987
41DT107	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	3	Some historic artifacts, unknown condition	Bill Martin, Melissa Green;	3/20/1987
41DT108	Delta	Prehistoric	Temporary Use/Camp	Flooded	4	No diagnostics	Bill Martin;	3/12/1987
41DT109	Delta	Prehistoric	Temporary Use/Camp	Flooded	3	No diagnostics, setting	Curtis McKinney, Dan McGregor;	3/12/1987
41DT110	Delta	Prehistoric	Temporary Use/Camp	Flooded	3	No diagnostics	Curtis McKinney, Dan McGregor;	3/15/1987
41DT111	Delta	Multi-Component	Temporary Use/Camp	Flooded	3	Unknown condition		3/18/1987
41DT112	Delta	Prehistoric	Artifact Scatter	Flooded	4	Site type	Bill Martin, Dan McGregor;	3/23/1987
41DT113	Delta	Multi-Component	Temporary Use/Camp	Flooded	2	Artifact type, setting	Melissa Green;	3/12/1987

*Priority Preservation Values: 1 (High Research Value) - 4 (Poor Research Value), NRHP Eligibility of Flooded = below 440 ft elevation, On Island = above 440 ft elevation within the pool limits.

Appendix VIII
Lake Jim Chapman Cultural Resources

THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41DT114	Delta	Prehistoric Multi-Component	Temporary Use/Camp	Flooded	2	Site Age	Melissa Green, Dan McGregor;	3/26/1987
41DT115	Delta	Multi-Component	Artifact Scatter	Flooded	4	Site to be destroyed	Curtis McKinney, Dan McGregor;	3/13/1987
41DT117	Delta	Prehistoric	Temporary Use/Camp	Flooded	2	Tools present, unknown condition	Gill Martin, Dan McGregor	3/22/1987
41DT12	Delta	Prehistoric	Semi-Permanent Occupation/Habitation	Flooded	1	Mention of wattle - structure	Edwards M. Moorman	12/3/1951
41DT120	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	4	Likely too recent	Melissa Green	9/1/1988
41DT121	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	4	Recent construction type	Melissa Green	9/2/1988
41DT122	Delta	Historic	Artifact Scatter	Flooded	4	No Feature listed	Curtis McKinney, Melissa Green	5/15/1988
41DT123	Delta	Historic	Artifact Scatter	Flooded	4	No Feature listed	Curtis McKinney, Melissa Green	5/16/1988
41DT124	Delta	Multi-Component	Semi-Permanent Occupation/Habitation	Flooded	1	Human remains	Curtis McKinney, Dan McGregor	6/15/1988
41DT125	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	3	Historic construction, unknown condition	Curtis McKinney, Melissa Green	5/16/1988
41DT126	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	2	Historic Native site	Curtis McKinney, Melissa Green	5/6/1988
41DT127	Delta	Prehistoric Multi-Component	Artifact Scatter	Flooded	3	Artifact Diversity	Dan McGregor	6/15/1988
41DT128	Delta	Prehistoric	Temporary Use/Camp	Flooded	2	Tools present, unknown condition	Bill Martin, Dan McGregor	6/15/1988

*Priority Preservation Values: 1 (High Research Value) - 4 (Poor Research Value), NRHP Eligibility of Flooded = below 440 ft elevation, On Island = above 440 ft elevation within the pool limits.

Appendix VIII
Lake Jim Chapman Cultural Resources

THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41DT13	Delta	Prehistoric	Temporary Use/Camp	Flooded	3	Low density, possibly disturbed	Edwards M. Moorman	12/30/1951
41DT130	Delta	Prehistoric	Artifact Scatter	Flooded	4	No Descriptions	D. McGregor;	4/7/1987
41DT131	Delta	Prehistoric	Artifact Scatter	Flooded	4	No Descriptions	Dan McGregor,	4/7/1987
41DT132	Delta	Prehistoric	Artifact Scatter	Flooded	4	No Descriptions	Dan McGregor;	4/22/1987
41DT133	Delta	Prehistoric	Temporary Use/Camp	Flooded	4	No diagnostics	Melissa Green, Dan McGregor;	3/12/1987
41DT134	Delta	Prehistoric	Temporary Use/Camp	Flooded	2	Site Age	Dan McGregor	4/6/1987
41DT135	Delta	Historic	Artifact Scatter	Flooded	4	No feature	Joe W. Saunders, Melissa Green;	3/10/1987
41DT137	Delta	Historic	Semi-Permanent Occupation/Habitation	Destroyed by dam	4	Mainly recent material	Melissa Green;	3/16/1987
41DT138	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	3	Insufficient data	Melissa Green;	3/12/1987
41DT139	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	4	Recent artifacts	Joe Saunders and Melissa Green	3/11/1987
41DT14	Delta	Prehistoric	Temporary Use/Camp	Flooded	3	Insufficient Data	Edwards M. Moorman	12/30/1951
41DT140	Delta	Historic	Artifact Scatter	Flooded	4	No Features	Curtis McKinney, Melissa Green;	3/12/1987
41DT144	Delta	Prehistoric	Artifact Scatter	Likely Not	4	Fluvial Context	C.Britt Boussman and Michael B. Collins	1/1/1987

*Priority Preservation Values: 1 (High Research Value) - 4 (Poor Research Value), NRHP Eligibility of Flooded = below 440 ft elevation, On Island = above 440 ft elevation within the pool limits.

Appendix VIII
Lake Jim Chapman Cultural Resources

THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41DT145	Delta	Prehistoric	Artifact Scatter	Flooded	4	Low artifact density	C.Britt Bousman and Michael B. Collins	1/1/1987
41DT146	Delta	Unknown	Unknown	Flooded	0	No Data		
41DT148	Delta	Multi-Component	Artifact Scatter	Flooded	4	Artifacts in secondary fill	Dave Saunders and Bill Young	5/1/1989
41DT149	Delta	Prehistoric	Temporary Use/Camp	Flooded	3	Insufficient data	Dave Saunders and Bill Young	4/21/1989
41DT15	Delta	Prehistoric	Semi-Permanent Occupation/Habitation	Flooded	1	Investigator's Recommendation	Edward H. Moorman	11/30/1951
41DT150	Delta	Prehistoric	Temporary Use/Camp	Flooded	3	Unknown context but buried material	Dave Saunders and Bill Young	4/17/1989
41DT151	Delta	Prehistoric	Artifact Scatter	Flooded	4	Only 1 artifact mentioned	Dave Saunders and Bill Young	4/26/1989
41DT152	Delta	Prehistoric	Temporary Use/Camp	Flooded	1	Artifacts subsurface	Dave Saunders and Bill Young	4/26/1989
41DT153	Delta	Multi-Component	Semi-Permanent Occupation/Habitation	Likely Not	4	Report	Dave Saunders and Bill Young	4/25/1989
41DT154	Delta	Multi-Component	Semi-Permanent Occupation/Habitation	Likely	1	Report	Dave Saunders and Bill Young	4/25/1989
41DT156	Delta	Prehistoric	Artifact Scatter	Flooded	4	Low diversity	David Saunders, Melissa Green	4/27/1989
41DT157	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	4	Likely too recent	David Saunders, Melissa Green	4/27/1989
41DT158	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	4	Likely too recent	David Saunders, Bill Young	4/27/1989

*Priority Preservation Values: 1 (High Research Value) - 4 (Poor Research Value), NRHP Eligibility of Flooded = below 440 ft elevation, On Island = above 440 ft elevation within the pool limits.

Appendix VIII
Lake Jim Chapman Cultural Resources

THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41DT159	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	4	Likely too recent	David Saunders, Melissa Green	4/27/1989
41DT16	Delta	Prehistoric	Burial	Flooded	1	Human Remains	Joseph K. Long III, Greenville, KY	1/28/1959
41DT160	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	4	Likely too recent	David Jurney	9/20/1989
41DT167	Delta	Prehistoric	Artifact Scatter	Likely Not	4	Report		
41DT168	Delta	Prehistoric	Temporary Use/Camp	Likely Not	4	Report		
41DT17	Delta	Prehistoric	Temporary Use/Camp	Flooded	4	Site likely disturbed by recent house	Edward H. Moorman	11/30/1951
41DT171	Delta	Prehistoric	Temporary Use/Camp	Flooded	4	Report		
41DT175	Delta	Prehistoric	Temporary Use/Camp	On Island	4	Report		
41DT18	Delta	Multi-Component	Semi-Permanent Occupation/Habitation	Flooded	3	Insufficient information to assess	Edward H. Mooreman	11/30/1951
41DT180	Delta	Historic	Burial	On Island	4	Site Form	Kent Smolik	11/9/1989
41DT181	Delta	Prehistoric	Temporary Use/Camp	Flooded	4	Report	Kent Smolik	11/9/1989
41DT182	Delta	Prehistoric	Temporary Use/Camp	Flooded	4	Report	Fergus Flaherty	11/10/1989
41DT187	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	4	Report	Robert Feldacker	11/9/1989

*Priority Preservation Values: 1 (High Research Value) - 4 (Poor Research Value), NRHP Eligibility of Flooded = below 440 ft elevation, On Island = above 440 ft elevation within the pool limits.

Appendix VIII
Lake Jim Chapman Cultural Resources

THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41DT19	Delta	Prehistoric	Temporary Use/Camp	Flooded	4	Investigator's Recommendation	L.F. Duffield	2/24/1959
41DT190	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	2	Report	Kent Smolik	11/9/1989
41DT191	Delta	Historic	Semi-Permanent Occupation/Habitation	Likely Not	4	Report	Robert Feldacker	11/10/1989
41DT192	Delta	Historic	Semi-Permanent Occupation/Habitation	Possible	2	Report	Melissa Green	
41DT195	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	4	Report		
41DT196	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	4	Report		
41DT199	Delta	Historic	Semi-Permanent Occupation/Habitation	Likely Not	4	Report		
41DT2	Delta	Prehistoric	Semi-Permanent Occupation/Habitation	Flooded	1	Investigators Comments	Joseph K. Long III, Greenville, Kentucky	1/28/1959
41DT20	Delta	Prehistoric	Temporary Use/Camp	Flooded	1	Investigator's Recommendation	L.F. Duffield	2/24/1959
41DT200	Delta	Historic	Semi-Permanent Occupation/Habitation	Likely Not	4	Report		
41DT201	Delta	Historic	Semi-Permanent Occupation/Habitation	Likely Not	4	Report		
41DT202	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	4	Report		
41DT19	Delta	Prehistoric	Temporary Use/Camp	Flooded	4	Investigator's Recommendation		

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THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41DT205	Delta	Historic	Semi-Permanent Occupation/Habitation	Likely Not	4	Report	Kent Smolik	11/10/1989
41DT209	Delta	Historic	Semi-Permanent Occupation/Habitation	Possibly	2	Report	Jeff Putzi	12/8/1989
41DT21	Delta	Caddo	Burial	Possibly	2	human remains but excavated	K. Gilmore and N. Hoffrichter, excavation 1962.	1962
41DT211	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	4	Report	Kent Smolik	12/11/1989
41DT215	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	4	Report	Robert Feldacker	12/11/1989
41DT218	Delta	Historic	Semi-Permanent Occupation/Habitation	On Island	4	Report	Jeff Putzi	12/11/1989
41DT219	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	4	Report	Christopher Charles Prillwitz	12/11/1989
41DT222	Delta	Historic	Semi-Permanent Occupation/Habitation	Likely Not	4	Report	David Saunders	12/7/1989
41DT223	Delta	Historic	Semi-Permanent Occupation/Habitation	Likely Not	4	Report	David Saunders	12/8/1989
41DT224	Delta	Historic	Semi-Permanent Occupation/Habitation	Likely	1	Report		
41DT225	Delta	Historic	Semi-Permanent Occupation/Habitation	Likely Not	4	Report		
41DT227	Delta	Prehistoric	Temporary Use/Camp	On Island	4	Report		
41DT228	Delta	Historic	Semi-Permanent Occupation/Habitation	On Island	4	Report		

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THC Site No.	County	Site Age Category	Simplified Site Type	Potential for NRHP Eligibility	Preservation Priority (Pre-Reservoir)	Reason for Eligibility Recommendation	Site Recorder	Recording Date
41DT229	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	4	Report		
41DT230	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	4	Report		
41DT231	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	4	Report		
41DT232	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	4	Report		
41DT233	Delta	Historic	Semi-Permanent Occupation/Habitation	On Island	4	Report		
41DT235	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	4	Report		
41DT236	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	4	Report		
41DT237	Delta	Historic	Semi-Permanent Occupation/Habitation	Likely Not	4	Report		
41DT238	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	4	Report		
41DT239	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	4	Report		
41DT240	Delta	Historic	Semi-Permanent Occupation/Habitation	Likely Not	4	Report		
41DT242	Delta	Prehistoric	Temporary Use/Camp	Flooded	4	Report		
41DT243	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	4	Report		

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41DT244	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	4	Report		
41DT25	Delta	Prehistoric	Temporary Use/Camp	Flooded	4	Setting sounds disturbed	Robert Scott;	5/1/1986
41DT258	Delta	Prehistoric	Temporary Use/Camp	Flooded	2	Features listed	Britt Bousman and Gail Bailey	5/30/1990 0:00
41DT259	Delta	Historic	Burial	Likely Not	4	Already Relocated	Douglas K. Boyd	6/6/1990
41DT260	Delta	Historic	Semi-Permanent Occupation/Habitation	Flooded	4	Investigator's Recommendation	Dave Saunders	2/12/1990
41DT27	Delta	Prehistoric	Temporary Use/Camp	Flooded	3	Insufficient Data		
41DT28	Delta	Prehistoric	Temporary Use/Camp	Flooded	4	No features, flooded	Skinner and Hyatt	6/16/1970
41DT29	Delta	Prehistoric	Temporary Use/Camp	Flooded	1	Investigator's Recommendation	S.A.S., R.D.H.	6/17/1970
41DT30	Delta	Prehistoric	Temporary Use/Camp	Flooded	1	Investigator's recommendation	Skinner, Hyatt	6/18/1970
41DT31	Delta	Prehistoric	Semi-Permanent Occupation/Habitation	Flooded	1	Subsurface Deposits	Skinner, Hyatt	6/18/1970
41DT32	Delta	Prehistoric	Artifact Scatter	Flooded	4	Low artifact density	RDH	6/18/1970
41DT33	Delta	Prehistoric	Temporary Use/Camp	Flooded	4	Frequently Flooded	Skinner, Hyatt	6/18/1970
41DT35	Delta	Prehistoric	Temporary Use/Camp	Flooded	1	Investigator's recommendation	Skinner, Hyatt	6/19/1970

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41DT36	Delta	Prehistoric	Temporary Use/Camp	Flooded	2	Chance for Buried deposits	RDH; SAS	6/19/1970
41DT37	Delta	Prehistoric	Temporary Use/Camp	Flooded	1	Investigator's recommendation	Skinner	6/19/1970
41DT38	Delta	Prehistoric	Temporary Use/Camp	Flooded	1	Investigator's recommendation	RDH	6/19/1970
41DT39	Delta	Prehistoric	Temporary Use/Camp	Flooded	4	Investigator's recommendation	Skinner	6/19/1970
41DT40	Delta	Prehistoric	Temporary Use/Camp	Flooded	3	Insufficient data	Skinner, Hyatt	6/22/1970
41DT41	Delta	Caddo	Temporary Use/Camp	Flooded	2	Potential for subsurface, not excavated	Skinner, Hyatt	6/22/1970
41DT42	Delta	Prehistoric	Temporary Use/Camp	Flooded	3	In situ but poor in material	Skinner	6/22/1970
41DT43	Delta	Prehistoric	Artifact Scatter	Flooded	3	Site known from rodent back dirt	Skinner	6/22/1970
41DT44	Delta	Prehistoric	Temporary Use/Camp	Flooded	4	Investigator's recommendation	Skinner	6/23/1970
41DT45	Delta	Prehistoric Multi-Component	Temporary Use/Camp	On Island	3	Eroding but some material potentially in place	SAS, RDH	6/23/1970
41DT46	Delta	Prehistoric	Temporary Use/Camp	Likely	1	Investigator's Recommendation	Skinner, Hyatt	6/23/1970
41DT47	Delta	Prehistoric	Temporary Use/Camp	Flooded	1	Investigator's Recommendation	Skinner, Hyatt	6/24/1970
41DT48	Delta	Prehistoric Multi-Component	Temporary Use/Camp	Flooded	4	Revised Site Form	Skinner, Hyatt	6/24/1970

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41DT49	Delta	Prehistoric	Semi-Permanent Occupation/Habitation	Flooded	2	Disturbed but structure possible	Hyatt	6/24/1970
41DT50	Delta	Prehistoric	Temporary Use/Camp	Flooded	4	heavily bioturbated	Hyatt	6/24/1970
41DT51	Delta	Prehistoric	Temporary Use/Camp	On Island	3	Some subsurface material, unknown context	Skinner, Hyatt	6/25/1970
41DT52	Delta	Prehistoric	Temporary Use/Camp	On Island	1	Investigator's Recommendation	Hyatt	6/25/1970
41DT53	Delta	Prehistoric	Temporary Use/Camp	On Island	2	Potential for subsurface material	Hyatt, Skinner	6/25/1970
41DT54	Delta	Prehistoric Multi-Component	Temporary Use/Camp	Flooded	1	Investigator's Recommendation	Hyatt, Skinner	6/25/1970
41DT55	Delta	Prehistoric	Artifact Scatter	Likely Not	4	Disturbed, low density artifacts	Hyatt,	6/25/1970
41DT56	Delta	Prehistoric	Temporary Use/Camp	Possibly	2	Investigator's recommendation	RDH, SAS	6/26/1970
41DT57	Delta	Prehistoric	Temporary Use/Camp	Flooded	4	Low diversity	Skinner, Hyatt	6/26/1970
41DT58	Delta	Prehistoric	Temporary Use/Camp	Flooded	3	Disturbed	RDH	6/30/1970
41DT6	Delta	Prehistoric	Semi-Permanent Occupation/Habitation	Flooded	1	Investigator's Recommendation	Edward H. Moorman	12/4/1951
41DT61	Delta	Caddo	Temporary Use/Camp	Likely Not	4	Investigator's Recommendation	RDH, SAS	7/13/1970
41DT62	Delta	Prehistoric	Temporary Use/Camp	Flooded	2	Investigator's comments	SAS	7/4/1970

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41DT63	Delta	Prehistoric	Temporary Use/Camp	Flooded	4	No depth to site	Hyatt	7/4/1970
41DT64	Delta	Prehistoric	Temporary Use/Camp	Flooded	4	No depth to site	RDH/SAS	7/14/1970
41DT65	Delta	Caddo	Temporary Use/Camp	Flooded	2	Not disturbed	RDH/SAS	7/14/1970
41DT66	Delta	Prehistoric	Temporary Use/Camp	Flooded	1	Buried cultural material	RDH/SAS	7/14/1970
41DT67	Delta	Prehistoric	Temporary Use/Camp	Flooded	3	Investigators Comments	Hyatt	7/16/1970
41DT68	Delta	Prehistoric	Temporary Use/Camp	Flooded	4	Low Density	SAS	7/6/1970
41DT69	Delta	Prehistoric	Temporary Use/Camp	Flooded	3	Insufficient data	RDH	7/22/1970
41DT7	Delta	Prehistoric	Artifact Scatter	On Island	4	Disturbed by House	Edwards M. Moorman	12/4/1951
41DT70	Delta	Prehistoric	Temporary Use/Camp	Flooded	4	Too disturbed	SAS	7/22/1970
41DT71	Delta	Prehistoric	Temporary Use/Camp	Flooded	3	Slight potential	SAS, RDH	7/24/1970
41DT72	Delta	Prehistoric	Temporary Use/Camp	Flooded	2	Investigators Comments	Skinner, Hyatt	7/24/1970
41DT73	Delta	Prehistoric	Semi-Permanent Occupation/Habitation	Flooded	1	Investigators Comments	Skinner, Hyatt	7/24/1970
41DT74	Delta	Prehistoric	Semi-Permanent Occupation/Habitation	Flooded	1	Potential for Subsurface material	Hyatt	7/27/1970

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41DT75	Delta	Prehistoric	Temporary Use/Camp	Flooded	3	Some potential for in situ deposits	Hyatt, SAS	7/27/1970
41DT76	Delta	Prehistoric	Temporary Use/Camp	Flooded	4	Poor Context	Skinner	7/27/1970
41DT77	Delta	Prehistoric	Temporary Use/Camp	Flooded	3	Setting	Hyatt	7/27/1970
41DT78	Delta	Prehistoric	Temporary Use/Camp	Flooded	2	Investigators Comments	Skinner	7/27/1970
41DT80	Delta	Prehistoric Multi-Component	Temporary Use/Camp	Flooded	1	Investigator Recommendation	Hyatt-1972	1975
41DT81	Delta	Prehistoric	Temporary Use/Camp	Flooded	4	Low Diversity	Hyatt-1972	1975
41DT82	Delta	Prehistoric	Artifact Scatter	Flooded	3	Investigators Comments	Hyatt-1972	1975
41DT83	Delta	Prehistoric	Artifact Scatter	Flooded	4	Site type	Hyatt-1972	5/28/1905
41DT84	Delta	Caddo	Temporary Use/Camp	Flooded	1	Subsurface deposits	Karen	1976
41DT88	Delta	Historic	Semi-Permanent Occupation/Habitation	Likely Not	4	Mainly recent 20th C	Timothy K. Perttula	10/11/1986
41DT89	Delta	Historic	Semi-Permanent Occupation/Habitation	Likely Not	4	Likely too recent	Timothy K. Perttula	10/11/1986
41DT90	Delta	Historic	Semi-Permanent Occupation/Habitation	Destroyed by dam	4	Preserved but recent	Timothy K. Perttula	10/11/1986
41DT91	Delta	Historic	Semi-Permanent Occupation/Habitation	Destroyed by dam	4	Research potential exhausted, Possibly destroyed	Timothy K. Perttula	10/11/1986

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41DT92	Delta	Historic	Semi-Permanent Occupation/Habitation	Destroyed by dam	4	Partially destroyed	Timothy K. Perttula	10/11/1986
41DT93	Delta	Historic	Semi-Permanent Occupation/Habitation	Destroyed by dam	4	Site is an outhouse	Timothy K. Perttula	10/11/1986
41DT94	Delta	Historic	Semi-Permanent Occupation/Habitation	Destroyed by dam	3	Some subsurface remains	Timothy K. Perttula	10/11/1986
41DT95	Delta	Historic	Semi-Permanent Occupation/Habitation	Destroyed by dam	4	Low potential	Timothy K. Perttula	10/11/1986
41DT96	Delta	Historic	Semi-Permanent Occupation/Habitation	Destroyed by dam	4	Recent	Timothy K. Perttula	10/11/1986
41DT97	Delta	Multi-Component	Semi-Permanent Occupation/Habitation	Flooded	3	Some potential for subsurface deposits	Timothy K. Perttula	10/12/1986
41DT98	Delta	Prehistoric	Temporary Use/Camp	Flooded	4	Investigator's Comments	Timothy K. Perttula	10/12/1986
41DT99	Delta	Historic	Semi-Permanent Occupation/Habitation	Destroyed by dam	4	Site is destroyed	Timothy K. Perttula	10/12/1986
41HP10	Hopkins	Historic	Semi-Permanent Occupation/Habitation	Possibly	2	Insufficient information to assess		
41HP100	Hopkins	Prehistoric	Temporary Use/Camp	Flooded	4	No diagnostics	R.D.H.	7/22/1970
41HP101	Delta	Prehistoric	Temporary Use/Camp	Flooded	4	Investigators Comments	S.A.S.	7/22/1970
41HP102	Hopkins	Prehistoric Multi-Component	Temporary Use/Camp	Flooded	1	Investigator's Comments	RDH, SAS	7/22/1970
41HP103	Hopkins	Prehistoric	Temporary Use/Camp	Likely Not	4	Site type, low density artifacts	R.D.H., S.A.S.	7/23/1970

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41HP104	Hopkins	Prehistoric	Artifact Scatter	Flooded	3	Poor description	R.D.H.	7/23/1970
41HP105	Hopkins	Multi-Component	Temporary Use/Camp	Flooded	1	Site Type, subsurface datable material	Skinner, Hyatt	7/23/1970
41HP106	Hopkins	Multi-Component	Occupation	Destroyed by dam	1	Stratified Prehistoric deposits	T.K. Perttula	11/11/1986
41HP108	Hopkins	Unknown	Unknown	Flooded	0	No Data		
41HP112	Hopkins	Historic	Semi-Permanent Occupation/Habitation	Flooded	3	Vague Description	Timothy K. Perttula	10/11/1986
41HP113	Hopkins	Prehistoric	Artifact Scatter	Flooded	4	Site not relocated	Timothy K. Perttula	10/11/1986
41HP114	Hopkins	Historic	Semi-Permanent Occupation/Habitation	Destroyed by dam	2	Preserved farmstead from 1880s	Timothy K. Perttula	10/11/1986
41HP115	Hopkins	Prehistoric	Temporary Use/Camp	Destroyed by dam	4	Sparse assemblage low chance of datable material	Timothy K. Perttula	10/11/1986
41HP116	Hopkins	Prehistoric	Temporary Use/Camp	Destroyed by dam	1	Buried site component	Timothy K. Perttula	10/11/1986
41HP117	Hopkins	Multi-Component	Semi-Permanent Occupation/Habitation	Destroyed by dam	2	Possibly related to Hurricane Hill	Timothy K. Perttula	10/12/1986
41HP118	Hopkins	Prehistoric	Artifact Scatter	Destroyed by dam	4	Site Not relocated	Timothy K. Perttula	10/12/1986
41HP119	Hopkins	Prehistoric	Temporary Use/Camp	Likely Not	4	Report	C. Garvey	10/30/1986
41HP134	Hopkins	Prehistoric	Artifact Scatter	Flooded	4	Investigator's Recommendation	Dan McGregor	6/15/1988

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41HP135	Hopkins	Prehistoric	Temporary Use/Camp	Flooded	4	Investigator's Recommendation	Dan McGregor	6/15/1988
41HP136	Hopkins	Prehistoric	Temporary Use/Camp	Destroyed by dam	4	Investigator's Recommendation	Dan McGregor	6/15/1988
41HP137	Hopkins	Prehistoric	Temporary Use/Camp	Flooded	4	Mitigation Complete	Dan McGregor	6/15/1988
41HP138	Hopkins	Prehistoric	Temporary Use/Camp	Flooded	4	Investigator's Recommendation	Dan McGregor	6/15/1988
41HP139	Hopkins	Multi-Component	Artifact Scatter	Destroyed by dam	4	Investigator's Recommendation	Dan McGregor	6/15/1988
41HP140	Hopkins	Multi-Component	Temporary Use/Camp	Destroyed by dam	4	Investigator's Recommendation	Dan McGregor	6/15/1988
41HP141	Hopkins	Multi-Component	Semi-Permanent Occupation/Habitation	Destroyed by dam	4	Investigator's Recommendation	Dan McGregor, Melissa Green	6/7/1988
41HP142	Hopkins	Multi-Component	Semi-Permanent Occupation/Habitation	Destroyed by dam	4	Investigator's Recommendation	Dan McGregor, Melissa Green	5/14/1988
41HP145	Hopkins	Multi-Component	Semi-Permanent Occupation/Habitation	Flooded	4	Investigator's Recommendation	Dan McGregor, Melissa Green	6/7/1988
41HP147	Hopkins	Prehistoric	Temporary Use/Camp	Flooded	4	Investigator's Recommendation	Maynard Cliff and Dan McGregor	6/7/1988
41HP149	Hopkins	Prehistoric	Temporary Use/Camp	Flooded	4	Investigators Recommendation	Dan McGregor	6/15/1988
41HP150	Hopkins	Prehistoric	Temporary Use/Camp	Flooded	4	Investigators Recommendation	Dan McGregor	6/15/1988
41HP151	Hopkins	Historic	Semi-Permanent Occupation/Habitation	Flooded	4	Investigator's Recommendation	Dan McGregor, Melissa Green	6/7/1988

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41HP154	Hopkins	Unknown	Unknown	Flooded	0	No Data	Bousman and Collins	1/1/1987
41HP155	Hopkins	Prehistoric	Temporary Use/Camp	Flooded	1	Investigators Comments	Bousman and Collins	1/1/1987
41HP156	Hopkins	Prehistoric	Unknown	Flooded	3	Insufficient information to assess	Bousman and Collins	1/1/1987
41HP159	Hopkins	Prehistoric Multi-Component	Temporary Use/Camp	Flooded	1	Report	Jeffery A. Bohlin	5/1/1989
41HP160	Hopkins	Prehistoric	Temporary Use/Camp	Flooded	3	Insufficient information to assess	Jeffery A. Bohlin	5/1/1989
41HP161	Hopkins	Historic	Semi-Permanent Occupation/Habitation	Flooded	1	Investigator's Recommendation	David Jurney	4/17/1989
41HP162	Hopkins	Prehistoric Multi-Component	Temporary Use/Camp	Flooded	1	Investigator's Recommendation	Fergus Flaherty	5/2/1989
41HP168	Hopkins	Prehistoric	Temporary Use/Camp	Flooded	4	Investigator's Recommendation	Jeffery A. Bohlin	5/1/1989
41HP17	Hopkins	Prehistoric	Artifact Scatter	Possibly	2	Report	Edward H. Moorman	12/5/1951
41HP170	Hopkins	Multi-Component	Semi-Permanent Occupation/Habitation	Flooded	4	Investigator's Recommendation	Jeffery A. Bohlin	5/2/1989
41HP171	Hopkins	Multi-Component	Temporary Use/Camp	Flooded	4	Investigator's Recommendation	Fergus Flaherty	5/2/1989
41HP172	Hopkins	Prehistoric	Semi-Permanent Occupation/Habitation	Flooded	1	Investigator's Recommendation	Jeffery A. Bohlin	5/2/1989
41HP175	Hopkins	Caddo	Temporary Use/Camp	Flooded	1	Report		

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41HP179	Hopkins	Prehistoric	Artifact Scatter	Likely Not	4	Report	David Saunders	
41HP180	Hopkins	Prehistoric	Temporary Use/Camp	Likely	1	Report		
41HP182	Hopkins	Prehistoric	Temporary Use/Camp	Likely Not	4	Report	David Saunders	11/15/1989
41HP19	Hopkins	Prehistoric	Temporary Use/Camp	Likely	1	Material Type	Edward H. Moorman	12/5/1951
41HP191	Hopkins	Unknown	Unknown	Flooded	0	No Data		
41HP21	Hopkins	Prehistoric	Temporary Use/Camp	Flooded	4	Weathered and in poor context	Hyatt	7/2/1970
41HP22	Hopkins	Prehistoric	Temporary Use/Camp	Flooded	3	Tools present but little mention of other data	Edward H. Moorman	12/6/1951
41HP23	Hopkins	Prehistoric	Temporary Use/Camp	Flooded	2	Investigators Comments	Edward H. Moorman	12/6/1951
41HP34	Hopkins	Prehistoric	Artifact Scatter	Likely Not	4	Investigator's Recommendation	David M. Hovde	4/27/1982
41HP5	Hopkins	Historic	Semi-Permanent Occupation/Habitation	Possibly	2	Insufficient information to assess		
41HP6	Hopkins	Prehistoric	Semi-Permanent Occupation/Habitation	Likely	1	Density of material, deep deposits	Joseph K. Long III, Greenville, Kentucky	1/28/1959
41HP7	Hopkins	Prehistoric	Temporary Use/Camp	Flooded	4	Site Setting	Joseph K. Long III, Greenville, Ky	1/27/1959
41HP74	Hopkins	Prehistoric Multi-Component	Semi-Permanent Occupation/Habitation	Flooded	1	Investigator's Recommendation	ROH, SAS	6/29/1970

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41HP75	Hopkins	Caddo	Temporary Use/Camp	Flooded	4	Investigator's Recommendation	Skinner, Hyatt	6/29/1970
41HP77	Hopkins	Prehistoric	Artifact Scatter	Flooded	4	Poor context	RDH	6/30/1970
41HP78	Hopkins	Prehistoric Multi-Component	Semi-Permanent Occupation/Habitation	Flooded	1	Investigators Recommendation	Hyatt	7/6/1970
41HP88	Hopkins	Prehistoric	Artifact Scatter	Likely Not	4	Site Type	SAS	7/13/1970
41HP94	Hopkins	Prehistoric	Temporary Use/Camp	Likely Not	4	Investigator's Recommendation	S.A.S., R.D.H.	7/15/1970
41HP95	Hopkins	Prehistoric	Temporary Use/Camp	Flooded	3	Disturbed with some potential	R.D.H., S.A.S.	7/15/1970
41HP96	Hopkins	Prehistoric Multi-Component	Temporary Use/Camp	Flooded	3	Investigator's Comments	S.A.S., R.D.H.	7/15/1970
41HP97	Hopkins	Prehistoric	Temporary Use/Camp	Flooded	2	Investigators Comments	S.A.S., R.D.H.	7/16/1970
41HP98	Hopkins	Prehistoric	Temporary Use/Camp	Flooded	1	Investigators Comments	S.A.S., R.D.H.	7/16/1970
41HP99	Hopkins	Prehistoric	Temporary Use/Camp	Flooded	4	Too disturbed	R.D.H., S.A.S.	7/22/1970

*Priority Preservation Values: 1 (High Research Value) - 4 (Poor Research Value), NRHP Eligibility of Flooded = below 440 ft elevation, On Island = above 440 ft elevation within the pool limits.