

Appendix F

Biological and Habitat Studies

F-1: Lake Ralph Hall Preliminary Habitat Assessment

F-2: Summary of SWAMPIM and WHAP Memorandum

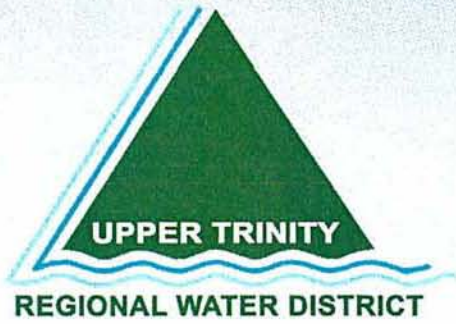
F-3: Biological Assessment of the North Sulphur River

F-1: Lake Ralph Hall Preliminary Habitat Assessment

**ATTACHMENT 4
LAKE RALPH HALL
PRELIMINARY HABITAT ASSESSMENT**

**PREPARED BY
ALAN PLUMMER ASSOCIATES, INC.**





REPORT

Lake Ralph Hall Preliminary Habitat Assessment



December 6, 2005



**ALAN PLUMMER
ASSOCIATES, INC.**

ENVIRONMENTAL ENGINEERS - DESIGNERS - SCIENTISTS

in association with



346.0402



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EXECUTIVE SUMMARY

Background and History of Area

The proposed Lake Ralph Hall reservoir would impound a portion of the North Sulphur River, inundating the river channel and portions of its named and unnamed tributaries as well as the immediate river valley. The proposed reservoir site is located in northeast Texas, in the southern portion of Fannin County, north of the City of Ladonia. (Figure ES-1). The surface area at conservation pool, based on preliminary engineering studies, is approximately 7,560 acres. This report presents the documentation of the initial environmental survey efforts to assess the habitat existing within the proposed reservoir project area.

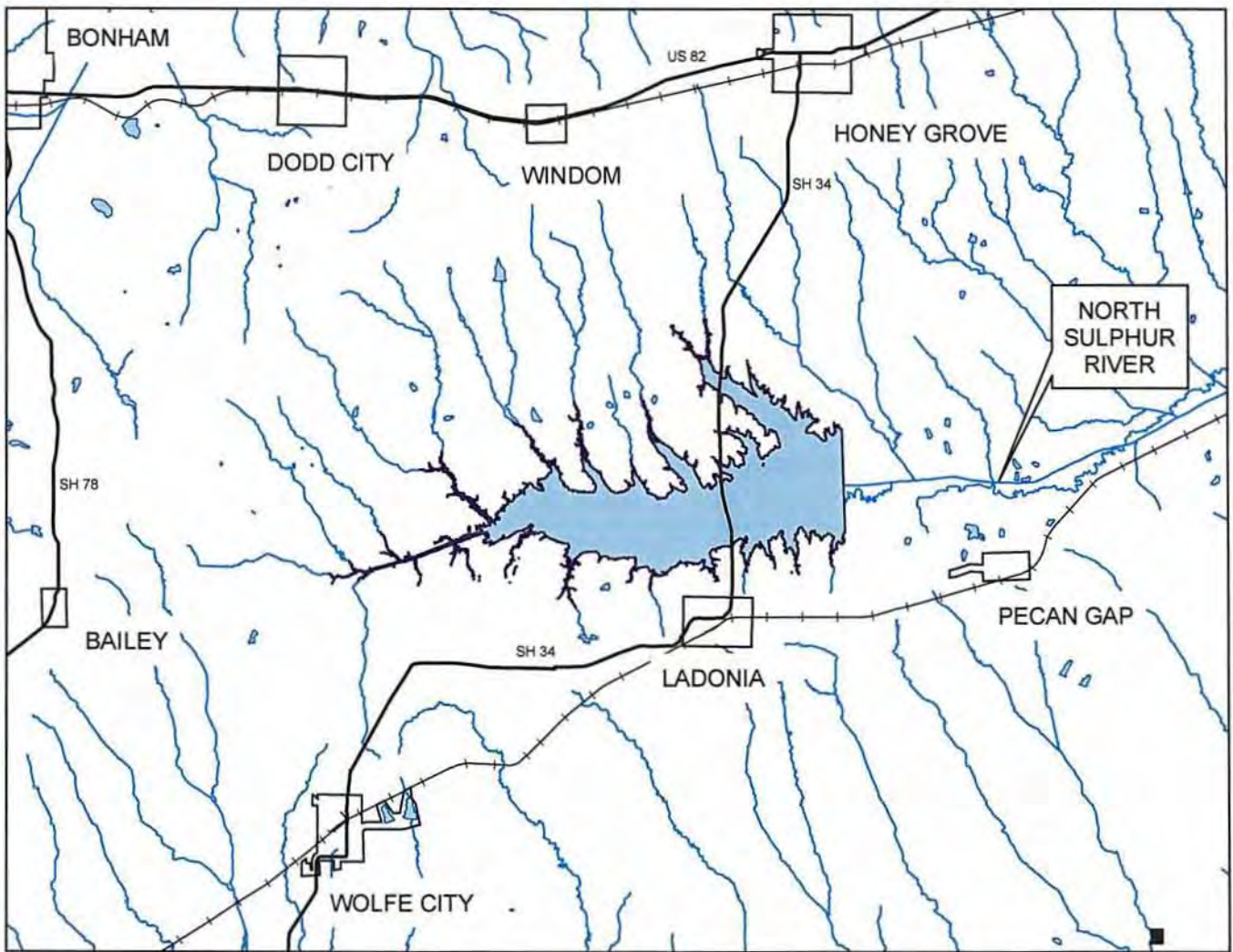
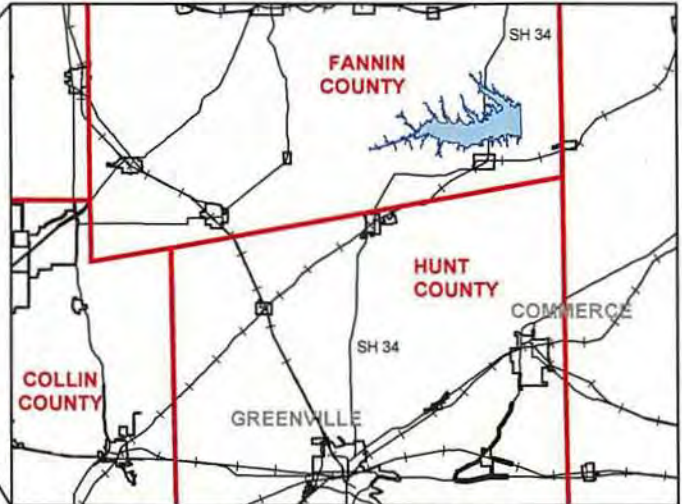
Fannin County lies within the Blackland Prairie Ecoregion. Pre-settlement conditions of the region were representative of true prairie grassland community dominated by a diverse assortment of perennial and annual grasses and forbs with forested or wooded areas restricted to bottomlands along the river and tributary streams. Early settlers used the prairie lands for grazing livestock. Farming became a major use in the 1870s at which time the prairies were plowed and converted to cropland, primarily for the production of cotton through the first half of the 1900s. Agriculture is still considered the main business of Fannin County with nearly half of the agricultural income in the county derived from the sale of livestock, primarily beef cattle, on improved pastures of Bermudagrass and fescue.⁽⁴⁾ Crops currently under production within the general project area include wheat and soybeans.⁽¹⁸⁾

Significant portions of the North Sulphur River, including the reach within the proposed reservoir project area and continuing for several miles downstream, were channelized beginning in the 1920s to increase drainage of floodwaters from agricultural cropland. The original channelization project created a straight channel approximately 40 feet wide and 10 feet deep.⁽¹⁵⁾ Severe erosion within the main river channel, the tributary channels, and the watershed has occurred over the past several decades and continues to date resulting in loss of soil, riparian vegetation, and stream properties and functions. After several decades of erosion, the main channel of the North Sulphur River is currently 200-300 feet wide and over 60 feet deep.




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Legend

 Proposed Lake Ralph Hall Reservoir

17,000 8,500 Feet



**FIGURE ES-1
GENERAL LOCATION MAP**

f:\projects\346\0402\gis\permit_app\figure 18-1_general location map.mxd

Aquatic resources within the project area outside the river and tributary channels are limited to scattered upland stock ponds constructed to provide water for livestock or for erosion control. Approximately 147 ponds, varying in size from less than 1 acre to approximately 4 acres, were identified within the project area. Total acreage within the identified ponds is approximately 87 acres.

The Caddo Lyndon B. Johnson National Grasslands (Ladonia Unit) administered by the U.S. Forest Service (USFS) located at the southwest edge of the proposed reservoir is managed under a cooperative agreement with the Texas Parks and Wildlife Department. The Ladonia Unit is comprised of twelve individual, non-contiguous tracts totaling 2,780 acres owned by the federal government but surrounded by privately owned land. Primary management emphasis on the Caddo-LBJ National Grasslands concerns restoration of the land and conservation of soil and watershed resource values. Since the twelve tracts are not contiguous, management for habitat restoration and public hunting is difficult. Also, soil erosion continues to be a problem on the tracts and approximately 93 acres of gullies are reported across seven of the twelve tracts and are targeted for management plans. The proposed reservoir conservation pool will inundate approximately 220 acres or 7.9 percent of the federally owned land. There are two Texas Natural Heritage Areas identified within the Ladonia Units. Neither lies within the proposed conservation pool footprint of Lake Ralph Hall.

TPWD Natural Diversity Database Review

Review of records within the TPWD database for information regarding rare, threatened, and endangered plants and animals, exemplary natural communities, and other significant ecological features within an expanded project area was requested by Alan Plummer Associates, Inc. Response from TPWD included a list of rare, threatened, and endangered species reported for the county, special features and natural communities including colonial waterbird rookeries and Little Bluestem-Indiangrass Series communities within and in the area of the Caddo National Grasslands – Ladonia Tract and Caddo Wildlife Management Area. Concerns were expressed regarding the resulting inundation of portions of the federally owned grassland tracts based on the proposed footprint of the reservoir, but potential mitigation options for this impact were

suggested. Also some potentially positive impacts for the managed grassland area resulting from the proposed reservoir were presented. Further baseline surveys for determining and quantifying the impacts of the proposed projects conducted in conjunction with the TPWD, the U.S. Forest Service, and the U.S. Fish and Wildlife Service were recommended by the TPWD.

Habitat Assessment

Review of historical and current aerial photographs and maps followed by groundtruthing of identified tracts of representative land cover types was conducted from early spring through summer of 2005. Groundtruthing investigations were conducted on over 3,300 acres of the 8,060 acres within the project area including conservation pool, embankment, and spillway areas. The methodology used for the assessment was the TPWD's Wildlife Habitat Appraisal Procedure (WHAP), since this is the methodology that has been primarily used by the state and U.S. Fish and Wildlife Service to evaluate impacts of proposed reservoir sites across the state of Texas. The WHAP measures key components of each identified cover type, which contribute to ecological condition of the cover type and resulting overall suitability for wildlife. An average Habitat Quality (HQ) score was derived from the evaluation of multiple sites for each identified cover type.

The majority (about 65 percent) of the land use within the project area is in agricultural production including cropland and pasture (both improved and native grasses). Due to the ongoing severe erosion of soil from cropland within the area, cropland is actively being converted to forage production with plantings of improved forage grasses including bermudagrass and fescue. Although there are wooded riparian areas still present along the North Sulphur River and its major tributaries, these areas are limited and are isolated, discontinuous tracts, which decreases their value for wildlife habitat. Hydrologic and hydraulic studies of the river channel indicated that at the proposed dam site, the existing channel has the capacity to fully contain and convey the 100-year flood.⁽¹⁶⁾ Based on the elevations of the tributaries relative to the river channel and extrapolation of river channel flow depth under 100-year flood conditions where the flow in the main channel creates a backwater condition for the tributaries, the flow in the tributary channels for the north side of the river is also contained within the banks

of the creek channels for about a mile upstream of the river channel.⁽¹⁷⁾ Therefore, none of the riparian forest tracts were considered as bottomland hardwood forest. The six land cover types evaluated included cropland, pasture, grassland, parks, young forest, and forest. The WHAP methodology does not provide means for evaluating aquatic resources such as ponds and stream channels. As to stream channels, the North Sulphur River, because of the on-going erosion, appears to be unable to sustain viable populations of aquatic life. The bottom and sidewalls of the channel are essentially devoid of vegetation. The river is intermittent and pools remaining after rainfall events were devoid of visible life.

Overall, the quality of habitat along the North Sulphur River within the proposed project area is mostly degraded by agricultural usage and the significant continuing erosion problems experienced as a result of historical channelization projects. The remaining wooded areas provide moderate quality habitat, but these areas are isolated and fragmented reducing the overall ability to support wildlife populations. None of the riparian forested areas has current hydrology to support classification of bottomland hardwood forest. Native grassland areas that are being managed to preserve and enhance native prairie habitat also provide some moderate quality habitat, but these areas are likewise fragmented reducing the effectiveness of management plans and utilization by wildlife and public. Invasion by species including eastern red cedar, honey locust, cedar elm, and other common woody invaders is also prevalent throughout the grassland areas.

Multiple opportunities exist for providing benefits to help stabilize the North Sulphur River watershed in association with the development of the proposed Lake Ralph Hall reservoir project. Proposed coordination with federal, state, and local government agencies as well as local citizens could result in reduction of impacts from currently on-going severe erosion as well as maintain water quality within the proposed water supply reservoir. These efforts would also serve to enhance habitat for local and migratory wildlife and provide a diverse, healthy environment for future generations.

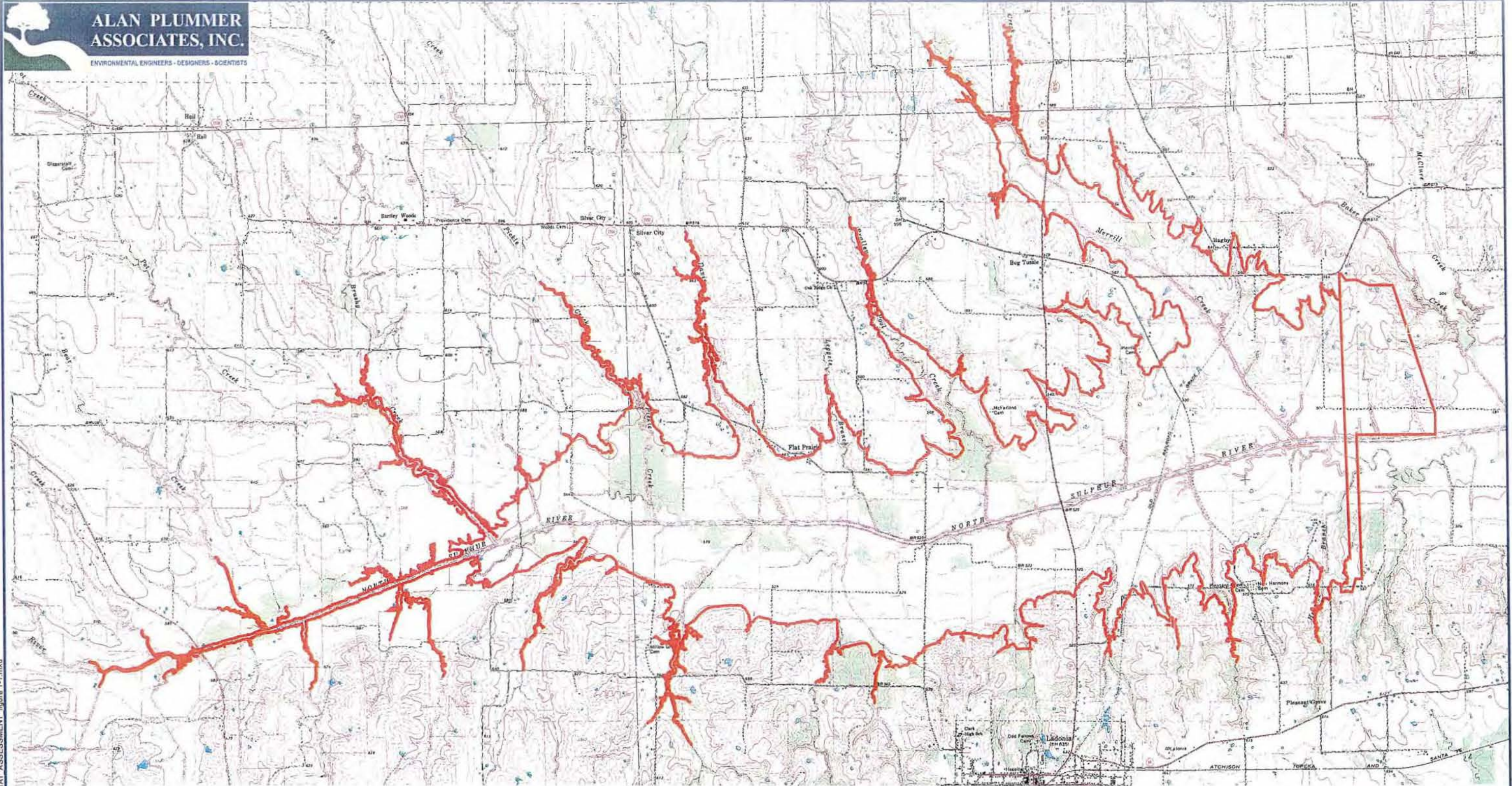
SECTION 1

BACKGROUND


The proposed Lake Ralph Hall project involves the impoundment of a portion of the North Sulphur River in Fannin County, north of the City of Ladonia, resulting in the creation of an approximately 7,560 acre (based on conservation pool) reservoir. This reservoir would inundate the river and portions of its named and unnamed tributaries as well as the immediate river valley. Figure 1-1 shows the location of the proposed reservoir site and the approximate footprint of the conservation pool for the proposed reservoir based on the preliminary engineering studies.

Fannin County is located in northeast Texas. The North Sulphur River drains the southern portion of Fannin County, which lies within the Blackland Prairie Ecoregion. Annual rainfall ranges from 41 inches in the western part of the county to 44 inches in the eastern part. Nearly 25 inches or about 56 percent of the annual rainfall usually falls from April through September. In winter, the average temperature is 44 degrees F and the average daily minimum temperature is 33 degrees F. In summer, the average temperature is 81 degrees F.⁽⁴⁾

Beginning in the 1920s, significant portions of the North Sulphur River, including the reach within the proposed reservoir project area, were channelized to increase drainage of floodwaters from agricultural cropland, primarily in cotton cultivation at the time. The original channelization project created a straight channel that was approximately 40 feet wide and 10 feet deep.⁽¹⁵⁾ After several decades of erosion, the main channel of the North Sulphur River is currently 200-300 feet wide and over 60 feet deep. Some tributaries were also channelized some distance upstream of their confluence with the river. Substantial erosion is also exhibited in the majority of the major tributaries to the North Sulphur River as a result of the channelization and also the increasing gradient produced as the river channel deepens. Head cutting and bank widening as a result of gully erosion exacerbated by both sheet and rill erosion are actively occurring along both the North Sulphur River channel and its major tributaries resulting in continued loss of soil, riparian vegetation, and stream properties and functions. The North Sulphur River itself appears to be unable to sustain viable populations of aquatic life



Legend

 Proposed Lake Ralph Hall



0 2,000 4,000
Feet

FIGURE 1-1
USGS TOPOGRAPHIC MAPS:
LADONIA, GOBER, HONEY GROVE, AND PECAN GAP, TX QUADRANGLES

throughout the proposed project reach due to the constant slaking of the eroding shale within the current channel bottom and lack of cover for protection from high velocity flows.

This report documents the efforts to date to assess the habitat existing within the proposed reservoir project area. These efforts include initial review of available information including maps, aerial photographs, historical data, soil survey data, field investigation, and analysis of gathered data using the Texas Parks and Wildlife Department's Wildlife Habitat Appraisal Procedure (WHAP) to evaluate the current habitat conditions within identified land cover types occurring in the project area. The following sections discuss the efforts conducted and present the findings of this preliminary assessment.

SECTION 2 METHODOLOGY

2.1 Literature Review

The North Sulphur River flows across the southern portion of Fannin County. The proposed reservoir site lies entirely within Fannin County; however, some downstream habitats in Lamar and Delta Counties may potentially be impacted by changes in hydrology resulting from the proposed project. Therefore, preliminary evaluation of potential impacts to downstream habitat areas is included in this study.

The southern portion of Fannin County and the proposed reservoir project area lie within the Blackland Prairie Ecoregion where the soils formed under prairie vegetation. A historical perspective of this ecoregion presented by the Texas Parks and Wildlife Department (TPWD)⁽⁹⁾ indicates that pre-settlement conditions of this region were that of a true prairie grassland community dominated by a diverse assortment of perennial and annual grasses and forbs. Early settlers into the area described it as a vast endless sea of grasses and wildflowers with sparsely scattered trees or mottes of oaks on uplands. Forested or wooded areas were restricted to bottomlands along major rivers and streams, ravines, protected areas, or on certain soil types. Recurrent prairie fires, either ignited by lightning or humans (American Indian), were the major force that molded the prairie landscape. These fires were typically very large in scale and would traverse the countryside until they reached landforms or conditions that would contain them (rivers, creek bottoms, soil change, topographical change, climatic change, or fuel charge). Fire maintained these plant communities by suppressing invading woody species and stimulating growth of prairie grasses and forbs.

One of the earliest uses of the Blackland Prairies by early settlers was grazing livestock, primarily cattle and horses. Farming was also common but did not become a major use until the 1870's. During this time, the prairies were plowed under and cotton replaced ranching as the principle land use. The rich soils of the Blackland Prairie were ideal for growing cotton and in a relatively short time, a majority of the desirable land was cultivated, leaving only small remnants

of the original prairie intact. Farming is still a major land use in the Blackland Prairies region today, but a large portion of the previously farmed land has been converted to pastureland (mostly "improved" grasses) for grazing livestock. ⁽⁹⁾

Agriculture is still considered the main business of Fannin County, according to the Soil Survey of Fannin County, Texas (United States Department of Agriculture, Natural Resources Conservation Service in cooperation with the Texas Agriculture Experiment Station, the U.S. Forest Service, and the Texas State Soil and Water Conservation Board).⁽⁴⁾ Nearly half of the agricultural income in the county is derived from the sale of livestock, primarily beef cattle.⁽⁴⁾ Bermudagrass and fescue are the main improved pasture grasses.⁽⁴⁾ Other important cash crops for the county include wheat, grain sorghum, soybeans, corn, and peanuts.⁽⁴⁾ Cotton, once the main cash crop, is now grown on less than 2,000 acres in the county.⁽⁴⁾ Crops currently under production within the general project area include wheat and soybeans.⁽¹⁸⁾

Of the approximately 575,916 acres within Fannin County⁽⁴⁾, 3,749 acres were dedicated to irrigated cropland in 2000 (as reported to the Texas Water Development Board in its annual irrigation survey in 2000⁽⁸⁾). Countywide, the number of acres enrolled in the Conservation Reserve Program from 1987-2003 was 3,672.4, and 471 acres were enrolled in the Environmental Quality Incentives Program in 2002. Another 770 acres of private land was enrolled in the Wetlands Reserve Program in 2002. However, no acres of private lands were reported as enrolled in the Wildlife Habitat Incentives Program in 2002.⁽⁸⁾

The Soil Survey of Fannin County, Texas states that soil is the most important natural resource in the county.⁽⁴⁾ Food, fiber, and timber for marketing and for home consumption as well as forage for livestock are products of the soils in the county. These products represent the major source of livelihood for many people of the area. Water is also considered an important natural resource with several lakes in the northern part of the county (in the Red River drainage basin) providing water for towns as well as for recreation and fishing. Wells provide water for household use and a few wells provide water for irrigation. Many floodwater-retarding structures have been built in the northwest and southwest parts of the county.⁽⁴⁾ However, the

proposed reservoir project area does not encompass any floodwater-retarding structures other than scattered upland stock ponds.

Wildlife provides both recreational opportunities and income for landowners in the county. Quail and dove are throughout the county. Deer and turkey are more prevalent in the northeast part of the county.⁽⁴⁾

There are two Federally listed species under the Endangered Species Act for Fannin County in addition to a number of species listed by the state of Texas as endangered, threatened, rare, or species of concern. The listed animal and plant species of concern, typical habitat for each species, and classification by the Federal and State governments for Fannin, Lamar, and Delta Counties are shown in Table A-1 included in Appendix A. Potential impacts to Federally and State listed species were evaluated based on the preliminary assessment of typical habitat for the list species or available reports of occurrence within the region of the proposed project area. Table A-2, Appendix A, identifies the potential for impacts based upon this preliminary assessment. Information regarding the designated critical habitat for the listed species of special concern for the study area is presented in Table A-3, Appendix A. No designated critical habitat for any of the listed species is found within the proposed project study area.

The Caddo Lyndon B. Johnson National Grasslands (Ladonia Unit) administered by the U.S. Forest Service (USFS) is managed under a cooperative agreement with Texas Parks and Wildlife Department as the Caddo Wildlife Management Area – Ladonia Unit and is located at the southwest edge of the proposed reservoir footprint. The twelve tracts that make up the Ladonia Unit were purchased by the federal government in the mid- to late 1930's as part of a national program to restore eroded and sub-marginal lands. Most of the land purchased was abandoned farms and ranches suffering severe soil erosion from poor agricultural practices.⁽¹⁰⁾ Primary management emphasis on the Caddo-LBJ National Grasslands concerns restoration of the land and conservation of soil and watershed resource values. These grasslands tracts are managed to provide public hunting and appreciative uses in a manner compatible with the resource.⁽¹⁰⁾ Since the twelve tracts of the Ladonia Unit are not contiguous and boundaries are sometimes hard to find, hunting is limited. The habitat attracts mostly doves and quail.⁽¹¹⁾ However, the once

abundant northern bobwhite population have reached a non-viable level for hunting and appear to be approaching extirpation based on recent whistle count and brood survey data.⁽¹⁰⁾ Densities of white-tailed deer, another primary game species present, range from moderate to low depending on habitat diversity and range conditions.⁽¹⁰⁾ Based on communication with Jack Jernigan, TPWD, occasionally a few white-tailed deer are harvested from the Ladonia Unit.⁽¹²⁾ One of the stated objectives of the management plan for the Caddo Wildlife Management Area is to enhance wildlife habitat and diversity on the Ladonia Unit since this Unit receives light public use due to low game and nongame species populations.⁽¹⁰⁾

Ephemeral streams bisect some of the tracts of the Ladonia Unit, but there are no permanently flowing streams on this Unit.⁽¹⁰⁾ Although the management plan for the Caddo Wildlife Management Area⁽¹⁰⁾ mentions numerous small water impoundments of less than one acre scattered throughout the Unit, only one pond was identified during the review of aerial photographs of the grasslands area. Alfredo Sanchez, TPWD field technician, indicated that there are several small ponds within the Ladonia Unit that have bream and catfish, but that no regular stocking program is practiced.⁽¹⁴⁾ Jack Jernigan, TPWD manager for the Ladonia Unit, also indicated that he was not aware of any stocking programs being undertaken for any ponds by the TPWD at the Ladonia Unit.⁽¹²⁾

All tracts within the Ladonia Unit are noted as being subject to soil erosion due to run off. Approximately 93 acres of gullies that need treatment are reported across seven of the twelve tracts that make up the Ladonia Unit.⁽¹³⁾

Two Texas Natural Heritage Areas (TNHAs) exist in the Ladonia Units. These include the Center Point Prairie in Unit 44 and Gober Prairie in Unit 47. The Environmental Assessment for the Ladonia Watershed Landscape Analysis⁽¹³⁾ indicates that the goal for these areas is to maintain the areas for the botanical character and successional stage for which the area was designated (little bluestem-Indian grass). Neither of the TNHAs lies within the proposed footprint based on the conservation pool of Lake Ralph Hall.

2.2 TPWD Natural Diversity Database Review

The TPWD maintains a database called the Natural Diversity Database (NDD) (formerly called the Texas Biological and Conservation Data System) that stores information on rare, threatened, and endangered plants and animals, exemplary natural communities, and other significant ecological features. A request for review of the proposed project area including the reservoir footprint for the 100-year flood elevation plus a potential impact zone downstream of the proposed dam site and an additional 1-mile buffer zone around this footprint for potential impacts to rare, threatened, and endangered species, natural communities, or other recorded significant features recorded for this area was submitted to TPWD on November 10, 2004. Base maps indicating proposed reservoir 100-year floodplain footprint on 7.5 minute USGS quadrangle sheets (Dodd City, Texas; Gober, Texas; Honey Grove, Texas; and Ladonia, Texas), 2002 aerial photograph, and GIS maps showing 911 residences for Fannin County, 2003 rural addresses, and roadways from the Texas Department of Transportation Electronic Files, as well as on-site photographs were included with the review request. The response received from TPWD, dated May 12, 2005, is included in Appendix B. A statement was included in the letter to the effect that although the database represents the best data available to the TPWD regarding rare species, it does not provide a definitive statement as to the presence, absence, or condition of special species, natural communities, or other significant features in the project area.

In addition to a list of rare, threatened, and endangered species reported for the proposed project area, special features and natural communities listed included colonial waterbird rookeries and Little Bluestem-Indiangrass Series communities. The Caddo National Grasslands – Ladonia Tract and Caddo Wildlife Management Area – Ladonia Unit were also listed. The TPWD manages the Caddo National Grasslands – Ladonia Tract as the Caddo Wildlife Management Area – Ladonia Unit, so these actually represent the same land area. Concerns regarding proposed inundation of portions of the managed grassland areas were expressed. The reported acreage for the national grasslands is not all owned by the government, and the area perceived as potentially being inundated by the proposed reservoir represents a larger percentage of the government owned land (9 percent versus 1 percent). The project area submitted to the TPWD with the review request was based on approximately 1-mile buffer around the probable

maximum flood (pmf) boundary for the proposed reservoir. Based on the conservation pool footprint for the proposed reservoir, about 220 acres or 7.9 percent of the government owned land would be inundated.

The correspondence from TPWD also presents some of the potentially positive impacts for the managed grassland area resulting from the proposed reservoir. These included the potential development of wetland and open water habitats beneficial to migratory species such as waterfowl and possibly the bald eagle, and that the potential for inundation of private lands providing source of wildlife migration to the managed grassland areas resulting in increased wildlife populations and diversity of habitats. It was suggested that purchase of private properties bordering currently managed units to develop larger contiguous tracts for grassland species management would be potential compensatory mitigation for loss of grassland and shrubland habitats inundated by the proposed reservoir. These possibilities need to be explored further including baseline surveys for determining and quantifying the impacts of the proposed project in conjunction with the TPWD, the USFS, and the U.S. Fish and Wildlife Service.

2.3 Maps and Aerial Photograph Reconnaissance

Recent and historical aerial photographs, USGS topographic quadrangles (Gober, Ladonia, Honey Grove, and Pecan Gap), and U.S. Department of Interior - National Wetlands Inventory (NWI) Maps for the identified quadrangles, and the Soil Survey of Fannin County, Texas maps and aerial photographs were reviewed for the proposed project area to develop an inventory of aquatic and terrestrial resources and land cover types. Maps and aerial photographs reviewed are included in Appendix C. As indicated on the maps and aerial photographs reviewed, the majority of the land use within the proposed reservoir project area is in agricultural production, either as improved pasture or as cropland. Although there are wooded riparian areas still present along the North Sulphur River and its major tributaries, these areas are isolated, discontinuous tracts. Some isolated areas were identified including abandoned meanders of the original river channel that still exist and reclaimed native prairie areas such as the managed national grassland tracts that potentially could have higher habitat quality, but have reduced functionality for habitat due to their small size and discontinuity.

Preliminary analysis of recent aerial photographs (2002) identified the following potential land use cover types:

- Mixed Upland Forest – forest along stream channels that does not stay inundated for sufficient duration to be considered bottomland hardwood forest
- Mixed Upland Forest – forest in upland areas not associated with river or tributary channels
- Grassland (Native) – grassland dominated by native prairie grasses
- Grassland (Tame) – grassland dominated by “improved” pasture grasses; maybe utilized as pasture or as hay meadow
- Crops – includes land actively being cropped and fallow fields
- Scrub-Shrub – wetland areas dominated by small trees and shrubs
- Emergent Marsh – wetland areas dominated by herbaceous vegetation
- Bottomland Hardwood Forest – forest along stream channels that have soil characteristics indicating sustained periods of inundation or saturation and dominated by hardwood species
- Open Water – diked or excavated impoundments with sufficient water depths to maintain open water (>6.6 feet)
- Other – areas occupied by homesteads, farm buildings, cemeteries, etc.

Representative tracts containing the identified cover types were identified from the 2002 aerial photograph and county tax maps, and rights-of-entry were obtained from the individual private landowners so that the representative sites could be inspected or groundtruthed to confirm cover type characteristics.

2.4 Groundtruthing Field Assessment

Of the approximately 7,560 acres within the conservation pool of the proposed reservoir project plus the approximately 500 acres at the embankment and emergency spillway channel, field investigation was conducted by two biologist from Alan Plummer Associates, Inc. for over 3,300



acres represented in 67 privately owned tracts. This field investigation was conducted to develop data for evaluating the cover types identified during the preliminary assessment of the 2002 aerial photograph. Since the methodology selected for the evaluation was the TPWD's Wildlife Habitat Appraisal Procedure (WHAP), the originally identified cover types were correlated with the major physiognomic classes of vegetation listed for Texas as used for the WHAP. The following vegetation cover types were used during the field investigation for the WHAP evaluation:

- Grasses – Herbs (grasses, forbs, and grasslike plants) dominant; woody vegetation lacking or nearly so (generally 10 percent or less woody canopy coverage).
- Pasture – Similar to grasses, but grazing limits the density of vegetation to sparse ground cover.
- Parks – Woody plants mostly equal to or greater than nine feet tall generally dominant and growing as small clusters, or as randomly scattered individuals within continuous grass or forbs (11 to 70 percent woody canopy cover). (This category is defined based on vegetation characteristics and should not be confused with parks as public use facilities.)
- Young Forest – Immature deciduous or evergreen trees generally equal to or less than 30 feet tall (greater than 20 percent canopy cover); mid-story usually absent; potential to form mature forest; usually encountered in association under silvicultural treatments.
- Forest – Deciduous or evergreen trees dominant; mostly greater than 20 feet tall with closed crowns or nearly so (71 to 100 percent canopy cover); midstory generally apparent except in managed monoculture.
- Cropland – Includes cultivated cover crops or row crops used for the purpose of producing food and/or fiber for either man or domestic animals. For the purpose of this assessment, fallow fields or areas recently cropped with characteristics more closely matching active cropland rather than pasture or grassland were counted as crop cover type.

Photographs, GPS locations, and vegetative species lists for each representative site were compiled during field investigations conducted from March 15 through September 2, 2005. Representative photographs of the identified land cover types surveyed are included in

Appendix D. Selection of representative site locations was influenced by stratification of vegetative land cover within the proposed reservoir project area, availability of access, and special emphasis on special features that represent a small percentage of the overall project area but potentially higher quality habitat (e.g., remaining former river channel oxbows).

2.5 Wildlife Habitat Appraisal Procedure Analysis

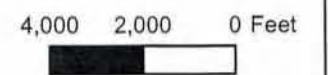
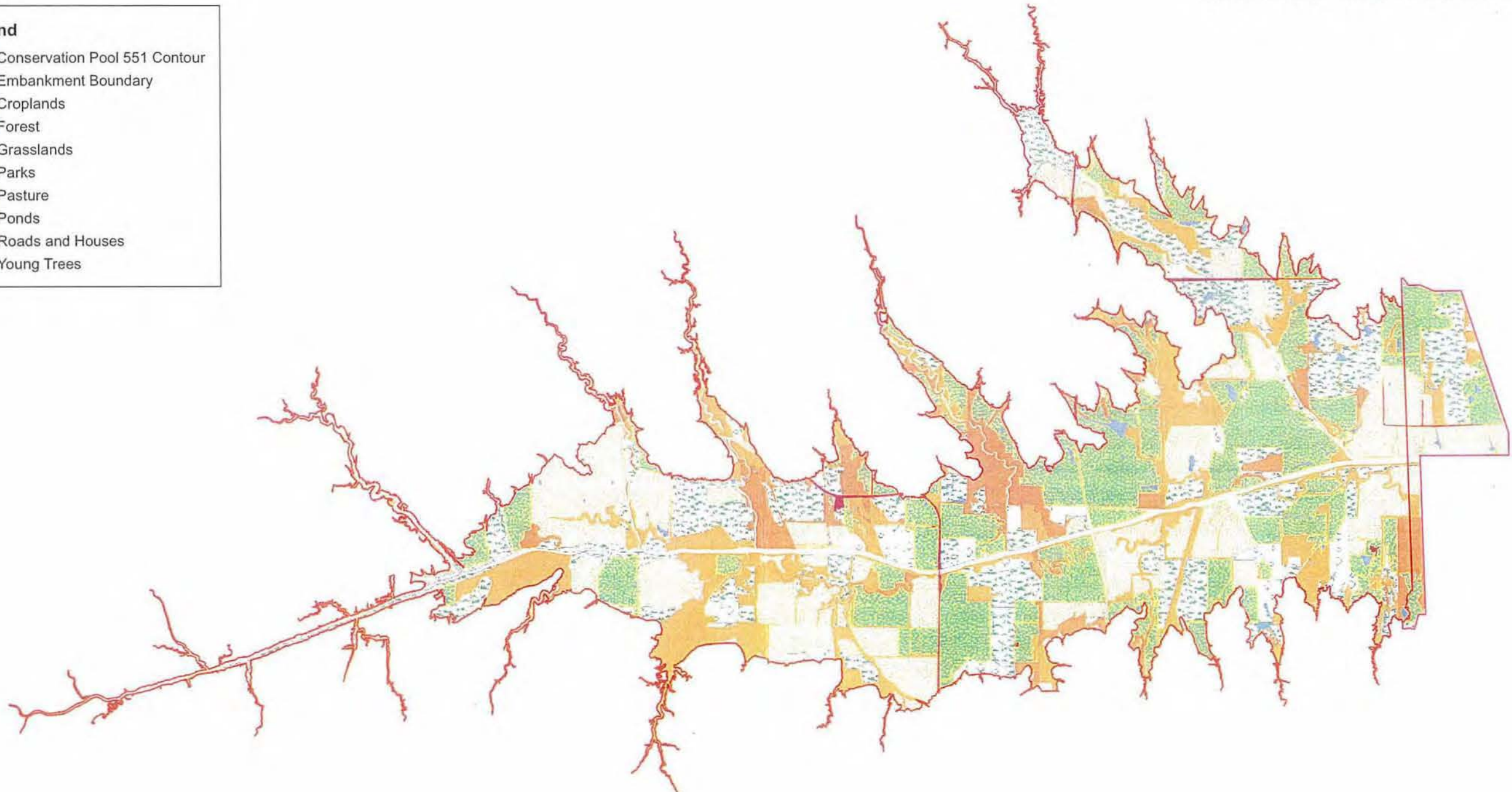
The method used to evaluate the proposed Lake Ralph Hall project site was the Wildlife Habitat Appraisal Procedure (WHAP) developed by TPWD.⁽²⁾ The WHAP methodology was used by the TPWD and U.S. Fish and Wildlife Service (USFWS) to evaluate direct impacts to wildlife resources for 30 of 44 proposed reservoir sites throughout the state of Texas during the 1980s.⁽³⁾ The WHAP measures key components of each cover type, which contribute to ecological condition of the cover type and resulting overall suitability for wildlife. The WHAP was designed to obtain a direct measure of the habitat suitability for wildlife using an assessment of ecological productivity and diversity rather than an evaluation based on the selection of individual wildlife species. Key habitat components which are evaluated include: site potential for woody and herbaceous plant production; age of existing vegetation; relative abundance of the habitat type and its value to wildlife; diversity of occurring woody species; vertical stratification of vegetation canopy cover; relative abundance or the scarcity of dens and refuge sites; and availability of browse and herbaceous material. The biological habitat components evaluation key for the WHAP is included in Appendix E. A habitat quality (HQ) score was derived from this evaluation for each cover type. Habitat Units (HU's) are derived by multiplying the average habitat quality score (HQ) of the cover type by the number of acres for each cover type as determined by the photo-interpretation of the 2002 aerial and subsequent confirmation by groundtruthing.

Classification of land cover within the proposed reservoir project area was performed by conventional analysis of digital aerial photographs from 2002 with 2 feet per pixel resolution. This analysis was used to produce two principal products:

1. A classification map portraying major vegetation cover types and associations (Figure 2-1); and

Figure 2-1
Upper Trinity Regional Water District
Lake Ralph Hall Drainage Basin
Land Cover Classification Map

- Legend**
-  Conservation Pool 551 Contour
 -  Embankment Boundary
 -  Croplands
 -  Forest
 -  Grasslands
 -  Parks
 -  Pasture
 -  Ponds
 -  Roads and Houses
 -  Young Trees



SECTION 3

RESULTS

Lists of the plant species identified within the proposed reservoir project area for each land use cover type for the WHAP analysis are included in Appendix F. These lists along with Biological Components Field Evaluation Forms for each cover type, also included in Appendix F, provide a characterization of the habitat suitability for wildlife as determined by WHAP analysis of the data gathered during the groundtruthing field investigations.

Table F-1 displays the scores for the seven crop WHAP sites. Crops include cultivated cover or row crops for food or fiber production (Frye 1995). Based on personal communication with the Fannin County NRCS field office staff (Randy Moore), crops currently under cultivation in the general project area include wheat and soybeans. No cotton is currently being produced. Former cropland in the project area is also actively being converted and utilized for production of forage (bermuda and fescue grass) as part of land management programs developed with the National Resources Conservation Service (NRCS) to control loss of soil due to the extreme erosion in the area. These forage grasses are used for hay production. Cropland areas identified from the 2002 aerial photograph that were determined to be planted to forage grasses based on the groundtruthing investigations conducted in 2005 was considered to be more representative of pasture cover type and acreage for these areas transferred accordingly. The representative cropland sites scored very consistently with the exception of Component 7, Criteria C which relates to condition of existing vegetation. The average WHAP score for all crop sites was 0.09 out of a possible maximum of 0.65. Plants, other than the crops, commonly occurring in cultivated fields included Japanese brome grass (*Bromus japonicus*), Bermudagrass (*Cynodon dactylon*), perennial ryegrass (*Lolium perenne*), peppergrass (*Lepidium spp.*), giant ragweed (*Ambrosia trifida*), Johnsongrass (*Sorghum halepense*), and crabgrass (*Digitaria ciliaris*). Vegetation observed on the crop sites is listed in Table F-2 included in Appendix F.

Table F-3 shows the scores for the seven pasture WHAP sites. These sites were dominated by improved grasses but had been over-seeded with cool-season grasses and/or legumes in some cases. A variety of wildflowers and forbs were also observed at some sites in addition to pasture

grasses. The representative pasture sites scored very consistently with the exception of Component 7, Criteria B (Condition of Existing Vegetation, Herbaceous). The average HQ score for pasture cover type was 0.20 out of a possible maximum of 0.92. The improved grasses dominating these sites included Bermudagrass and Johnsongrass. Legumes and cool-season grasses observed included white clover, vetch (*Vicia sp.*), spurred butterfly pea (*Centrosema virginianum*), and Texas wintergrass (*Stipa leucotricha*). Other forbs observed included yellow thistle (*Cirsium horridulum*), Texas toadflax (*Nuttallanthus texanus*), primrose (*Oenothera speciosa*), prairie phlox (*Phlox pilosa*), Texas prairie parsley (*Polytaenia texana*), dotted blue-eyed grass (*Sisyrinchium langloisii*), buttercup (*Ranunculus sp.*), dewberry (*Rubus trivialis*), trumpet creeper (*Campsis radicans*), wild onion (*Allium ascalonicum*), wood sorrel (*Oxalis spp.*), curly dock (*Rumex crispus*), fiddle dock (*Rumex pulcher*), violet (*Viola sp.*), and cocklebur (*Xanthium sp.*). Table F-4 lists the vegetative species observed in the pasture cover type sites surveyed.

The scores for the seven representative grasses WHAP sites are listed in Table F-5. These sites were vegetated by both native and introduced grasses and a diversity of legumes and forbs. Variation in the scores for uniqueness and relative abundance for two of the sites was due to a higher ranking score given for larger contiguous tracts with dominance of native grass species. The average HQ score for the grasses was 0.25 out of a possible 0.92. The dominant grasses observed included little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), Bermudagrass (*Cynodon dactylon*), purple threeawn (*Aristida purpurea*), and Virginia wildrye (*Elymus virginicus*). Legumes included Illinois bundleflower (*Desmanthus illinoensis*), spurred butterfly pea (*Centrosema virginianum*), and sensitive briar (*Schrankia spp.*). A variety of forbs were observed including annual ragweed (*Ambrosia artemisiifolia*), giant ragweed (*Ambrosia trifida*), common yarrow (*Achillea millefolium*), wild onion (*Allium ascalonicum*), milkweed (*Asclepia sp.*), Indian paintbrush (*Castilleja indivisa*), prairie parsley (*Polytaenia nuttalli*), yellow thistle (*Cirsium horridulum*), prairie plantain (*Plantago elongata*), common selfheal (*Prunella vulgaris*), fiddle dock (*Rumex pulcher*), nightshade (*Solanum sp.*), and Texas vervain (*Verbena halei*). Vegetative species observed across the grasses sites are listed in Table F-6 included in Appendix F.

Table F-7 lists the scores for the seven representative forest WHAP sites. Forest areas within the proposed project area consist of isolated tracts mostly along the major tributaries draining to the north side of the North Sulphur River with some tracts south of the river, associated with tributaries or segments of the former river channel. Due to historical clearing of riparian forest within the proposed project area for agricultural purposes, the forests observed mostly represent regrowth that is less than 50 years old. Those tracts that were somewhat larger or provided a more contiguous corridor with a diversity of mature hard mast producing species were scored higher for Criteria 3 – Uniqueness and Relative Abundance. The average HQ score for forest sites was 0.59 out of a maximum possible 1.0. Canopy species observed in the isolated tracts of riparian forest are pecan (*Carya illinoensis*), American elm (*Ulmus americana*), bur oak (*Quercus macrocarpa*), shumard red oak (*Quercus shumardii*), post oak (*Quercus stellata*), blackjack oak (*Quercus marilandica*), southern red oak (*Quercus falcata*), bois d'arc (*Maclura pomifera*), sassafras (*Sassafras albidum*), gum bumelia (*Bumelia lanuginosa*), eastern red cedar (*Juniperus virginiana*), American elm (*Ulmus americana*), cedar elm (*Ulmus crassifolia*), and green ash (*Fraxinus pennsylvanica*). Species observed in the understory included young specimens of the canopy species listed above as well as chinkapin oak (*Quercus muhlenbergii*), coralberry (*Symphoricarpos orbiculatus*), deciduous holly (*Ilex decidua*), roughleaf dogwood (*Cornus drummondii*), sugar hackberry (*Celtis laevigata*), Eve's necklace (*Sophora affinis*), honey locust (*Gleditsia triacanthos*), box elder (*Acer negundo*), with woody vines represented by common trumpet creeper (*Campis radicans*), poison ivy (*Toxicodendron radicans*), rattanvine (*Berchemia scandens*), saw greenbriar (*Smilax bona-nox*), and Virginia creeper (*Parthenocissus quinquefolia*). Herbaceous species commonly observed in the wooded areas included inland sea oats (*Chasmanthium latifolium*), knotroot bristlegrass (*Setaria geniculata*), Virginia wildrye, Missouri violet (*Viola missouriensis*), sedge (*Carex spp.*), and Japanese honeysuckle (*Lonicera japonica*). Table F-8 provides a list of the species recorded in the surveyed areas for forest cover type.

Young forest, with trees less than 30 feet tall making up more than 20 percent of the canopy, were scored separately from forested areas. This category scored 0.44 out of a maximum possible 1.0. Table F-9 lists the scores for the seven representative young forest WHAP sites. Tree species recorded as canopy included eastern red cedar, cottonwood (*Populus deltoides*),

gum bumelia, American elm, cedar elm, bois d'arc, green ash, box elder, sugar hackberry, toothache tree (*Zanthoxylum clava-herculis*), and mesquite (*Prosopis glandulosa*). Young hard mast producing tree species including bur oak, red oak (*Quercus shumardii*), pecan, and post oak were also observed on some tracts. Black willow (*Salix nigra*) was observed around ponds and along stream channels. Understory species noted included young specimens of the canopy tree species as well as Chinese privet (*Ligustrum sinense*), rattlebush (*Sesbania drummondii*), Chickasaw plum (*Prunus angustifolia*), Mexican plum (*Prunus mexicana*), wild rose (*Rosa sp.*), hawthorn (*Crataegus sp.*), Eve's necklace (*Sophora affinis*), and soapberry (*Sapindus drummondii*). Poison ivy and greenbriar (*Smilax spp.*) were commonly observed vines. A variety of herbaceous species was observed within the young forest cover type including residual plants from former land use and colonization from available sources. Common herbaceous plant species included Johnsongrass, Bermuda grass, inland sea oats, Virginia wildrye, bushy bluestem (*Andropogon glomeratus*), sedge (*Carex sp.*), perennial ryegrass (*Lolium perenne*), false garlic, catchweed bedstraw (*Galium aparine*), Japanese honeysuckle, buttercup (*Ranunculus sp.*), giant ragweed, henbit (*Lamium amplexicaule*), poison hemlock (*Conium maculatum*), American pokeweed (*Phytolacca americana*), Texas prairie parsley (*Polytaenia texana*), curly dock (*Rumex crispus*), and prickly pear cactus (*Opuntia sp.*). Table F-10 lists the species observed within the forest areas.

Land use areas including pasture and grassland with scattered large trees or isolated wooded mottes were characterized as parks. This cover type scored a 0.41 out of a maximum possible 1.0. Scores for the seven representative park WHAP sites are listed in Table F-11. Species observed within this cover type varied considerably depending on the overall land use. Occasional large trees including pecan, post oak, red oak, American elm, cedar elm, and catalpa (*Catalpa speciosa*) were observed as shade trees within some pastures. Clumps of trees and shrubs were also observed as invaders within grassland or as more mature stands along ponds and small drainages. Canopy species observed in these areas included green ash, bois d'arc, American elm, cedar elm, sugar hackberry, pecan, and red oak. Understory species observed in these areas included sugar hackberry, black willow, Eve's necklace, cedar elm, green ash, eastern red cedar, Chickasaw plum, soapberry, Chinese privet, roughleaf dogwood, hawthorn, honey locust, deciduous holly, bois d'arc, Mexican plum, and post oak. A large variety of grasses and

forbs were observed across the various tracts representing this land cover as listed in Table F-12. Commonly observed grasses included Johnsongrass, Bermuda grass, little bluestem, Japanese brome, bushy bluestem, and purple three awn. Commonly observed forbs included poison ivy, greenbriar, coralberry, dotted blue-eyed grass, giant ragweed, annual ragweed, false garlic, buttercup, Indian paintbrush (*Castilleja sp.*), and prairie peppergrass (*Lepidium densiflorum*).

Aquatic Resources

During the Environmental Characteristics study performed in 2002-2003, which was primarily a literature review and study of available maps and aerial photographs, several types of aquatic resources including streams and rivers, wetlands, and ponds (open water) were identified within the proposed reservoir project area. Approximately 615,000 linear feet of stream channels including the North Sulphur River, its major tributaries, and headwater tributaries to the tributaries were identified within the proposed reservoir footprint based on evaluation of 2002 aerial photographs. Revised calculation of impacts to jurisdictional stream channels following the groundtruthing conducted with the habitat assessment and preliminary jurisdictional determination field investigations indicates that 600,573 linear feet of stream channel will be impacted by inundation within the proposed conservation pool of Lake Ralph Hall.

Additional aquatic areas identified visually during the 2002-2003 Environmental Characteristics study from 2002 aerial photographs included 209 ponds totaling approximately 119 acres; 74 wetland areas, as identified by the National Wetland Inventory Maps produced by the U.S. Department of the Interior, totaling approximately 351 acres; and approximately 11,200 linear feet of remnant stream channels or meander scars totaling approximately 6.5 acres that may potentially be jurisdictional waters. Further investigation of these resources was conducted during the 2005 field investigation. Within the 8,060 acres of the conservation pool footprint of the proposed reservoir and the embankment and spillway area, the total number of ponds impacted is only 147 totaling 87 acres. This acreage is included within the total acreages for each of the cover types depending on the locations of the individual ponds.

The numerous small ponds (less than 1 acre in size) scattered throughout the proposed project area serve primarily as water supply for livestock within the pasture and grassland areas. These small ponds also provide habitat functions for local and migratory wildlife. The ponds typically have characteristic aquatic flora around the fringes including spikerushes (*Eleocharis spp.*), soft rush (*Juncus effusus*), water primrose (*Ludwigia peploides*), arrowhead (*Sagittaria spp.*) and cattails (*Typha spp.*). Other aquatic species observed in some locations included toothcup (*Ammannia coccinea*), fragrant waterlily (*Nymphaea odorata*), flatsedges (*Cyperus spp.*), and sedges (*Carex spp.*). During this preliminary survey due to the limitations of the WHAP methodology, these small ponds were not evaluated separately from the cover type in which they were located. The vegetation observed around the pond areas was included in the assessment of vegetative diversity for the representative cover type being assessed. However, due to the paucity of aquatic habitat within the project area, the small farm ponds increase the overall habitat quality of the land cover in which they are located.

The majority (335 acres) of the wetland acreage originally identified from the NWI maps during the Environmental Characteristic study performed in 2002-2003 was characterized as palustrine forested, describing areas of potential bottomland hardwood forests along the North Sulphur River and its major tributaries. However, current hydrologic and hydraulic studies of the river channel indicated that at the proposed dam site, the existing channel has the capacity to fully contain and convey the 100-year flood.⁽¹⁶⁾ Based on the elevations of the tributaries relative to the river channel and extrapolation of river channel flow depth under 100-year flood conditions where the flow in the main channel creates a backwater condition for the tributaries, the flow in the tributary channels for the north side of the river is also contained within the banks of the creek channels for about a mile upstream of the river channel.⁽¹⁷⁾ Based on the hydraulic analyses and observations during field investigations, the forested areas identified as potential wetland areas on the NWI maps do not appear to have sufficient hydrology to be characterized as bottomland hardwood forest. These areas were considered to function as riparian forest and were assessed within the forest land use cover type. As observed during the field investigations, these forested areas continue to be cleared for agricultural and other development.

SECTION 4
DISCUSSION

The preliminary habitat assessment included review of aerial photographs and field investigation to provide groundtruthing of identified cover types. Based on analysis of the preliminary surveys using the WHAP protocol, approximately 7,764 acres in six identified cover types out of the 8,060 acres within the total project area impacted based on the conservation pool of the proposed reservoir and the embankment/spillway area were assessed. A map of the identified cover types superimposed on the 2002 aerial photograph is included in Appendix G. The acreage assessed does not include the approximately 252 acres within stream channels. However, the acreage of the 147 identified ponds was included within the surrounding cover type and the assessment incorporates the vegetative diversity identified around small ponds within each identified cover types. Further evaluation will be needed to determine a habitat quality separately for the aquatic resources. Table 4-1 presents the wildlife habitat appraisal summary based upon the preliminary investigations.

TABLE 4-1
WILDLIFE HABITAT APPRAISAL SUMMARY

Cover Type Category	Average Habitat Quality Score (HQ)	Total Acres	Habitat Units HQ X Acres
Cropland	0.09	1,720	154.80
Grasses	0.25	1,435	358.75
Pasture	0.20	2,192	438.40
Parks	0.41	516	211.56
Forest	0.59	602	355.18
Young Forest	0.44	1,299	571.56
TOTAL		7,764	2,090.25

The conservation pool of the proposed reservoir site is approximately 7,560 acres as defined in the preliminary engineering studies. The additional acreage assessed in the habitat assessment survey includes the areas of the embankment footprint and emergency spillway area downstream of the embankment. As engineering studies and design progress, further refinements to adjust the area of potential impacts may be conducted.

Based on the preliminary habitat assessment, approximately 69 percent of the potential vegetated impact area for the proposed reservoir is currently under agricultural production (crop, grasses and pasture). The cover type identified as parks, representing another 6.6 percent, is also used for grazing livestock. Acreage with woody vegetation (forest, young forest, and parks) represents approximately 31 percent of the proposed project area. Over half of this acreage (1,299 acres) is in young regrowth forest. Parks (516 acres) represent about one-quarter of the wooded vegetation areas. . The remaining wooded vegetation areas are identified as forest (602 acres). In the project area, this classification represents more mature regrowth that has occurred following historical clearing of the area for cotton growing in the late 1800s and early 1900s. Based on current hydrologic and hydraulic analysis of the North Sulphur River watershed, none of the forested areas should be considered bottomland hardwood forest since flood flows up through the 100-year event are completely contained within the river and tributary channels up to a mile upstream of the river for the tributaries on the north side of the river.

Severe erosion throughout the watershed is a significant ongoing problem as demonstrated by the eroded drainage channels, creek channels, and the main channel of the North Sulphur River observed during the field investigations. As a result of historical erosion, cropland within the proposed project area is continuing to be converted to pasture with the planting of forage grasses such as Bermuda and fescue as part of land management programs attempting to address soil loss from the area. The historical and ongoing erosion has significantly reduced areas formerly considered prime farmland within the North Sulphur River watershed.

SECTION 5 CONCLUSIONS

Overall, the quality of habitat along the North Sulphur River within the proposed project area is mostly degraded by agricultural usage and the significant continuing erosion problems experienced as a result of historical channelization projects along the river. The few existing wooded areas provide some moderate quality habitat, but these areas are fragmented reducing the overall ability to support wildlife populations. Since the channels have eroded to the extent that the 100-year flood flows are contained within the channel, none of the existing riparian forest areas has current hydrology to be classified as bottomland hardwood forest. Native grassland areas that are being managed to preserve and enhance native prairie habitat also provide some moderate quality habitat, but these areas are likewise fragmented (the Ladonia unit of the Caddo National Grassland WMA has twelve separate land tracts) reducing the effectiveness of management plans and wildlife as well as public utilization. Substantial areas being managed as native grassland are currently dominated by woody invaders such as eastern red cedar, honey locust, cedar elm.

Multiple opportunities exist for providing benefits to the North Sulphur River watershed in association with the development of the proposed Lake Ralph Hall reservoir project. Proposed coordination with federal, state, and local government agencies as well as local citizens could result in the following benefits: stabilize the watershed and reduce impacts from currently ongoing severe erosion, maintain water quality within the proposed reservoir, enhance habitat for local and migratory wildlife, and provide a diverse, healthy environment for future generations.

SECTION 6
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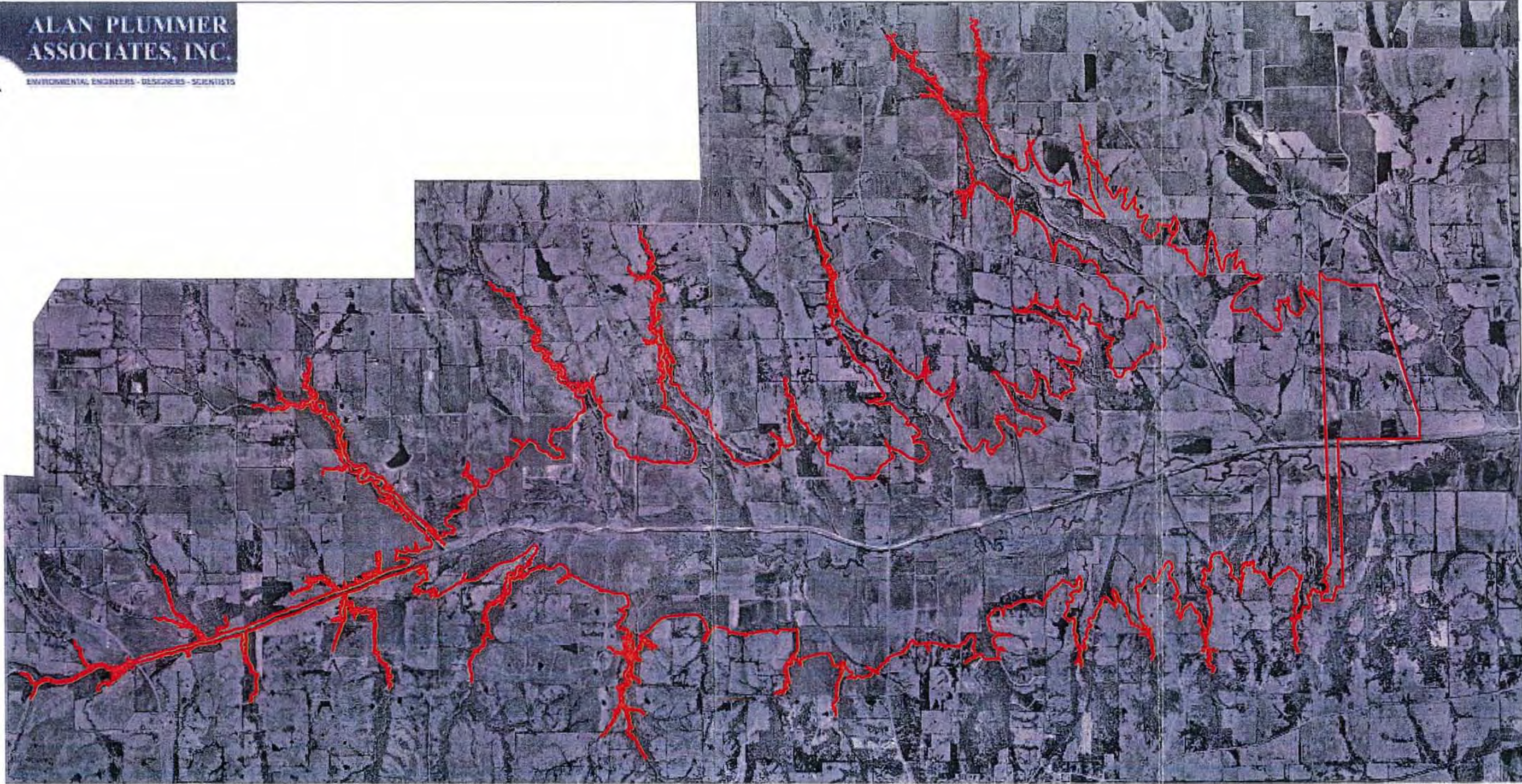
**FEDERALLY AND STATE LISTED
THREATENED OR ENDANGERED SPECIES**

TABLE A-1
Federally and State Listed Species in Fannin, Lamar and Delta Counties


	Common Name	Scientific Name	Habitat	Status Within County		
				Fannin	Lamar	Delta
Birds	American Peregrine Falcon	<i>Falco peregrinus anatum</i>	areas with high, massive cliffs with expansive views near water where prey are numerous and diverse	State listed as endangered	State listed as endangered	State listed as endangered
	Arctic Peregrine Falcon	<i>Falco peregrinus tundrius</i>	areas with high, massive cliffs with expansive views near water where prey are numerous and diverse	State listed as threatened	State listed as threatened	State listed as threatened
	Bachman's Sparrow	<i>Aimophila aestivalis</i>	open pine woods with understory, brushy slopes, old fields	State listed as threatened	N/A	State listed as threatened
	Baird's Sparrow	<i>Ammodramus bairdii</i>	shortgrass prairie with scattered low bushes and matted vegetation	State listed as rare	N/A	N/A
	Bald Eagle	<i>Haliaeetus leucocephalus</i>	large lakes, nesting in tall trees; feeds in areas of open water where food is available	Federally and State listed as threatened	Federally and State listed as threatened	Federally and State listed as threatened
	Cerulean Warbler	<i>Dendroica cerulea</i>	mature deciduous forests	State listed as rare	N/A	N/A
	Eskimo Curlew	<i>Numenius borealis</i>	coastal prairies and open tundra	State listed as endangered	N/A	N/A
	Henslow's Sparrow	<i>Ammodramus henslowii</i>	weedy fields or cut-over areas with some bare ground where bunch grasses and vines occur	State listed as rare	N/A	State listed as rare
	Interior Least Tern	<i>Sterna antillarum athalassos</i>	nests along sand and gravel bars within braided streams and rivers	Federally and State listed as endangered	Federally and State listed as endangered	Federally listed as endangered
	Piping Plover	<i>Charadrius melodus</i>	found along sandy areas associated with rivers, lakes, or oceans that are bare to sparsely vegetated	N/A	N/A	Federally listed as threatened

Federally and State Listed Species (Continued)

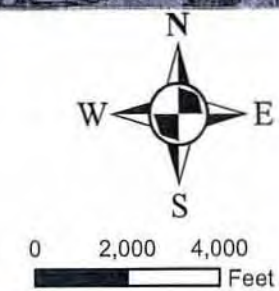
	Common Name	Scientific Name	Habitat	Status Within County		
				Fannin	Lamar	Delta
Birds (Continued)	Western Burrowing Owl	<i>Athene cunicularia hypugaea</i>	open grasslands, especially prairie, plains, and savannas, nest and roosts in abandoned burrows	N/A	N/A	State listed as rare
	Whooping Crane	<i>Grus americana</i>	marshes, river bottoms, potholes, prairies, and cropland (migratory)	N/A	Federally listed as endangered	N/A
	Wood Stork	<i>Mycteria americana</i>	prairie ponds, flooded pastures or fields, ditches, and other shallow standing water	State listed as threatened	N/A	State listed as threatened
Fish	Blackside Darter	<i>Percina maculata</i>	clear, gravelly streams; prefers pools with some current, or quiet pools to swift riffles	N/A	N/A	State listed as threatened
	Blue Sucker	<i>Cycleptus elongatus</i>	large, deep rivers and deeper zones of reservoirs with moderate to swift currents; bottom type is bedrock, gravel, or rubble	State listed as threatened	State listed as threatened	N/A
	Creek Chubsucker	<i>Erimyzon oblongus</i>	small rivers and creeks of various types; seldom in impoundments; prefers headwaters, but seldom occurs in springs	State listed as threatened	State listed as threatened	State listed as threatened
	Paddlefish	<i>Polyodon spathula</i>	slow moving waters of large rivers and reservoirs	State listed as threatened	State listed as threatened	State listed as threatened
	Shovelnose Sturgeon	<i>Scaphirhynchus platorynchus</i>	bottom of pools with sand, rock, or gravel substrate	State listed as threatened	N/A	N/A
	Western Sand Darter	<i>Ammocrypta clara</i>	large streams; most common in slight to moderate current over a sandy bottom	State listed as rare	N/A	N/A

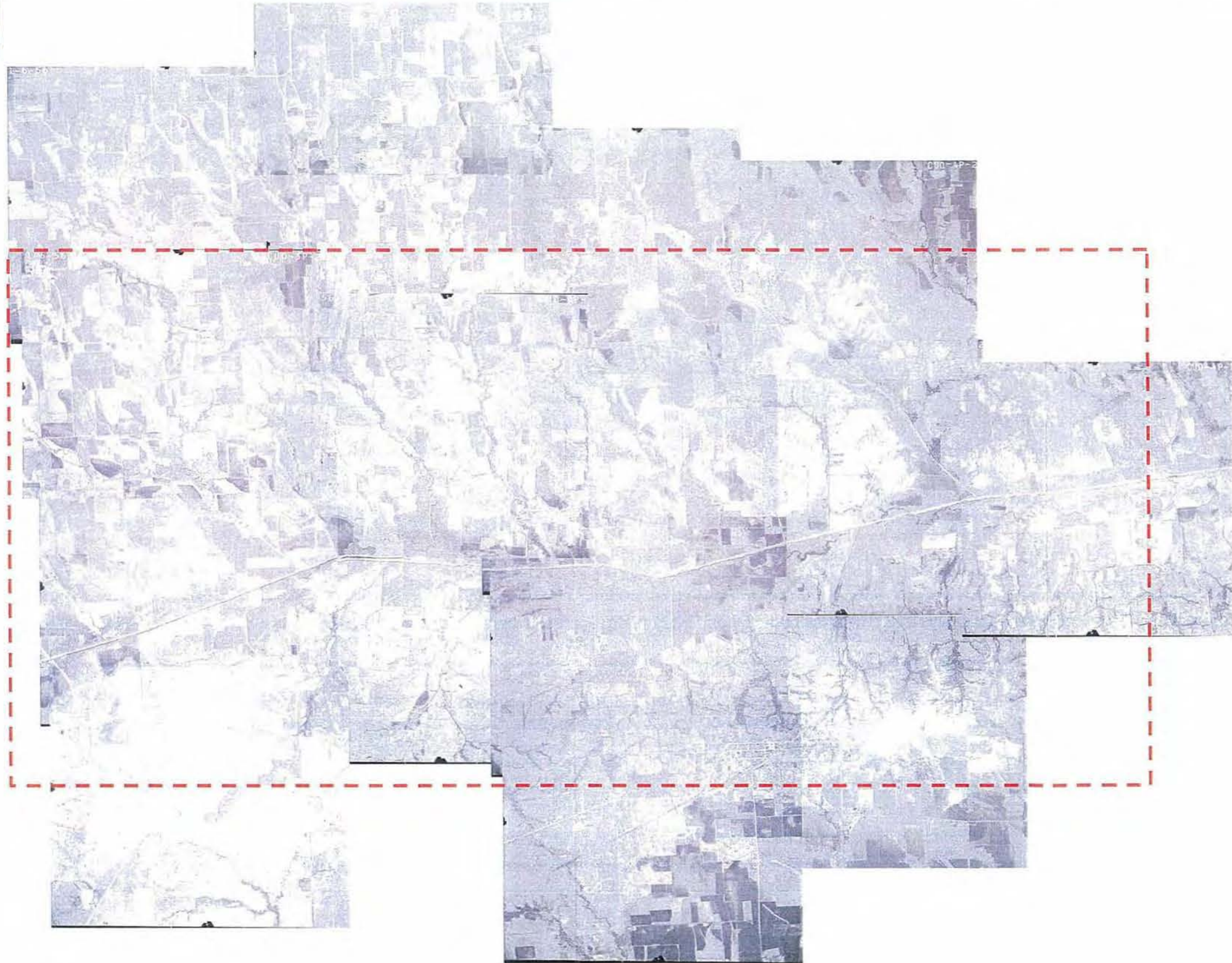


Legend

 Proposed Lake Ralph Hall Reservoir

**FIGURE C-1
2003 AERIAL PHOTOGRAPH**






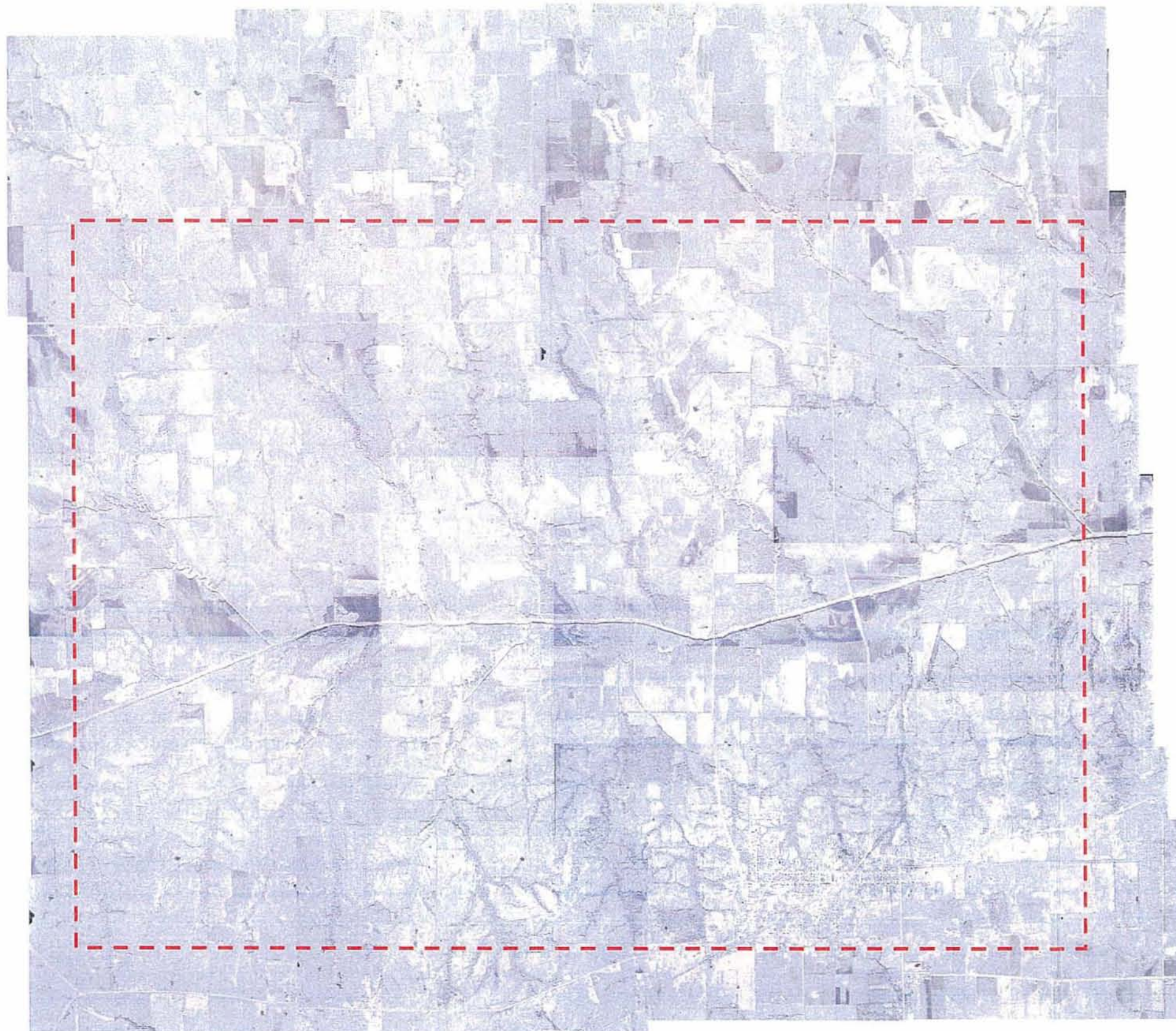
 General Area for the Proposed Lake Ralph Hall

FIGURE C-2
1956 AERIAL PHOTOGRAPH



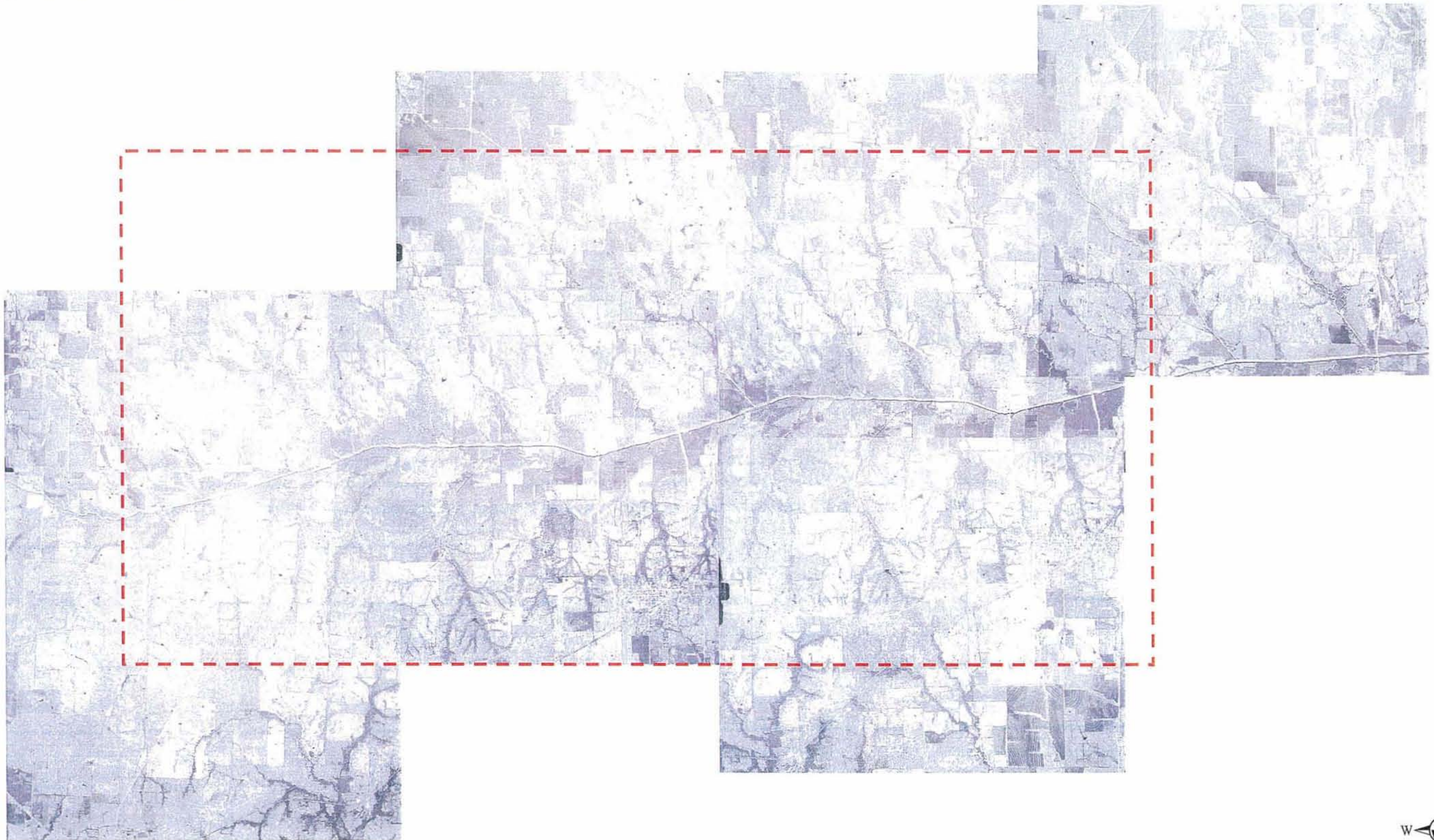
Not To Scale



Not To Scale

 General Area for the Proposed Lake Ralph Hall

FIGURE C-3
1969 AERIAL PHOTOGRAPH

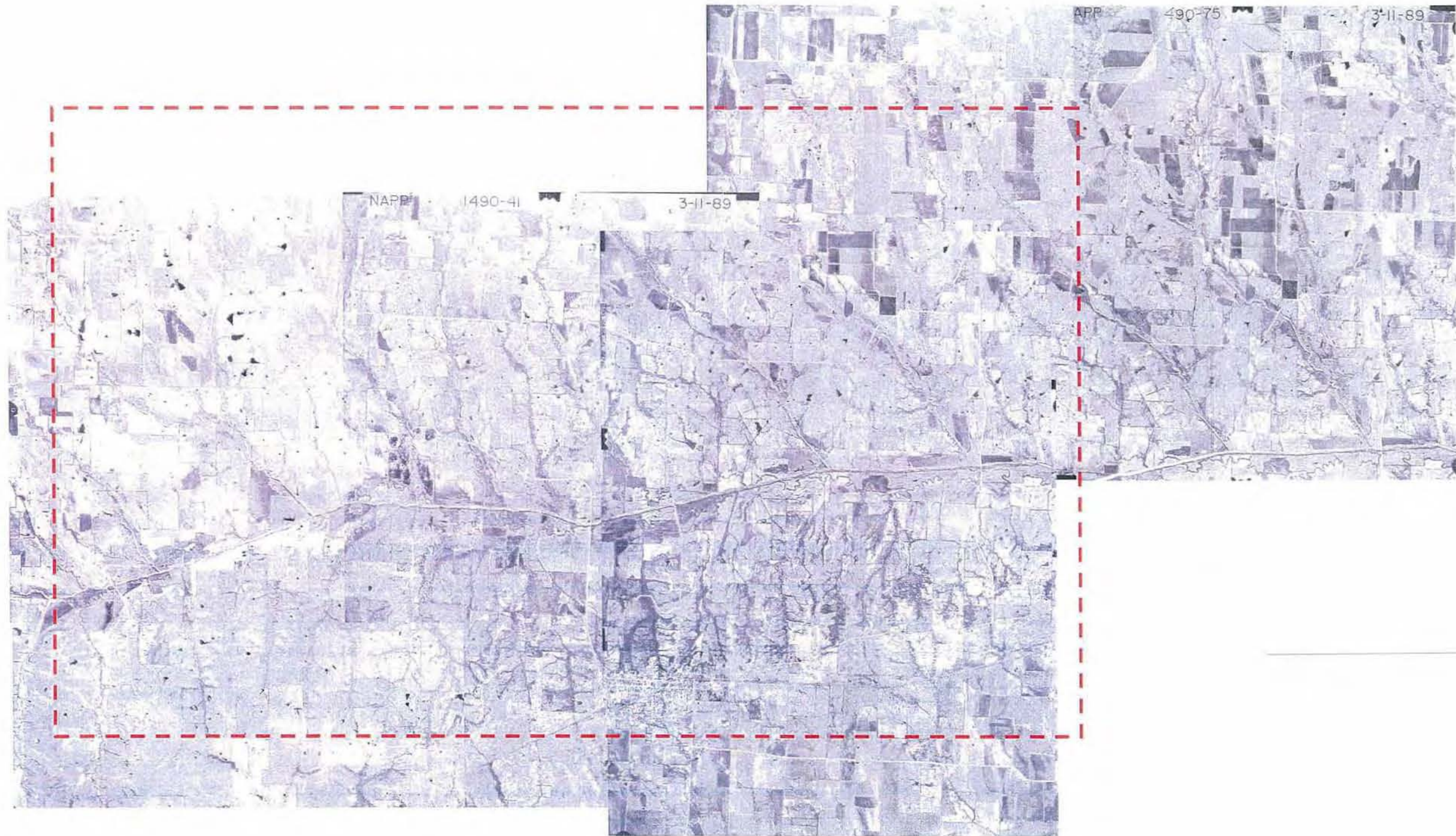


 General Area for the Proposed Lake Ralph Hall

FIGURE C-4
1979 AERIAL PHOTOGRAPH



Not To Scale




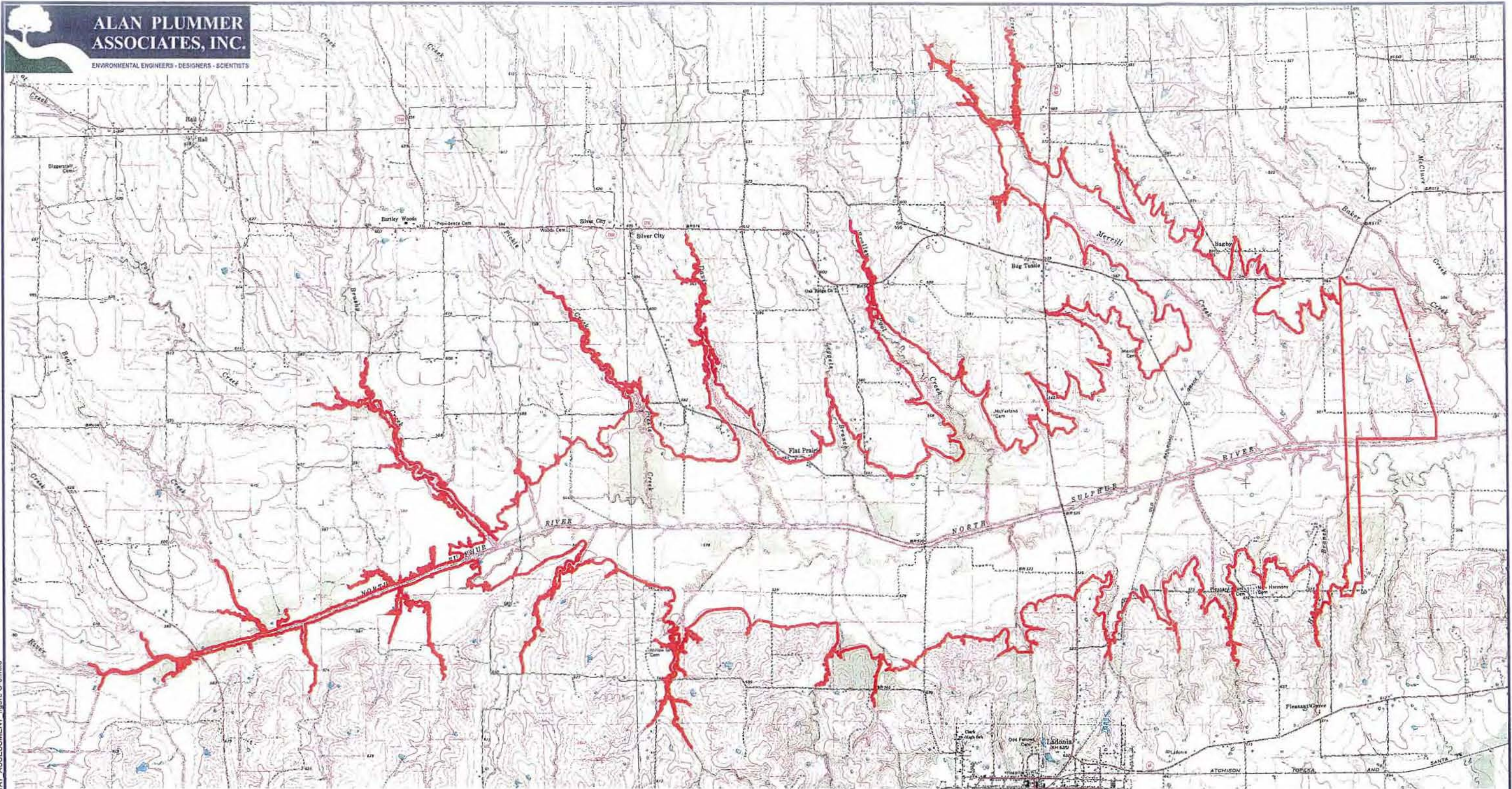

 General Area for the Proposed Lake Ralph Hall

FIGURE C-5
1989 AERIAL PHOTOGRAPH





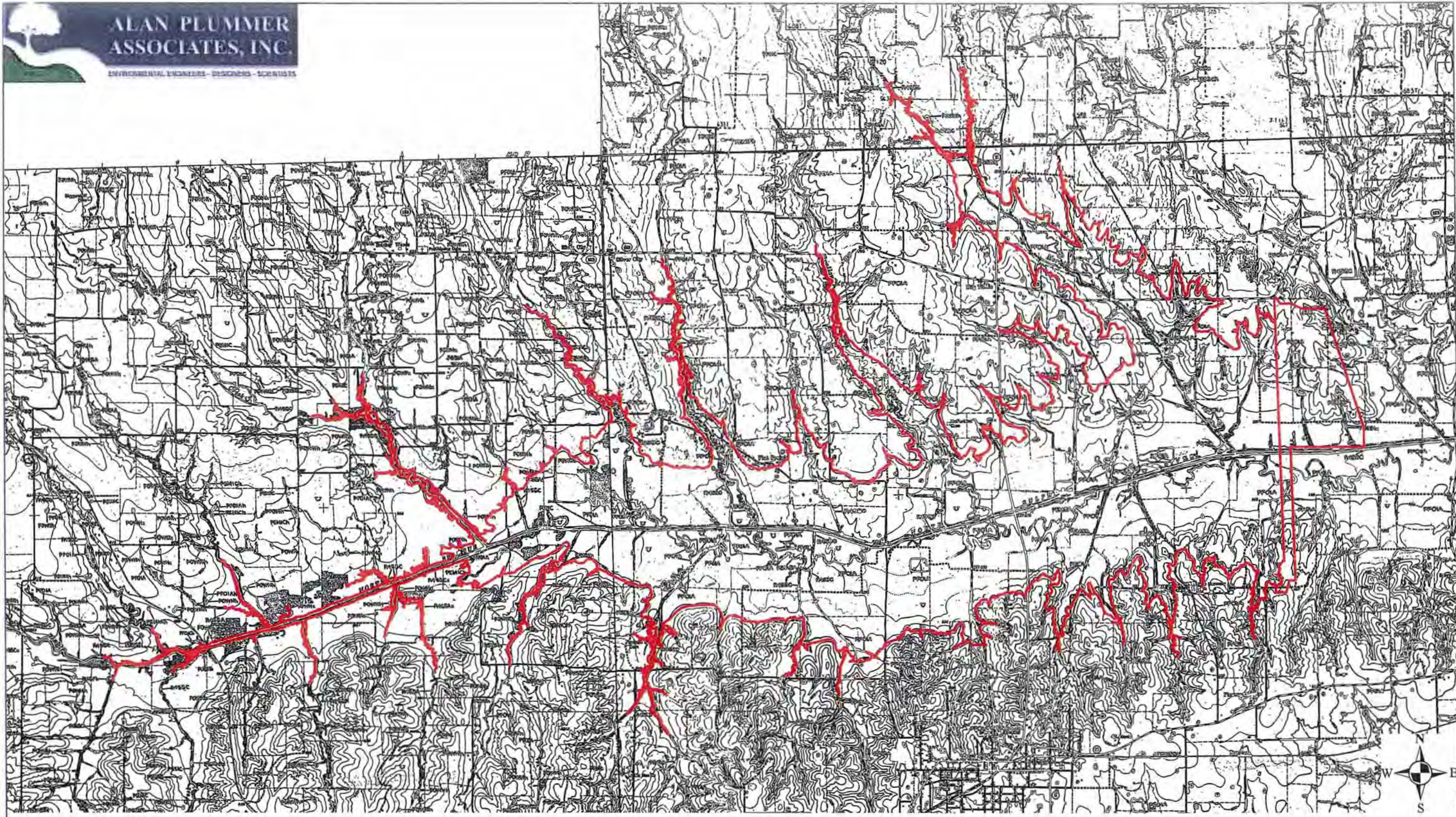
Legend

 Proposed Lake Ralph Hall



0 2,000 4,000
Feet

FIGURE C-6
USGS TOPOGRAPHIC MAPS:
LADONIA, GOBER, HONEY GROVE, AND PECAN GAP, TX QUADRANGLES



Legend


 Proposed Lake Ralph Hall Reservoir

FIGURE C-7
NATIONAL WETLANDS INVENTORY MAPS:
LADONIA, GOBER, AND HONEY GROVE, TX QUADRANGLES

0 2,000 4,000
Feet






 General Area for the Proposed Lake Ralph Hall

FIGURE C-8
SOIL SURVEY OF FANNIN COUNTY



Not To Scale

Federally and State Listed Species (Continued)

	Common Name	Scientific Name	Habitat	Status Within County		
				Fannin	Lamar	Delta
Mammals	Black Bear	<i>Ursus americanus</i>	bottomland hardwoods and large tracts of inaccessible forested areas	State listed as threatened	N/A	State listed as threatened
	Louisiana Black Bear	<i>Ursus americanus luteolus</i>	woodlands and forests near water especially bottomland hardwoods and floodplain forests; occasionally upland hardwood forests, mixed pine/hardwood forests, wetlands, and ag fields	Federally listed as threatened	Federally listed as threatened	Federally and state listed as threatened
	Plains Spotted Skunk	<i>Spilogale putorius interrupta</i>	open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands	State listed as rare	N/A	State listed as rare
	Red Wolf	<i>Canis rufus</i>	extirpated - formerly throughout eastern half of Texas in brushy and forested areas and coastal prairies	State listed as endangered	N/A	N/A
Mollusks	Ouachita Rock-pocketbook Mussel	<i>Arkansia wheeleri</i>	muddy or rocky substrate of slow-flowing streams, side channels and backwaters, as well as in pools of small, slow-moving rivers	N/A	State listed as endangered	N/A
Reptiles	Alligator Snapping Turtle	<i>Macrolemys temminckii</i>	deepwater rivers, lakes, oxbows, sloughs; occasionally enters brackish water	State listed as threatened	N/A	State listed as threatened
	Texas Garter Snake	<i>Thamnophis sirtalis annectens</i>	wet or moist microhabitats	State listed as rare	N/A	State listed as rare
	Texas Horned Lizard	<i>Phrynosoma cornutum</i>	open, arid and semi-arid regions with sparse vegetation	State listed as threatened	State listed as threatened	State listed as threatened
	Timber/Canebrake Rattlesnake	<i>Crotalus horridus</i>	swamps, floodplains, upland pine and deciduous forests, riparian zones, abandoned farmland, prefers dense brush	State listed as threatened	State listed as threatened	State listed as threatened

Federally and State Listed Species (Continued)

	Common Name	Scientific Name	Habitat	Status Within County		
				Fannin	Lamar	Delta
Vascular Plants	Arkansas Meadow-Rue	<i>Thalictrum arkansanum</i>	low lying rich woods, edges of swamps, and along stream banks	N/A	State listed as rare	State listed as rare

TABLE A-2
Preliminary Assessment of Potential Project Impacts to Listed Species

	Common Name	Scientific Name	Habitat	Potential for Impact (Low, Medium, High)
Birds	American Peregrine Falcon	<i>Falco peregrinus anatum</i>	areas with high, massive cliffs with expansive views near water where prey are numerous and diverse	low; potential migrant around wetland complexes
	Arctic Peregrine Falcon	<i>Falco peregrinus tundrius</i>	areas with high, massive cliffs with expansive views near water where prey are numerous and diverse	low; potential migrant around wetland complexes
	Bachman's Sparrow	<i>Aimophila aestivalis</i>	open pine woods with understory, brushy slopes, old fields	low; lack of pine forest in project area
	Baird's Sparrow	<i>Ammodramus bairdii</i>	shortgrass prairie with scattered low bushes and matted vegetation	low; overgrazed pastures may temporarily simulate shortgrass prairie conditions
	Bald Eagle	<i>Haliaeetus leucocephalus</i>	large lakes, nesting in tall trees; feeds in areas of open water where food is available	low; potential migrant around wetland complexes
	Cerulean Warbler	<i>Dendroica cerulea</i>	mature deciduous forests	low; limited areas of mature forests within project area
	Eskimo Curlew	<i>Numenius borealis</i>	coastal prairies and open tundra	low; migrant, last accepted record in Texas in 1962
	Henslow's Sparrow	<i>Ammodramus henslowii</i>	weedy fields or cut-over areas with some bare ground where bunch grasses and vines occur	medium; within weedy fields, pastures, or grasslands
	Interior Least Tern	<i>Sterna antillarum athalassos</i>	nests along sand and gravel bars within braided streams and rivers	medium to high; along sand/gravel bars within North Sulphur River
	Piping Plover	<i>Charadrius melodus</i>	found along sandy areas associated with rivers, lakes, or oceans that are bare to sparsely vegetated	medium to high; along sand/gravel bars/shoreline within North Sulphur River and tributaries

Preliminary Assessment of Potential Project Impacts (Continued)

	Common Name	Scientific Name	Habitat	Potential for Impact
Birds (Continued)	Western Burrowing Owl	<i>Athene cunicularia hypugaea</i>	open grasslands, especially prairie, plains, and savannas, nest and roosts in abandoned prairie dog burrows	low; overgrazed pastures may temporarily create favorable habitat
	Whooping Crane	<i>Grus americana</i>	marshes, river bottoms, potholes, prairies, and cropland (migratory)	low; migrant around wetland complexes
	Wood Stork	<i>Mycteria americana</i>	prairie ponds, flooded pastures or fields, ditches, and other shallow standing water	low; migrant around wetland complexes
Fish	Blackside Darter	<i>Percina maculata</i>	clear, gravelly streams; prefers pools with some current, or quiet pools to swift riffles	low; no records in North Sulphur River basin but possible in its tributaries; present in tributaries to Red, Sabine, and Neches Rivers
	Blue Sucker	<i>Cycleptus elongatus</i>	large, deep rivers and deeper zones of reservoirs with moderate to swift currents; bottom type is bedrock, gravel, or rubble	low; due to lack of depth in North Sulphur River; however, may impact downstream populations
	Creek Chubsucker	<i>Erimyzon oblongus</i>	small rivers and creeks of various types; seldom in impoundments; prefers headwaters, but seldom occurs in springs	low; possible in tributaries to North Sulphur River; reported from tributaries of Red, Sabine, Neches, Trinity and San Jacinto rivers
	Paddlefish	<i>Polyodon spathula</i>	slow moving waters of large rivers and reservoirs	low; unlikely in project area unless areas remain that are at least one meter deep; may impede migration of downstream populations, if any
	Shovelnose Sturgeon	<i>Scaphirhynchus platyrhynchus</i>	bottom of pools with sand, rock, or gravel substrate	low; no records in North Sulphur River. If present, dam could block access to spawning areas.
	Western Sand Darter	<i>Ammocrypta clara</i>	large streams; most common in slight to moderate current over a sandy bottom	low; only known records in Texas are in Red, Sabine, and Neches River Basins

Preliminary Assessment of Potential Project Impacts (Continued)

	Common Name	Scientific Name	Habitat	Potential for Impact
Mammals	Black Bear	<i>Ursus americanus</i>	bottomland hardwoods and large tracts of inaccessible forested areas	low due to lack of large tracts of bottomland hardwoods contiguous to other habitat areas
	Louisiana Black Bear	<i>Ursus americanus luteolus</i>	woodlands and forests near water especially bottomland hardwoods and floodplain forests; occasionally upland hardwood forests, mixed pine/hardwood forests, wetlands, and ag fields	low due to lack of large tracts of bottomland hardwoods contiguous to other habitat areas
	Plains Spotted Skunk	<i>Spilogale putorius interrupta</i>	open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands	medium due to similarity of habitat, but not reported from this area
	Red Wolf	<i>Canis rufus</i>	extirpated - formerly throughout eastern half of Texas in brushy and forested areas and coastal prairies	low; extirpated from state
Mollusks	Ouachita Rock-pocketbook Mussel	<i>Arkansia wheeleri</i>	muddy or rocky substrate of slow-flowing streamside channels and backwaters, as well as in pools of small, slow-moving rivers	low; due to highly disturbed habitat; however, recently collected in North Central Texas
Reptiles	Alligator Snapping Turtle	<i>Macrolemys temminckii</i>	deepwater rivers, lakes, oxbows, sloughs; occasionally enters brackish water	low; potential impact to downstream populations, but presence unlikely within project area due to lack of deep water habitat
	Texas Garter Snake	<i>Thamnophis sirtalis annectens</i>	wet or moist microhabitats	low; potential habitat in North Sulphur River floodplain
	Texas Horned Lizard	<i>Phrynosoma cornutum</i>	open, arid and semi-arid regions with sparse vegetation	medium; known records of species in Fannin County
	Timber/Canebrake Rattlesnake	<i>Crotalus horridus</i>	swamps, floodplains, upland pine and deciduous forests, riparian zones, abandoned farmland, prefers dense brush	low; lack of suitable habitat, no records in Fannin County

Preliminary Assessment of Potential Project Impacts (Continued)

	Common Name	Scientific Name	Habitat	Potential for Impact
Vascular Plants	Arkansas Meadow-Rue	<i>Thalictrum arkansanum</i>	low lying rich woods, edges of swamps, and along streambanks	low; unless bottomland hardwood/wetland complexes remain within the project area that are not already impacted as a result of the substantial, on-going channel erosion and subsequent drainage of riparian areas

TABLE A-3
Designated Critical Habitat for Listed Species in Fannin, Lamar and Delta Counties

	Common Name	Scientific Name	Designated Critical Habitat
Birds	American Peregrine Falcon	<i>Falco peregrinus anatum</i>	Critical habitat designated in California
	Arctic Peregrine Falcon	<i>Falco peregrinus tundrius</i>	N/A
	Bachman's Sparrow	<i>Aimophila aestivalis</i>	N/A
	Baird's Sparrow	<i>Ammodramus bairdii</i>	N/A
	Bald Eagle	<i>Haliaeetus leucocephalus</i>	No critical habitat
	Cerulean Warbler	<i>Dendroica cerulean</i>	N/A
	Eskimo Curlew	<i>Numenius borealis</i>	No critical habitat
	Henslow's Sparrow	<i>Ammodramus henslowii</i>	N/A
	Interior Least Tern	<i>Sterna antillarum athalassos</i>	No critical habitat
	Piping Plover	<i>Charadrius melodus</i>	Great Lakes Shoreline and areas along the Texas Coast
	Western Burrowing Owl	<i>Athene cunicularia hypugaea</i>	N/A
	Whooping Crane	<i>Grus Americana</i>	Aransas National Wildlife Refuge (Calhoun, and Refugio Counties, Texas)
	Wood Stork	<i>Mycteria Americana</i>	No critical habitat
Fish	Blackside Darter	<i>Percina maculate</i>	N/A
	Blue Sucker	<i>Cycleptus elongates</i>	N/A
	Creek Chubsucker	<i>Erimyzon oblongus</i>	N/A
	Paddlefish	<i>Polyodon spathula</i>	N/A
	Shovelnose Sturgeon	<i>Scaphirhynchus platyrhynchus</i>	N/A
	Western Sand Darter	<i>Ammocrypta clara</i>	N/A
Mammals	Black Bear	<i>Ursus americanus</i>	N/A
	Louisiana Black Bear	<i>Ursus americanus luteolus</i>	Proposed critical habitat (not specified)
	Plains Spotted Skunk	<i>Spilogale putorius interrupta</i>	N/A
	Red Wolf	<i>Canis rufus</i>	No critical habitat
Mollusks	Ouachita Rock-pocketbook Mussel	<i>Arkansia wheeleri</i>	No critical habitat
Reptiles	Alligator Snapping Turtle	<i>Macrolemys temminckii</i>	N/A
	Texas Garter Snake	<i>Thamnophis sirtalis annectens</i>	N/A
	Texas Horned Lizard	<i>Phrynosoma cornutum</i>	N/A
	Timber/Canebrake Rattlesnake	<i>Crotalus horridus</i>	N/A
Vascular Plants	Arkansas Meadow-Rue	<i>Thalictrum arkansanum</i>	N/A

**TEXAS PARKS AND WILDLIFE DEPARTMENT
RESPONSE LETTER**



May 12, 2005

Ms. Loretta Mokry
Alan Plummer Associates, Inc.
7524 Mosier View Court, Suite 200
Fort Worth, Texas 76118

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-
- ROBERT L. COOK
EXECUTIVE DIRECTOR

Dear Ms. Mokry:

This letter is in response to your preliminary review request, dated November 10, 2004, for potential impacts to rare, threatened, and endangered species from the proposed development of Ralph Hall Lake consisting of a 7,500-acre reservoir on the North Sulfur River northwest of Ladonia in Fannin County (#346-0402).

Given the small proportion of public versus private land in Texas, the TPWD Natural Diversity Database (NDD) (formerly Biological and Conservation Data System) does not include a representative inventory of rare resources in the state. Although it is based on the best data available to TPWD regarding rare species, the data from the BCD do not provide a definitive statement as to the presence, absence, or condition of special species, natural communities, or other significant features in your project area. These data cannot substitute for an on-site evaluation by your qualified biologists. The BCD information is intended to assist you in avoiding harm to species that may occur on your site.

Based on the project description, the following species and special features could be impacted by potential development activities:

Federal and State Listed Endangered
Interior Least Tern (*Sterna antillarum athalassos*)

Federal Listed Endangered
American Burying Beetle (*Nicrophorus americanus*)

State Listed Threatened
Blackside Dater (*Percina maculata*)
Blue Sucker (*Cypleptus elongatus*)
Creek Chubsucker (*Erimyzon oblongus*)
Paddlefish (*Polyodon spathula*)
Alligator Snapping Turtle (*Macrochelys temiminckii*)
Timber/Canebrake Rattlesnake (*Crotalus horridus*)

Species of Concern
Fawnsfoot (*Truncilla doniformis*)



Take a kid
hunting or fishing
Visit a state park
or historic site

Little Spectaclecase (*Villosa lienosa*)
Rock-pocketbook (*Arcidens confragosus*)
Wabash Pigtoe (*Fusconaia flava*)
White Heelsplitter (*Lasmigona complanata*)
Arkansas meadow-rue (*Thalictrum arkansanum*)

Special Features and Natural Communities

Colonial Waterbird Rookeries

Little Bluestem-Indiangrass (*Schizachyrium scoparium-Sorghastrum nutans*) Series

Managed Areas

Caddo National Grasslands – Ladonia Tract

Caddo Wildlife Management Area (WMA) – Ladonia Unit

Occurrences of a Little Bluestem-Indiangrass Series natural plant community and portions of the Caddo National Grasslands/Caddo WMA – Ladonia Unit would be directly inundated by the reservoir. Printouts for these occurrence records are included for your planning reference.

Please do not include NDD occurrence printouts in your draft or final documents. Because some species are especially sensitive to collection or harassment, these records are for your reference only.

~~CEL~~

Please note: the review request lists the amount of acreage for the Ladonia Unit at 17,874, however it is actually 2,780 acres. With the 17,874 amount, the approximately 257 acres of the unit directly impacted by inundation would comprise only 1%, when actually it will encompass 9% of the Ladonia Unit. Plus, additional acreage could be indirectly impacted by water that will back up into two of the drainages. This could create some low level flooding and marsh habitat at flood elevation. Some of the impacts could be comprised of a rise in creek depth while other impacts could be more substantial with the creation of approximately 30 to 50 acres of marsh and flooded shrub lands.

While the loss of grassland and shrub land habitat through inundation would impact upland species such as bobwhite quail and/or eastern turkey, it would create wetland and open water habitats beneficial to migratory species such as waterfowl and possibly the bald eagle. If mitigation can replace the loss of grassland and shrubland habitats with comparable property bordering current units to the south of the project, it would create larger contiguous tracts that would be more beneficial for grassland species management in the Ladonia Unit of the wildlife management area.

Secondly, the impacts due to the loss of wildlife habitat on private lands could provide source populations for immigration onto the Ladonia Unit. That immigration could be determined by the condition of the habitat on those lands. Therefore, research to include baseline surveys for inventorying the flora and fauna would need to be conducted to help quantify and determine those impacts.

Over all, the project could provide increased wildlife populations and diverse habitats on the Ladonia Unit, as well as increased hunter opportunity. Both of which are goals for the Department. However, these gains should not be gained at the expense of endemic grassland

habitats, which is a problem that must be addressed on a landscape scale. Conservation and preservation of endemic habitats are also Department goals.

The US Fish and Wildlife Service (FWS) should be contacted for additional species occurrence data, guidance, permitting, survey protocols, and mitigation for federally listed species. TPWD recommends the enclosed updated lists for Fannin, Delta, and Lamar counties of rare species be reviewed as species, in addition to those listed above, could occur depending upon habitat availability.

This letter does not include a complete review of habitat impacts for general fish and wildlife from this project. Once additional information on the project plans is developed please provide the environmental documentation for review to the office of Kathy Boydston, TPWD Wildlife Habitat Assessment Program, Wildlife Division (512) 389-4571.

Thank you for the opportunity to provide preliminary comment on this project. Please contact me if you have any questions or need additional assistance (512) 912-7021.

Sincerely,



Celeste Brancel, Environmental Review Coordinator
Wildlife Habitat Assessment Program
Threatened and Endangered Species

Enclosures (3)

FANNIN COUNTY

	Federal Status	State Status
*** BIRDS ***		
American Peregrine Falcon (<i>Falco peregrinus anatum</i>) - potential migrant; nests in west Texas	DL	E
Arctic Peregrine Falcon (<i>Falco peregrinus tundrius</i>) - potential migrant	DL	T
Baird's Sparrow (<i>Ammodramus bairdii</i>) - shortgrass prairie with scattered low bushes and matted vegetation		
Bald Eagle (<i>Haliaeetus leucocephalus</i>) - found primarily near seacoasts, rivers, and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds	LT-PDL	T
Cerulean Warbler (<i>Dendroica cerulea</i>) - treetops of riverbank woodlands, swamps, and bottomlands; mainly insectivorous		
Eskimo Curlew (<i>Numenius borealis</i>) - nonbreeding: grasslands, pastures, plowed fields, and less frequently, marshes and mudflats	LE	E
Henslow's Sparrow (<i>Ammodramus henslowii</i>) - wintering individuals (not flocks) found in weedy fields or cut-over areas where lots of bunch grasses occur along with vines and brambles; a key component is bare ground for running/walking		
Interior Least Tern (<i>Sterna antillarum aibalassos</i>) - this subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish & crustaceans, when breeding forages within a few hundred feet of colony	LE	E
Mountain Plover (<i>Charadrius montanus</i>) - breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields; primarily insectivorous		
Wood Stork (<i>Mycteria americana</i>) - forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960		T
*** FISHES ***		
Blackside Darter (<i>Percina maculata</i>) - clear, gravelly streams; prefers pools with some current, or even quiet pools, to swift riffles		T
Blue Sucker (<i>Cyprinus elongatus</i>) - usually inhabits channels and flowing pools with a moderate current; bottom type usually consists of exposed bedrock, perhaps in combination with hard clay, sand, and gravel; adults winter in deep pools and move upstream in spring to spawn on riffles		T
Creek Chubsucker (<i>Erimyzon oblongus</i>) - small rivers and creeks of various types; seldom in impoundments; prefers headwaters, but seldom occurs in springs; young typically in headwater rivulets or marshes; spawns in river mouths or pools, riffles, lake outlets, upstream creeks		T
Goldeneye (<i>Hiodon alosoides</i>) - spawns spring to July in shallow firm-bottomed backwaters or gravel shoals in tributaries, eggs semibuoyant drift downstream or to quiet water; adults in quiet turbid water of medium to large lowland rivers, small lakes, marshes and muddy shallows connected to them; young feed on microcrustaceans and other inverts; adults on surface water insects, also frogs, fishes, and small mammals		

	Federal Status	State Status
Orangebelly Darter (<i>Etheostoma radiosum</i>) - spawns February to mid-April, eggs buried in gravel riffles and raceways; post-larvae in quiet water, move to faster water during maturation; adults range from high gradient streams to sluggish lowland streams; headwaters only, gravel and rubble riffles with moderate to high current preferred; young feed mainly on copepods and cladocerans, adults on mayfly and fly larvae		
Paddlefish (<i>Polyodon spathula</i>) - prefers large, free-flowing rivers, but will frequent impoundments with access to spawning sites; spawns in fast, shallow water over gravel bars; larvae may drift from reservoir to reservoir		T
Shovelnose Sturgeon (<i>Scaphirhynchus platyrhynchus</i>) - open, flowing channels with bottoms of sand or gravel; spawns over gravel or rocks in an area with a fast current; never more than a rare occurrence in Rio Grande		T
Western Sand Darter (<i>Ammocrypta clara</i>) - clear to slightly turbid water of medium to large rivers that have moderate to swift currents, primarily over extensive areas of sandy substrate		

INSECTS

American Burying Beetle (<i>Nicrophorus americanus</i>) - varies widely from oak-hickory and coniferous forest ridges tops or hillsides to riparian corridors and valley floor pastures; extremely xeric, saturated, or loose sandy soils unsuitable; adults primarily above ground, eggs in soil adjacent to buried carcass, teneral adults overwinter in soil	LE	
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*** MAMMALS ***

Black Bear (<i>Ursus americanus</i>) - within historical range of Louisiana Black Bear in eastern Texas, Black Bear is federally listed threatened and inhabits bottomland hardwoods and large tracts of undeveloped forested areas; in remainder of Texas, Black Bear is not federally listed and inhabits desert lowlands and high elevation forests and woodlands; dens in tree hollows, rock piles, cliff overhangs, caves, or under brush piles	T/SA; NL	T
Plains Spotted Skunk (<i>Spilogale putorius interrupta</i>) - catholic in habitat; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie		
Red Wolf (<i>Canis rufus</i>) (extirpated) - formerly known throughout eastern half of Texas in brushy and forested areas, as well as coastal prairies	LE	E

MOLLUSKS

Fawnsfoot (Common) (<i>Truncilla donaciformis</i>) - small and large rivers especially on sand, mud, rocky mud, and sand and gravel, also silt and cobble bottoms in still to swiftly flowing waters; Red (historic), Cypress (historic), Sabine (historic), Neches, Trinity, and San Jacinto River basins.		
Pimpleback (Common) (<i>Quadrula pustulosa</i>) - small streams to larger rivers, and associated with nearly every bottom type except deep shifting sands; Red River downstream of Lake Texoma and possibly Big Cypress Bayou and lower Sulphur river basins		

Federal Status State Status

- Pistolgrip** (*Tritogonia verrucosa*) - stable substrate, rock, hard mud, silt, and soft bottoms, often buried deeply; east and central Texas, Red through San Antonio River basins
- Rock-pocketbook** (*Arcidens confragosus*) - mud, sand, and gravel substrates of medium to large rivers in standing or slow flowing water, may tolerate moderate currents and some reservoirs, east Texas, Red through Guadalupe River basins
- Wabash Pigtoe** (*Fusconaia flava*) - creeks to large rivers on mud, sand, and gravel from all habitats except deep shifting sands; found in moderate to swift current velocities; east Texas River basins, Red through San Jacinto River basins; elsewhere occurs in reservoirs and lakes with no flow
- White heelsplitter** (*Lasmigona complanata*) - typically large rivers and streams with sluggish, turbid waters, on mud or mud-gravel bottoms; also smaller streams and reservoirs usually deep in soft mud or occasionally among rocks; quiet areas of otherwise swift streams; Red River with unsuccessful introductions into the upper Trinity River System

*** REPTILES ***

- Alligator Snapping Turtle** (*Macrochelys temminckii*) - deep water of rivers, canals, lakes, and oxbows; also swamps, bayous, and ponds near deep running water; sometimes enters brackish coastal waters; usually in water with mud bottom and abundant aquatic vegetation; may migrate several miles along rivers; active March-October; breeds April-October T
- Texas Garter Snake** (*Thamnophis sirtalis annectens*) - wet or moist microhabitats are conducive to the species occurrence, but is not necessarily restricted to them; hibernates underground or in or under surface cover; breeds March-August
- Texas Horned Lizard** (*Phrynosoma cornutum*) - open, arid and semi-arid regions with sparse vegetation, which could include grass, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive; breeds March-September T
- Timber/Canebrake Rattlesnake** (*Crotalus horridus*) - swamps, floodplains, upland pine and deciduous woodlands, riparian zones, abandoned farmland; limestone bluffs, sandy soil or black clay; prefers dense ground cover, i.e. grapevines or palmetto T

Status Key:

- LE, LT - Federally Listed Endangered/Threatened
- PE, PT - Federally Proposed Endangered/Threatened
- E/SA, T/SA - Federally Listed Endangered/Threatened by Similarity of Appearance
- C1 - Federal Candidate for Listing, Category 1; information supports proposing to list as Endangered/Threatened
- DL, PDL - Federally Delisted/Proposed for Delisting
- NL - Not Federally Listed
- E, T - State Listed Endangered/Threatened
- "blank" - Rare, but with no regulatory listing status

Species appearing on these lists do not all share the same probability of occurrence. Some species are migrants or wintering residents only, or may be historic or considered extirpated.

DELTA COUNTY

	Federal Status	State Status
*** BIRDS ***		
American Peregrine Falcon (<i>Falco peregrinus anatum</i>) - potential migrant; nests in west Texas	DL	E
Arctic Peregrine Falcon (<i>Falco peregrinus tundrius</i>) - potential migrant	DL	T
Bachman's Sparrow (<i>Aimophila aestivalis</i>) - open pine woods with scattered bushes or understory, brushy or overgrown hillsides, overgrown fields with thickets and brambles, grassy orchards; nests on ground against grass tuft or under low shrub		T
Bald Eagle (<i>Haliaeetus leucocephalus</i>) - found primarily near seacoasts, rivers, and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds	LT- PDL	T
Henslow's Sparrow (<i>Ammodramus henslowii</i>) - wintering individuals (not flocks) found in weedy fields or cut-over areas where lots of bunch grasses occur along with vines and brambles; a key component is bare ground for running/walking		
Interior Least Tern (<i>Sterna antillarum athalassos</i>) - this subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish & crustaceans, when breeding forages within a few hundred feet of colony	LE	E
Mountain Plover (<i>Charadrius montanus</i>) - breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields; primarily insectivorous		
Western Burrowing Owl (<i>Athene cunicularia hypugaea</i>) - open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows and man-made structures, such as culverts		
Wood Stork (<i>Mycteria americana</i>) - forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960		T

FISHES

Blackside Darter (<i>Percina maculata</i>) - clear, gravelly streams; prefers pools with some current, or even quiet pools, to swift riffles		T
Creek Chubsucker (<i>Erimyzon oblongus</i>) - small rivers and creeks of various types; seldom in impoundments; prefers headwaters, but seldom occurs in springs; young typically in headwater rivulets or marshes; spawns in river mouths or pools, riffles, lake outlets, upstream creeks		T
Orangebelly Darter (<i>Etheostoma radiosum</i>) - spawns February to mid-April, eggs buried in gravel riffles and raceways; post-larvae in quiet water, move to faster water during maturation; adults range from high gradient streams to sluggish lowland streams; headwaters only, gravel and rubble riffles with moderate to high current preferred; young feed mainly on copepods and cladocerans, adults on mayfly and fly larvae		

	Federal Status	State Status
Paddlefish (<i>Polyodon spathula</i>) - prefers large, free-flowing rivers, but will frequent impoundments with access to spawning sites; spawns in fast, shallow water over gravel bars; larvae may drift from reservoir to reservoir		T

*** MAMMALS ***

Black Bear (<i>Ursus americanus</i>) - within historical range of Louisiana Black Bear in eastern Texas, Black Bear is federally listed threatened and inhabits bottomland hardwoods and large tracts of undeveloped forested areas; in remainder of Texas, Black Bear is not federally listed and inhabits desert lowlands and high elevation forests and woodlands; dens in tree hollows, rock piles, cliff overhangs, caves, or under brush piles	T/SA; NL	T
Louisiana Black Bear (<i>Ursus americanus luteolus</i>) - possible as transient; bottomland hardwoods and large tracts of inaccessible forested areas	LT	T
Plains Spotted Skunk (<i>Spilogale putorius interrupta</i>) - catholic in habitat; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie		

*** MOLLUSKS ***

Fawnsfoot (Common) (*Truncilla donaciformis*) - small and large rivers especially on sand, mud, rocky mud, and sand and gravel, also silt and cobble bottoms in still to swiftly flowing waters; Red (historic), Cypress (historic), Sabine (historic), Neches, Trinity, and San Jacinto River basins.

Little Spectaclecase (*Villosa lienosa*) - creeks, rivers, and reservoirs, sandy substrates in slight to moderate current, usually along the banks in slower currents; east Texas, Cypress through San Jacinto River basins

Pimpleback (Common) (*Quadrula pustulosa*) - small streams to larger rivers, and associated with nearly every bottom type except deep shifting sands; Red River downstream of Lake Texoma and possibly Big Cypress Bayou and lower Sulphur river basins

Pistolgrip (*Tritogonia verrucosa*) - stable substrate, rock, hard mud, silt, and soft bottoms, often buried deeply; east and central Texas, Red through San Antonio River basins

Rock-pocketbook (*Arcidens confragosus*) - mud, sand, and gravel substrates of medium to large rivers in standing or slow flowing water, may tolerate moderate currents and some reservoirs, east Texas, Red through Guadalupe River basins

Wabash Pigtoe (*Fusconaia flava*) - creeks to large rivers on mud, sand, and gravel from all habitats except deep shifting sands; found in moderate to swift current velocities; east Texas River basins, Red through San Jacinto River basins; elsewhere occurs in reservoirs and lakes with no flow

*** REPTILES ***

Alligator Snapping Turtle (<i>Macrochelys temminckii</i>) - deep water of rivers, canals, lakes, and oxbows; also swamps, bayous, and ponds near deep running water; sometimes enters brackish coastal waters; usually in water with mud bottom and abundant aquatic vegetation; may migrate several miles along rivers; active March-October; breeds April-October		T
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	Federal Status	State Status
Texas Garter Snake (<i>Thamnophis sirtalis annectens</i>) - wet or moist microhabitats are conducive to the species occurrence, but is not necessarily restricted to them; hibernates underground or in or under surface cover; breeds March-August		
Texas Horned Lizard (<i>Phrynosoma cornutum</i>) - open, arid and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive; breeds March-September		T
Timber/Canebrake Rattlesnake (<i>Crotalus horridus</i>) - swamps, floodplains, upland pine and deciduous woodlands, riparian zones, abandoned farmland; limestone bluffs, sandy soil or black clay; prefers dense ground cover, i.e. grapevines or palmetto		T

*** VASCULAR PLANTS ***

Arkansas meadow-rue (*Thalictrum arkansanum*) - mesic mostly deciduous woodlands or forests, often on alluvial terraces; flowering March - April

Status Key:

- LE,LT - Federally Listed Endangered/Threatened
- PE,PT - Federally Proposed Endangered/Threatened
- E/SA,T/SA - Federally Endangered/Threatened by Similarity of Appearance
- CI - Federal Candidate, Category 1; information supports proposing to list as endangered/threatened
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- E,T - State Endangered/Threatened
- "blank" - Rare, but with no regulatory listing status

Species appearing on these lists do not all share the same probability of occurrence. Some species are migrants or wintering residents only, or may be historic or considered extirpated.

LAMAR COUNTY

Federal Status State Status

***** DRAFT ***** DRAFT ***** DRAFT***** DRAFT ***** DRAFT ***** DRAFT*****
UNDER CONSTRUCTION **** SPECIES MIGHT BE ADDED/DELETED DURING QUALITY CONTROL

*** BIRDS ***

- | | | |
|--|--------|---|
| American Peregrine Falcon (<i>Falco peregrinus anatum</i>) - potential migrant; nests in west Texas | DL | E |
| Arctic Peregrine Falcon (<i>Falco peregrinus tundrius</i>) - potential migrant | DL | T |
| Bachman's Sparrow (<i>Aimophila aestivalis</i>) - inhabits mature open pine forests with grassy understory, regenerating pine clear-cuts (1-7 years post re-planting), or open habitats with a dense ground cover of grasses and forbs, or palmetto scrub; in Texas, known to occur only in the far eastern portion of the state; most abundant in forests south of Angelina National Forest | | T |
| Bald Eagle (<i>Haliaeetus leucocephalus</i>) - found primarily near seacoasts, rivers, and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds | LT-PDL | T |
| Cerulean Warbler (<i>Dendroica cerulea</i>) - treetops of riverbank woodlands, swamps, and bottomlands; mainly insectivorous | | |
| Henslow's Sparrow (<i>Ammodramus henslowii</i>) - wintering individuals (not flocks) found in weedy fields or cut-over areas where lots of bunch grasses occur along with vines and brambles; a key component is bare ground for running/walking | | |
| Interior Least Tern (<i>Sterna antillarum atbalassos</i>) - this subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish & crustaceans, when breeding forages within a few hundred feet of colony | LE | E |
| Mountain Plover (<i>Charadrius montanus</i>) - breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields; primarily insectivorous | | |
| Wood Stork (<i>Mycteria americana</i>) - forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960 | | T |

FISHES

- | | | |
|---|--|---|
| Blackside Darter (<i>Percina maculata</i>) - clear, gravelly streams; prefers pools with some current, or even quiet pools, to swift riffles | | T |
| Blue Sucker (<i>Cycleptus elongatus</i>) - usually inhabits channels and flowing pools with a moderate current; bottom type usually consists of exposed bedrock, perhaps in combination with hard clay, sand, and gravel; adults winter in deep pools and move upstream in spring to spawn on riffles | | T |
| Creek Chubsucker (<i>Erimyzon oblongus</i>) - small rivers and creeks of various types; seldom in impoundments; prefers headwaters, but seldom occurs in springs; young typically in headwater rivulets or marshes; spawns in river mouths or pools, riffles, lake outlets, upstream creeks | | T |

	Federal Status	State Status
Goldeneye (<i>Hiodon alosoides</i>) - spawns spring to July in shallow firm-bottomed backwaters or gravel shoals in tributaries, eggs semibuoyant drift downstream or to quiet water; adults in quiet turbid water of medium to large lowland rivers, small lakes, marshes and muddy shallows connected to them; young feed on microcrustaceans and other inverts; adults on surface water insects, also frogs, fishes, and small mammals		
Orangebelly Darter (<i>Etheostoma radiosum</i>) - spawns February to mid-April, eggs buried in gravel riffles and raceways; post-larvae in quiet water, move to faster water during maturation; adults range from high gradient streams to sluggish lowland streams; headwaters only, gravel and rubble riffles with moderate to high current preferred; young feed mainly on copepods and cladocerans, adults on mayfly and fly larvae		
Paddlefish (<i>Polyodon spathula</i>) - prefers large, free-flowing rivers, but will frequent impoundments with access to spawning sites; spawns in fast, shallow water over gravel bars; larvae may drift from reservoir to reservoir		T
Shovelnose Sturgeon (<i>Scaphirhynchus platorynchus</i>) - open, flowing channels with bottoms of sand or gravel; spawns over gravel or rocks in an area with a fast current; never more than a rare occurrence in Rio Grande		T
Western Sand Darter (<i>Ammocrypta clara</i>) - clear to slightly turbid water of medium to large rivers that have moderate to swift currents, primarily over extensive areas of sandy substrate		

INSECTS

American Burying Beetle (<i>Nicrophorus americanus</i>) - varies widely from oak-hickory and coniferous forest ridges tops or hillsides to riparian corridors and valley floor pastures; extremely xeric, saturated, or loose sandy soils unsuitable; adults primarily above ground, eggs in soil adjacent to buried carcass, teneral adults overwinter in soil	LE	
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*** MAMMALS ***

Black Bear (<i>Ursus americanus</i>) - within historical range of Louisiana Black Bear in eastern Texas, Black Bear is federally listed threatened and inhabits bottomland hardwoods and large tracts of undeveloped forested areas; in remainder of Texas, Black Bear is not federally listed and inhabits desert lowlands and high elevation forests and woodlands; dens in tree hollows, rock piles, cliff overhangs, caves, or under brush piles	T/SA; NL	T
Plains Spotted Skunk (<i>Spilogale putorius interrupta</i>) - catholic; in habitat; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie		
Red Wolf (<i>Canis rufus</i>) (extirpated) - formerly known throughout eastern half of Texas in brushy and forested areas, as well as coastal prairies	LE	E

MOLLUSKS

Fawnsfoot (Common) (<i>Truncilla donaciformis</i>) - small and large rivers especially on sand, mud, rocky mud, and sand and gravel, also silt and cobble bottoms in still to swiftly flowing waters; Red (historic), Cypress (historic), Sabine (historic), Neches, Trinity, and San Jacinto River basins.		
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	Federal Status	State Status
Ouachita Rock-pocketbook (<i>Arkansia wheeleri</i>) - large, dense, diverse beds of other unionids; stable mud, sand, and gravel substrates of medium-sized rivers, backwater or slackwater areas adjacent to the main channel; also reported from cobble-gravel bottoms in pools of small, slow-flowing rivers; Red River Basin	LE	E
Pimpleback (Common) (<i>Quadrula pustulosa</i>) - small streams to larger rivers, and associated with nearly every bottom type except deep shifting sands; Red River downstream of Lake Texoma and possibly Big Cypress Bayou and lower Sulphur river basins		
Pistolgrip (<i>Tritogonia verrucosa</i>) - stable substrate, rock, hard mud, silt, and soft bottoms, often buried deeply; east and central Texas, Red through San Antonio River basins		
Plain pocketbook (<i>Lampsilis cardium</i>) - small creeks and large rivers, flowing waters, occasionally oxbows or slackwater areas of sandy-bottomed rivers and reservoirs on sand, sand-gravel, or sand-mud but not typically in dense beds; Red and Cypress River basins		
Rock-pocketbook (<i>Arcidens confragosus</i>) - mud, sand, and gravel substrates of medium to large rivers in standing or slow flowing water, may tolerate moderate currents and some reservoirs, east Texas, Red through Guadalupe River basins		
Wabash Pigtoe (<i>Fusconaia flava</i>) - creeks to large rivers on mud, sand, and gravel from all habitats except deep shifting sands; found in moderate to swift current velocities; east Texas River basins, Red through San Jacinto River basins; elsewhere occurs in reservoirs and lakes with no flow		
Wartyback (<i>Quadrula nodulata</i>) - gravel and sand-gravel bottoms in medium to large rivers and on mud; Red, Sabine, Neches River basins		
White heelsplitter (<i>Lasmigona complanata</i>) - typically large rivers and streams with sluggish, turbid waters, on mud or mud-gravel bottoms; also smaller streams and reservoirs usually deep in soft mud or occasionally among rocks; quiet areas of otherwise swift streams; Red River with unsuccessful introductions into the upper Trinity River System		

*** REPTILES ***

Alligator Snapping Turtle (<i>Macrochelys temminckii</i>) - deep water of rivers, canals, lakes, and oxbows; also swamps, bayous, and ponds near deep running water; sometimes enters brackish coastal waters; usually in water with mud bottom and abundant aquatic vegetation; may migrate several miles along rivers; active March-October; breeds April-October	T
Texas Horned Lizard (<i>Phrynosoma cornutum</i>) - open, arid and semi-arid regions with sparse vegetation, which could include grass, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive; breeds March-September	T
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*** VASCULAR PLANTS ***

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REPRESENTATIVE FIGURES

REPRESENTATIVE PHOTOGRAPHS

**REPRESENTATIVE PHOTOGRAPHS
OF
CROPLAND**

REPRESENTATIVE PHOTOGRAPHS OF CROPLAND





**REPRESENTATIVE PHOTOGRAPHS
OF
PASTURE**

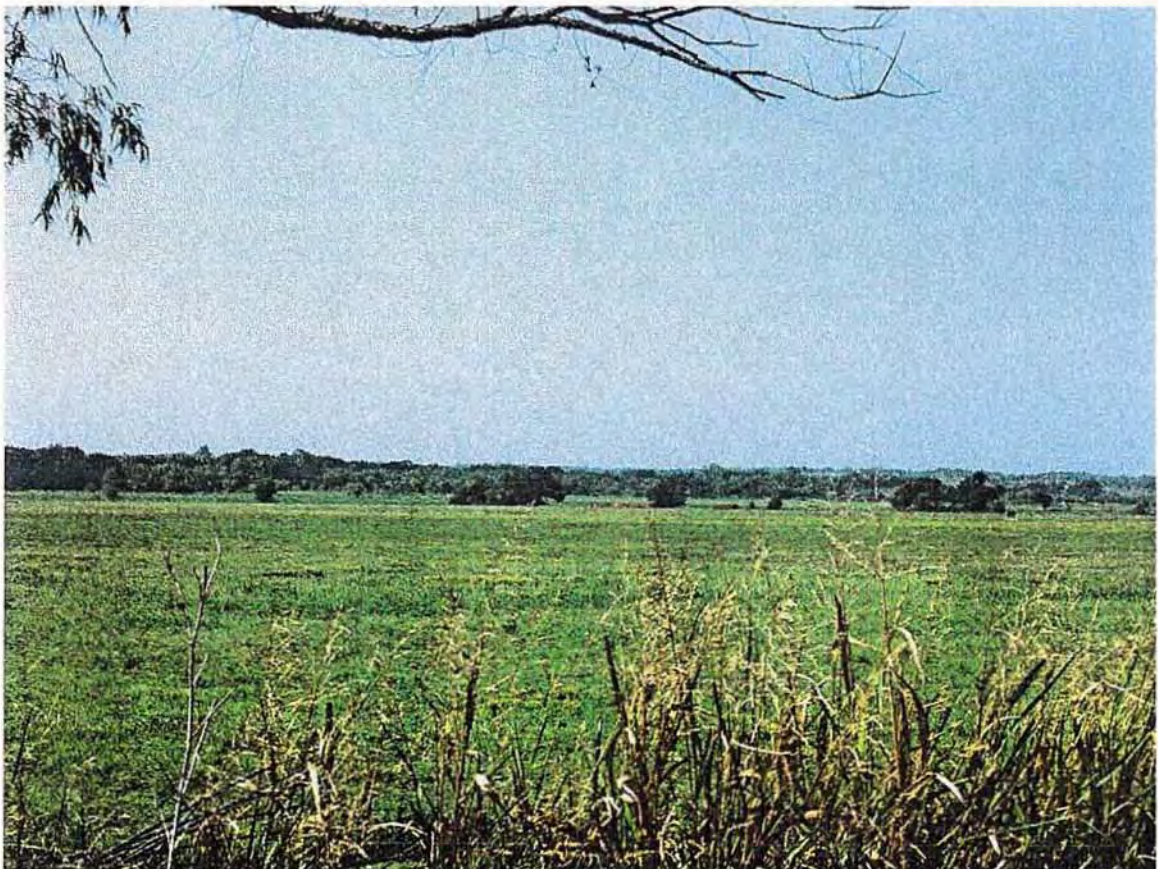
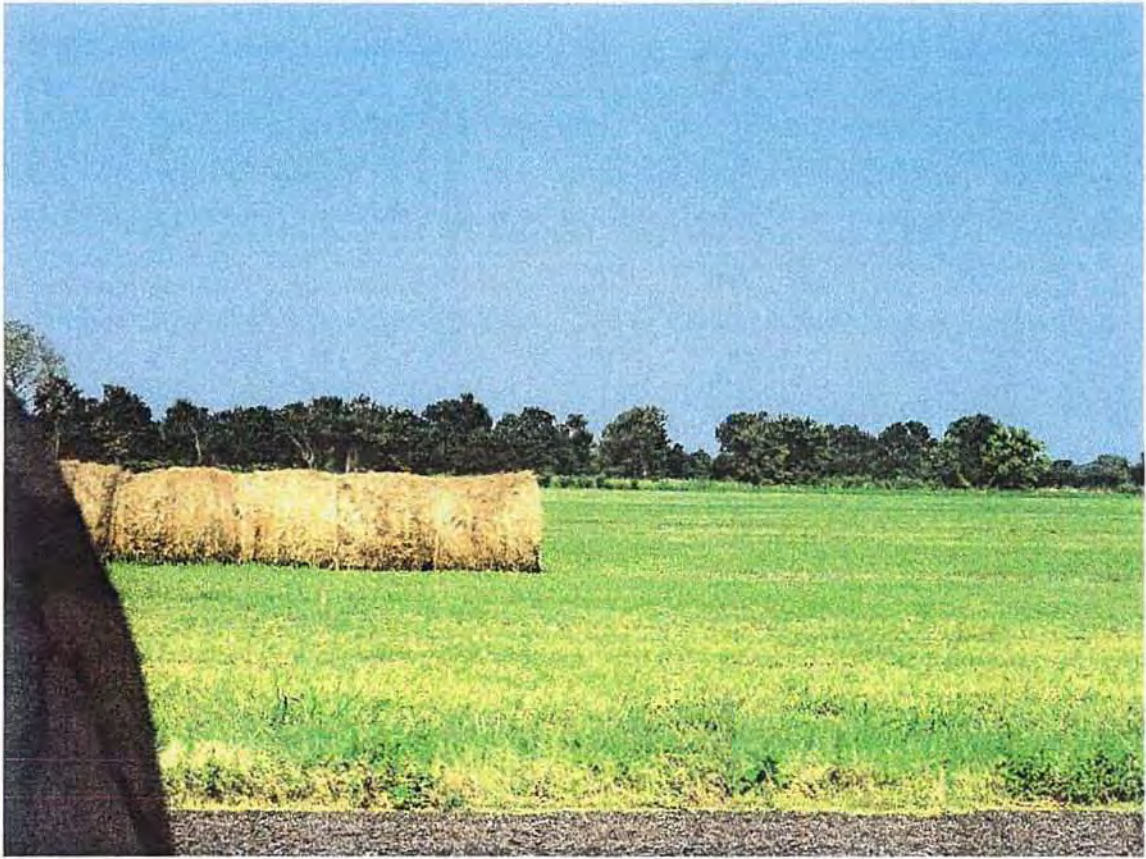
REPRESENTATIVE PHOTOGRAPHS OF PASTURE







Cropland recently converted to forage grasses





**REPRESENTATIVE PHOTOGRAPHS
OF
GRASSLAND**

REPRESENTATIVE PHOTOGRAPHS OF GRASSLAND









Boundary signage for Caddo National Grasslands – Ladonia Unit Tract





**REPRESENTATIVE PHOTOGRAPHS
OF
FOREST**

REPRESENTATIVE PHOTOGRAPHS OF FOREST



