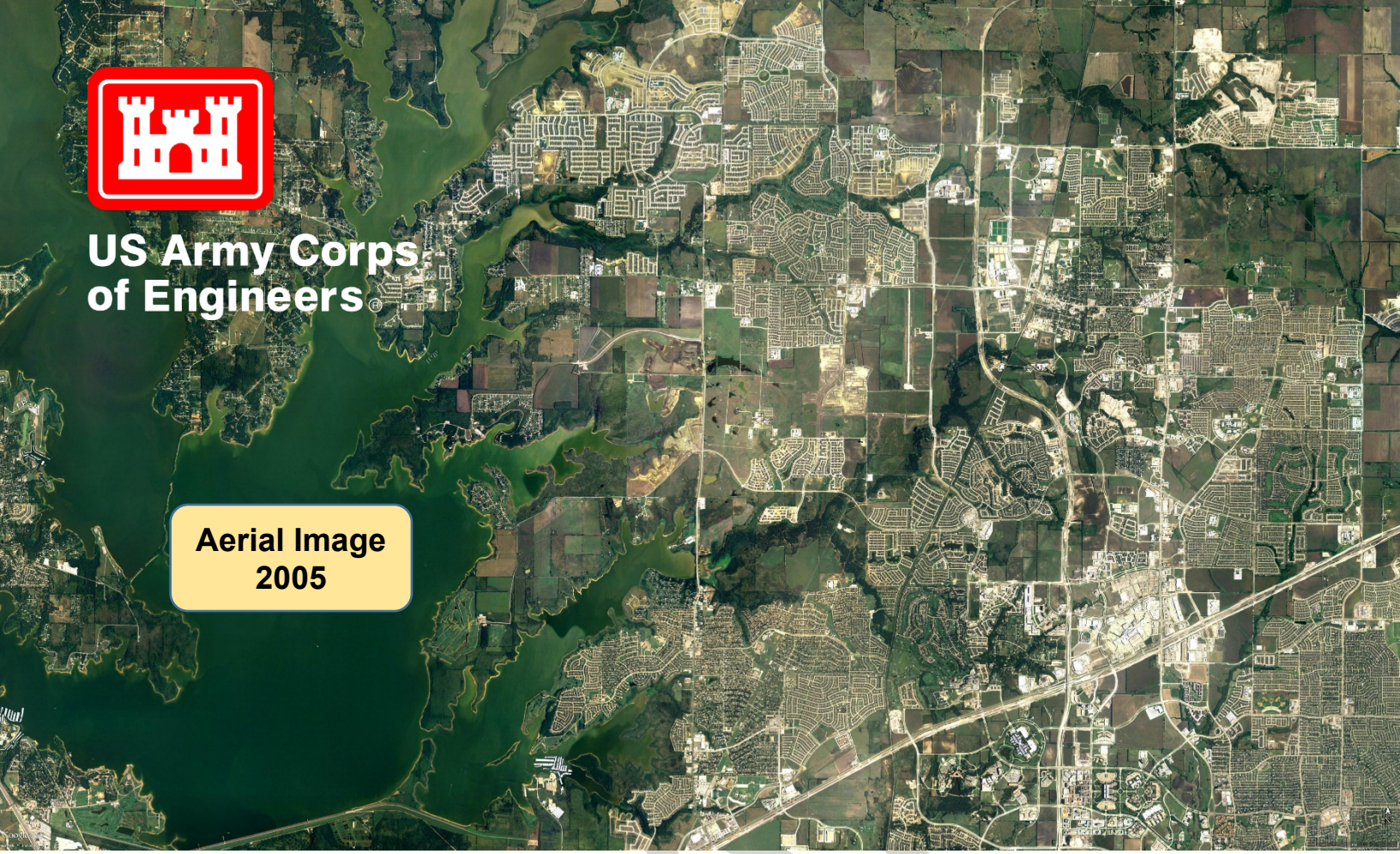
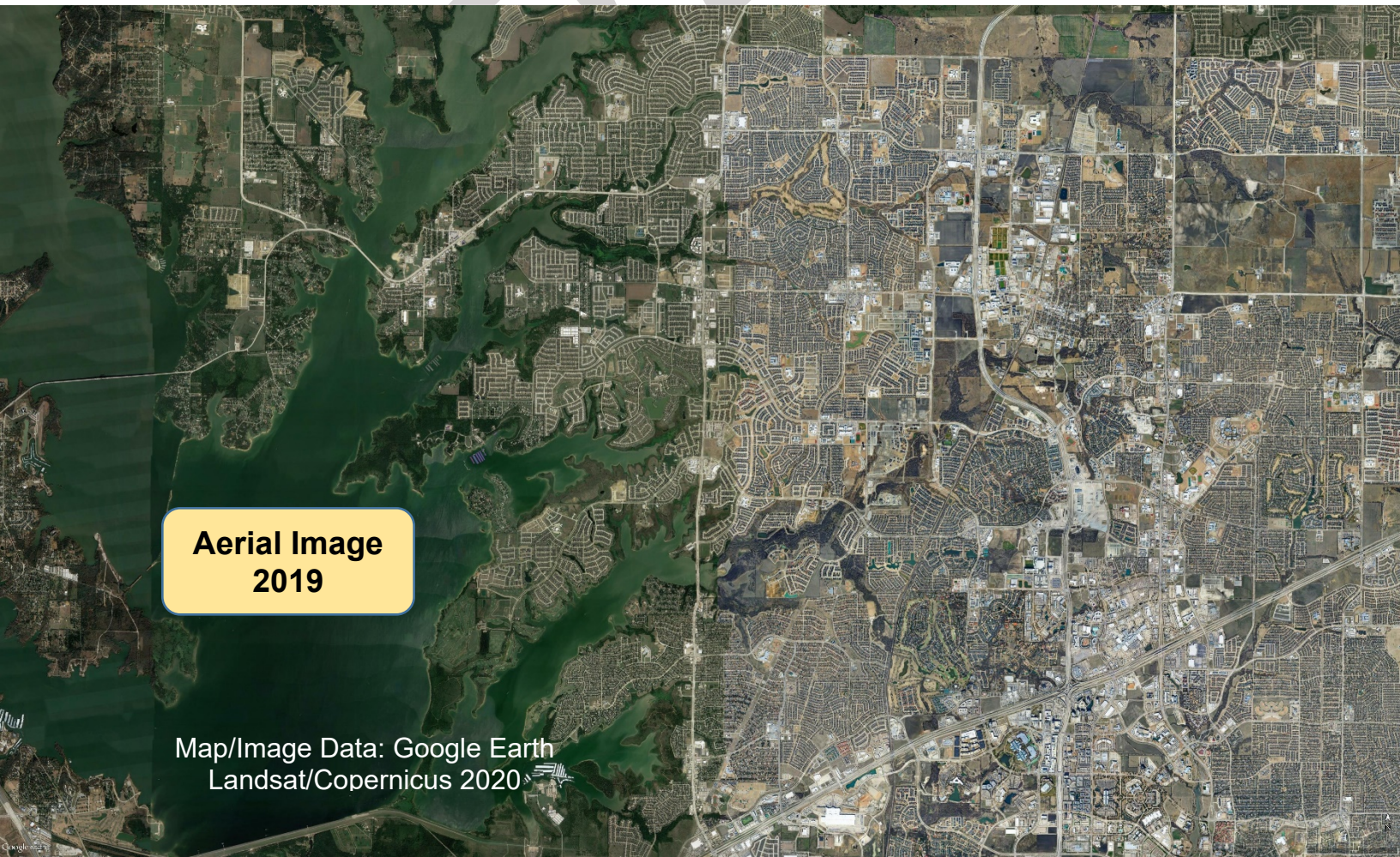


Lewisville Lake 2020 Master Plan

Elm Fork of the Trinity River – Denton County, Texas



EXECUTIVE SUMMARY
Lewisville Lake Master Plan

U.S. Army Corps of Engineers
Prepared by the Regional Planning and Environmental Center
2020

PURPOSE

The revision of the Lewisville Lake Master Plan (hereafter Plan or Master Plan) is a framework built collaboratively to serve as a guide toward appropriate stewardship of U.S. Army Corps of Engineers (USACE) administered resources at Lewisville Lake over the next 25 years. The 1985 Lewisville Lake Master Plan, including a major supplement in 2004, is the most recent version of the Plan and has served well for the past 33 years, but dynamic population growth around the lake, the addition of new recreation facilities, the leasing of USACE lands to several adjacent municipalities for lake-related outdoor recreation, and an increased public awareness of the value of USACE lands as recreation open space and wildlife habitat has led to the need for a complete revision of the 1985 Master Plan.

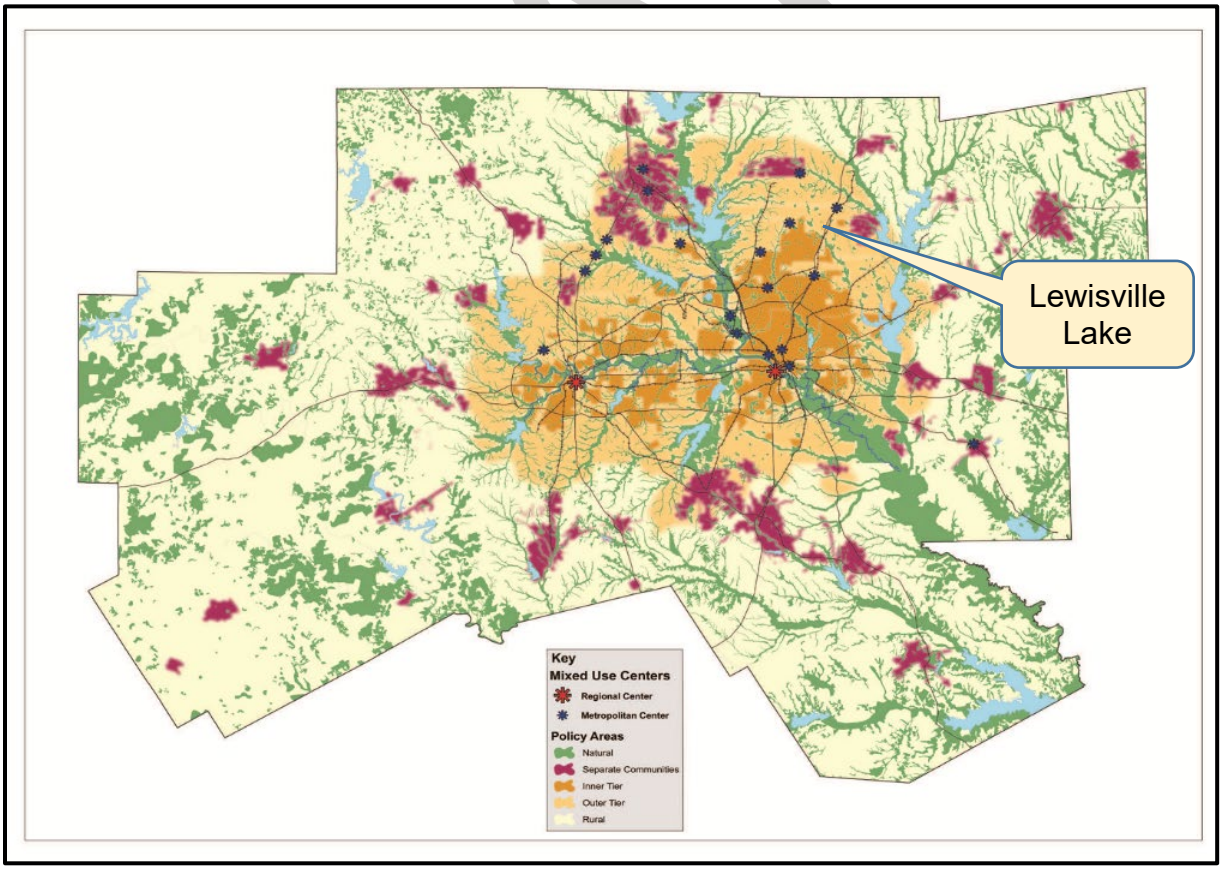


Figure ES.1 Preferred Physical Development Pattern for the Seventeen County NCTCOG for Year 2050 (Source: NCTCOG: Vision North Texas)

The Master Plan is primarily a land use and outdoor recreation strategic plan that does not address the specific authorized project purposes of water storage for flood risk management or water supply. Water management is addressed in the 2018 USACE Water Control Manual for Lewisville Lake. The 1985 Master Plan classified a total of 45,823 acres of USACE land, which included 29,980 acres of surface water at the conservation pool elevation of 522.0 feet National Geodetic Vertical Datum of 1929 (NGVD). The 28,980 acre figure was derived using land measurement technology dating to the 1950's and 60's and has been used since 1985 to describe the size of the pool at the normal elevation of 522.0 NGVD. A survey in 2007 by the Texas Water Development Board, in cooperation with USACE, used more sophisticated, Geographic Information Systems (GIS) technology and determined the size of the pool to be approximately 27,175 acres. The difference between the earlier figure of 28,980 acres and the 2007 figure can be attributed to a combination of factors including land accretion through sediment deposition (thus shrinking the surface area of the pool), the elevation of the lake when measurements were made, and the use of better measurement technology.

For the purpose of preparing this Master Plan, the conservation pool is considered to be 27,175 acres with approximately 20,592 acres of land lying above the conservation pool. This Plan also addresses management of the Ray Roberts Lake State Park – Greenbelt Corridor which consists partly of lands originally acquired for Lewisville Lake and partly of lands acquired specifically for establishment of the Greenbelt Corridor. It is notable that the 27,175 acre conservation pool, plus the 20,592 acres lying above the conservation pool, when added together equal 47,767 acres which is a sum greater than the official USACE real estate records that show the total fee ownership at Lewisville Lake to be 46,001 acres, plus 1,136 acres acquired for the Greenbelt, for a grand total of 47,137 acres. This difference of 630 acres is approximately 1.4% of the deed-recorded acreage and is easily attributed to the difference in the way the conservation pool was measured in the 1980's compared to the current GIS estimate. This Plan and supporting documentation provides an inventory, analysis, goals, objectives and recommendations for USACE lands and water surface at Lewisville Lake, Texas.

PUBLIC INPUT

Public and agency input obtained for the development of the Master Plan was obtained to ensure a balance between operational, environmental, and recreational outcomes. An Environmental Assessment (EA) was completed in conjunction with the Master Plan Revision to evaluate the impacts of alternatives. The EA is included in Appendix B.

A public information meeting was held on May 2, 2017 in Lewisville, Texas and on May 4, 2017 in Little Elm, Texas to announce the initiation of the master plan revision, explain the process involved and to solicit input. A total of 72 individuals, not

including USACE personnel, attended the two information meetings. In addition to the two initial public information meetings, USACE personnel met personally with representatives from 19 separate entities involved in the daily management of USACE lands and water surface. The 19 entities included representatives from Texas Parks & Wildlife Department, cities, marina operators and non-profit organizations. A total of 24 written comments were received during the 30-day public comment period following the information meetings and the 19 separate meetings with stakeholders. A summary of public comments and the USACE response is provided in Chapter 7 of this Plan.

The public meetings to announce the final draft Master Plan with the EA and Finding of No Significant Impact (FONSI) were scheduled for March 31 and April 1, 2020, but had to be canceled due to public health and safety concerns associated with the COVID-19 virus. In lieu of face-to-face public meetings, USACE conducted an online public review of the draft revised master plan beginning in April, 2020 followed by a comment period ending on June 22, 2020. The comment period resulted in (number) comments of which a summary can be found in Table 7.2 of this Plan.

RECOMMENDATIONS

The land classifications changes set forth in Table ES-1 below and detailed in Chapter 8, Table 8.2, resulted from the inventory, analysis, and synthesis of data, documents, and public and agency input. With the exception of Project Operations acreage, it is not possible to make a direct comparison of the new land classification with the prior, 2004 land classifications. In the 2004 MP supplement, the Recreation classification showed 8,935 acres but a careful measurement of the same areas for this 2020 MP shows that 4,780 are included in the High Density Recreation classification. The 2004 MP does not explain why so many acres are shown to be in the Recreation classification. One possible explanation is that the 1985 Master Plan described approximately 9,000 acres in a recreation-related land classification and those figures may have been used in the 2004 MP supplement. In general, 20,592 acres were reclassified, with fee and conservation pool acreage changes due in part to siltation, land conveyance, and improvements in measurement technology using Geographical Information System (GIS) technology. This technology allows for more finely tuned measurements and thus acreages may vary slightly from official land acquisition records and prior master plan measurements.

Table ES.1 Land Use Acreage Changes

Prior (2004) Land Classifications	Acres		New Land Classifications	Acres
Operation and Maintenance	1,170		Project Operations	1,083
Recreation	8,935		High Density Recreation	4,780
			Separable Recreation Lands	1,136[3]
Environmentally Sensitive Areas	7,292[1]		Environmentally Sensitive Areas	10,918
Fish and Wildlife Management	6,738[2]		Multiple Resource Management – Low Density Recreation	543
			Multiple Resource Management – Wildlife Management	3,268
Conservation Pool 522.0 NGVD29	28,980		Conservation Pool 522.0 NGVD29	27,175
Flowage Easement	5,746[4]		Flowage Easement	8,712

1. The majority of these acres were also included in the acres shown for Fish and Wildlife Management

2. A majority of these acres were also classified as ESA.

3. Separable Recreation Lands is not a land classification but is required by USACE regulations to be described in project Master Plans. Separable Recreation Lands are those lands acquired only for the purpose of recreation and are otherwise not required for the successful operation of Lewisville Lake for the primary missions of flood risk management and water conservation. The acreage of Separable Recreation Lands is included in the acreage totals for High Density Recreation lands. The 1,136 acres of Separable Recreation Lands existed in 2004 but were not identified as such in the 2004 Master Plan Supplement.

4. This figure was incorrectly stated in the 2004 Master Plan Supplement. The correct number of 8,712 acres is shown under the column for New Land Classifications.

PLAN ORGANIZATION

Chapter 1 of the Master Plan presents an overall introduction of Lewisville Lake. Chapter 2 consists of an inventory and analysis of project resources. Chapters 3 and 4 lay out management goals, resource objectives, and land allocation and classification. Chapter 5 is the resource plan that identifies how project lands will be managed through a resource use plan for each land use classification. This includes current and projected park facility needs, an analysis of existing and anticipated resource use, and anticipated influences on overall project operation and management. Chapter 6 details topics that are unique to Lewisville Lake. Chapter 7 identifies the coordination efforts and stakeholder input gathered for the development of the Master Plan, and Chapter 8 gives a summary of the changes in land classification from the previous Master Plan to the present one. Finally, the appendices include information and supporting documents for

this Master Plan revision, including Land Classification and Park Plate Maps (Appendix A).

An EA analyzing alternative management scenarios for Lewisville Lake has been prepared in accordance with the National Environmental Policy Act of 1969, as amended (NEPA); regulations of the Council on Environmental Quality; and USACE regulations, including Engineer Regulation 200-2-2: Procedures for Implementing NEPA. The EA is a separate document that informs this Master Plan and can be found in its entirety in Appendix B.

The EA evaluated two alternatives as follows: 1) No Action Alternative and 2) Proposed Action. The EA analyzed the potential impact the No Action and Proposed Action would have on the natural, cultural, and human environments. Because the Master Plan is conceptual, any action proposed in the plan that would result in significant disturbance to natural resources or result in significant public interest would require additional NEPA documentation at the time the action takes place.

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CHAPTER 1 - INTRODUCTION

1.1. OVERVIEW

Lewisville Dam and Lake (hereafter Lewisville Lake) is a multipurpose water resources project constructed and operated by the U.S. Army Corps of Engineers (USACE), Fort Worth District. The lake and associated federal lands are located entirely within Denton County, Texas (TX). Lewisville Lake Dam is located on the Elm Fork of the Trinity River in the in the Trinity River Basin at river mile 30 along the northern edge of the City of Lewisville, Texas and approximately 24 miles from the central business district of the City of Dallas. The dam and associated infrastructure, as well as all lands acquired for the Lewisville Lake project, are federally-owned and administered by the USACE.

Photo 1.1 Lewisville Lake Dam Looking West (USACE Photo)

The Lewisville Lake Master Plan (hereafter Plan or Master Plan) is a the revision of the 1985 Master Plan, including the 2004 Supplement, and is intended to serve as a comprehensive land and recreation management guide with an effective life of approximately 25 years. The focus of the Plan is to guide the stewardship of natural and cultural resources, and make provision for outdoor recreation facilities and opportunities on federal land associated with Lewisville Lake. The Plan does not address the flood risk management or water supply purposes of Lewisville Lake (see the USACE Water Control Manual for Lewisville Lake for a description of these project purposes).

National USACE missions associated with water resource development projects may include flood risk management, water conservation, navigation, recreation, fish and wildlife conservation, and hydroelectric power generation. Most of these missions serve to protect the built environment and natural resources of a region from the climate extremes of drought and floods. This creates a more resilient and sustainable region for the health, welfare, and energy security of its citizens. Mitigation, while not a formal mission at USACE lakes, may be implemented to achieve the fish and wildlife and recreation missions. Maintaining a healthy vegetative cover and including a tree canopy where ecologically appropriate on Federal lands within the constraints imposed by primary project purposes helps reduce stormwater runoff and soil erosion, mitigates air pollution, and moderates temperatures. To this end, USACE has developed the following statements.

The USACE Sustainability Policy and Strategic Plan states that:

"The U.S. Army Corps of Engineers strives to protect, sustain, and improve the natural and man-made environment of our Nation, and is committed to compliance with applicable environmental and energy statutes, regulations, and Executive Orders. Sustainability is not only a natural part of the Corps' decision processes, it is part of the culture.

Sustainability is an umbrella concept that encompasses energy, climate change and the environment to ensure today's actions do not negatively impact tomorrow. The Corps of Engineers is a steward for some of the Nation's most valuable natural resources, and must ensure customers receive products and services that provide sustainable solutions that address short and long-term environmental, social, and economic considerations."

The USACE mission of the Responses to Climate Change Program is:

"To develop, implement, and assess adjustments or changes in operations and decision environments to enhance resilience or reduce vulnerability of USACE projects, systems, and programs to observed or expected changes in climate."

The history of Lewisville Lake extends back in time approximately 100 years from the date of this Plan. The City of Dallas constructed the Garza Dam on the Elm Fork of the Trinity River in the early 1920's, completing the dam in 1927. The reservoir impounded by this early dam was referred to by several names but was most often called Lake Dallas. The water supply from Lake Dallas served the City of Dallas for many years, but following World War II in the late 1940's, the need for additional water supply coincided with the need for improved flood control along the Trinity River where it traverses through Dallas. In response to these needs, planning for Lewisville Lake and Dam was initiated, with completion of Lewisville Dam in 1955. The boundary of the new reservoir, Lewisville Lake, completely incorporated the original Lake Dallas. After completion of Lewisville Dam, the old Garza Dam was intentionally breached in two spots, but much of the old dam remained in place and is still visible in the northeast sector of Lewisville Lake. All lands surrounding the old Lake Dallas were owned by the City of Dallas and as part of the Lewisville Lake project were deeded over to USACE.

Another major chapter in the history of Lewisville Lake was the construction of Ray Roberts Dam and Lake (formerly Aubrey Lake) in the 1980s. Ray Roberts Dam is on the Elm Fork of the Trinity River a few miles upstream from Lewisville Lake and was completed in 1987. By design, the construction of Ray Roberts Dam and Lake resulted in a permanent seven-foot increase in the conservation pool at Lewisville Lake raising the pool from 515.0 NGVD to 522.0 NGVD. The permanent increase in the conservation pool resulted in the relocation of many recreation facilities at Lewisville Lake as well as the acquisition of several parcels of land around the perimeter of the lake and the raising of numerous boat ramps.

One of the most significant changes at Lewisville Lake associated with construction of Ray Roberts Dam and Lake was the significant expansion and modernization of Hickory Creek Park bringing the total number of campsites in the park to 128, and the construction of three large camper service buildings and a beach. Hickory Creek Park is currently operated by USACE. Another major recreation feature associated with the construction of Ray Roberts Dam and Lake was the acquisition of land and conservation easements along the Elm Fork of the Trinity River above Lewisville Lake for the purpose of developing the Greenbelt Corridor between Lewisville Lake and Ray Roberts Lake. The Greenbelt Corridor features hike, bike and equestrian trails and is managed by the Texas Parks & Wildlife Department (TPWD) as a part of Ray Roberts Lake State Park. The Greenbelt Corridor is described in more detail in Chapters 4 and 5 of this Plan.

Lewisville Dam and Lake are a multi-purpose project used for flood control, water supply, hydropower, fish and wildlife, and recreation. The project is a unit of the Trinity River Basin System, which consists of eight USACE lakes and various channel improvements and levees operated to provide flood protection along the Trinity River. Lewisville Dam and Lake operates in conjunction with Ray Roberts Dam on the Elm Fork of the Trinity River to provide flood control for the lower Elm Fork Trinity River and the mainstem Trinity River through Dallas and downstream. The lake provides water supply to the cities of Denton and Dallas, Texas. Major municipal water intakes on the lake are operated by the City of Denton, City of Lewisville, and the Upper Trinity Regional Water District (UTRWD). The city of Dallas obtains a large volume of water from the lake for municipal purposes via water releases through low-flow gates at the USACE gate control tower. Some of the releases are channeled through a small hydroelectric turbine constructed by the City of Denton in 1991. The small turbine is now operated by the City of Garland, Texas. Low flow releases required by the city of Dallas flow downstream to a water intake facility operated by Dallas on land owned by the City.

The Master Plan is intended to serve as a comprehensive land and recreation management guide with an effective life of approximately 25 years. The focus of the Plan is to guide the stewardship of natural and cultural resources, and make provision for outdoor recreation facilities and opportunities on federal land associated with Lewisville Lake. The Master Plan identifies conceptual types and levels of activities, but does not include designs, project sites, or estimated costs. All actions carried out by USACE, other agencies, and individuals granted leases to USACE lands must be consistent with the Master Plan. The Plan does not address the flood risk management, or water supply purposes of Lewisville Lake (see the USACE Water Control Manual for Lewisville Lake for a description of these project purposes). The Lewisville Lake Master Plan was last updated in 1985 with a major supplement published in 2004.

1.2 PROJECT AUTHORIZATION

The initiation and partial construction of Lewisville Dam and Lake on the Trinity River was authorized by the River and Harbor Act approved 2 March 1945 (Public Law 14, 79th Congress, and 1st Session). The River and Harbor Act of 1945 was approved in accordance with recommendations made by the Chief of Engineers contained in

House Document Number 403 (77th Congress, 1st Session). Authority to initiate advance planning is contained in a letter by the Chief of Engineers to the Division Engineer, Southwestern Division (SWD), dated 2 April 2 1945, subject "Advance Planning of River and Harbor Projects Authorized in the Act Approved 2 March 1945". The preliminary examination titled “Preliminary Report on Hydrology of Elm Fork Trinity River and Spillway Design Flood for Garza-Little Elm Dam and Reservoir” was published in February 1947. The Definite Project Report for Lewisville Dam was submitted to the Chief of Engineers in October 1947. Public Law 329, 84th Congress, 1st Session changed the name of the dam from "Garza-Little Elm" to "Lewisville" dam. Congressional authority for the modification of Lewisville Lake including the construction of Ray Roberts Lake (formerly Aubrey Lake) is contained in the River and Harbor Act of 1965 (PL 89 298) in accordance with the total plan of improvements for the Trinity River as presented in House Document No. 276 (89th Congress, 1st Session).

1.3 PROJECT PURPOSE

Lewisville Lake is a multipurpose water resources project designed and operated by USACE for the primary purposes of flood risk management and water conservation within the Trinity River Basin. USACE administers the surrounding federal lands and water surface to provide a variety of public, outdoor recreation opportunities, and to conserve important natural and cultural resources. Recreation facilities on Federal land at Lewisville Lake are currently operated by ten different municipalities, several private concessionaires, three private non-profit organizations (Dallas Corinthian Yacht Club (DCYC), Young Men’s Christian Association (YMCA), Lewisville Lake Environmental Learning Area (LLELA)), the University of North Texas, Texas Parks and Wildlife Department and USACE. Refer to map LE19MP-OM-01 in Appendix A for an overview of the lands managed by each managing entity. Environmental stewardship of Federal lands is carried out to recognize and protect important fish and wildlife habitats and species, and cultural resources.

1.4 MASTER PLAN PURPOSE AND SCOPE

The Lewisville Lake Master Plan is the living, flexible, long-term strategic land-use management document that guides the comprehensive management and development of all the project’s recreational, natural, and cultural resources. Under the guidance published in Chapter 3 Engineering Regulation (ER) 1130-2-550, and the accompanying Engineer Pamphlet (EP) 1130-2-550, the Plan guides the efficient and cost-effective development, management, and use of project lands. It is a dynamic tool that provides for the responsible stewardship and sustainability of the project’s resources for the benefit of present and future generations. The Plan works in tandem with the Operational Management Plan (OMP), which is the task oriented implementation tool for the resource objectives and development needs identified in the Master Plan. The Master Plan guides and articulates the USACE responsibilities pursuant to federal laws. The USACE vision for the future management of the natural resources and recreation program at Lewisville Lake is set forth as follows:

"The land, water and recreational resources of Lewisville Lake will be managed to protect, conserve, and sustain natural and cultural resources, especially environmentally sensitive resources, and provide outdoor recreation opportunities that complement overall project purposes for the benefit of present and future generations."

It is important to note what the Master Plan does not address. Details of management and administration and implementation are not addressed here, but are covered in the Lewisville Lake OMP. In addition, the Master Plan does not address the specifics of regional water quality, shoreline management (a term used to describe the management of private docks and vegetation modification by neighboring landowners), or water level management, nor does it address the operation and maintenance of prime project operations facilities such as the dam embankment, gate control outlet, and spillway. Additionally, the Plan does not address the flood risk management or water conservation purposes of Lewisville Lake with respect to management of the water level in the lake (see the USACE Water Control Manual for Lewisville Lake for a description of these project purposes).

The master planning process encompasses the examination and analysis of past, present, and future environmental, recreational and socioeconomic conditions and trends. Within a generalized conceptual framework, the process focuses on the following four primary components:

- Regional and ecosystem needs
- Project resource capabilities and suitabilities
- Expressed public interests that are compatible with Lewisville Lake's authorized purposes
- Environmental sustainability elements

The Lewisville Lake Master Plan, originally published as Design Memorandum No. 1C in 1966 was updated in 1973 and then completely revised in 1985 just prior to completion of Ray Roberts Dam and Lake. A major supplement to the Master Plan was added in 2004 to address, new and proposed recreation facilities, land classification, mitigation, and utility corridors. Since publication of the 1985 Master Plan and subsequent supplement, outdoor recreation trends, regional land use, population, legislative requirements, and USACE management policy have evolved. Increased urbanization, fragmentation of wildlife habitat, impacts of climate change, and the growing demand for recreational access and natural resources management has affected the region and Lewisville Lake. In response to these escalating pressures, a full revision of the 1985 Master Plan is required. The Master Plan revision will update land classifications, include new resource management objectives, and describe future plans proposed by key partners and USACE. The Plan will also inform the management of wildlife and other resource lands for the next 25 years.

1.5 BRIEF WATERSHED AND PROJECT DESCRIPTION

Lewisville Lake is located in the Elm Fork of the Trinity River watershed in the Upper Trinity River Basin. The Elm Fork of the Trinity River originates in eastern Montague County, Texas and flows in a southeasterly direction for approximately 110 miles through Cooke, Denton and Dallas Counties to its confluence with the West Fork of the Trinity in the City of Dallas. The watershed lies in the north central portion of Texas extending across the state between north latitudes 33°44′ and 32°42′ and west longitudes 96°43′ and 97°50′. The watershed is comprised of parts of Montague, Cooke, Grayson, Collin, Wise, Tarrant, Denton and Dallas Counties. It is about 80 miles long along its axis and has a maximum width of 60 miles. The watershed of the Elm Fork of the Trinity River has a total drainage area of 2,577 square miles of which 917 square miles are downstream from Lewisville Dam. Lewisville Lake controls 1,660 square miles of the drainage area.

Lewisville Dam is located on the Elm Fork of the Trinity River at river mile 30.0. The river drops from an elevation of about 1,210 feet at its source to 435 feet at the Lewisville Dam site. The Elm Fork continues to drop to elevation 387 feet at its confluence with the West Fork in Irving/Dallas. The average slope of the stream bed is 7.5 feet per mile, and the average slope downstream of Lewisville dam is 1.6 feet per mile.

The principal tributaries contributing to the Elm Fork of the Trinity River are the right bank tributaries, Denton Creek, Hickory Creek and Clear Creek, and the left bank tributaries, Isle Du Bois Creek and Little Elm Creek. With the exception of Denton Creek, all of these principal tributaries are located upstream of Lewisville Lake.

Lewisville Lake Dam consists of a rolled, earthfill embankment. The embankment is essentially a homogeneous fill constructed of impervious clays and shales. Water is released from Lewisville Lake through the outlet works consisting of an approach channel, an intake structure, a concrete conduit through the dam, stilling basin and a discharge channel. The discharge conduit passes through the embankment. The intake structure is equipped with gates and a trash rack. In addition to the discharge conduit the outlet works also has two smaller conduits used for the release of water for municipal purposes. Located near the east end of the embankment is the spillway consisting of an uncontrolled ogee weir a and a 1300 feet long approach channel. Flow over the spillway discharges into a 3,200 feet long pilot channel. The discharge capacity of the spillway is 216,800 cubic feet per second (cfs) when the water surface elevation is at 553.0 feet.

According to the first Master Plan for Lewisville Lake dated 1966, the total area initially acquired in fee simple was 49,234 acres. Flowage easements were required for 5,654 acres. These numbers changed over time due to land disposals and land acquisitions. Refer to Section 2.6 of this Plan for a description of why and when these lands and flowage easements were acquired and how the numbers changed. In general, land up to elevation 537.0 was acquired in fee. Flowage easements were acquired in numerous locations from approximately elevation 527.5 up to elevation

537.0. In most areas, the acquisition of lands and flowage easements followed a blocked out line sufficient to encompass the 537.0 contour. Today, at the normal or conservation pool elevation of 522.0 NGVD, the lake has approximately 187 shoreline miles and a surface area of 27,175 acres.

There are 23 distinct areas designated for public recreation use at Lewisville Lake. Three of these areas are used only as a boat ramp access point. These 23 areas are managed by 12 different entities including 10 cities, TPWD, and USACE. There are five public, concessionaire-operated marinas on the lake with each marina being located within or adjacent to a larger recreation area. One private marina, the Dallas Corinthian Yacht Club, is located on the Elm Fork arm of Lewisville Lake. There are also two major natural/environmental on the lake; the Lewisville Lake Environmental Learning Area operated by a consortium of entities and the Clear Creek Natural Heritage Area operated by the City of Denton. Finally, the YMCA and University of North Texas each manage an area on Lewisville Lake for public benefit.

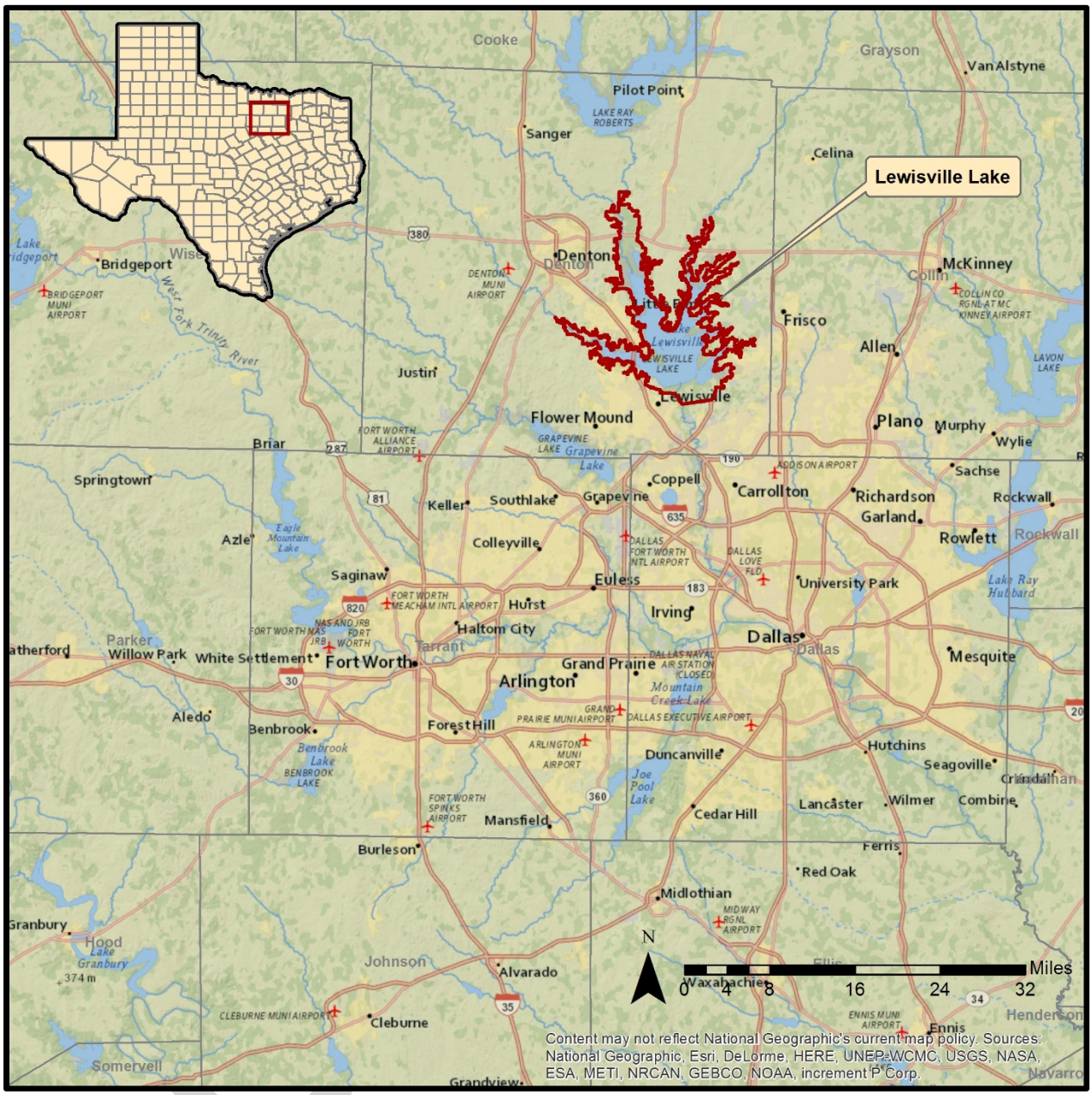


Figure 1.1 Vicinity Map of Lewisville Lake

1.6 DESCRIPTION OF RESERVOIR

Lewisville Lake is, by comparison to many USACE lakes, a medium to large size reservoir with a normal or conservation pool of 27,175 surface acres at elevation 522.0 NGVD. The depth of the lake near the outlet works is approximately 87 feet based on a streambed elevation of 435.0 feet at the outlet works, but depths decrease as one moves north from the dam. The top of the flood control pool is elevation 532.0 NGVD which is also the elevation of the uncontrolled spillway crest. Design criteria from the 1947 Definite Project Report indicated that Lewisville Lake would provide 53,500 acre-

feet of sediment storage over a period of 57 years. A volumetric survey conducted by USACE in 1965 indicated that 31,849 acre-feet of the original 53,500 acre-feet remained available in the lake. After construction of Ray Roberts Dam and Lake, the storage in Lewisville Lake was reallocated in 1987. The reallocation estimated that an additional 73,800 acre-feet of sediment would accumulate in Lewisville Lake by the year 2087. The TWDB last performed a standard volumetric survey for Lewisville Lake in 2007. Results from the survey indicate Lewisville Lake encompasses 27,175 surface acres and contains a total volume of 598,902 acre-feet at conservation pool elevation 522.0 feet. Comparing the 2007 figures with the USACE figures from the 1965 survey reveals a predictable steady accumulation of sediment within the conservation pool of Lewisville Lake. More information on sedimentation of Lewisville Lake can be found in Section 2.2.10.

At the conservation pool elevation of 522.0 NGVD, Lewisville Lake provides long vistas of open water. In general terms, the western half of the lake is located in the Cross Timbers Ecoregion whereas the eastern half of the lake is in the Texas Blackland Prairies Ecoregion. The western half of the lake has more topographic relief and is generally more aesthetically pleasing than the eastern half, but overall, the entire lake and surrounding public land is a green oasis almost entirely surrounded by residential and commercial development.

1.7 PROJECT ACCESS

The general setting of Lewisville Lake in Denton County is one of intense population growth and fast-paced development. Denton County is the ninth most populated county in Texas with an estimated 2017 population of 781,321. The county population was 432,976 in 2000 and the Census Bureau predicts a 2045 population of 1,990,969. See Chapter 6 of this Plan for more discussion about the rapidly increasing population surrounding the lake. This high growth rate, coupled with similar high growth rates in the surrounding region, has dictated a vastly expanded road and transportation network in the immediate area surrounding Lewisville Lake. In the ten years prior to publication of this plan the major road and transportation expansions listed below have been completed. Each of these projects required close coordination between USACE and road proponents (primarily the Texas Department of Transportation (TXDOT), North Texas Toll Authority (NTTA) and numerous cities.)

- The Lewisville Lake Toll Bridge was completed by the NTTA in 2009. The bridge is an extension of FM 2181 (Swisher Road) on the west and SH 720 (Eldorado Parkway) on the east. The linkage of FM 2181 and FM 720 provides a major east-west corridor across the middle-upper portions of Lewisville Lake.
- Replacement of the FM 720 (Eldorado Parkway) Bridge over the Little Elm Creek arm of Lewisville Lake. The FM 720 bridge was a relocation project completed by USACE as part of the Lewisville Lake Project in the 1950s. Replacement of the bridge involved widening and raising the bridge.
- The extension of FM 2499 across USACE land in the Hickory Creek Arm of the lake was completed in 2011. This project involved construction of two bridges and is a major 4-lane, divided roadway that provides an alternative north-south

transportation corridor roughly parallel to and west of Interstate Highway (IH) 35E.

- Widening of IH 35E where it crosses the Hickory Creek Arm of the lake. This project involved construction of a new south bound bridge and increased free traffic lanes going north and south from 3 to 4 lanes in both directions as well as two toll lanes each going north and south. The bridge provides a pedestrian lane as well. IH 35E is a major access corridor on the west side of Lewisville Lake.
- The widening of portions of FM 423 on the east side of Lewisville Lake has been going on for several years where it traverses through the The Colony. FM 423 is a major north-south corridor providing access to the east side of Lewisville Lake.
- US Highway 380 (US 380) is a major east-west corridor across the upper end of Lewisville Lake. The highway was widened to six lanes in the early 2000s where it crosses the Elm Fork Arm on the upper end of Lewisville Lake.
- In June 2011 the Denton County Transit Authority (DCTA) opened the A-Train light rail from the Denton central business district to the Trinity Mills Station where the A-Train connects to the Green Line of the Dallas Area Rapid Transit (DART) system. The A-Train route roughly parallels IH-35E and includes the Highland Village/Lewisville Lake Station at the intersection of IH-35E and Garden Ridge Boulevard.
-

Photo 1.2 Lewisville Lake Toll Bridge (FM 2181) completed in 2011 by North Texas Tollway Authority (USACE Photo)

Completion of the above-listed projects has met many of the immediate transportation needs surrounding Lewisville Lake. In spite of this significant amount of road improvement work, most of the major roads surrounding Lewisville Lake remain congested during periods of high traffic and are likely to remain that way for the foreseeable future. The North Central Texas Council of Governments (NCTCOG) coordinates with cities, counties and transportation partners to plan road, transit, bicycle and pedestrian transportation improvements for 16 counties comprising the NCTCOG and serves as the Metropolitan Planning Organization for the Dallas-Fort Worth Area. NCTCOG's Mobility 2045 plan was used as a reference document for this Master Plan. The 2017 Denton County Thoroughfare Plan (DCTP) was also used as a reference. Items recommended for implementation in the Mobility 2045 plan and/or the DCTP that are of significance to the area surrounding Lewisville Lake include the following:

- Widening of Highway 380 in the area east of the City of Denton.
- Widening of FM 423 from US 380 to SH 121
- Widening of FM 2499 from IH 35E to FM 407
- Widening of FM 428 where it crosses USACE land on the Greenbelt Corridor

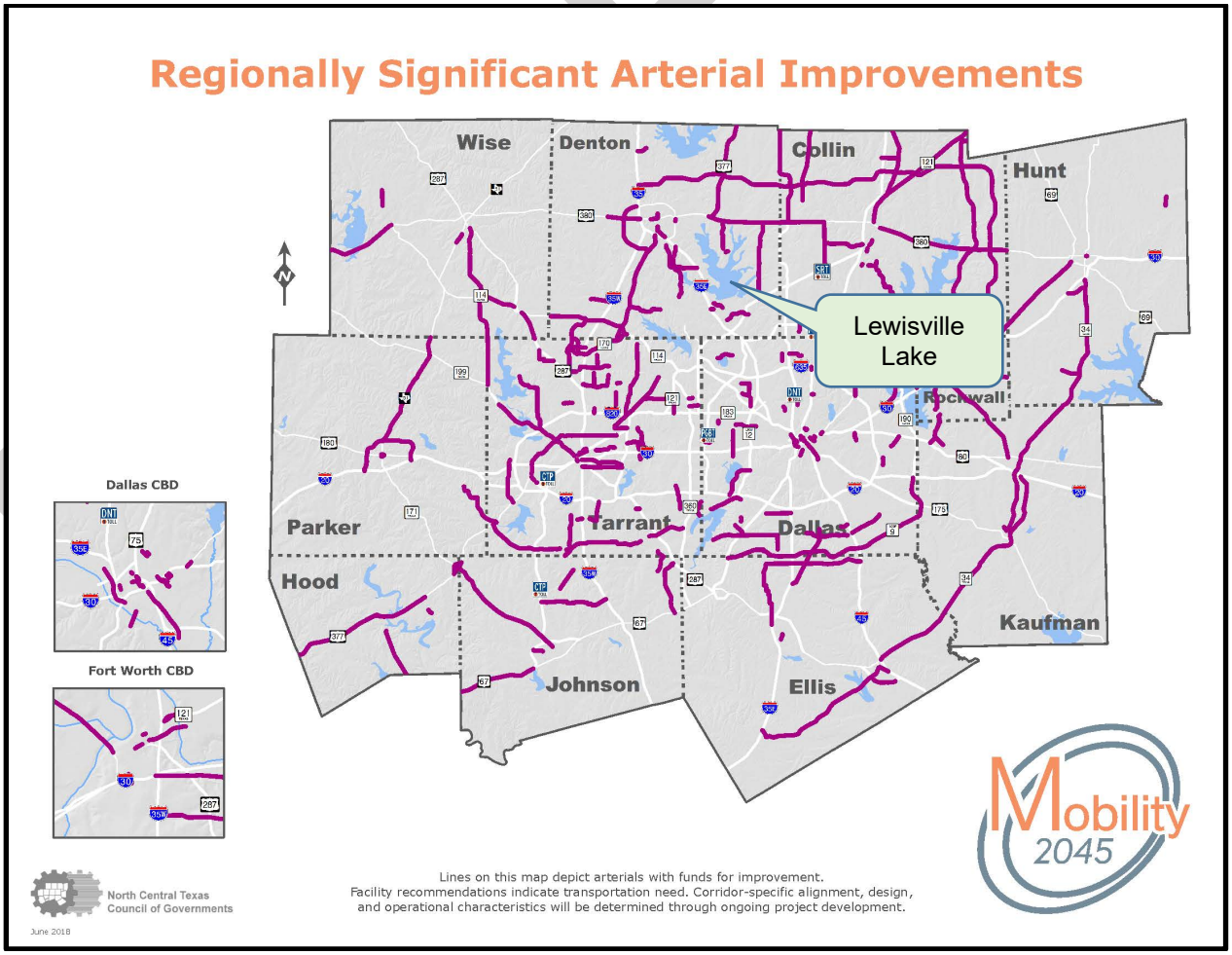


Figure 1.2 Recommended Improvements to Regionally Significant Arterials
(Source: NCTCOG)

National USACE policy set forth in ER 1130-2-550, Appendix H, states that USACE lands will, in most cases, only be made available for roads that are regional arterials or freeways (as defined in ER 1130-2-550). All other types of proposed roads, including driveways and alleys, are generally not permitted on USACE lands. The proposed expansion or widening of existing roadways on USACE lands will be considered on a case-by-case basis.

1.8 PRIOR DESIGN MEMORANDA, MANUALS AND REPORTS

Design Memorandums and reports were prepared from 1947 thru 2017 setting forth design criteria for all aspects of the project including the prime flood risk management facilities, real estate acquisition, road and utility relocations, reservoir clearing, dam safety modifications, and the master plan for recreation development and land management. Table 1.1 lists the Design Memoranda as well as other manuals and reports for Lewisville Lake.

Table 1.1 Design Memoranda, Manuals and Reports – Lewisville Lake

Item Number	Title of Design Memorandum, Manual or Report	Date
1.	Preliminary Report on Hydrology of Elm Fork Trinity River, and Spillway Design Flood for Garza-Little Elm Dam and Reservoir	February 1947
2.	Preliminary Report on Investigation of Proposed Reservoirs for Flood Control and Water Conservation on Elm Fork Trinity River	March 1947
3.	Definite Project Report	October 1947
4.	Design Memorandum for the East Portion of Embankment Garza-Little Elm Dam and Reservoir	August 1949
5.	Real Estate Planning Report, Part I	September 1949
6.	Analysis of Design for Construction of Outlet Works Garza-Little Elm Dam and Reservoir	September 1950
7.	Real Estate Planning Report, Part II	January 1950
8.	Design Memorandum for Construction of Spillway Garza Little Elm Dam and Reservoir	November 1951
9.	Design Memorandum for Reservoir Clearing Garza-Little Elm Dam and Reservoir	September 1952
10.	Design Analysis for Completion of Embankment and Construction of Service Bridge	September 1952
11.	Plan for Reservoir Regulation - Garza-Little Elm Reservoir	September 1956
12.	Draft Master Plan	September 1959

13.	Report of Sedimentation Resurvey Garza-Little Elm Reservoir	April 1960
14.	Design Memorandum No. 1C - Updated Master Plan	April 1966
15.	Aubrey Lake - Design Memorandum No. 1 - Hydrology - Supplement No. 1 - Supplement No. 2 - Supplement No. 3	August 1972 February 1973 September 1973 October 1974
16.	Revised Design Memorandum No. 1C - Updated Master Plan	January 1973
17.	Design Memorandum No. 2 - Real Estate Addition Reservoir Land	October 1973
18.	Environmental Impact Statement - Lewisville Lake	December 1973
19.	Aubrey Lake - Design Memorandum No. 5 - Embankment and Spillway	July 1974
20.	Revised Aubrey Lake - Design Memorandum No. 5 - Embankment and Spillway	June 1976
21.	Report on Sedimentation - Lewisville Lake - Resurvey of September 1965	July 1975
22.	Aubrey Lake - Design Memorandum No. 6 - Outlet Works	September 1976
23.	Design Memorandum No. 3 - Lewisville Dam - Modification of Embankment	October 1976
24.	Reconnaissance Report - Lewisville Dam - Modification of Embankment	June 1977
25.	Design Memorandum No. 3 - Lewisville Dam - Modification of Embankment Supplement No. 1	April 1979
26.	Spillway Design Flood Study - Lewisville Lake	August 1981
27.	Reconnaissance Report - Adding Hydropower to Lewisville Dam	September 1981
28.	Design Memorandum No. 3 - Lewisville Dam - Modification of Embankment - Supplement No. 2	November 1982
29.	Dam Safety Assurance Study - Lewisville Lake - Hydrology and Hydraulics (With Ray Roberts)	March 1983
30.	Lewisville Lake - Operation and Maintenance Manual - Volume II - Flood Emergency Plan	June 1984
31.	Design Memorandum No. 1C - Master Plan Lewisville Lake	June 1985
32.	Drought Contingency Plan - Trinity River Basin, Texas - (including Lewisville Lake)	August 1991
33.	Ray Roberts Lake - Operation and Maintenance Manual - Flood Emergency Plan	February 1993

34.	Flood Insurance Study - Denton County, Texas - Unincorporated Areas - Revised	June 1994
35.	Water Quality Report - Lewisville Lake	February 1996
36.	Sediment Survey of 2007 TWDB	December 2008
37.	Dam Safety Modification Report (DSMR)	March 2017

Source: USACE 2018 Water Control Manual for Lewisville Lake

1.9 PERTINENT PROJECT INFORMATION

The following table provides pertinent information regarding key reservoir elevations and storage capacity at Lewisville Lake

Table 1.2 Elevations and Water Storage Capacity

Source: USACE

	Elevation (Feet NGVD)	Lake Area (Acres)	Storage (Acre-Feet)	Runoff (inches)
Top of Dam	560.0			
PMF Water Surface (2017 IDF Study)	554.10	67,073	2,082,608	23.52
Maximum Design Water Surface Elevation (1951 Study)	553.0	66,100	2,051,200	23.34
Top of Flood Pool & Spillway Crest (1965 Survey)	532.0	39,168	981,763	11.09
Top of the Conservation Pool (2007 Survey)	522.0	27,175	598,902	7.24
Sediment Reserve-Flood Pool Storage(1987-2087)	532.0-522.0		10,400	
Sediment Reserve-Conservation Pool Storage (1987-2087)	Below 522.0		63,400	
Maximum Tailwater	533.0			
Streambed (2007 Survey)	435.0	0	0	

Figure 1.3 Construction of Lewisville Dam Spillway, 9 Dec 1952

CHAPTER 2 - PROJECT SETTING AND FACTORS INFLUENCING MANAGEMENT AND DEVELOPMENT

2.1 PHYSIOGRPAHIC SETTING

2.1.1 Ecoregion Overview

Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources. The Environmental Protection Agency (EPA) has developed a series of maps that categorizes these regions across the United States. Levels I and II divide the North American continent in to 15 and 52 regions, respectively, while Level III ecoregions represent a subdivision of those into 104 unique regions and Level IV a finer sub-classification of those. Lewisville Lake lies within the Northern Blackland Prairie (Level III) and Eastern Cross Timbers ecoregion (Level III) as depicted in Figure 2.1.

The Blackland Prairie is divided into distinct Northern and Southern regions, with the Northern region stretching over 300 miles from Sherman in the north to San Antonio in the south. The region is characterized by fine-textured, clayey soils and predominantly prairie vegetation. Prairie vegetation includes various grasses and forbs, while the bottomland hardwood forests is predominantly oak and other hardwood trees.

The Eastern Cross Timbers stretches from Waco to the Texas-Oklahoma State border. The Cross Timbers ecoregion is a complex mosaic of upland deciduous forest, savanna, and prairie communities that vary geographically depending upon soil conditions, rainfall, and fire history, highlighting the broad and overlapping ecotone transition areas between the eastern forests and the grasslands of the Great Plains. The region supports an evolving plant life as it radiates outward on an upward gradient, from open lake waters, shallow wetlands, and shoreline transition toward more elevated and better drained sites The vegetation types parallel the progression from wetland herbaceous/shrub plants and grasses to bottomland forest, oak forests, and then grasslands/prairies on the deeper soiled, well drained areas at the higher elevations. Scrub and marginal/transitional forest trees can be found where the soil is shallow or has rock outcrops. Cross Timbers type oak forests cover most of the ridged and hilly terrain between the prairies and the bottomland forests, and account for the major portion of land area and vegetative cover surrounding the lake. Elevations range from approximately 400 feet to 1700 feet NGVD29 in the Cross Timbers region, with Lewisville Lake conservation pool at 522 feet NGVD29.

Figure 2.1 Lewisville Lake within Texas Ecoregions (Source: EPA)

Before Anglo settlement, the Cross Timbers and Blackland Prairie region was habitat for bison, pronghorn antelope, mountain lion, bobcat, ocelot, black bear, collared peccary, deer, coyote, fox, badger, river otter, and many species of birds. In 1886, the naturalist Washington Irving stated that wandering through the Cross Timbers area was like “struggling through forests of cast iron.” Much of the original prairie and forest has been converted to cropland and pasture or cleared for urbanization, with less than one percent of both the original Blackland Prairie and Cross Timbers vegetation remaining today.

2.1.2 Climate

Located within the Elm Fork Trinity River Basin, the climate of Lewisville Lake is a warm, temperate, humid, subtropical climate. Summers are usually hot and often humid during the day and warm at night, while winter temperatures are normally mild with short durations of freezing temperatures. Tropical maritime air masses from the Gulf of Mexico play a dominant role in the climate from late spring through early fall, while polar air masses determine the winter climate. Warm seasonal rainfall is largely the result of thunderstorm activity, with amounts varying considerably in both intensity and location.

2.1.2.1 Temperature

The mean annual temperature over the basin is about 65 degrees Fahrenheit (°F). The average low and high temperatures range from 33°F in January to 96°F in August. The lowest minimum-recorded temperature is -7°F, while the highest-recorded temperature was 114°F. The area has a growing season ranging from 226 days at Gainesville in the upper part of the watershed to 267 days at Dallas near the lower watershed boundary. Table 2.1 gives temperature averages and extremes for the Elm Fork Trinity River basin.

Table 2.1 Temperature Averages and Extremes

Average Low January Temperature	33°F
Average High August Temperature	96°F
Average Annual Temperature	65°F
Average Days with Temperature ≤ 32°F	33 days
Average Days With Temperature ≥ 100°F	18 days
Record Low Temperature	-7°F
Record High Temperature	114°F

Source: NOAA & National Weather Service

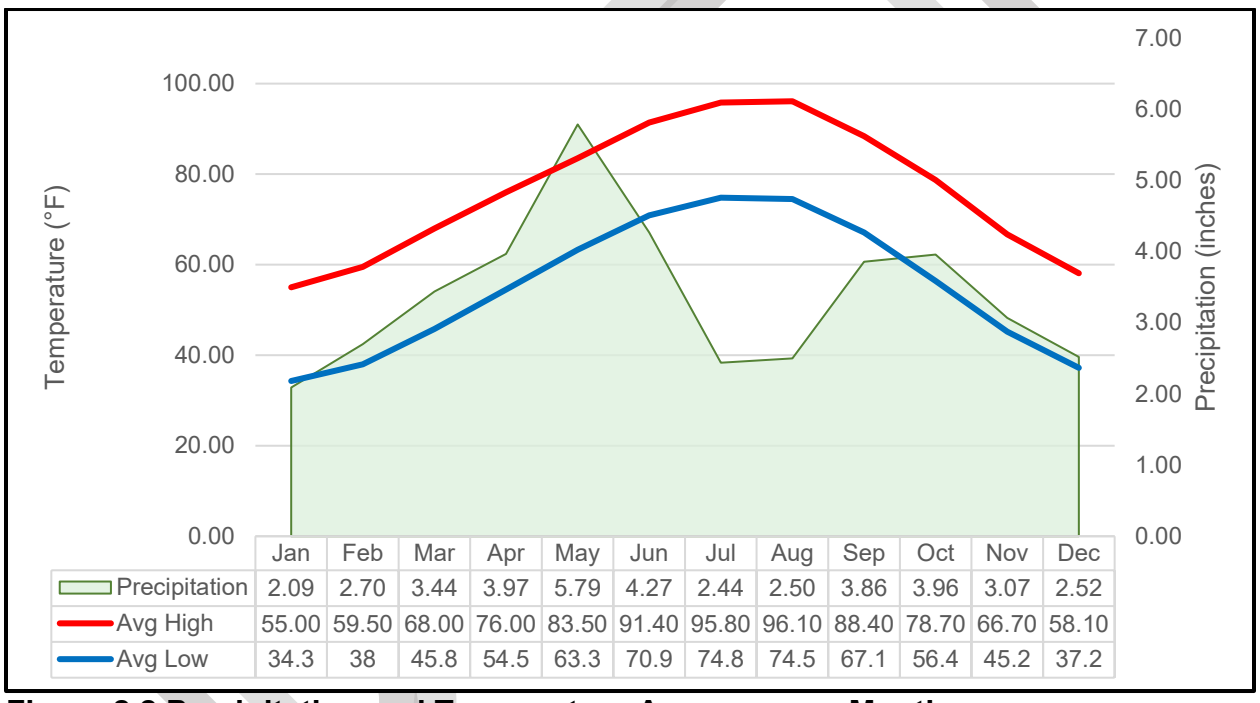
2.1.2.2 Precipitation

The normal annual precipitation over the Elm Fork Trinity River watershed varies from approximately 36 inches at Carrollton in the southeastern part of the watershed, to 41 inches at Pilot Point, in the north central portion of the watershed. Across the watershed, precipitation levels are higher in the late-spring and early-summer months, peaking in May-June and lowest in November-February. Tropical maritime air can bring heavy showers of short duration at any time during the year. Rainfall can occur through short rainstorms or even torrential thunderstorms delivering over 5 inches of rain in a 24-hour period. Those torrential storms, when combined with poorly draining soil, can lead to significant runoff and a threat of flooding. The precipitation averages and extremes within the watershed area are documented in Table 2.2, while average annual precipitation and temperature are documented in Figure 2.2. Minor accumulations of snowfall (about 2.5 inches) occur periodically during the winter months; however, snowfall does not contribute significantly to area precipitation or runoff.

Table 2.2 Watershed Precipitation Averages and Extremes

Mean Annual Precipitation	36.2 inches (Watershed)
Maximum Annual Precipitation	87.72 inches (2015, Gainesville)
Minimal Annual Precipitation	15.11 inches (1963, Denton)
Maximum Monthly Precipitation	30.30 inches (May 1982, Pilot Point)
Minimum Monthly Precipitation	0.00 inches (Several)
Maximum 24-hour Rainfall	13.00 (13 May 1982, Pilot Point)
Average Annual Snowfall	2.5 inches (Watershed)
Maximum Monthly Snowfall	13.5 inches (Feb 1978)
Maximum 24-hour Snowfall	12.5 inches (Feb 2010)

Source: NOAA, National Weather Service, and Water Control Manual



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Precipitation	2.09	2.70	3.44	3.97	5.79	4.27	2.44	2.50	3.86	3.96	3.07	2.52
Avg High	55.00	59.50	68.00	76.00	83.50	91.40	95.80	96.10	88.40	78.70	66.70	58.10
Avg Low	34.3	38	45.8	54.5	63.3	70.9	74.8	74.5	67.1	56.4	45.2	37.2

Figure 2.2 Precipitation and Temperature Averages per Month
Source: NOAA, National Weather Service, and Water Control Manual

2.1.2.3 Storms and Floods

The Elm Fork Trinity River watershed is subject to three general types of flood-producing rainfall: thunderstorms, frontal rainfall, and tropical cyclones. The topography, soils, and typical rainfall patterns of the watershed lead to rapid runoff and sharp crested flood hydrographs. Floods occur frequently and at almost any time of year. Generally, the highest 24-hour and monthly precipitation periods have occurred during major thunderstorms. However, there are some instances of heavy precipitation resulting from local thunder storms. The maximum 24-hour rainfall reported in or adjacent to the basin was 13.00 inches, which occurred at Pilot Point, a small town in

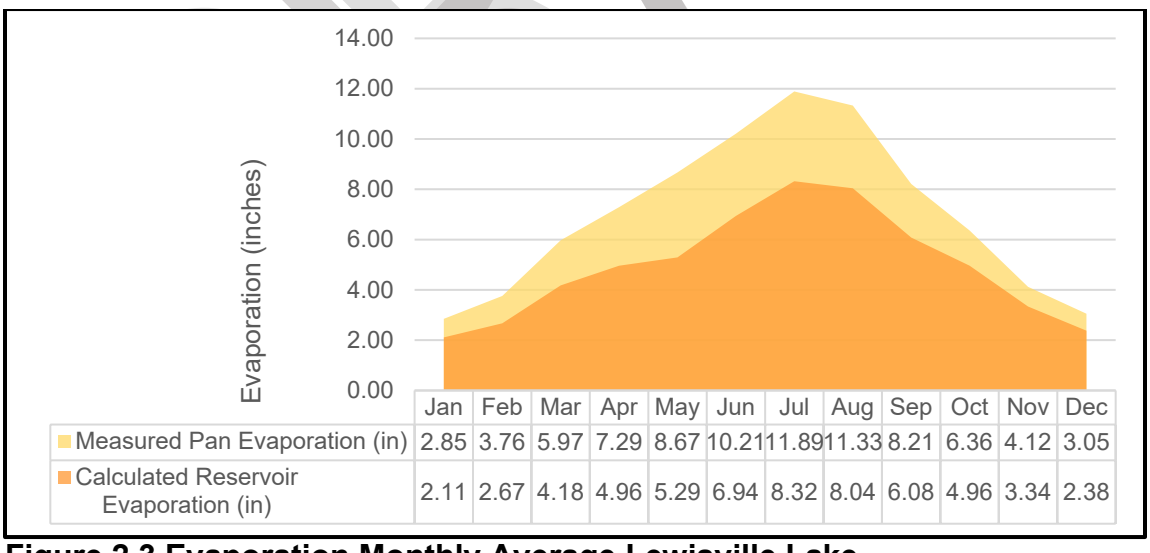
Denton County, on 13 May 1982. The maximum monthly rainfall reported was 30.30 inches for May 1982 at Pilot Point. Generally the Elm Fork Trinity River's large floods are long-duration type having two or more peaks spaced as close as ten days apart. However, it is possible that large peak and volume floods could occur in about two weeks duration. The major storms experienced over the watershed for which rainfall data are available, together with the average rainfall depths produced on the watershed above the dam, are listed in Table 2.2.

2.1.2.4 Runoff Characteristics

Floods may occur at almost any time of year in the Elm Fork Trinity River watershed. Steep slopes in the upper part of the Elm Fork Basin produce high runoff during periods of heavy rainfall. Initial rainfall losses range from 0.30 inches to 1.00 inches, with uniform infiltration rates between 0.04 to 0.15 inches per hour.

2.1.2.5 Evaporation

The major factors affecting the rate of evaporation are temperature, humidity, and wind. Normally, evaporation is measured with an evaporation pan, but there is no evaporation pan currently at Lewisville Lake. A NWS "Class A" evaporation pan at Grapevine Lake is used to estimate evaporation at Lewisville Lake since the two dams are close to each other. The evaporation pan has a higher rate of evaporation than the lake, so a coefficient is used to estimate the actual lake evaporation. The evaporation pan at Grapevine Lake is 10-inch deep with 47.5-inch diameter. From measurements collected between August 1953 and September 2012, the estimated average annual evaporation from the lake is about 83 inches. The average monthly and annual evaporation from Lewisville Lake are given in Figure 2.3. The highest recorded annual evaporation was 113.4 inches in 1956, while the lowest was 69.59 in 2007. The highest evaporation during a single month was 13.86 inches in July 2011.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Measured Pan Evaporation (in)	2.85	3.76	5.97	7.29	8.67	10.21	11.89	11.33	8.21	6.36	4.12	3.05
Calculated Reservoir Evaporation (in)	2.11	2.67	4.18	4.96	5.29	6.94	8.32	8.04	6.08	4.96	3.34	2.38

Figure 2.3 Evaporation Monthly Average Lewisville Lake
Source: Water Control Manual

2.1.2.6 Wind

The prevailing winds over the watershed are from the south during the spring, summer, and fall months, while northerly winds prevail during the winter months. Severe winds have been experienced near Lewisville Lake. Gusts as fast as 110 miles per hour have been recorded near NWS Station in Denton, approximately 16 miles northwest of the dam site on 13 June 1989. Data from a wind monitoring station at nearby Denton Airport are diagrammed in Figure 2.4 showing the wind intensity, frequency, and direction.

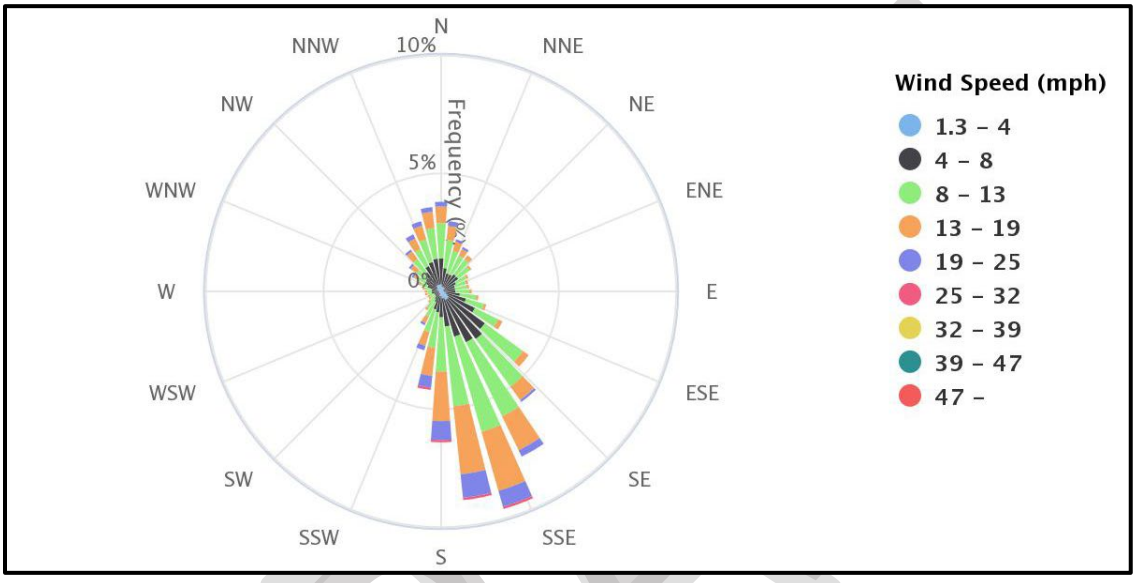


Figure 2.4 Wind Rose at Denton Municipal Airport
Source: MRCC Cli-MATE Tool, Wind Rose from Denton Municipal Airport, 1996-2017

The design wind speed of Lewisville Lake is 54 mph, the fetch for wind setup is 15.42 miles, and the computed required freeboard is 5.9 feet. This freeboard was computed for the 2017 Inflow Design Flood elevation of 560.0 feet, which is adequate and equal to the top of dam. The average annual wind speed at Dallas, Texas, 29 miles southeast of the Lewisville Dam, is 11 miles per hour over the entire year. Tornadoes are a somewhat rare occurrence in the watershed. In 2015 a series of tornados reaching EF4 level left 13 people dead and injured over 300 across parts of North and Central Texas.

2.1.3 Geology

Lewisville Lake is founded on the basal Eagle Ford Formation and the upper part of the underlying Woodbine Formation. The eastern abutment of the dam and most of the valley embankment is underlain by Eagle Ford Shale an Eagle Ford residual overburden.

The western abutment is composed of Woodbine sandstone shale and residual soil material. The trace of contact between these two upper Cretaceous Formations begins near the west abutment tending northward across the divide between Elm Fork

and Pecan Creek, then northeastward along the lower reaches of Little Elm Creek. The regional strike of these formations is 12 degrees east and the drop is to the southeast at 50 to 60 feet per mile. The lower Eagle Ford Shale is selenic, bituminous and medium to dark gray, weathering to tan. It contains calcareous concretions, setaria, and marine megafossils. Overburden consists of residual clay and reworked Eagle Ford Shale. The Woodbine Formation consists of 70 to 80 feet of glaconitic shale with sand lenses, underlain by about 260 feet of sandstone. The sandstone beds are highly variable, featuring cross bedding, minor shale beds, tuffaceous clay lenses, carbonaceous clay, and lignite. The upper sandstones are glaconitic and contain fossil oyster reefs and other megafossils. Overburden on the Woodbine generally consists of clay sands and silts. The maximum overburden thickness on the periphery of the lake is about 50 feet.

2.1.4 Topography

Lewisville Lake and its tributaries are located in the Blackland Prairie, East Cross Timbers, Grand Prairie, and West Cross Timbers subdivisions of the Gulf Coastal Plain physiographic province. The topography throughout the basin is predominantly gently rolling. Basin topography varies from level or gently rolling in the lower reaches to broken prairie in the north and northwestern reaches. Some rough land occurs along the streams in the lower reaches.

In the Eastern Cross Timbers area, soils are mainly red and yellow sands that have been leached of nutrients. Post oaks and blackjack oaks have adapted to life in sandy soils and they dominate the overstory, with scattered honey mesquite and grasses, such as little bluestem and threeawn, growing beneath them. Although the rural land use is predominantly cattle grazing, there is some farming for peanuts, grain sorghum, pecans, peaches, and vegetables.

In the Blackland Prairie, Soils are mostly fine-textured, dark, calcareous, and productive Vertisols. Historical vegetation was dominated by little bluestem, big bluestem, yellow Indiangrass, and tall dropseed. The rolling to nearly level plains of the Northern Blackland Prairie ecoregion are underlain by interbedded chalks, marls, limestones, and shales of Cretaceous age. This region now contains a higher percentage of cropland than adjacent regions; pasture and forage production for livestock is common. Large areas of the region are being converted to urban and industrial uses.

2.1.5 Hydrology and Groundwater

The Trinity River Basin is the third largest river basin in Texas by average volume and the largest river basin that both begins and ends in the state. The Trinity River provides water to over half of the state’s population, serving two major population centers: Dallas/Fort Worth in the north and Houston in the South. The basin has an overall length of 360 miles, where the Trinity River meanders a total of 715 miles before draining into the Galveston Bay and estuary system, a very productive ecosystem and commercial fishery.

The Elm Fork of the Trinity River originates in eastern Montague County, Texas and flows in a southeasterly direction for approximately 110 miles through Cooke, Denton and Dallas Counties to its confluence with the West Fork of the Trinity in the City of Dallas. The watershed lies in the north central portion of Texas extending across the state between north latitudes 33°44′ and 32°42′ and west longitudes 96°43′ and 97°50′. The watershed is comprised of parts of Montague, Cooke, Grayson, Collin, Wise, Tarrant, Denton and Dallas Counties. It is about 80 miles long along its axis and has a maximum width of 60 miles. The watershed of the Elm Fork of the Trinity River has a total drainage area of 2,577 square miles of which 917 square miles are downstream from Lewisville Dam. Lewisville Lake controls 1,660 square miles of the drainage area.

Lewisville Dam is located on the Elm Fork of the Trinity River at river mile 30.0. The river drops from an elevation of about 1,210 feet at its source to 435 feet at the Lewisville Dam site. The Elm Fork continues to drop to elevation 387 feet at its confluence with the West Fork in Irving/Dallas. The average slope of the stream bed is 7.5 feet per mile, and the average slope downstream of Lewisville dam is 1.6 feet per mile.

The principal tributaries contributing to the Elm Fork of the Trinity River are the right bank tributaries, Denton Creek, Hickory Creek and Clear Creek, and the left bank tributaries, Isle Du Bois Creek and Little Elm Creek. With the exception of Denton Creek, all of these principal tributaries are located upstream of Lewisville Lake.

The Elm Fork basin has gently rolling hills and broad river valleys, with generally greater relief in the upper reaches. Basin vegetation is divided between the tall prairie grasses of the Grand Prairie physiographic region and the dense growth of Blackjack and Post Oaks of the Eastern Cross Timbers Region. The majority of the Lewisville Lake watershed lies within the Cross Timbers ecoregion to the west, and the Texas Blackland Prairie ecoregion to the east. The Trinity River basin is supported by numerous industries, including trade, transportation and utilities, professional business service, and education and healthcare.

Deep below Lewisville Lake lies the Trinity Aquifer, a major aquifer, and the Woodbine (subcrop) aquifer, which is a minor aquifer. Water in the aquifer is very fresh with slight to moderate salinity and dissolved solids. The aquifer discharges to several natural springs on the western edge of the aquifer, but most springs discharge at less than 10 cubic feet per second. The aquifer is one of the most extensive and highly used groundwater resources in the state, and is used primarily as a municipal water source, but also for irrigation, livestock, and other domestic uses.

The Trinity River Authority of Texas (TRA) has contracted with USACE for all water supply storage in Lewisville Lake for the cities of Denton and Dallas, as well as surrounding communities. Recently, the aquifer has suffered some of the state's worst water level declines, both lowering the depth and reducing the pressure of water within the aquifer. This has been due to recent droughts combined with increasing pumping for

municipal water use. The regional water planning group has recommended that municipalities start developing other water sources, including increasing surface water use as municipal demand for water is expected to increase.

2.1.6 Soils

Soils in the primary strata along the sides of the valley of the Elm Fork are terraces of sandy clay, sands, and gravel that were deposited during the Pleistocene geologic age. These terrace deposits cover the flood plain east of the Elm Fork, reaching a thickness of approximately 35 feet. The valley of the Elm Fork and its tributaries are filled with recent flood plain deposits consisting of clay and sandy clay. These overlay the sand and gravel of the Pleistocene deposits.

Many different soils, comprising more than 15 major series, occur in the Lewisville Lake vicinity. Residual soils east of the Elm Fork overlaying the Eagle Ford formation are predominantly clay soils. Soils west of the Elm Fork overlying the Woodbine formation are somewhat sandy. The sandy soils are fairly shallow and overlie clay based subsoil with a deep profile to bedrock.

A soil survey by the Natural Resource Conservation Service (NRCS) shows there are seven out of the eight possible general soil classifications occurring in the reservoir area. The erosion hazards and limitations for use increase as the class number increases. Class I has few limitations, whereas Class VIII has many. The soil class data for project lands is provided in Table 2.3. This data is compiled by the NRCS and is a standard component of natural resources inventories on USACE lands. This, and other inventory data, is recorded in the USACE Operations and Maintenance Business Information Link (OMBIL). A general soil type map is provided in Figure 2.5.

Table 2.3 NRCS/USDA Soil Classification

Class	Acreage	Description
I	50	Class I (1) soils have slight limitations that restrict their use.
II	1,000	Class II (2) soils have moderate limitations that reduce the choice of plants or require moderate conservation practices.
III	2	Class III (3) soils have severe limitations that reduce the choice of plants or require special conservation practices, or both.
IV	6,058	Class IV (4) soils have very severe limitations that restrict the choice of plants or require very careful management, or both.
V	4,050	Class V (5) soils have little or no hazard of erosion but have other limitations, impractical to remove, that limit their use mainly to pasture, range, forestland, or wildlife food and cover.
VI	4,000	Class VI (6) soils have severe limitations that make them generally unsuited to cultivation and that limit their use mainly to pasture, range, forestland, or wildlife food and cover.
VII	3,000	Class VII (7) soils have very severe limitations that make them unsuited to cultivation and that restrict their use mainly to grazing, forestland, or wildlife.
VIII	1,000	Class VIII (8) soils and miscellaneous areas have limitations that preclude their use for commercial plant production and limit their use to recreation, wildlife, or water supply or for esthetic purposes.

Source: OMBIL; Class descriptions from NRCS/USDA

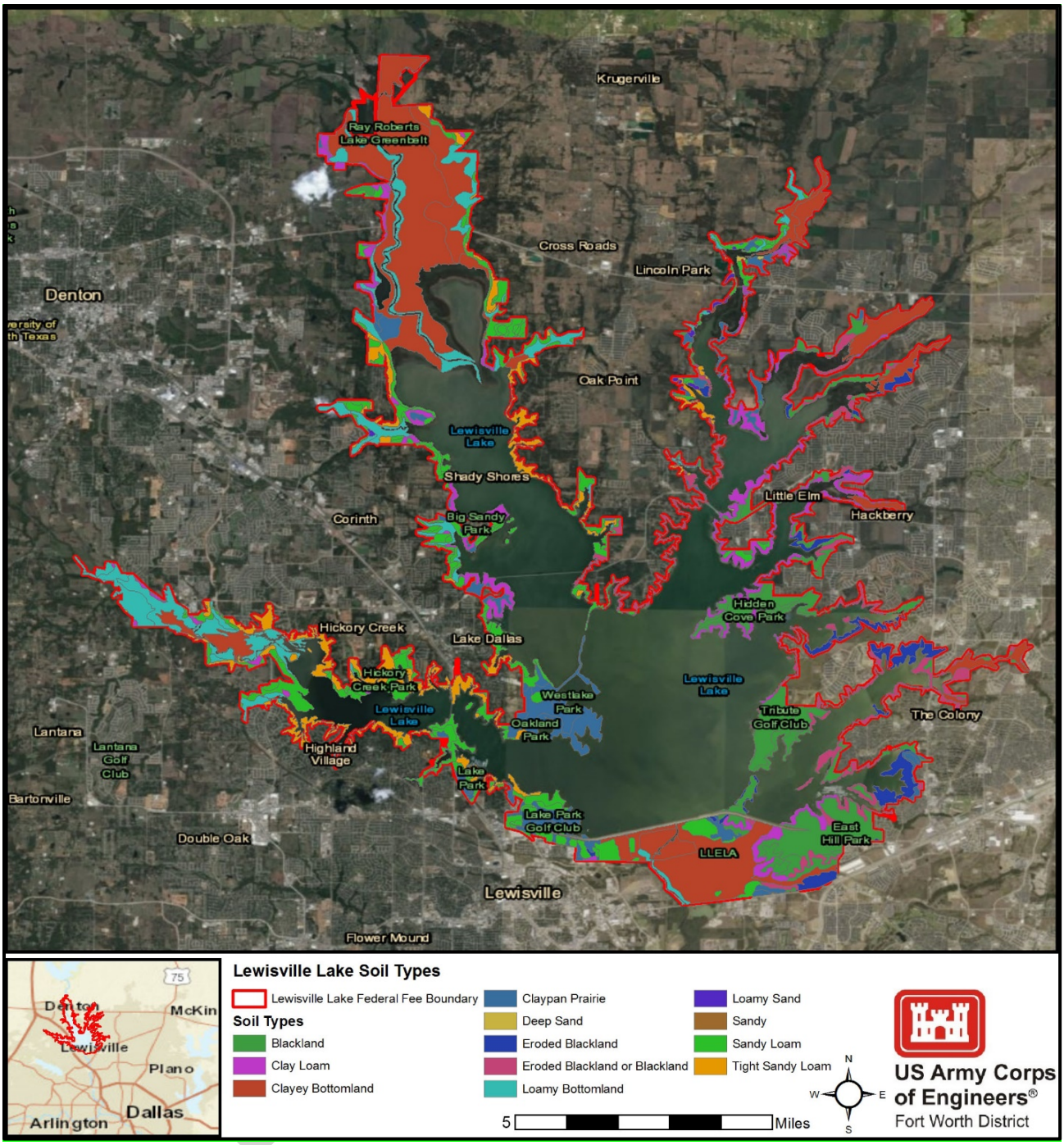


Figure 2.5 Soils Map for Lewisville Lake

2.2 ECOREGION AND NATURAL RESOURCE ANALYSIS

2.2.1 Natural Resource Stewardship and Analysis

The natural resources present at Lewisville Lake include the water, wetlands, soil, vegetation, and fish and wildlife, including those species listed as endangered or threatened by the U.S. Fish and Wildlife Service (USFWS) and the state of Texas. The

most common habitat types include grassland, marsh, riparian/bottomland hardwood forest, and upland forest. The stewardship of natural resources adheres to ecosystem management principles as described in the USACE regulations ER and EP 1130-2-540. Effective stewardship is imperative to the sustainability and use of project resources. The ecoregion and the local natural resources are described in further detail in the following section.

As part of the master planning process, USACE completed a habitat study for the Environmental Assessment (EA, located in Appendix B) based on Texas Parks and Wildlife Department's (TPWD) Wildlife Habitat Appraisal Procedure (WHAP). The WHAP was developed to allow a qualitative and holistic evaluation of wildlife habitat for a particular location without requiring significant time for field work or compiling data. In the fall of 2017, a total of 94 points were surveyed from the known major habitat types throughout USACE lands around the lake to assess the quality of the habitat around Lewisville Lake. Overall marsh and grassland habitats exhibited the highest average total score (0.70 and 0.66), as these habitats generally exhibited more herbaceous vegetative species and structural diversity. On average, all habitat types, including riparian/BHF and upland forest, displayed at least medium quality habitat. The grassland site receiving a score of 1.00 is likely to transition to upland forest in the near future. The surrounding forest will continue to encroach into the grassland area as supported by the diversity of young woody species detected within the site. The results of the WHAP provided critical data to identify unique, diverse, or sensitive environments around the lake for the EA as well as updating land classifications for this master plan. A summary of WHAP scores tallied at Lewisville Lake is provided in Table 2.4. The WHAP Report is included in Appendix C.

Table 2.4 Average, Maximum, and Minimum Total WHAP Scores per Habitat Type

Habitat Type	Average Total Score	Maximum Total Score	Minimum Total Score
Grassland	0.66	1.00	0.47
Marsh	0.77	0.98	0.41
Riparian/BHF	0.63	0.81	0.45
Upland Forest	0.61	0.89	0.43

2.2.2 Vegetative Resources

USACE regulations and policy require a basic inventory of the vegetation at all operational projects. This inventory, referred to in EP 1130-2-540 as a Level 1 inventory, classifies the vegetation in accordance with the National Vegetation Classification System (NVCS) down to the Sub-Class level which is a very broad classification level. The inventory data, presented in Table 2.5 is recorded in the USACE national database referred to as OMBIL and is useful in providing a general characterization of the vegetation on all operational projects. Daily management of USACE lands requires more detailed knowledge of the vegetation down to the

Association level within the NVCS, and for most management prescriptions, down to the individual species level of dominant vegetation.

Table 2.5 Vegetation Classification and Acres at Lewisville Lake

Order	Class	Sub-class	Total Sub-Class Acreage	Sustainable Acres	Total Condition Acres
Non-Vegetated	Non-Vegetated	Non-Vegetated	29,592	29,592	29,592
Herb Dominated	Herbaceous Vegetation	Hydromorphic Rooted Vegetation	350	350	350
Herb Dominated	Herbaceous Vegetation	Perennial Graminoid Vegetation (Grassland)	3,858	3,858	3,858
Tree Dominated	Closed Tree Canopy	Deciduous Closed Tree Canopy	9,545	9,545	9,545
Tree Dominated	Closed Tree Canopy	Evergreen Forest	1	1	1
Tree Dominated	Closed Tree Canopy	Mixed Evergreen-Deciduous Closed Tree Canopy	75	75	75
Tree Dominated	Open Tree Canopy	Deciduous Open Tree Canopy	5,331	5,331	5,331

Source: OMBIL Report Project Site Vegetation Classification and Condition Records for Fiscal Year 2017

The Texas Blackland Prairies ecoregion originally contained a diverse range of prairie species including little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardi*), yellow Indiangrass (*Sorghastrum nutans*), switchgrass (*Panicum virgatum*), eastern gamagrass (*Tripsacum dactyloides*), tall dropseed (*Sporobolus compositus*), asters (*Aster spp.*), prairie bluet (*Stenaria nigricans*), prairie clovers (*Dalea spp.*), and coneflowers (*Echinacea spp.*). Bottomland hardwood forests are not as prevalent, but where they occur contain bur oak (*Quercus macrocarpa*), Shumard oak (*Quercus shumardii*), post oak (*Quercus stellata*), blackjack oak (*Quercus marilandica*), green ash (*Fraxinus pennsylvanica*, pecan (*Carya illinoinensis*), cedar elm (*Ulmus crassifolia*), American elm (*Ulmus americana*), Winged elm (*Ulmus alata*), sweetgum (*Liquidambar styraciflua*), sugar hackberry (*Celtis laevigata*), and eastern cottonwood (*Populus deltoides*). Some slopes and upland forests support honey mesquite (*Prosopis glandulosa*) and several cedars and junipers (*Juniperus spp.*), and have become more prevalent due to the absence of regular fires.

The vegetation of the Cross Timbers section of the Limestone Cut Plain is composed of numerous tree species including post oak (*Quercus stellata*), white shin oak (*Quercus sinuata var. breviloba)*, cedar elm (*Ulmus crassifolia*), Texas ash (*Fraxinus albicans*), plateau live oak (*Quercus fusiformis*), and bur oak (*Quercus macrocarpa*). Although the grasslands of the Limestone Cut Plain are a mix of tall, mid,

and short grasses, some consider it a westernmost extension of the tallgrass prairie, which distinguishes this ecoregion from the Edwards Plateau Woodland. Grasses include big bluestem (*Andropogon gerardi*), little bluestem (*Schizachyrium scoparium*), yellow Indiangrass (*Sorghastrum nutans*), silver bluestem (*Bothriochloa saccharoides*), Texas wintergrass (*Nassella leucotricha*), tall dropseed (*Sporobolus compositus*), sideoats grama (*Bouteloua curtipendula*), and common Curly mesquite (*Hilaria belangeri.*). The Cross Timbers wooded areas consist primarily of post oak (*Quercus stellata*), blackjack oak (*Quercus marilandica*), and hickories (*Carya spp.*), along with tall and midgrasses. A denser woody understory forms in the absence of fire.

Photo 2.1 Post oak acorns. The post oak (Quercus stellata) is a dominant tree species in the Cross Timbers Ecoregion at Lewisville Lake
(USACE Photo by Don Wiese)

2.2.3 Wetlands

Waters of the United States are defined within the Clean Water Act (CWA), and jurisdiction is addressed by the USACE and United States Environmental Protection Agency (EPA). Wetlands are a subset of the waters of the United States that may be subject to regulation under Section 404 of the CWA (40 CFR 230.3).

Wetlands are defined as those areas inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in

saturated soil conditions. For the purpose of preparing and implementing this Plan, the National Wetlands Inventory (NWI) established by US Fish and Wildlife Service (USFWS) is used to identify wetland types in the project area. As Figure 2.6 shows, Lewisville Lake has areas of Freshwater Emergent Wetlands and Freshwater Forested/Shrub Wetlands, predominantly to the north of the lake.

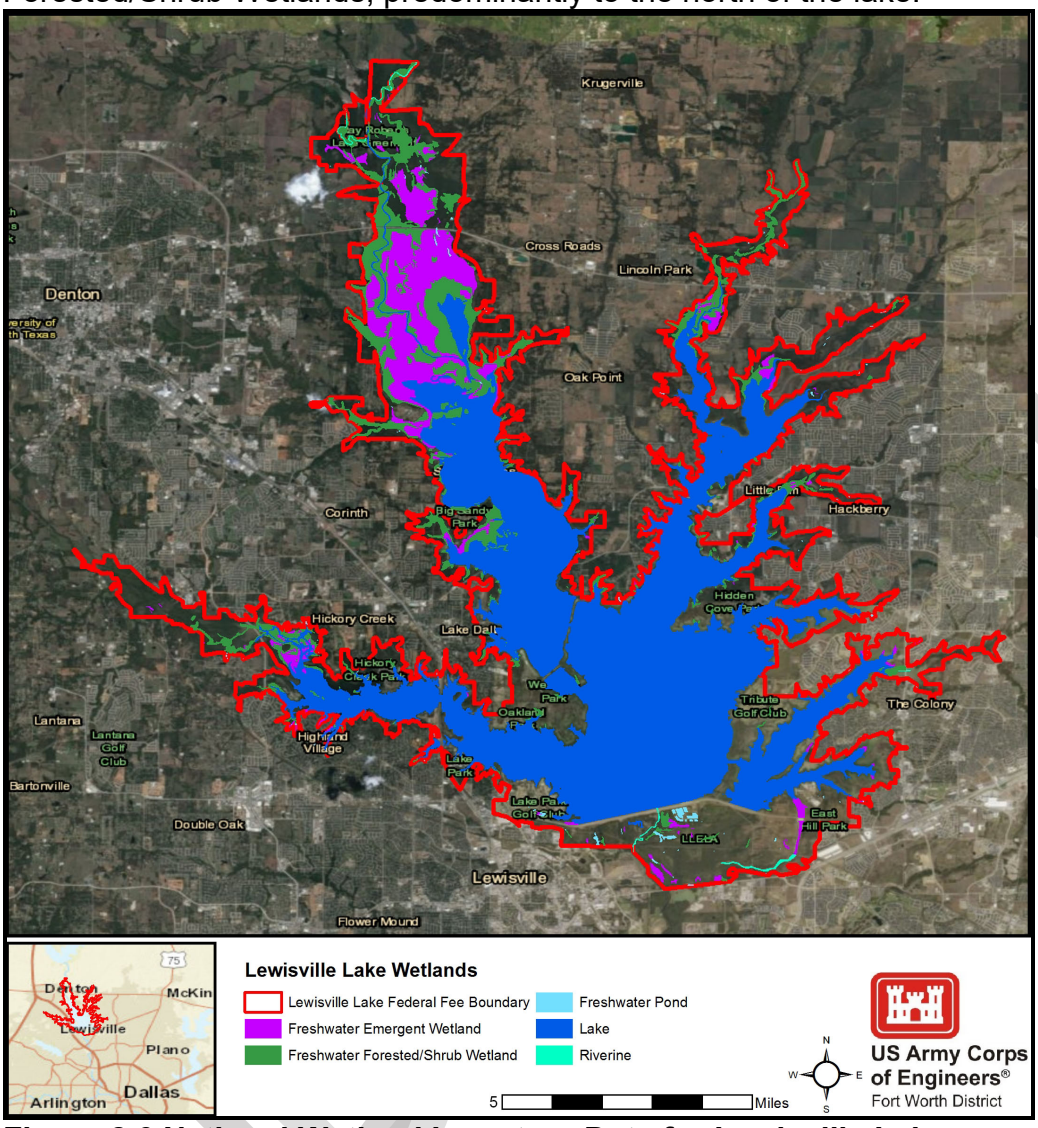


Figure 2.6 National Wetland Inventory Data for Lewisville Lake
Source: NWI Data from USFWS

Table 2.6 lists the acreages of various types of wetlands present at Lewisville Lake. Wetland classifications presented are derived from the U.S. Fish & Wildlife Service's (USFWS) Trust Resource List generated using the Information, Planning, and Conservation System decision support system.

Table 2.6 Wetland Acreages at Lewisville Lake

SYSTEM	SUB-SYSTEM	CLASS	CLASS ACRES
Lacustrine	Limnetic	Unconsolidated Bottom	19,370
Palustrine	No Sub-System	Freshwater Emergent Wetland	2,806
Palustrine	No Sub-System	Freshwater Forested/Emergent Wetland	4,670
Riverine	Lower Perennial	Unconsolidated Bottom	159

Source: OMBIL

2.2.4 Fish and Wildlife Resources

Lewisville Lake provides habitat for an abundance of fish species, providing fishing opportunities from the shoreline, boats, and fishing platforms at the marina. Predominant fish species in the lake are largemouth bass (*Micropterus salmoides*), channel catfish (*Ictalurus punctatus*), white crappie (*Pomoxis annularis*), and white bass (*Morone chrysops*). Other less prominent species include black, yellow, and striped bass; carp; blue and hybrid catfish; gar; and sunfish. Several species have been stocked periodically since 1981 with bass and catfish being the most popular. There is significant fishing pressure at the lake, since it is located within one of the most populated urban metro areas in the United States. TPWD has set special size restrictions for largemouth bass at Lewisville Lake.

Many of the undeveloped opens spaces provide habitat for wildlife including coyotes (*Canis latrans*), bobcats (*Lynx rufus*), eastern cottontail rabbit (*Sylvilagus floridanus.*), fox squirrel (*Sciurus niger*), nine-banded armadillo (*Dasypus novemcinctus*), striped skunks (*Mephitis mephitis*), and raccoons (*Procyon lotor*). The area also provides habitat for a diverse range of birds and acts as a stopover or nesting area for migratory birds. Approximately 5,400 acres are included in the Lewisville Lake Environmental Learning Area on the south end of the Lake and the Clear Creek Natural Heritage Center on the north end. Both areas are managed for the benefit of wildlife. These two areas are described in more detail in Chapter 5 of this Plan. The entire USACE land holding at Lewisville Lake is located in Denton County. The lake is surrounded by 13 incorporated cities and a few areas of unincorporated Denton County. Due to the proximity to urban development, hunting is controlled by USACE and the City of Denton through permit systems at Lewisville Lake. The major ecological habitat types at Lewisville Lake are depicted in Figure 2.7.

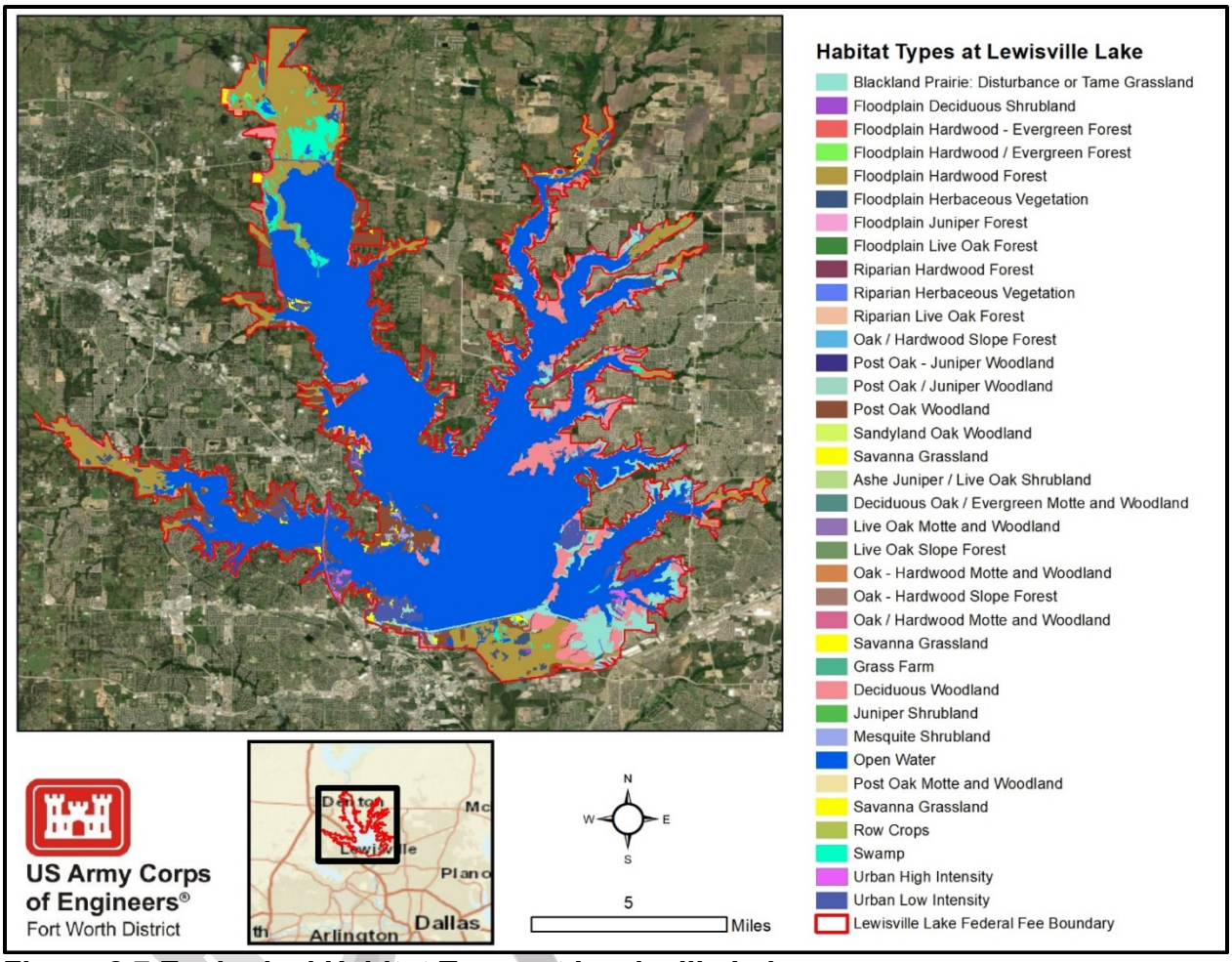


Figure 2.7 Ecological Habitat Types at Lewisville Lake
Source: TPWD Ecological Mapping Service

2.2.5 Threatened and Endangered Species

Threatened species are those which are likely to become endangered within the foreseeable future. Endangered species are in danger of extinction throughout all or a significant portion of their range. Section 7(a)(2) of the Endangered Species Act requires federal agencies to ensure that any action authorized, funded, or carried out by such agency is not likely to: (1) jeopardize the continued existence of any endangered or threatened species or (2) result in the destruction or adverse modification of critical habitat. The term, "jeopardize the continued existence of", means to reduce appreciably the likelihood of both the survival and recovery of listed species in the wild by reducing the species' reproduction, numbers, or distribution. Jeopardy opinions must present reasonable evidence that the project will jeopardize the continued existence of the listed species or result in destruction or adverse modification of critical habitat.

The USFWS's Information for Planning and Consultation (IPaC) database (2018a) lists the threatened and endangered species and trust resources that may occur within the Lewisville Lake project lands. There are three Federally-listed species and no candidate species that have the potential to utilize Lewisville Lake project lands.

No Critical Habitat has been designated within or near Lewisville Lake. The species identified as Threatened, Endangered, or Candidate Species by Texas Parks and Wildlife Department (TPWD) that are not Federally-listed are included in Appendix C of the 2018 Master Plan. Federally-listed threatened and endangered species having potential to occur on USACE lands and waters at Lewisville Lake are listed in Table 2.7.

Table 2.7 USFWS List of Threatened and Endangered Species That May Occur Within Lewisville Lake Federal Fee Boundary

Common Name	Scientific Name	Federal Status	State Status
Piping Plover	*Charadrius melodus*	Threatened	Threatened
Least Tern	*Sterna antillarum*	Endangered	Endangered
Whooping Crane	*Grus americana*	Endangered	Endangered

Source: USFWS IPaC Report

In addition to those federally endangered species, there are also many threatened and vulnerable species, most of which are migratory birds which could include stopovers at Lewisville Lake. The species and their potential presence are documented in detail in the IPaC report by the USFWS. TPWD also lists threatened and endangered species within the state as shown in Table 2.8. Additionally, TPWD also lists Species of Greatest Conservation Need (SGCN) for the Texas Blackland Prairie and Cross Timbers ecoregions. The SGCN list is provided in Appendix C.

Photo 2.2 Male Dickcissel. This neotropical migratory bird nests on the Lewisville Lake Environmental Learning Area (LLELA). The dickcissel is on TPWD's list of Species of Greatest Conservation Need (SGCN) in the Cross Timbers Ecoregion (USACE Photo by Jennifer Linde)

Table 2.8 TPWD List of Threatened and Endangered Species That May Occur Within the Lewisville Lake Federal Fee Boundary

Common Name	Scientific Name	Type	Listing Status
Alligator snapping turtle	*Macrochelys temminckii*	Reptile	Threatened
American Peregrine Falcon	*Falco peregrinus anatum*	Bird	Threatened
Bald Eagle	*Haliaeetus leucocephalus*	Bird	Threatened
Interior Least Tern	*Sterna antillarum athalassos*	Bird	Endangered
Louisiana pigtoe	*Pleurobema riddellii*	Mollusk	Threatened
Peregrine Falcon	*Falco peregrinus*	Bird	Threatened
Piping Plover	*Charadrius melodus*	Bird	Threatened
Red wolf	*Canis rufus*	Mammal	Endangered
Texas heelsplitter	*Potamilus amphichaenus*	Mollusk	Threatened
Texas horned lizard	*Phrynosoma cornutum*	Reptile	Threatened
Texas pigtoe	*Fusconaia askewi*	Mollusk	Threatened
Timber rattlesnake	*Crotalus horridus*	Reptile	Threatened
White-faced Ibis	*Plegadis chihi*	Bird	Threatened
Whooping Crane	*Grus americana*	Bird	Endangered
Wood Stork	*Mycteria americana*	Bird	Threatened

2.2.6 Invasive Species

An invasive species is defined as a plant or animal that is non-native (or native nuisance) to an ecosystem and whose introduction causes, or is likely to cause, economic and/or environmental harm, or harm to human health. Invasive species can thrive in areas beyond their normal range of dispersal. These species are characteristically adaptable, aggressive, and have high reproductive capacity. Their vigor, along with a lack of natural enemies or controls, often leads to outbreak populations with some level of negative effects on native plants, animals, and ecosystem functions. They are often associated with disturbed ecosystems and human developments.

Because several metropolitan areas are located in the Texas Blackland Prairie and Cross Timbers ecoregions, it has led to a greater number of invasive species than most other regions of the state. Feral and free-ranging pets (cats and dogs in particular) have made a significant impact on populations of small mammals, reptiles, and birds. Across the entire ecosystem, feral hogs (*Sus scrofa*) have decimated several fragile habitats and can change topography and worsen erosion in areas with large hog populations.

Other invasive animals at Lewisville Lake include red imported fire ants (RIFA, *Solenopsis invicta*), several species of introduced fish (including released baitfish and species associated with “aquarium dumping”), house sparrows (*Passer domesticus*), common starlings (*Sturnus vulgaris*), and mollusks including zebra mussels (*Dreissena polymorpha*). Although native, cowbirds (*Molothrus ater*) have become problematic due to their expanding range associated with agriculture and human development. The close proximity to urban landscaping has led to many common landscape plants becoming aggressive colonizers and becoming established at Lewisville Lake. Table 2.9 lists many of the invasive species found at Lewisville Lake. Other species are currently being researched for their invasive characteristics and may be added to this list.

Table 2.9 Invasive Species

Common Name	Scientific Name	Status	Type
Africanized honeybee	*Apis spec*	Non-native	Animal
Bahiagrass	*Paspalum notatum*	Non-native	Plant
Bermuda Grass	*Cynodon dactylon*	Non-native	Plant
Brown-headed Cowbirds	*Molothrus ater*	Native aggressive	Animal
Chinaberry	*Melia azedarach*	Non-native	Plant
Chinese Privet	*Ligustrum sinense*	Non-native	Plant
Chinese Tallow Tree	*Tridica sebifera*	Non-native	Plant
Common Starling	*Sturnus vulgaris*	Non-native	Animal
Feral Cats	*Felis silvestris*	Non-native	Animal
Feral Hogs	*Sus scrofa*	Non-native	Animal
Giant Reed	*Arundo donax*	Non-native	Plant
Giant Salvinia	*Salvinia molesta*	Non-native	Plant

Common Name	Scientific Name	Status	Type
Heavenly bamboo	*Nandina domestica*	Non-native	Plant
Honey Mesquite	*Prosipis gladulosa*	Native aggressive	Plant
House Sparrow	*Passer domesticus*	Non-native	Animal
Hydrilla	*Hydrilla verticillata*	Non-native	Plant
Johnsongrass	*Sorghum halepense*	Non-native	Plant
Juniper	*Juniperus spp.*	Native aggressive	Plant
King Ranch Bluestem (KR)	*Bothriochloa ischaemum* var. songarica	Non-native	Plant
Mediterranean Mustard	*Hirschfeldia incana*	Non-native	Plant
Nutria	*Myocastor coypus*	Non-native	Animal
Pincushions	*Scabiosa atropurpurea*	Non-native	Plant
Red Imported Fire Ants (RIFA)	*Solenopsis invicta*	Non-native	Animal
Purple loosestrife	*Lythrum salicaria*	Native	
Tree of Heaven	*Ailanthus altissima*	Non-native	Plant
Water hyacinth	*Eichhornia crassipes*	Non-native	Plant
Whitebrush	*Aloysia gradi*	Native aggressive	Plant
Yellow Sour Clover	*Melilotus indicus*	Non-native	Plant
Zebra Mussel	*Dreissena polymorpha*	Non-native	Animal

Source: USACE OMBIL

Photo 2.3 Johnsongrass – A major invasive species at Lewisville Lake

In 2015, 1,655 acres were treated for invasive species. Of that total, 55 acres were treated for four (4) terrestrial animals and 1,600 acres for 10 terrestrial plants. In 2016 and 2017, the number of acres treated and the number of plants and animals remained the same. Over the course of those two (2) years, 105 acres were treated: 100 acres were treated for five (5) terrestrial plants and five (5) acres were treated for two (2) terrestrial animals (USACE 2018).

2.2.7 Interpretation and Visual Qualities (Visual and Scenic Resources)

Lewisville Lake includes many acres of scenic shorelines, lake views, and wildlife viewing areas providing high visual and scenic qualities. Some areas are admired for their scenic attractiveness (intrinsic scenic beauty that evokes a positive response), scenic integrity (wholeness of landscape character), and landscape visibility (how many people view the landscape and for what reasons and how long). Because Lewisville Lake is located near several large cities, people come from local urban communities to enjoy the scenic and naturalistic views offered at the lake. Some areas have been designated as Wildlife or Environmentally Sensitive Areas to preserve specific animal, plant, or environmental features which also add to the scenic qualities at the lake.

Nearby parks have been designed to access the lake, allow access to hiking trails, and take advantage of scenic qualities at the lake and surrounding areas.

Lewisville Lake is located in the Cross Timbers and Blackland Prairie ecoregions, which is a unique convergence of local geography and habitats. The area provides many naturalistic views of the rugged terrain within an oak canopy juxtaposed with open prairies alive with spring wildflowers and native grasses, giving visitors an escape from the surrounding urban communities.

Adjacent landowners are informed that removing trees to obtain a view of the lake not only destroys wildlife habitat but also lowers the scenic quality of the shoreline when viewed by the general public from the water surface. Additionally, reasonable measures must be taken to ensure that damage to the natural landscape from invasive species and catastrophic wildfire are minimized. Vegetative management, mowing permits, debris removal, and other shoreline issues are addressed by the Shoreline Management Plan (SMP). The SMP is not changed by this Master Plan but is summarized in Chapter 6.

2.2.8 Mineral and Timber

Minerals

Oil and natural gas are the principal minerals known to exist near Lewisville Lake, primarily in the western reaches of the lake within the Hickory Creek watershed. Since the late 1990's and continuing today, active drilling for natural gas in the Barnett Shale formation has comprised the majority of mineral exploration near the lake. Currently, there are no well surface locations on USACE property. According to maps available on the Railroad Commission website there are several well surface locations near USACE property with multiple well bores that extend horizontally. None of the current well bores appear to extend under USACE property, including under the water surface. This is typical for most wells in the region wherein natural gas is retrieved through a process of horizontal drilling and hydraulic fracturing. See Figure 2.8 for a map of existing oil and natural gas activity near Lewisville Lake.

During acquisition of lands for Lewisville Lake, only relatively small areas of the mineral estate were acquired. Those areas include the mineral estate immediately under and adjacent to the dam which were acquired to protect the structural integrity of the dam and associated prime facilities, as well as a few isolated tracts upstream from the dam. The majority of the mineral estate underlying the lake remains in private ownership. USACE has implemented a "no hydraulic fracturing" zone around each dam operated and maintained by USACE. This zone is 3,000 horizontal feet from the toe of the dam at Lewisville Lake. USACE also monitors proposed locations of waste water injection wells where contaminated water from drilling and hydraulic fracturing operations are injected deep within the earth.

On several USACE tracts remote from the dam where the mineral estate was acquired by USACE, the minerals have been leased to a private operator. In February 2020, there are 5 active mineral leases on Federally-owned minerals at Lewisville Lake.

These mineral leases are in the far western reaches of fee-owned USACE lands. As with all federally-owned minerals, leases are administered by the Department of Interior, Bureau of Land Management, and contain protective stipulations required by USACE, including the stipulation that no surface occupancy is allowed.

Timber

Lewisville Lake is not located in a region having viable commercial timber resources. The woodlands that exist on USACE lands have value primarily as wildlife habitat and as an aesthetic resource, but have no commercial timber value.

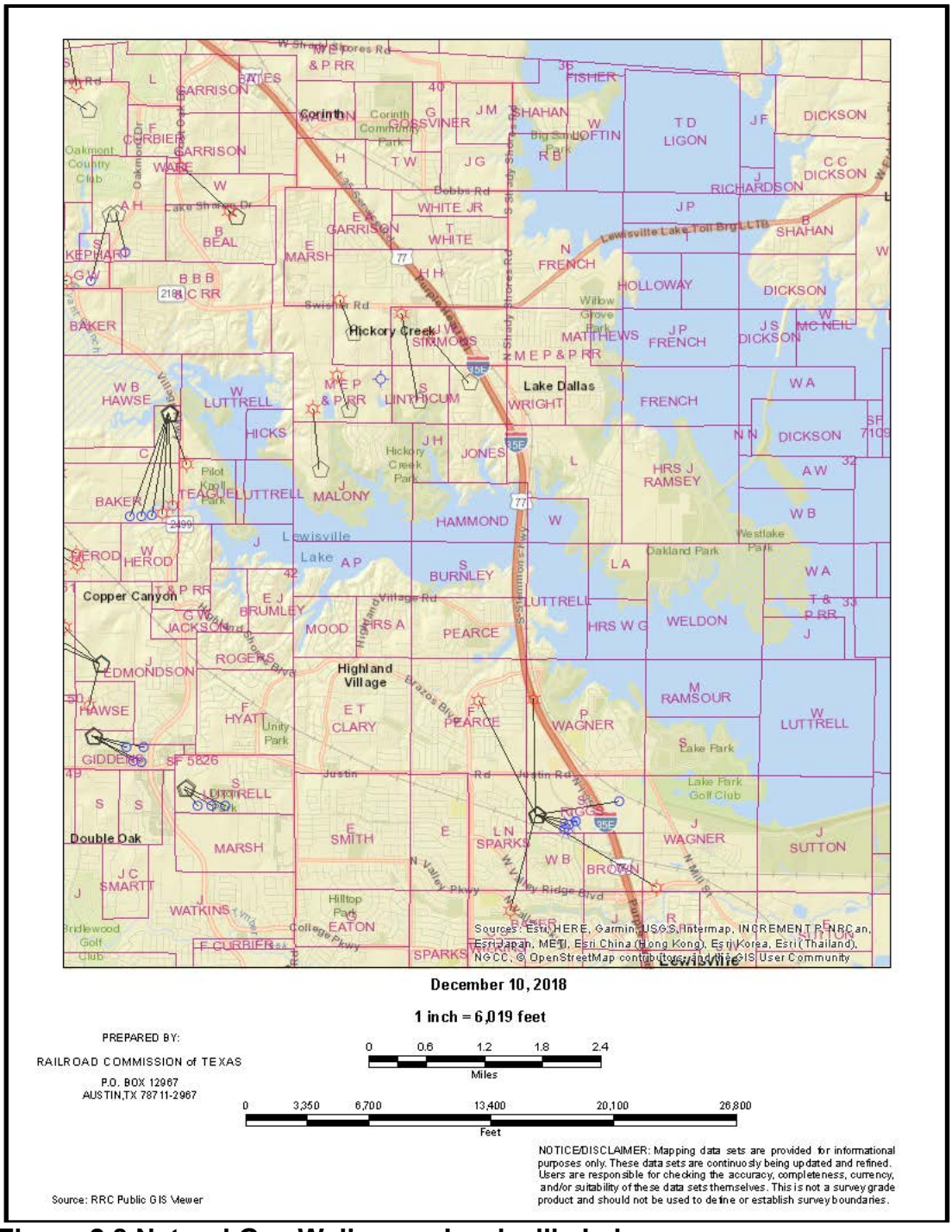


Figure 2.8 Natural Gas Wells near Lewisville Lake.
Source: Railroad Commission GIS Map Viewer

2.2.9 Water Usage and Quality

Texas Commission on Environmental Quality (TCEQ) publishes the assessment reports for the quality of surface waters for Trinity River basin in the biennial Integrated Report (formerly called the "Texas Water Quality Inventory and 303(d) List") that

evaluates the quality of all surface waters in Texas. The Integrated Report is prepared according to Clean Water Act Sections 305(b) and 303(d). In the report, the TCEQ classifies water bodies based on the body's ability to support its designated uses (Level of Support.)

The designated uses for Lewisville Lake are flood control, water supply, aquatic habitat, and contact recreation. According to the 2014 TCEQ report, Lewisville Lake (Segment ID 0823) had no water quality issues with the exception of a "Screening Level Concern" for Chlorophyll-a. All other monitored parameters were classified as either "Fully Supporting" their designated uses of public water supply and fish consumption, "No Concern", or "Not Assessed."

The United States Environmental Protection Agency (EPA) also released the water body reports and water quality assessment for Lewisville Lake for period 2002 to 2010. The designated uses of the lake were assessed, and all of them were found to be "good."

The USGS sampled eight sites for Lewisville Lake on three different occasions in 1997 (23 January 1997, 13 May 1997, 2 July 1997) for various biological and chemical parameters.14 The sampling results indicate that the levels of the various biological and chemical constituents monitored are generally within the criteria set by the Texas Department of Water Resources, and does not have any present or potential water quality problems.

Lewisville Lake receives effluent from eighteen municipal wastewater treatment plants under permits from the Texas Commission on Environmental Quality. In addition, Lewisville Lake has a substantial amount of shoreline development which contributes to nonpoint source pollution. A major potential contributor of non-point source loading is the nearby city of Denton. The point source dischargers and nonpoint pollutant sources plus modest loadings of nitrogen and suspended solids from tributary streams supply sufficient nutrient concentrations to support substantial phytoplankton communities.

The phytoplankton populations are potentially responsible for occasional taste and odor problems in the Dallas water supply. Measured chlorophyll concentrations have indicated relatively high levels of phytoplankton. During several summer seasons phytoplankton productivity has been especially high. At those times, blue green algae generally predominated over green algae and diatoms. According to the Waterways Experiment Station (WES) Aquatic Plant Research Facility at Lewisville Lake, Hydrilla infestation has existed at Lewisville Lake in the past. Isolated populations of Hydrilla are occasionally found in Lewisville Lake and control measures are taken as needed.

2.2.10 Sedimentation and Shoreline Erosion

A system of 110 sedimentation ranges and 9 degradation ranges were established and surveyed with monuments placed within the reservoir area and below the dam during the design of the dam. Initial storage allocations, in the Definite Project Report dated October 1947, provided for a total of 53,500 acre-feet of sediment deposition in the lake. The storage allocation was expected to provide for 57 years of

sediment accumulations. At the time of the 1965 sediment resurvey, 31,849 acre-feet of the original 53,500 acre foot sediment pool remained in the lake.

The storage in Lewisville Lake was reallocated after the construction of Ray Roberts Dam in June 1987. An estimated 35,200 acre-feet of sediment was deposited in Lewisville Lake prior to the completion of Ray Roberts Dam. It is estimated that an additional 73,800 acre-feet of sediment will accumulate in Lewisville Lake during the ensuing 100-year period. Approximately 63,400 acre-feet of this sediment is expected to be deposited in the conservation pool and the remaining 10,400 acre-feet will be deposited in the flood control pool. A schedule prepared in the Office of the Division Engineer, Southwestern Division (SWD), indicates that resurveys were planned for about 5-year intervals. However, currently sediment surveys are done periodically depending on need and available funding.

In 1991, the Texas Legislature authorized the Texas Water Development Board (TWDB) to develop a non-profit, self-supporting, reservoir volumetric survey program, which is named the Hydrographic Survey Program. The program includes a standard volumetric survey and a sedimentation survey. Since 1992, TWDB's Hydrographic Survey Program has completed 161 hydrographic surveys on 106 unique reservoirs. This includes 85 of the 114 water supply reservoirs monitored for inclusion in TWDB's monthly Water Conditions Report.

The TWDB last performed a standard volumetric survey for Lewisville Lake in 2007. Results from the survey indicate Lewisville Lake encompasses 27,175 surface acres and contains a total volume of 598,902 acre-feet at conservation pool elevation 522.0 feet.

Original design information was based on topographic maps with a 10-foot contour interval. The storage at the current top of conservation pool elevation of 522.0 feet, was estimated as 670,000 acre-feet and a corresponding surface area of 29,000 acres. In 1960, USACE performed a survey for Lewisville Lake. Records indicate that Lewisville Lake had a volume of 648,400 acre-feet of water at the top of conservation pool elevation 522.0 feet. In 1965, USACE resurveyed Lewisville Lake and estimated the capacity to be 640,986 acre-feet. Between the 1960 USACE survey and the 2007 TWDB volumetric survey, Lewisville Lake lost 49,498 acre-feet of water or 7.63 percent in conservation storage. The difference in storage indicated the sediment fill during the fiscal years from 1960 to 2007. Comparisons between the 1960 USACE survey, the 1965 USACE survey, and the 2007 TWDB volumetric survey are presented in Table 2.10.

Table 2.10 Area and Capacity Comparisons of Lewisville Lake

FEATURE	USACE DPR	USACE Survey	USACE Survey	TWDB Latest Survey
Year	1947	1960	1965	2007
Surface Area at Conservation Pool Elevation 522.0 feet NGVD29 (acres)	29,500	N/A	N/A	27,175
Volume at Conservation Pool Elevation 522.0 feet NGVD29 (acre-feet)	670,000	648,400	640,986	598,902

2.2.11 Air Quality

In 2018 the US Environmental Protection Agency (EPA) designated nine counties in the North Central Texas region as marginal nonattainment for the pollutant ozone in accordance with the 2015 eight-hour ozone National Ambient Air Quality Standards (NAAQS). The NAAQS standard for ozone is 70 parts per billion (ppb) which is a level that insures a good quality of life for people of all ages. The NAAQS standards are designed to protect human and environmental health, and ground-level ozone is monitored and targeted for reductions due to its potentially harmful effects. The nine counties that are marginal nonattainment in North Central Texas are Wise, Denton, Collin, Parker, Tarrant, Dallas, Johnson, and Ellis.

In order to receive some forms of federal assistance, nonattainment areas must have a State Implementation Plan (SIP) to reduce ozone to levels compliant with the NAAQS and have EPA reviews every five years. Four main sources of ozone-causing emissions include on-road mobile sources like cars and trucks, non-road mobile sources like construction equipment, point sources like electricity-generating utilities and industrial boilers, and area sources like solvent use and agriculture. The Dallas-Fort Worth area SIP includes programs to get older cars off the road, technologies to clean up vehicles already on the road, and education programs so residents in the region can do their part in improving air quality in Northern Texas. For more information about what individuals and businesses can do to clean the air, visit the Air North Texas website

There are no air monitoring stations on USACE property at Lewisville, but there are several nearby operated by the Texas Commission on Environmental Quality (TCEQ). Those stations monitor for Nitric Oxide (NO), Nitrogen Dioxide (NO2), other Nitrogen Oxides (NOX), Ozone (O3), PM2.5, as well as weather and climate data. Because Lewisville Lake is located within an urban area, all monitored substances can reach moderate levels on occasion, normally when weather patterns cause the air to stagnate. TCEQ's Air Quality Index (AQI) is based on ozone and PM2.5 levels, and sometimes reaches “unhealthy for sensitive groups," which could affect people with asthma and those with prolonged or heavy outdoor exertion. The AQI occasionally

reaches "unhealthy" levels, but rarely reaches “very unhealthy” or “hazardous” levels, and would likely be related to fires or unusual atmospheric events. The region is also prone to “very high” pollen counts for much of the year, affecting those with allergies and allergy-related asthma. The tree canopy and other vegetation around Lewisville Lake help to mitigate local air pollution by absorbing carbon dioxide (CO2), filtering airborne particulates and other airborne pollutants, and modulating local temperatures influencing the urban heat island effect.

In conducting routine operations and maintenance activities at Lewisville Lake, the USACE will comply with all Federal, state, and local laws governing air quality and will implement Best Management Practices (BMPs) to protect air quality. Prescribed fire is a useful land management tool for improving native prairie and certain forested areas and will be conducted in accordance with the Texas Administrative Code, Section 111.211(1). Statutory requirements governing prescribed fire and other types of outdoor burning are explained in the TCEQ publication “Outdoor Burning in Texas” available on the TCEQ website. USACE guidance for wildland fire management is set forth in EP 1130-2-540.

2.3 CULTURAL RESOURCES

2.3.1 Prehistoric

The earliest well-documented evidence of human occupation in North Central Texas dates to about 12,000 years before present (B.P.). Prehistory is divided generally into three broad time periods: Paleo-Indian (12,000-8,500 B.P.), Archaic (8,500-1.250 B.P.), and Late Prehistoric (1,250-300 B.P.).

Evidence for Paleo-Indian period occupation is relatively rare in the Lewisville Lake area, and is known primarily from distinctive projectile point styles dating to this time period found in surface collections or in mixed multi-component sites. It is likely that intact Paleo-Indian camp sites may be buried deeply beneath Holocene floodplain alluvium, as was the case with the Aubrey Clovis site upstream on the Elm Fork Trinity River. Evidence suggests that the region was occupied by small groups of highly mobile hunter-gatherers that traveled over very large territories. Traditionally thought of as big-game hunters of mammoth and bison, more recent evidence indicates Paleo-Indians exploited a much broader range of animal and plant resources.

The Archaic period is divided into Early (8,500-6,000 B.P.), Middle (6,000-3,500 B.P.), and Late (3,500-1,250 B.P.) sub periods. During this long time period, a generalized hunting and gathering subsistence strategy is indicated. Trends through time suggest increasing population density and decreasing group mobility within smaller territories. Sites with Late Archaic components are well represented in the Lewisville Lake area and in North Central Texas generally.

The Late Prehistoric Period (1,250-300 B.P.) is marked by the presence of the bow and arrow and pottery. During the early portion of this time span, subsistence strategies remained similar to those of the preceding Late Archaic. By around 800 B.P., there is limited evidence for maize horticulture and more sedentary occupations in some

North Central Texas sites. After around 600 B.P., there is widespread evidence for an increase in bison hunting. Pottery from Lewisville Lake sites includes plain and decorated grog-tempered specimens in the Caddo ceramic tradition. It is unclear whether this pottery was made locally or represents trade with East Texas Caddo groups. Plain, shell-tempered pottery is the most common ceramic type found at Lewisville Lake sites and is thought to show connections with southern plains groups to the north and west. This shell-tempered pottery is generally thought to date to the late portion of the Late Prehistoric period (after ca. 600 B.P.) when bison hunting became more important.

2.3.2 Historic

Local tradition holds that Native Americans of the Wichita and Caddo Nations inhabited the Lewisville Lake area prior to the arrival of the first white settlers in the early 1840s. The first large colonization occurred after W.S. Peters of St. Louis obtained a land grant from the Republic of Texas in 1841. The first "Peters Colony" contract included the Lewisville Lake area. The majority of these early settlers were farmers operating small family farms growing mainly wheat and corn. When Denton County was created out of Fannin County in 1846, the estimated population was only 150. The population grew steadily between the 1840s and 1870s. The arrival of the railroads in the early 1870s allowed farmers access to markets and led to a major increase in the number of farms. Cotton farming became an important agricultural activity in the Blackland Prairie region and tenant farming was a major social institution. Most of the historic resources at Lewisville Lake include the archeological remains of house sites and farmsteads dating from the late 19th century through the mid 20th century, although a few sites dating to the earlier Peters Colony occupation have been recorded.

2.3.3 Previous Investigations at Lewisville Lake

The initial archeological investigations at Lewisville Lake were conducted between 1948 and 1950 by the River Basin Surveys. During that period, 27 sites were recorded, and three sites (41DN5, 41DN6, 41DN12) were tested. Plans to enlarge the lake led to additional survey in 1986 and 1987 by the University of North Texas (UNT), followed by test excavations at 23 prehistoric and 16 historic sites. In 1988, UNT performed data recovery excavations at five prehistoric (41DN20, 41DN26, 41DN27, 41DN372, 41DN381) and three historic (41DN401, 41DN404, 41DN429) sites. Limited survey work since then has added to the number of known archeological sites.

2.3.4 Recorded Cultural Resources

Currently, 161 archeological sites have been recorded at Lewisville Lake. One of these archeological sites (Cranston Pottery Kiln - 41DN16) and the historic Old Alton Bridge (see Photo 2.4) are listed on the National Register of Historic Places (NRHP). Of the remaining 160 archeological sites, ten have been determined eligible for NRHP and 136 have been determined ineligible. Fourteen of the recorded sites have not yet been evaluated for NRHP eligibility.

Photo 2.4 Old Alton Bridge National Historic Site
(Photo Courtesy of Wikipedia)

2.3.5 Long-term Objectives for Cultural Resources

As funding allows, a Cultural Resources Management Plan (CRMP) shall be developed and incorporated into the Operational Management Plan in accordance with EP 1130-2-540. The purpose of the CRMP is to provide a comprehensive program to direct the historic preservation activities and objectives at Lewisville Lake. Completion of a full inventory of cultural resources at Lewisville Lake is a long-term objective that is needed for compliance with Section 110 of the National Historic Preservation Act (NHPA). All currently known and any newly recorded sites must be evaluated to determine their eligibility for the NRHP. In accordance with Section 106 of the NHPA, any proposed ground-disturbing activities or projects, such as those described in this master plan or as may be proposed in the future by others for right-of-way easements, will require cultural resource surveys to locate and evaluate historic and prehistoric resources. Resources determined eligible for the NRHP must be protected from proposed project impacts, or the impacts must be mitigated. All future cultural resource investigations at Lewisville Lake must be coordinated with the State Historic Preservation Officer and federally-recognized Tribes to insure compliance with the National Historic Preservation Act, the Archaeological Resources Protection Act, and the Native American Graves Protection and Repatriation Act

2.4 DEMOGRPAHIC AND ECONOMIC ANALYSIS

2.4.1 Zone of Interest

Lewisville Lake is located in the North Central Texas area, lying entirely within Denton County. The zone of interest for the socioeconomic analysis of Lewisville Lake is defined as Denton County plus the counties that surround the lake to the south and east, which are Collin, Dallas, and Tarrant Counties in Texas.

2.4.2 Population

The total population for the zone of interest in 2017 was 6,231,284, as shown in Table 2.11**Error! Reference source not found.** Approximately 41% of the zone of interest population resides in Dallas County, 32% in Tarrant County, 15% in Collin County, and 13% in Denton County.

The zone of interest's population makes up almost 23% of the total population of Texas. From 2017 to 2045, the population in the zone of interest is expected to increase from 6.2 million to 10.8 million, an annual growth rate of 2%. By comparison, the population of Texas is projected to increase at a rate of 1.7% per year during that same timeframe, and the national growth rate is expected to be 0.6% per year. All counties within the zone of interest are projected to have positive growth, with Collin and Denton Counties growing the fastest at annual rates of 3.1% and 3.4%, respectively.

Table 2.11 Population Estimates and 2045 Projections, 2000 and 2018

Geographical Area	2000 Population Estimate	2018 Population Estimate	2045 Population Projection
Texas	20,851,820	27,885,195	**43,867,040**
Collin County	491,675	944,350	**2,137,242**
Dallas County	2,218,899	2,586,552	**3,667,351**
Denton County	432,976	807,047	**1,990,969**
Tarrant County	1,446,219	2,019,977	**3,023,145**
Zone of Interest Total	**4,589,769**	**6,357,926**	**10,818,707**

Source: U.S. Census Bureau, Population Division (2000 Estimate); U.S. Census Bureau, American Community Survey 1-Year Estimates (2018 Estimate); Texas State Data Center, The University of Texas at San Antonio (2045 Projections)

The distribution of the population among gender, as shown in Table 2.12, is approximately 49% male and 51% female in the zone of interest, similar to the overall gender distribution in Texas.

Table 2.12 Percent of Population Estimate by Gender, 2017

Geographical Area	Male	Female
Texas	13,616,977	13,802,635
Collin County	448,915	465,160
Dallas County	1,257,751	1,294,462
Denton County	384,390	396,931
Tarrant County	971,142	1,012,533
Zone of Interest Total	**3,062,198**	**3,169,086**

Source: U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates (2016 Estimate)

Figure 2.9 shows the zone of interest's population by age group in 2017 compared to the population projections by age group for 2045. The forecast shows that the population ages 0 to 59 will decrease slightly while ages 60 and over will increase between 2017 and 2045.

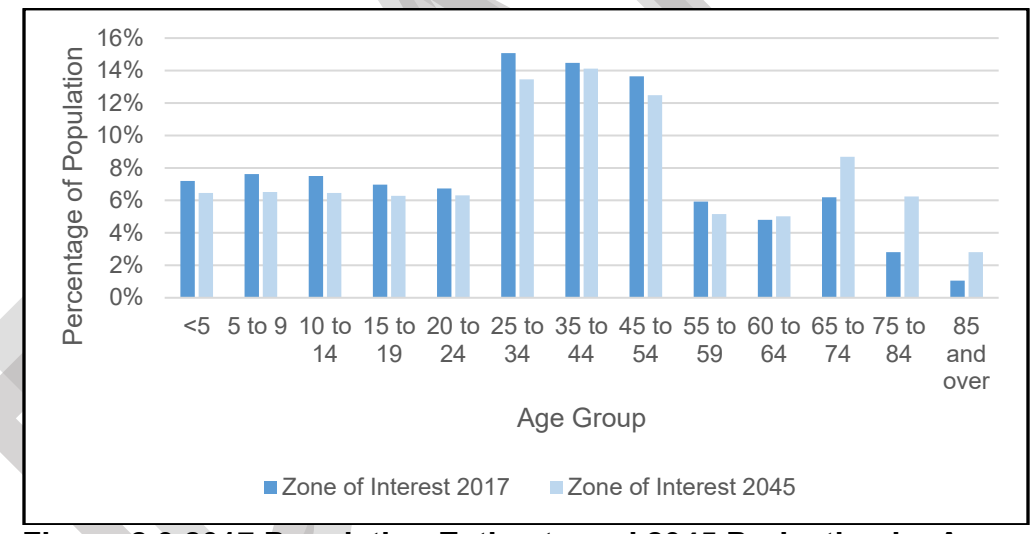


Figure 2.9 2017 Population Estimate and 2045 Projection by Age Group

Source: U.S. Census Bureau, 2012-2017 American Community Survey 5-Year Estimates (2017 Estimate); Texas State Data Center, The University of Texas at San Antonio (2045 Projections)

Population by race and Hispanic Origin is displayed in Table 2.13. The population in the zone of interest is approximately 44% White, 16% Black, 30% Hispanic or Latino, 7% Asian, and 2% two or more races. The other race categories account for less than 1% each of the population. By comparison, the state's population is approximately 43% White, 12% Black, 39% Hispanic or Latino, 4% Asian, and 2% two or more races. Figure 2.14 shows the 2017 estimate and the 2045 projections of

race/ethnicity in the zone of interest distributed between five categories, White, Black, Hispanic or Latino, Asian, and Other. The figure shows that the Black, Hispanic or Latino, Asian, and Other categories are expected to increase in the zone of interest, while the White category decreases by 15%.

Table 2.13 2017 Population Estimate by Race/Hispanic Origin

Area	White	Black	Asian alone	American Indian and Alaska Native alone	Native Hawaiian and Other Pacific Islander alone	Some other race alone	Two or more races	Hispanic or Latino
Texas	11,755,493	3,199,022	1,222,975	65,883	20,170	39,153	443,007	10,673,909
Collin County	540,387	84,259	123,495	2,858	568	2,377	22,260	137,871
Dallas County	771,258	563,220	152045	4,450	1098	4485	44,283	1,011,374
Denton County	475,452	70,796	60788	2,289	579	1602	20,529	149,286
Tarrant County	959,103	308,577	100,560	5,443	3,298	3,539	44,130	559,025
Zone of Interest Total	**2,746,200**	**1,026,852**	**436,888**	**15,040**	**5,543**	**12,003**	**131,202**	**1,857,556**

Source: U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates (2017 Estimate)

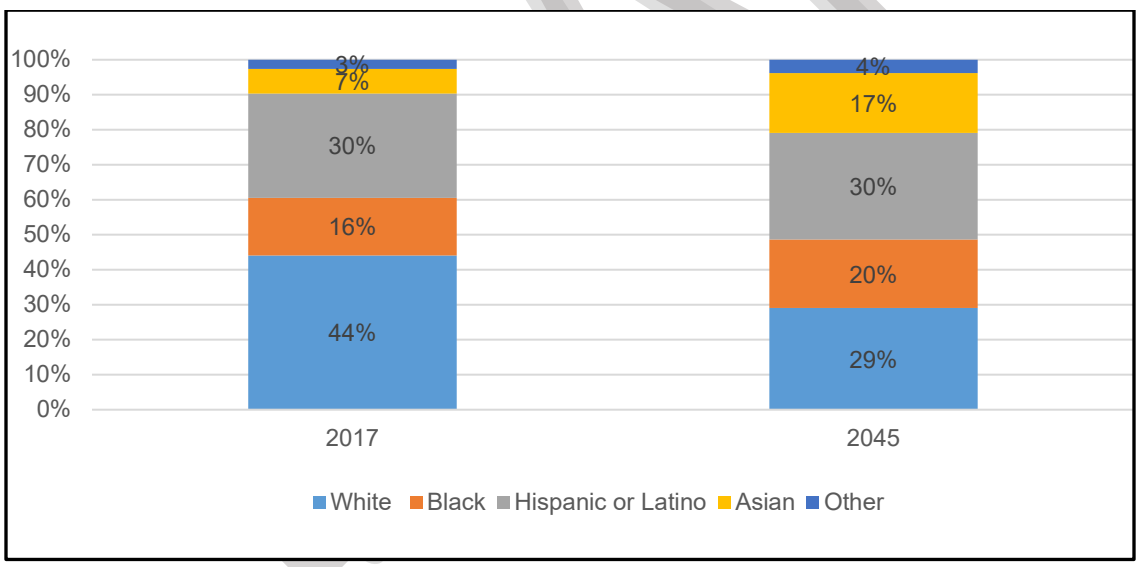


Figure 2.10 Zone of Interest Population Estimate and Projection by Race/Ethnicity

Source: U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates (2017 Estimate); Texas State Data Center, The University of Texas at San Antonio (2045 Projections)

2.4.3 Education

Table 2.14 displays the highest level of education attained by the population ages 25 and over. In the zone of interest, 8% of the population has less than a 9th grade education, and another 8% has between a 9th and 12th grade education; 21% has a high

school diploma or equivalent, and another 21% has some college and no degree; 7% has an Associate's degree; 23% has a Bachelor's degree; and 12% has a graduate or professional degree. In the state of Texas, 9% of the population has less than a 9th grade education; another 9% has between a 9th and 12th grade education; 25% has at least a high school diploma or equivalent; 22% has some college; 7% has an Associate's degree; 19% has a Bachelor's degree; and 10% has a graduate or professional degree.

Table 2.14 2017 Population Estimate by Highest Level of Educational Attainment, Population 25 Years of Age and Older

Area	Highest Level of Educational Attainment							
	Population 25 years and over	**Less than 9th grade**	**9th to 12th grade, no diploma**	**High school graduate (includes equivalency)**	**Some college, no degree**	**Associate's degree**	**Bachelor's degree**	**Graduate or professional degree**
Texas	17,454,431	1,513,995	1,491,909	4,372,430	3,857,193	1,208,509	3,288,777	1,721,618
Collin County	594,927	19,284	18,547	89,904	119,639	44,498	194,541	108,514
Dallas County	1,621,762	185,820	165,784	364,902	325,074	91,567	311,327	177,288
Denton County	506,132	19,149	21,220	93,186	115,250	37,863	148,204	71,260
Tarrant County	1,263,581	86,262	97,843	301,127	292,669	92,421	264,881	128,378
Zone of Interest Total	**3,986,402**	**310,515**	**303,394**	**849,119**	**852,632**	**266,349**	**918,953**	**485,440**
Source: U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates (2017 Estimate)								

Source: U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates (2016 Estimate)

2.4.4 Employment

Employment by sector is presented in Figure 2.15 and Table 2.15 shows that the largest percentage of the zone of interest is employed in the Educational services, and health care and social assistance sector at 19%, followed by 14% in the Professional, scientific, and management, and administrative and waste management services sector, and 11% in Retail Trade. Approximately 9% of the zone of interest population is employed in each of the following sectors: the Manufacturing sector, the Arts, entertainment, and recreation, and accommodation and food services sector, and the Finance and insurance, and real estate and rental and leasing sector. Approximately 8% of the zone of interest population is employed in the Construction sector, 6% in the Transportation and warehousing, and utilities sector, and 5% in Other services, except public administration. The remainder of the employment sectors each comprise less than 5% of the zone of interest's labor force.

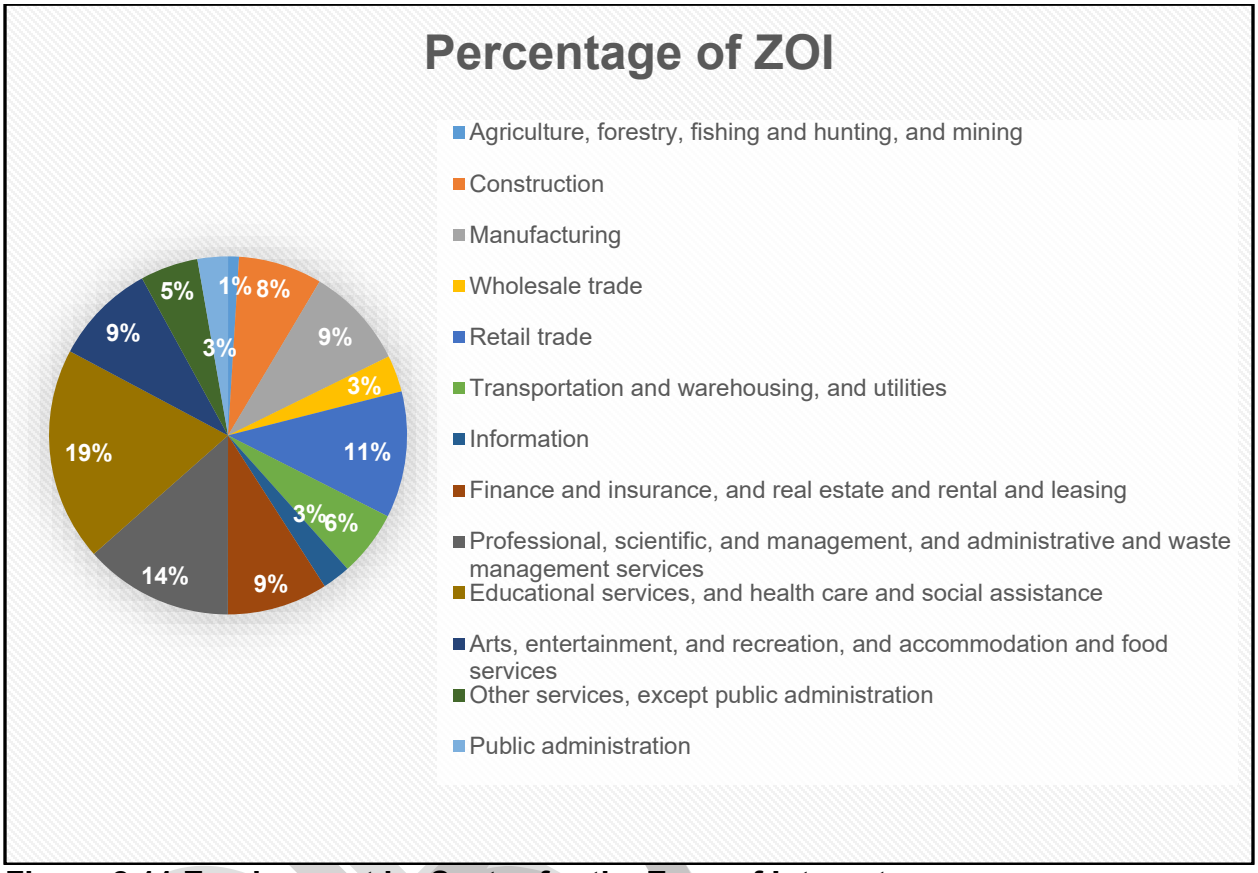


Figure 2.11 Employment by Sector for the Zone of Interest
Source: U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates (2017 Estimate)

Table 2.15 includes three columns displaying the growth rate of each industry by Workforce Development Area (WDA) between 2016 and 2026. Collin and Denton Counties both fall in to the North Central WDA, while Dallas and Tarrant Counties each have their own WDA. Projected industry growth for each of the WDAs is displayed in the table. When considering all three WDAs as a whole, the most growth is anticipated in the Educational services, and health care and social assistance sector, followed by the Arts, entertainment, and recreation, and accommodation and food services sector, and the Construction sector.

Table 2.15 Annual Average Employment by Sector

Employment Sector	Geographic Area								
	Texas	Collin County	Dallas County	Denton County	Tarrant County	Zone of Interest Total	Dallas County WDA Growth Rate (2016-2026)	North Central WDA Growth Rate (2016-2026)	Tarrant County WDA Growth Rate (2016-2026)
Civilian employed population 16 years and over	12,689,069	474,671	1,252,101	419,189	974,947	**3,120,908**	NA	NA	NA
Agriculture, forestry, fishing and hunting, and mining	412,873	5,174	8,812	4,622	12,077	**30,685**	-4%	17%	9%
Construction	1,038,063	23,634	120,569	23,087	68,819	**236,109**	23%	29%	23%
Manufacturing	1,116,657	42,794	108,592	32,984	102,185	**286,555**	0%	14%	7%
Wholesale trade	381,774	14,702	39,711	15,253	33,565	**103,231**	12%	27%	17%
Retail trade	1,454,504	54,365	139,454	50,490	112,289	**356,598**	13%	23%	13%
Transportation and warehousing, and utilities	702,367	15,508	73,468	21,912	73,786	**184,674**	17%	18%	12%
Information	227,592	18,657	29,235	13,126	18,470	**79,488**	1%	11%	5%
Finance and insurance, and real estate and rental and leasing	839,234	54,727	107,613	44,490	76,746	**283,576**	11%	28%	15%
Professional, scientific, and management, and administrative and waste management services	1,437,711	79,358	177,922	58,449	104,554	**420,283**	23%	30%	19%
Educational services, and health care and social assistance	2,739,219	94,775	226,948	85,793	194,866	**602,382**	24%	31%	26%
Arts, entertainment, and recreation, and accommodation and food services	1,154,649	38,560	121,123	38,034	90,705	**288,422**	16%	42%	18%
Other services, except public administration	663,422	20,961	70,223	19,847	52,148	**163,179**	17%	15%	18%
Public administration	521,004	11,456	28,431	11,102	34,737	**85,726**	12%	27%	4%
Source: U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates (2017 Estimate), Texas Workforce Commission Labor Market and Career Information (WDA Growth Rates)									

Table 2.16 Labor Force, Employment and Unemployment Rates, 2017 Annual Averages

Geographic Area	Civilian Labor Force	Number Employed	Number Unemployed	Unemployment Rate
Texas	13,538,385	12,960,595	577,790	4.3%
Collin County	527,317	509,347	17,970	3.4%
Dallas County	1,333,933	1,282,785	51,148	3.8%
Denton County	464,581	449,263	15,318	3.3%
Tarrant County	1,033,317	995,339	37,978	3.7%
Zone of Interest Total	**3,359,148**	**3,236,734**	**122,414**	**3.6%**

Source: Bureau of Labor Statistics, Current Population Survey (State estimate), LAUS (County estimates)

The civilian labor force in the zone of interest accounts for approximately 25% of the civilian labor force in the state of Texas. As shown in Table 2.16, the zone of interest experienced an unemployment rate of 3.6% in 2017, lower than that of the state of Texas, which had an unemployment rate of 4.3% that same year. The unemployment rate in each of the counties in the zone of interest were lower than that of Texas, ranging from 3.3% in Denton County to 3.8% in Dallas County.

2.4.5 Households, Income and Poverty

Table **2.17** displays the number of households and average household sizes in 2017. There were approximately 9.4 million households in the state of Texas with an average household size of 2.84 in 2017. The zone of interest contained approximately 2.2 million of those homes and also had an average household size of 2.84.

Table 2.17 2017 Households and Household Size

Geographic Area	Total Households	Average Household Size
Texas	9,430,419	2.84
Collin County	323,905	2.81
Dallas County	906,179	2.78
Denton County	275,164	2.79
Tarrant County	689,921	2.84
Zone of Interest Total	**2,195,169**	**2.84**

Source: U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates (2017 Estimate)

The median household income in the zone of interest ranged from $53,626 in Dallas County to $90,124 in Collin County in 2017, as displayed in Table 2.18 . Per capita income in the zone of interest was $32,892 in 2017, which was slightly higher than the state of Texas, which had a per capita income of $28,985.

Table 2.18 2017 Median and Per Capita Income

Geographic Area	Median Household Income	Per Capita Income
Texas	$57,051	$28,985
Collin County	$90,124	$41,609
Dallas County	$53,626	$29,810
Denton County	$80,290	$37,928
Tarrant County	$62,532	$30,857
Zone of Interest Total	**N/A**	**$32,892**

Source: U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates (2017 Estimate)

Table 2.19 displays the percentage of persons and families whose incomes fell below the poverty level in the past twelve months as of 2017. The zone of interest as a whole had a smaller percentage of people with incomes below the poverty level at 13.6% when compared to the state, which had 16.0% of people below the poverty level. Dallas County had the most persons with incomes below the poverty level at 17.7%, followed by Tarrant County at 13.5%, Denton County at 8.4%, and Collin County at 6.9%. In terms of families with incomes below the poverty level, the only county with a greater percentage of poverty than the state of Texas was Dallas County, which had 14.4% of families below the poverty level compared to 12.4% of the state. The remainder of the counties in the zone of interest had between 5.1% and 10.1% of families below the poverty level in 2017.

Table 2.19 Percent of Families and People Whose Income in the Past 12 Months is Below the Poverty Level (2017)

Geographic Area	All Persons	All Families
Texas	16.0%	12.4%
Collin County	6.9%	5.1%
Dallas County	17.7%	14.4%
Denton County	8.4%	5.5%
Tarrant County	13.5%	10.1%

Zone of Interest Total	**13.6%**	**N/A**
Source: Census Bureau		

2.4.6 Economic Impact

The overall economic impact of Lewisville Lake includes the economic benefits derived from the flood damage reduction, water conservation, outdoor recreation, and environmental stewardship missions. For the purpose of this Master Plan, only the economic impact associated with the outdoor recreation and environmental stewardship missions will be documented.

The money spent by visitors to USACE lakes on trip expenses adds to the local and national economies by supporting jobs and generating income. In 2016, there were nearly 2.7 million visits (person-trips) to Lewisville Lake. . Visitor spending represents a sizable component of the economy in many communities around USACE lakes. Within 30 miles of the lake, visitors spent an additional $65.4 million with $47.3 million coming from retail sales. This spending led to an additional 601 jobs and $18.6 million in labor income. Predicted population growth in Denton, Collin, Dallas and Tarrant counties would likely lead to increased economic benefits to the surrounding communities for years to come.

2.4.7 Social, Economic, and Environmental Benefits

USACE recognized the importance of Lewisville Lake and the activities on USACE lands and waters as being an important part of the local economy. Besides the obvious economic savings through flood risk management and development advantages afforded by water conservation businesses can see investment opportunities, and people are drawn to the natural areas surrounding Lewisville Lake, as is evidenced by the growing number of adjacent residents. The economic benefit from the USACE outdoor recreation and environmental stewardship missions are well documented. Nationally, USACE lakes attract about 335 million recreation visits every year, with direct economic benefits on local economies within a 30 mile radius. The following information in Table 2.20 describes some of the extended social and environmental benefits of Lewisville Lake for surrounding communities in 2016. By providing opportunities for active recreation, Corps lakes help combat one of the most significant of the nation's health problems: lack of physical activity. Recreational programs and activities at Corps lakes also help strengthen family ties and friendships; provide opportunities for children to develop personal skills, social values, and self-esteem; and increase recreational water safety.

Table 2.20 Social Benefits at Lewisville Lake in FY 2016

Facilities in FY 2016	Visits (person-trips) in FY 2016
30 recreation areas • 400 picnic sites • 449 camping sites • 21 playgrounds • 8 swimming areas • 23 number of trails • 51 trail miles • 0 fishing docks • 24 boat ramps • 2,708 marina slips	2,692,843 in total • 284,218 picnickers • 47,792 campers • 341,130 swimmers • 189,100 water skiers • 318,616 boaters • 967,438 sightseers • 474,181 anglers • 0 hunters • 737,646 others

Source: USACE Value to the Nation Website (Note: Although 0 hunters are shown in the table, as of the date of this Master Plan, USACE issues 600 annual first-come, first-served hunting permits at Lewisville Lake. The majority of Lewisville Lake hunters are waterfowl hunters.

There have also been many economic benefits to the nation and economy at Lewisville Lake. The money spent by visitors to Corps lakes on trip expenses adds to the local and national economies by supporting jobs and generating income. Visitor spending represents a sizable component of the economy in many communities around Corps lakes as summarized in Table 2.21.

Table 2.21 Economic Benefits at Lewisville Lake in FY 2016

Visitation per year resulted in:	With multiplier effects, visitor trip spending resulted in:
• $65,363,097 in visitor spending within 30 miles of the Corps lake. • $47,266,484 in sales within 30 miles of the Corps lake. • 601 jobs within 30 miles of the Corps lake. • $18,589,336 in labor income within 30 miles of the Corps lake. • $26,058,315 in value added within 30 miles of the Corps lake. • $15,524,707 in National Economic Development Benefits.	• $87,663,542 in total sales. • 839 jobs. • $32,869,793 in labor income. • $50,256,111 in value added (wages & salaries, payroll benefits, profits, rents, and indirect business taxes).

Source: USACE

Lewisville Lake provides environmental benefits to the local community by providing the public with access to a large expanse of natural area and recreational

water surface. Recreation experiences increase motivation to learn more about the environment; understanding and awareness of environmental issues; and sensitivity to the environment. The land acres, water acres, and shoreline miles are summarized in Table 2.22.

Table 2.22 Environmental Resource Summary in FY 2020

Resources in FY 2020
• 19,160 land acres • 27,175 water acres • 187 shoreline miles

2.5 RECREATION FACILITIES, ACTIVITIES, AND NEEDS

The initial development of outdoor recreation facilities at Lewisville Lake was addressed in the 1985 Master Plan for Lewisville Lake Design Memorandum (DM) No. 1C and Supplement No. 1 published in 2004. These two documents laid out a robust plan for the comprehensive management of the lake's lands and water surface including plans for a significant investment in outdoor recreation facilities. USACE directly manages 5 parks and/or access points at Lewisville Lake and partners with the cities of Lewisville, Highland Village, Copper Canyon, Hickory Creek, Lake Dallas, Oak Point, Little Elm, and The Colony to provide 16 parks, numerous boat ramps, and several trails. USACE also partners with Lewisville Lake Environmental Learning Area (LLELA) and the City of Denton at their Clear Creek Natural Heritage Center to provide two wildlife/nature centers for the public. Various commercial and non-profit entities also provide 6 marinas on Lewisville Lake. Texas Parks & Wildlife Department operates the Ray Roberts Lake State Park - Greenbelt Corridor along the Elm Fork of the Trinity River in the stretch between Lewisville Lake and Ray Roberts Lake.

USACE has a moderate role in directly managing outdoor recreation at the lake, relying heavily on partnerships and leases with surrounding cities. This role consists of managing fishing use, boating and water activities, and general pedestrian access to lands that are not leased to other agencies. Hunting is permitting in designated areas with a valid state hunting license and USACE permit. All hunters must obey hunting regulations issued Texas Parks & Wildlife Department, the U.S. Fish & Wildlife Service, and USACE through its Fort Worth District hunting policy.

The following factors contribute to the importance of Lewisville Lake as a recreational area:

- Close proximity to population centers in the Dallas-Fort Worth metropolitan area: by road, Lewisville Lake Dam is located 24 miles from downtown Dallas, 40 miles from downtown Fort Worth, and conveniently located at the northern end of the Dallas-Fort Worth Metropolitan Area;
- Parks leased to neighboring municipalities provide day use activities, camping, boat access, and trails;
- Full service marinas and boat ramps provide access for boating recreation;

- LLELA and the City of Denton seek to preserve and restore native Texas ecosystems and biodiversity, providing opportunities for environmental education, research, and recreation;
- Located entirely within fast growing Denton County and shares a common boundary with 13 cities or towns.

2.5.1 Zone of Influence

The zone of influence for Lewisville Lake as it relates to this Master Plan includes Denton, Collin, Tarrant and Dallas counties.

2.5.2 Visitation Profile

The majority of visitors to Lewisville Lake come from within the zone of influence. An examination of over 23,700 zip codes collected from visitors at Hickory Creek Park between 2013 through 2017 revealed that 86.7% of visitors came from Texas, and 76.1% came from within 50 miles of the lake. It is notable that out-of-state campers total 13.3% of total campers. This relatively high number for out-o-state campers may owe to the location of Hickory Creek Park only a short distance west of Interstate Highway 35. Table 2.23 provides examples of the percentage of campers coming from the top eleven cities within 50 miles of the lake. USACE checked with all entities managing campgrounds at Lewisville Lake and none of them keep track of the origin of their visitors.

Table 2.23 Eleven Top Cities of Origin for Campers at Hickory Creek Park, Lewisville Lake

City/Zip Code	Percent of Campers
Lewisville	8.3%
Denton	6.7%
Carrolton	4.6%
Corinth	4.5%
Flower Mound	4.3%
Dallas	3.7%
Plano	3.3%
Fort Worth	2.6%
Lake Dallas	2.2%
Frisco	2.0%
Highland Village	2.0%

SOURCE: Recreation.gov

2.5.3 Visitation Data

USACE has recently reorganized the method in which visitation is calculated at each lake. Reliable numbers are available from approximately 2014 thru 2018. The total visitation at Lewisville Lake is estimated Fiscal Year (FY Oct 1 thru Sep 30) to be as follows:

FY 14: 2,505,357
FY 15: 2,146,342
FY 16: 2,693,465
FY 17: 3,665,095
FY 18: 3,881,804

A major flood event in 2015 damaged many recreation areas to the extent that some areas were closed for extended periods. Some, but not all areas reopened in 2016 and most areas were operational by 2017 resulting in a rebound in visitation.

2.5.3 Recreation Areas and Facilities

The primary outdoor recreation facilities at Lewisville Lake are managed by neighboring cities and other agencies with USACE managing Hickory Creek, Oakland, and Westlake Parks in addition to boat ramps at Big Sandy Ramp and Doe Branch Access. Table 2.24 provides a summary of the recreation facilities at Lewisville Lake, and Figure 2.12 lists the recreation areas with various amenities in each of those areas.

Table 2.24 Summary of Recreation Facilities

Facilities	Number (and Detail)
Campsites: Total	449
Campsites: Electric and Water	400
Campsites: Electric, Water, and Sewer	16
Campsites: Group Campsites	25
Picnic Sites	400
Group Picnic Sites	22
Group Picnic Shelters	23
Cabins	44
Lodge/Inn/Hotel/Motel	1 (8 rooms)
Playgrounds	21
Court: Multipurpose	1
Court: Volleyball	19
Field: Baseball	19
Field: Soccer	24
Frisbee/Disc Golf Course	1
Golf Course	5
Trails: Equestrian	2 (6.2 miles)
Trails: Hiking	9 (12.4 miles)
Trails: Multipurpose	11 (31.2 miles)
Trails: Paddle Trail	1 (1 mile)
Marinas	6
Slips: Dry Storage	824
Slips: Wet Slips	2,708
Boat Ramps	23

Facilities	Number (and Detail)
Swimming Beaches	7
Interpretive Sites	4
Activity Center Buildings	3

Source: OMBIL

Figure 2.12 Recreation Areas and Amenities at Lewisville Lake

USACE Managed

$ USACE Fees Collected

Managed by Others in *Italics*

Camping
- **E** Electric Campsites
- **N** Non-electric Campsites
- **T** Pull Through Campsites
- **G** Group Camping
- **D** Dump Station

Fishing
- **C** Fish Cleaning Stations
- **D** Fishing Docks
- **P** Fishing Piers

Other
- **X** Exists At Lake

Picnic
- **A** Picnic Area
- **G** Group Picnic
- **GS** Group Picnic Shelter

Swimming
- **BE** Beach
- **P** Swimming Pool

Trails
- **B** Bike Trails
- **Q** Equestrian Trails
- **H** Hiking Trails
- **I** Hiking Trails – Interpretive
- **R** Off-Road Vehicle Trails
- **M** Multipurpose Trails
- **W** Water Trails

Recreation Area	Camping	Lodging	Showers	Boat Ramps	Marina	Gas	Fishing Facilities	Picnic Area/ Shelter	Playground	Swimming Area	Trails	Golf Course	Amphitheater	Grocery/Snack Bar
Arrowhead				X				A GS	X					
Big Sandy Ramp				X										
Clear Creek Natural Heritage Area											H			
Copperas Branch														
Cottonwood								A	X		H			
Cottonwood Creek Marina					X									
Crescent Oak Ramp				X										
Dallas Corinthian Yacht Club				X	X									
Doe Branch Access				X										
Eagle Point Marina				X	X									
East Hill			X	X				A GS	X	BE				
Eastvale				X				A			M			S
Falcons Flying Club								GS						
Greenbelt Access 380				X				A			Q M			
Harbor Lane								A	X					
Hickory Creek $	E N D		X	X				A GS	X		M			
Hidden Cove Park	E N		X	X	X		C	A GS	X	BE	H			
Lakeview Marina				X	X			GS						
Lewisville Lake Environmental Learning Area	N G							GS			H W			
Lewisville Lake Park	E D		X	X			P	A G GS	X	BE		X		S
Little Elm	N			X				A GS	X	BE	M		X	S
Oakland			X	X				A GS	X					
Pier 121 Marina				X	X									
Pilot Knoll	E D		X	X				A GS	X		M			

Recreation Area	Camping	Lodging	Showers	Boat Ramps	Marina	Gas	Fishing Facilities	Picnic Area/ Shelter	Playground	Swimming Area	Trails	Golf Course	Amphitheater	Grocery/Snack Bar
Point Vista				X				A	X					
Stewarts Creek	E D			X				A GS	X	BE	M	X		
Sycamore Bend	N			X				A GS	X		M			
Tower Bay Access				X										
Tribute Golf Course		X	X								M	X		S
Westlake $			X	X				A GS						
Willow Grove	E D		X	X			P	A GS	X	BE	H			
YMCA of Dallas								A GS		BE	H Q		X	

Source: OMBIL

2.5.3 Recreational Analysis – Trends

The Texas Outdoor Recreation Plan (TORP) published by TPWD in 2012 and 2017 is a comprehensive recreational demand study completed by Texas Parks and Wildlife. Some of the information in the TORP was extracted directly from the National Survey on Recreation and the Environment (NSRE) and reports generated by the USFWS. The top five needs identified in the 2017 TORP Survey by Texas residents are listed in Table 2.25, while the top five needs of those in Region 6, which includes Lewisville Lake, are listed in Table 2.26. The needs highlighted in these tables will increase as the population continues to grow and urban environments expand. Many of these needs can be met by having a regional resource like Lewisville Lake that can provide some of these amenities to the rapidly expanding population of the Dallas-Fort Worth Metropolitan Area.

Table 2.25 Top Five Recreation Opportunities Needed across Texas

Recreation Opportunity	Percent Wanting the Opportunity
Trails / places to hike or bike	23.5%
Pools / swimming facilities (other than lakes)	9.8%
More parks / more park capacity	9.8%
Campgrounds (including cabins)	6.4%
Fishing places and access	6.1%

SOURCE: 2017 TORP Survey Report

Table 2.26 Top Five Recreation Opportunities Needed by Residents in Region 6

Recreation Opportunity	Percent Wanting the Opportunity
Trails / places to hike or bike	26.1%
Pools / swimming facilities (other than lakes)	20.9%
More parks / more park capacity	12.1%
Sports Fields	7.0%
Boat and water access / put-ins / places to boat	6.4%

SOURCE: 2017 TORP Survey Report

Interest in watercraft sports such as boating, canoeing and kayaking continue to hold strong interest in recreation. Table 2.27 illustrates that over 35% of the U.S. population surveyed participate in boating activities. Canoeing and Kayaking are seeing an increase in participation amongst those surveyed. Table 2.28 shows that watercraft sports are also popular with Texas residents and specifically to those in the region.

Table 2.27 Percent of U.S. Residents Participating in Recreational Boating over Time

Activity	1982-1983	1994-1995	1999-2001	2005-2009
Boating	28.0%	37.8%	36.3%	35.6%
Canoeing/Kayaking	8.0%	9.5%	11.5%	12.4%

SOURCE: Cordell & Green, National Survey on Recreation and the Environment, Texas Reports 1994-95, 2000-01 and 2006-09, 2009; TORP – 2012

Table 2.28 Percent of Texas and Region 6 Residents Participating in Recreational Boating in 2017

Activity	Texas	Region 6
Motorized boating, such as boating with a motorboat, speedboat, powerboat, or personal watercraft	16.9%	17.0%
Non-motorized boating, such as boating with a sailboat, canoe, kayak, or rowing	13.0%	11.0%
Kayaking	9.0%	7.1%

SOURCE: 2017 TORP Survey Report

While participation in hunting and fishing show stable growth across those surveyed, there is a large jump in the population who are participating in the more passive activity of wildlife watching. As seen in Table 2.29, from 2001 to 2006 almost a million more people reported participating in this activity. The 2017 TORP reports that fishing is the top outdoor activity for Texas children with 22% of Texas children having participated in fishing. Across the entire state, 31% of all residents have participated in fishing, and within Region 6, 29% have participated in fishing. Hunting remains popular, with 13.5% of all Texas residents and 14.1% of Region 6 residents having participated in hunting.

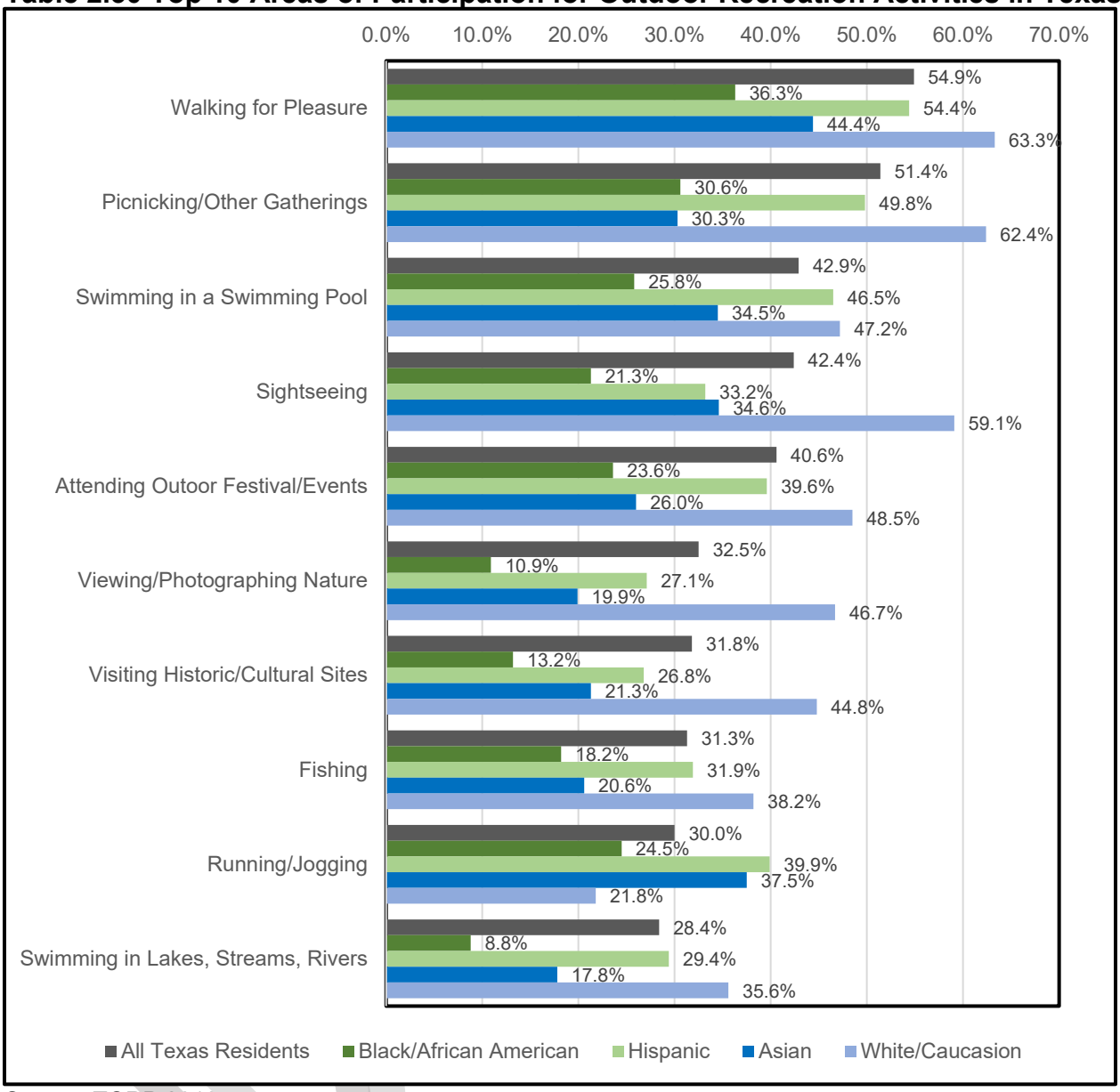
Table 2.29 Participation in Hunting, Fishing, and Wildlife Watching in Texas

Participation in Hunting, Fishing and Wildlife Watching in Texas (Residents and Non-Residents, 16 years and older)				
Texas	Fishing	Hunting	Wildlife Watching	Total Participants (Fishing + Hunting + Wildlife
1996 Survey	2.5 million	829 thousand	3.6 million	4.7 million
2001 Survey	2.4 million	1.2 million	3.2 million	4.9 million
2006 Survey	2.5 million	1.1 million	4.2 million	6.0 million

Source: 1996, 2001, 2006 National Survey of Fishing, Hunting and Wildlife-Associated Recreation for Texas, USFWS; TORP 2012

No specific survey has been conducted at Lewisville Lake to determine the ethnic/racial makeup of visitors, but the TORP provides an indication of Texas residents who participate in the top 10 outdoor recreation activities by different ethnic/racial groups, as shown in Figure 2.13. This figure presents in graphical form how minority groups often participate much less in the top outdoor recreation activities when compared to white/Caucasian residents. Parks near populated regions, such as those at Lewisville Lake, presents a prime opportunity to meet the needs of people across all ethnic/racial groups.

Table 2.30 Top 10 Areas of Participation for Outdoor Recreation Activities in Texas



Source: TORP 2018

Several cities around Lewisville Lake have parks and recreation master plans, and some even have trail system master plans. These plans describe that many nearby cities place a priority on having an extensive and connected multi-use trail network. In addition to trails, other top priorities for residents include access to nature, access to the lake, fishing, athletic fields, picnic areas, and improved accessibility.

2.6 REAL ESTATE

Initial land acquisition for Lewisville Lake followed the pre-1953 acquisition policy which generally required fee simple acquisition up to a blocked-out line that closely encompassed the 537.0 contour. In lieu of fee simple acquisition, flowage easements

were acquired in the upper reaches of most tributaries where the configuration of required lands was relatively narrow. Implementation of the 1953 – 1962 acquisition policy, sometimes referred to as the Eisenhower Policy, resulted in USACE reconveying (selling) approximately 2,752 acres back to the original landowners in the early 1960s. In general, these lands were sold down to about the 527.5 contour with flowage easements retained up to elevation 537.0. When the conservation pool was raised from 515.0 to 522.0 in the 1980s, a few tracts of additional land were acquired around Lewisville Lake totaling 681 acres.

Greenbelt Corridor

Development of recreation facilities associated with Ray Roberts Lake included land acquisition and construction of trails and trail access points on what is now known as the Ray Roberts Lake State Park Greenbelt Corridor. The Greenbelt Corridor runs approximately ten miles from an access point on Highway 380 north to Ray Roberts Dam. Much of the Greenbelt Corridor is located on fee-owned lands that are part of Lewisville Lake, but much of the northern portion of the Corridor required the acquisition of a strip of land along both sides of the Elm Fork of the Trinity River. The lands acquired for the Greenbelt Corridor totaled 1136 acres. In addition to the fee simple acquisition of lands for the Greenbelt Corridor, approximately 475 acres of conservation easements were also acquired to serve as a buffer between private land and the Greenbelt.

The area acquired in fee simple title at Lewisville Lake, taking into account the reconveyance of lands and the additional land acquisition required for the pool raise, is 46,001 acres, which includes land for construction of the dam and for the operation and maintenance of the project and public use areas. In addition to the fee land acquisition, approximately 8,712 acres of flowage easement was acquired in the upper reaches of several tributaries up to elevation 537.0 NGVD. The flowage easement estate conveys to the Government the right to periodically inundate the land for project operations purposes and to prevent human habitation on the easement or placement of fill material and changing contours in a manner that would reduce flood storage capacity.

Urban expansion in the cities of Lewisville, The Colony, Frisco, Little Elm, Denton, Shady Shores, Lake Dallas, Corinth, Hickory Creek, Copper Canyon, and Highland Village has almost completely surrounded Lewisville Lake. The road and utility network serving the expansion has resulted in numerous real estate outgrants on USACE fee and flowage easement lands. A summary of existing outgrants is provided in Table 2.30 as follows:

Table 2.31 Listing of Outgrants at Lewisville Lake

Leases:	21
Park and Recreation Lease	11
YMCA	1
Water Storage Tanks	1
Fish and Wildlife Lease	4
Marinas	6
Model Airplane Field	1
LLELA	1
Easements:	185
Sewer/water/storm drainage	64
Gas pipeline	8
Road	31
Electric	62
Water structure	7
Railroad	4
Other	9
Licenses:	154
Electric line	31
Waterline	104
Erosion control	13
Permits:	1
Doppler Weather Radar Site	1
Consent/Other:	341
Pond	7
Pool	29
Erosion Control	36
Driveway	15
Garage	6
Storage Building/Shed/Barn	19
Porch/Deck/Patio	41
Septic/Sewer/Waterline	85
Gazebo	6
Electric Line	31

Some lands were acquired subject to existing easements which are not recorded in the permanent real estate outgrant database.

2.7 PERTINENT PUBLIC LAWS

Numerous public laws apply directly or indirectly to the management of Federal land at Lewisville Lake. Listed below are several key public laws that are most frequently referenced in planning and operational documents. Refer to Appendix D for a more comprehensive listing.

- Public Law 78-534, Flood Control Act of 1944. - Section 4 of the act as last amended in 1962 by Section 207 of Public Law 87-874 authorizes USACE to construct, maintain, and operate public parks and recreational facilities in reservoir areas and to grant leases and licenses for lands, including facilities, preferably to Federal, State or local governmental agencies.

- Public Law 85-624, Fish and Wildlife Coordination Act 1958. - This act as amended in 1965 sets down the general policy that fish and wildlife conservation shall receive equal consideration with other project purposes and be coordinated with other features of water resource development programs. Opportunities for improving fish and wildlife resources and adverse effects on these resources shall be examined along with other purposes which might be served by water resources development.

- Public Law 86-717, Forest Conservation. - This act provides for the protection of forest and other vegetative cover for reservoir areas under this jurisdiction of the Secretary of the Army and the Chief of Engineers.

- Public Law 89-72, Federal Water Project Recreation Act of 1965. - This act requires that not less than one-half the separable costs of developing recreational facilities and all operation and maintenance costs at Federal reservoir projects shall be borne by a non-Federal public body. A HQUSACE/OMB implementation policy made these provisions applicable to projects completed prior to 1965.

- Public Law 91-190, National Environmental Policy Act of 1969 (NEPA). – NEPA declared it a national policy to encourage productive and enjoyable harmony between man and his environment, and for other purposes. Specifically, it declared a "continuing policy of the Federal Government... to use all practicable means and measures...to foster and promote the general welfare, to create conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans." Section 102 authorized and directed that, to the fullest extent possible, the policies, regulations and public law of the United States shall be interpreted and administered in accordance with the policies of the Act. It is Section 102 that requires consideration of environmental impacts associated with Federal actions. Section 101 of NEPA requires the federal government to use all practicable means to create and maintain conditions under which man and nature can exist in productive harmony.

  Specifically, Section 101 of the National Environmental Policy Act declares:
  - Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
  - Assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
  - Attain the widest range of beneficial uses of the environment without degradation risk to health or safety or other undesirable and unintended consequences;

- Preserve important historic, cultural, and natural aspects of our national heritage and maintain wherever possible an environment which supports diversity and variety of individual choice;
- Achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities: and
- Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

- PL 89-665, Historic Preservation Act of 1966. - This act provides for: (1) an expanded National Register of significant sites and objects; (2) matching grants to states undertaking historic and archeological resource inventories; and (3) a program of grants-in aid to the National Trust for Historic Preservation; and (4) the establishment of an Advisory Council on Historic Preservation. Section 106 requires that the President's Advisory Council on Historic Preservation have an opportunity to comment on any undertaking which adversely affects properties listed, nominated, or considered important enough to be included on the National Register of Historic Places.

- PL 101-601, Native American Graves Protection and Repatriation Act (16 November 1990), requires Federal agencies to return Native American human remains and cultural items, including funerary objects and sacred objects, to their respective peoples.

CHAPTER 3 - RESOURCE GOALS AND OBJECTIVES

3.1 INTRODUCTION

This chapter sets forth goals and objectives necessary to achieve the USACE vision for the future of Lewisville Lake. The terms "goal" and "objective" are often defined as synonymous, but in the context of this Master Plan goals express the overall desired end state of the Master Plan whereas resource objectives are specific task-oriented actions necessary to achieve the overall Master Plan goals.

3.2 RESOURCE GOALS

The following statements, paraphrased from *EP 1130-2-550*, Chapter 3, express the goals for the Lewisville Lake Master Plan:

GOAL A. Provide the best management practices to respond to regional needs, resource capabilities and capacities, and expressed public interests consistent with authorized project purposes.

GOAL B. Protect and manage project natural and cultural resources through sustainable environmental stewardship programs.

GOAL C. Provide public outdoor recreation opportunities that support project purposes and public interests while sustaining project natural resources.

GOAL D. Recognize the unique qualities, characteristics, and potentials of the project.

GOAL E. Provide consistency and compatibility with national objectives and other State and regional goals and programs.

In addition to the above goals, USACE management activities are guided by USACE-wide Environmental Operating Principles as follows:

- Strive to achieve environmental sustainability. An environment maintained in a healthy, diverse, and sustainable condition is necessary to support life.
- Recognize the interdependence of life and the physical environment. Proactively consider environmental consequences of USACE programs and act accordingly in all appropriate circumstances.
- Seek balance and synergy among human development activities and natural systems by designing economic and environmental solutions that support and reinforce one another.
- Continue to accept corporate responsibility and accountability under the law for activities and decisions under our control that impact human health and welfare and the continued viability of natural systems.
- Seek ways and means to assess and mitigate cumulative impacts to the environment; bring systems approaches to the full life cycle of our processes and work.
- Build and share an integrated scientific, economic, and social knowledge base that supports a greater understanding of the environment and impacts of our work.
- Respect the views of individuals and groups interested in USACE activities; listen to them actively, and learn from their perspective in the search to find innovative win-win solutions to the nation's problems that also protect and enhance the environment.

3.3 RESOURCE OBJECTIVES

Resource objectives are clearly written statements that respond to identified issues and that specify measurable and attainable activities for resource development and/or management of the lands and waters under the jurisdiction of the Fort Worth District, Lewisville Lake Project Office. The objectives stated in this Master Plan support the goals of the Master Plan, USACE Environmental Operating Principles (EOPs), and applicable national performance measures. They are consistent with authorized project purposes, federal laws and directives, regional needs, resource capabilities, and they consider public input. Recreational and natural resources carrying capacities are also accounted for during development of the objectives found in this Master Plan. Regional and state planning documents including TPWD's Texas Conservation Action Plan (TCAP) and TORP are monitored for applicability to Lewisville Lake. Finally, these

objectives are consistent with the management objectives of numerous lessees that manage parks and other USACE lands at Lewisville Lake.

The objectives in this master plan provide project benefits, meet public needs, and foster environmental sustainability for Lewisville Lake to the greatest extent possible. They include recreational objectives; natural resource management objectives; visitor information; education and outreach objectives; general management objectives; and cultural resource management objectives.

Table 3.1 Recreational Objectives

Recreational Objectives	Goals				
	A	B	C	D	E
In cooperation with all lessees operating recreation areas at Lewisville Lake, evaluate the demand for improved recreation facilities and increased public access on USACE-administered public lands and water for recreational activities (i.e. camping, walking, hiking, biking, boating, fishing, wildlife viewing, etc.) and facilities (i.e. campsites, picnic facilities, overlooks, all types of trails, boat ramps, courtesy docks, interpretive signs/exhibits, and parking lots).	*		*		
Monitor the condition and quality of day use and campground facilities within leased areas and areas managed directly by USACE including, but not limited to: roads, sewer hook ups, potable water systems, electrical service, concrete or asphalt recreational vehicle pads, tent pads, restrooms, trails, pavilions, and park entrances.	*		*		
Monitor public use levels (with a special focus on boating congestion and marina capacity) and evaluate potential impacts from overuse and crowding. Take action to prevent/remediate overuse, conflict, and public safety concerns.	*		*		

Recreational Objectives	Goals				
	A	B	C	D	E
Evaluate water surface classification and regulations with emphasis on designated quiet water or no-wake areas, natural resource protection, quality recreational opportunities, and public safety concerns.	*				
Follow the EOP associated with recreational use of waterways for all water-based management activities and plans.		*	*		*
Increase universally accessible facilities on Lewisville Lake and encourage lessees to do the same.	*		*		*
Consider flood/conservation pool elevations to address potential impact to recreational facilities (i.e. campsites, boat ramps, courtesy docks, etc.).	*	*	*	*	
Ensure consistency with USACE Recreation Strategic Plan.					*
Monitor the TCAP, the TORP, and adjacent municipality plans to insure that USACE is responsive to outdoor recreation trends, public needs and resource protection within a regional framework. All plans by others will be evaluated in light of USACE policy and operational aspects of Lewisville Lake.	*	*	*		*

*Denotes that the objective helps to meet the specified goal.

Table 3.2 Natural Resource Management Objectives

Natural Resource Management Objectives	Goals:				
	A	B	C	D	E
Consider flood/conservation pool levels to ensure that natural resources are managed in ways that are compatible with primary project purposes of flood risk management and water supply.	*	*		*	
Ensure project lands are managed with preservation and conservation of natural habitat and open space as a primary objective in order to maintain availability of public open space.	*			*	
Actively manage and conserve fish and wildlife resources, especially migratory and other special status species, by implementing ecosystem management principles. Key among these principles is the use of native species adapted to the ecological region in restoration and mitigation plans.	*	*		*	*
Consider watershed approach during decision-making process.					*

Natural Resource Management Objectives	Goals: A	B	C	D	E
Optimize resources, labor, funds, and partnerships for protection and restoration of fish and wildlife habitats.		*			*
Minimize activities that disturb the scenic beauty and aesthetics of the lake.	*	*	*	*	
Continually evaluate erosion control and sedimentation issues at Lewisville Lake and develop alternatives to resolve the issues.	*	*			*
Address unauthorized uses of public lands such as off-road vehicle use, trash dumping, unauthorized fires, fireworks, poaching, clearing of vegetation, unauthorized trails and paths, and placement of advertising signs that create negative environmental impacts.	*	*	*	*	*
Monitor lands and waters for invasive, non-native, and aggressively spreading native species and take action to prevent and/or reduce the spread of these species. Potential invasive species of great concern are the zebra mussel, Chinese privet (Ligustrum sinense), and emerald ash borer. Implement prescribed fire as a management tool to control the spread of noxious plants including Johnsongrass, King Ranch bluestem, and eastern redcedar, and to promote the vigor of native prairie grasses and forbs.	*	*		*	*
Protect and/or restore important native habitats such as riparian zones, wetlands, and native prairie where they occur, or historically occurred on project lands. Special emphasis should be taken to protect and/or restore special or rare plant communities, to include actions that promote butterfly and/or pollinator habitat, migratory bird habitat, and habitat for birds listed by USFWS as Birds of Conservation Concerns. Some of these habitats may be classified as Environmentally Sensitive Areas.	*	*	*	*	*
Administer the Shoreline Management Program to balance private shoreline uses (such as mowing or vegetation removal requests along the Federal property boundary, or paths to the shoreline) with wildlife habitat protection and impacts to public use.	*		*		

*Denotes that the objective helps to meet the specified goal.

Table 3.3 Visitor Information, Education, and Outreach Objectives

Visitor Information, Education, and Outreach Objectives	Goals				
	A	B	C	D	E
Provide more opportunities for communication with lessees, agencies, special interest groups, and the general public (i.e. comment cards, updates to City Managers, web page).	*			*	*
Implement more educational, interpretive, and outreach programs at the lake office and around the lake. Topics to include: history, lake operations (flood risk management and water supply), water safety, recreation, nature, cultural resources, ecology, and USACE missions.	*	*	*	*	*
Enhance network among local, state, and federal agencies in order to exchange lake-related information for public education and management purposes.	*			*	*
Increase public awareness of special use permits or other authorizations required for special activities, organized special events, and commercial activities on public lands and waters of the lake.	*	*	*		
Capture trends concerning boating accidents and other incidents on public lands and waters and coordinate data collection with other public safety officials.	*		*	*	*
Promote USACE Water Safety message.	*		*	*	*
Educate adjacent landowners on shoreline management policies and permit processes in order to reduce encroachment actions.	*	*	*	*	*

*Denotes that the objective helps to meet the specified goal.

Table 3.4 General Management Objectives

General Management Objectives	Goal				
	A	B	C	D	E
Maintain the USACE boundary line to ensure it is clearly marked and recognizable in all areas to reduce habitat degradation and encroachment actions.	*	*		*	
Secure sustainable funding for the shoreline management program.	*	*	*	*	*
Ensure consistency with USACE Campaign Plan (national level), IPlan (regional level), and OPlan (District level).					*

General Management Objectives	Goal				
	A	B	C	D	E
Ensure green design, construction, and operation practices, such as the Leadership in Energy and Environmental Design (LEED) criteria for government facilities, are considered as well as applicable Executive Orders.					*
Carefully manage non-recreation outgrants such as utility and road easements in accordance with national guidance set forth in ER-1130-2-550 and applicable chapters in ER 405-1-12.	*	*			*
Manage project lands and recreational programs to advance broad national sustainability goals including energy conservation, increased use of renewable energy, reduced use of potable water, waste reduction and recycling, as set forth in Executive Order 13834 and related USACE policy.					*

*Denotes that the objective helps to meet the specified goal.

Table 3.5 Cultural Resources Management Objectives

Cultural Resources Management Objectives	Goal				
	A	B	C	D	E
Monitor and coordinate lake development and the protection of cultural with lessees and appropriate entities.	*	*		*	*
Increase public awareness and education of regional history.		*		*	*
Two sites at Lewisville Lake, the Cranston Pottery Kiln and the Old Alton Bridge are listed on the National Register of Historic Places (NRHP). Of the remaining 160 known sites ten have been determined eligible for the NRHP and 136 have been determined ineligible. Fourteen sites have not been evaluated for eligibility. The project office will ensure any future historical preservation is fully integrated into the Lewisville Lake Master Plan and the planning decision making process (Section 106 and 110 of the National Historic Preservation Act) on public lands surrounding the lake.		*		*	*
Develop partnerships that promote and protect cultural resources at Lewisville Lake.		*	*	*	*
Stop unauthorized use of public lands as it pertains to the illegal excavation and removal of cultural resources.		*		*	*

*Denotes that the objective helps to meet the specified goal.

Photo 3.1 The Minor-Porter Log Cabin and Poneer Homestead reconstructed by the LLELA consortium on the LLELA area

CHAPTER 4 - LAND ALLOCATION, LAND CLASSIFICATION, WATER SURFACE, AND PROJECT EASEMENT LANDS

4.1 LAND ALLOCATION

All lands at USACE water resource development projects are allocated by USACE into one of four categories in accordance with the congressionally authorized purpose for which the project lands were acquired. There are four possible categories of allocation identified in USACE regulations including Operations, Recreation, Fish and Wildlife, and Mitigation. At Lewisville Lake, the land allocation categories that apply are Operations and Recreation. Operations allocation, is defined as those lands that are required to operate the project for the primary authorized purposes of flood risk management, hydroelectric power, and water conservation. Recreation allocation, is defined as lands acquired specially for the authorized purpose of recreation, referred to as separable recreation lands. The remaining allocations of Fish and Wildlife, and Mitigation would apply only if lands had been acquired specifically for these purposes. The entire fee simple federal estate at Lewisville Lake, including fee-owned land acquired for the Ray Roberts Greenbelt is 47,137 acres (46,001associated with Lewisville Lake plus 1,136 acres acquired for the Greenbelt) of which 27,175 acres is inundated at conservation pool. The 1,136 acres acquired for the Greenbelt are

allocated as Recreation lands with the remaining 46,001 acres allocated to Project Operations.

4.2 LAND CLASSIFICATION

The 2004 MP supplement used only three land classifications including Project Operations, Recreation and Wildlife. This MP reclassifies project lands according to standard protocol set forth in Chapter 3 of EP 1130-2-550, dated January 2013. The new land classifications in this MP include classifications that are similar to prior classifications but a direct comparison of prior and new classifications is not possible. The prior land classifications were intended to simplify the overall classification of lands, but are not refined sufficiently to describe existing and potential public uses. Additionally, in the 15 years since the 2004 MP supplement was published, wildlife habitat values, surrounding land use, and regional recreation trends have changed giving rise to the need for revised classifications. Refer to Table 8.1 in Chapter 8 for a summary of land classification changes from the prior classifications to the current classifications.

4.2.1 Current Land and Water Surface Classifications

USACE regulations require project lands and waters to be classified in accordance with the primary use for which project lands are managed. There are six categories of classification identified in USACE regulations including:

- Project Operations
- High Density Recreation
- Mitigation
- Environmentally Sensitive Areas
- Multiple Resource Management Lands
- Water Surface

The land and water surface classifications for Lewisville Lake were established after taking into account public comments, input from key stakeholders including elected officials, city and county governments, and lessees operating on USACE land. Additionally, public comment, wildlife habitat values, and the trends analysis provided in TPWD's TORP and TCAP were also used in decision making. Maps showing the various land classifications can be found in Appendix A. Each of the land classifications, including the acreage and description of allowable uses is described in the following paragraphs.

4.2.2 Project Operations

This classification includes the lands managed for operation of the dam, project office, and maintenance yards, all of which must be maintained to carry out the authorized purpose of flood risk management. In addition to the operational activities taking place on these lands, limited recreational use may be allowed for activities such as fishing near the stilling basin. Regardless of any limited recreation use allowed on these lands, the primary classification of Project Operations will take precedent over

other uses. There are 1,083 acres of Project Operations land specifically managed for this purpose.

4.2.3 High Density Recreation (HDR)

These are lands developed for intensive recreational activities for the visiting public including day use areas, campgrounds, marinas and related concession areas. Recreation development by lessees operating on USACE lands must follow policy guidance contained in USACE regulations at ER 1130-2-550, Chapter 16. That policy includes the following statement:

> "*The primary rationale for any future recreation development must be dependent on the project's natural or other resources. This dependency is typically reflected in facilities that accommodate or support water-based activities, overnight use, and day use such as marinas, campgrounds, picnic areas, trails, swimming beaches, boat launching ramps, and comprehensive resort facilities. Examples that do not rely on the project's natural or other resources include theme parks or ride-type attractions, sports or concert stadiums, and standalone facilities such as restaurants, bars, motels, hotels, non-transient trailers, and golf courses. Normally, the recreation facilities that are dependent on the project's natural or other resources, and accommodate or support water-based activities, overnight use, and day use, are approved first as primary facilities followed by those facilities that support them. Any support facilities (e.g., playgrounds, multipurpose sports fields, overnight facilities, restaurants, camp stores, bait shops, comfort stations, and boat repair facilities) must also enhance the recreation experience, be dependent on the resource-based facilities, and be secondary to the original intent of the recreation development…"*

Lands classified for High Density Recreation are suitable for the development of comprehensive resorts. The regulation cited above defines Comprehensive Resort as follows:

> "*Typically, multi-faceted developments with facilities such as marinas, lodging, conference centers, golf courses, tennis courts, restaurants, and other similar facilities."*

At Lewisville Lake, prior land classifications included a number of areas under the high density recreation classification. Using public, agency, and lessee input, the planning team changed the classification of some of these lands to reflect current and projected outdoor recreation needs and trends. At Lewisville Lake there are 4,780 acres classified as High Density Recreation land. Refer to Figure 2.12 for a listing of the recreation facilities currently provided on the HDR lands at Lewisville Lake. Each of the High Density Recreation areas is described briefly in Chapter 5 of this Plan.

4.2.4 Mitigation

This classification is used only for lands allocated for mitigation for the purpose of offsetting losses associated with the development of the project. There are no lands at Lewisville Lake with this classification.

4.2.5 Environmentally Sensitive Areas (ESA)

These are areas where scientific, ecological, cultural, and aesthetic features have been identified. At Lewisville Lake several distinct areas have been classified as Environmentally Sensitive Areas (ESA), primarily for the protection of sensitive habitats or cultural resources. Each of these areas is discussed in Chapter 5 of this Plan and illustrated on the maps in Appendix A. There are 10,918 acres classified as ESA at Lewisville Lake.

4.2.6 Multiple Resource Management Lands (MRML)

This classification is divided into four sub-classifications identified as: Low Density Recreation, Wildlife Management, Vegetative Management, and Future/Inactive Recreation Areas. A given tract of land may be classified using one or more of these sub-classifications but the primary sub classification should reflect the dominant use of the land. Typically, Multiple Resource Management Lands support only passive, non-intrusive uses with very limited facilities or infrastructure. Where needed, some areas may require basic facilities that include, but are not limited to minimal parking space, a small boat ramp, and/or primitive sanitary facilities. The following paragraphs list each of the sub-classifications, and the number of acres and primary uses of each.

4.2.6.1 Low Density Recreation (LDR). These are lands that may support passive public recreational use (e.g., fishing, hunting, wildlife viewing, natural surface trails, hiking, etc.). Under prior land classifications, numerous areas were classified to support “low use” recreation and wildlife management. The planning process resulted in most of these areas be reclassified as either LDR or Wildlife Management. In general, the relatively narrow tracts that have shoreline along the main body of the lake and are located immediately adjacent to residential areas have been reclassified as LDR. There are 543 acres under this classification at Lewisville Lake.

4.2.6.2 Wildlife Management (WM). This land classification applies to those lands managed primarily for the conservation of fish and wildlife habitat. These lands generally include comparatively large contiguous parcels, most of which are located within the flood pool of the lake. Passive recreation uses such as natural surface trails, fishing, hunting, and wildlife observation are compatible with this classification unless restrictions are necessary to protect sensitive species or to promote public safety. There are 3,268 acres of land included in this classification at Lewisville Lake.

4.2.6.3 Vegetative Management (VM). These are lands designated for stewardship of forest, prairie, and other native vegetative cover. Passive recreation activities previously described may be allowed in these areas. There are no acres of land included in this classification at Lewisville Lake.

4.2.6.4 Future or Inactive Recreation. These are lands with site characteristics compatible with High Density Recreation development. Prior land classifications at Lewisville Lake identified several tracts for future high density recreation development. In this MP there are no areas classified as Future or Inactive Recreation.

4.2.7 Water Surface

USACE regulations specify four possible sub-categories of water surface classification. These classifications are intended to promote public safety, protect resources, or protect project operational features such as the dam and spillway. These areas are typically marked by USACE or lessees with navigational or informational buoys or signs, or are denoted on public maps and brochures. The Water Surface Classifications are shown on the Land Classification maps found in Appendix A of this Plan. The four sub-categories of water surface classification include:

- Restricted. Restricted water surface includes those areas where recreational boating is prohibited or restricted for project operations, safety, and security purposes. The areas include water intake towers and designated swim beaches at Lewisville Lake parks. There are 79 acres of restricted water surface at Lewisville Lake.

- Designated No-Wake. Designated No-Wake areas are intended to protect environmentally sensitive shorelines and improve boating safety near key recreational water access areas such as boat ramps and in select coves where paddle craft are popular. There are 23 boat ramps and 6 marinas at Lewisville Lake where no-wake restrictions are in place for reasons of public safety and protection of property. There are 1016 acres of designated no-wake water surface at Lewisville Lake.

- Fish and Wildlife Sanctuary. This water surface classification applies to areas with annual or seasonal restrictions to protect fish and wildlife species during periods of migration, resting, feeding, nesting, and/or spawning. Lewisville Lake has no water surface areas designated as a Fish and Wildlife Sanctuary.

- Open Recreation. Open Recreation includes all water surface areas available for year round or seasonal water-based recreational use. This classification encompasses the majority of the lake water surface and is open to general recreational boating. Boaters are advised through maps and brochures, or signs at boat ramps and marinas, that navigational hazards, including areas where standing dead timber may be present as depicted on the land and water surface classification maps in Appendix A, may be present at any time and at any location in these areas. Operation of a boat in these areas is at the owner's risk. Specific navigational hazards may or may not be marked with a

buoy. There are 25,542 acres of open recreation water surface at Lewisville Lake.

Future management of the water surface includes the maintenance of warning, information, and regulatory buoys as well as routine water safety patrols during peak use periods.

4.2.8 Recreational Seaplane Operations

Seaplane restrictions are part of Title 36 Code of Federal Regulations. At Lewisville Lake and other USACE lakes across the nation, areas where recreational seaplane operations are prohibited were established through public meetings and environmental assessments circa 1980. The seaplane policy for USACE Fort Worth District is found in the Notice to Seaplane Pilots (see Appendix E), which lays out general restrictions as well as lake-specific restrictions for seaplane operation. In general, recreational seaplane landings and takeoffs on Lewisville Lake are prohibited west of Interstate Highway 35, north of Highway 720 on the Little Elm arm of the lake, north of the Crescent Oaks boat ramp, and in the uncleared portions of the eastern half of the lake and within 500 feet of structures such as bridges and the dam. Once on the water, seaplanes are considered to be water vessels and fall under guidelines for watercraft. Commercial seaplane operations, such as pilot training exercises, are prohibited unless authorized by written permission from the District Engineer.

Table 4.1 provides a summary of land classifications at Lewisville Lake. Acreages were calculated by historical and GIS data. A map representing these areas can be found in Appendix A.

Table 4.1 Land and Water Surface Classification Acres at Lewisville Lake

CLASSIFICATION	ACRES
Project Operations	1,083
High Density Recreation	4,780
Environmental Sensitive Areas	10,918
Multiple Resource Managed Lands - Low Density Recreation	543
Multiple Resource Managed Lands - Wildlife Management	3,268
Water Surface: Restricted	79
Water Surface: Designated No-Wake	1,016
Water Surface: Open Recreation	25,542

Note: Acreages were measured using GIS technology and may vary from the official land acquisition records. Acreage varies depending on changes in lake levels, sedimentation and shoreline erosion.

4.3 PROJECT EASEMENT LANDS

Project Easement Lands are primarily lands on which easement interests were acquired. Fee title was not acquired on these lands, but the easement interests convey to the Federal government certain rights to use and/or restrict the use of the land for specific purposes. Easement lands are typically classified as Operations

Easement, Flowage Easement, and/or Conservation Easement. At Lewisville Lake, flowage easement lands exist for one primary purpose. A flowage easement, in general, grants to the government the perpetual right to temporarily flood/inundate private land during flood risk management operations and to prohibit activities on the flowage easement that would interfere with flood risk management operations such as placement of fill material or construction of habitable structures. There are approximately 8,712 acres of flowage easements lands and 475 acres of conservation easements at Lewisville Lake.

CHAPTER 5 - RESOURCE PLAN

5.1 MANAGEMENT BY CLASSIFICATION

This chapter describes the management plans for each land use classification within the Master Plan. The classifications that exist at Lewisville Lake are Project Operations (PO), High Density Recreation (HDR), Environmentally Sensitive Area (ESA), and Multiple Resource Management Lands (MRML) on which a predominant use is specified including Low Density Recreation (LDR), Vegetative Management (VM) and Wildlife Management (WM). The water surface is also classified into sub-classifications of Restricted, Designated No Wake, and Open Recreation. The management plans describe how these project lands and water surface will be managed in broad terms. A more descriptive plan for managing these lands can be found in the Lewisville Lake OMP or the park master plans prepared by the various land managing lessees. Acreages shown for the various land classifications was calculated using GIS technology and may not agree with lease documents, prior publications, or official land acquisition records.

5.2 PROJECT OPERATIONS

The Project Operations (PO) classification is land associated with the dam, spillway, levees, lake office, maintenance facilities, and other areas managed solely for the operation and fulfillment of the primary missions of flood risk management and water conservation at Lewisville Lake. There are 1,083 acres of lands under this classification, all of which are managed by the USACE. Public fishing access as well as access for launching paddle craft is currently allowed in the area immediately downstream from the stilling basin. This recreational public use is considered by USACE to be incidental to operational needs and is subject to termination if necessary for project operational purposes. USACE currently has no plans to curtail this recreational use, but future dam maintenance needs or security concerns could result in cessation of this use. The management plan for the PO lands is to continue providing physical security necessary to ensure sustained operations of the dam and related facilities including restricting public access in hazardous locations near the dam and spillway.

5.3 HIGH DENSITY RECREATION

Lewisville Lake has 4,780 acres classified as High Density Recreation (HDR). These lands are referred to as parks and are developed, or suitable to be developed, for intensive recreational activities for the visiting public including day use areas, campgrounds and commercial concessions within the areas classified as HDR. Other land classifications exist within designated parks including ESA, MRML-WM, and MRML-LDR.

As noted in Chapter 4, national USACE policy set forth in ER 1130-2-550, Chapter 16, limits recreation development on USACE lands to those activities that are dependent on a project's natural resources and typically includes water-based activities, overnight use and day use such as marinas, campgrounds, picnic areas, trails, swimming beaches, boat launching ramps and comprehensive resorts. Examples of activities that are not dependent on a project's natural resources include, athletic fields for organized sports, theme parks or ride-type attractions, sports or concert stadiums, and stand-alone facilities such as restaurants, bars, motels, hotels, and golf courses.

The currently developed parks operated by USACE and others are listed in Chapter 2 in Figure 2.12. The primary recreation facilities offered in each park are listed in the table. Provided in the following sections is a description of HDR areas currently operated by USACE followed by a description of each HDR area operated by others. Campgrounds or campsites managed directly by USACE at Lewisville Lake are defined by USACE as Class A campgrounds which provide a full range of facilities but may or may not have sewer hookups (see Appendix M of EP 1130-2-550 for a full definition of Class A campgrounds).

5.3.1 Current Campgrounds Operated by USACE

Hickory Creek Park

General Description: This park is a premier campground operated by USACE. The park consists of 246 acres of which 100 acres are currently developed. The park has 137 campsites (10 primitive campsites and 20 group sites), 4 restrooms, 2 vault toilets, a 2 lane boat ramp, and a dump station. A controlled entrance area is open year around from 6 a.m. – 10 p.m.

Management: At this time, no serious management concerns exist. The park opened in October 1990. During original construction of the park in the mid 1980's, a water tower was installed as part of the potable water system for the park. Subsequently, the park was hooked up to the Lake Cities Municipal Utility Authority water supply and use of the

tower was discontinued. Options are being considered for removal of the old water tower.

Needed Facilities: Significant repair work is underway and no new facilities or upgrades are envisioned until repair work from periodic flooding is complete. Part of the repair work includes the upgrade of all campsites to 50 AMP electrical service.

5.3.2 Current Day Use Parks Operated by USACE

Oakland and Westlake Parks

General Description: The two parks consist of 853 acres with approximately 120 acres presently developed. A controlled entrance area is open year around from 6 a.m. – 10 p.m. and controls access into both parks. There are 4 waterborne toilets – 3 with showers, 2, 2- lane boat ramps, a beach area, 4 group shelters, 69 picnic sites, and a dump station. Undeveloped area is available for fishing, hiking, and swimming by pedestrian traffic. Oakland Park was formerly operated by USACE as a campground but has been converted to day use.

Management: Flooding is an issue along the south shoreline of Oakland Park. This south shoreline area remains closed indefinitely due to flood damages.

Needed Facilities: Oakland and Westlake Parks were damaged extensively by the extended flooding that occurred in the summer of 2015. No new facilities or upgrades are envisioned until repairs are completed. Most repairs have been accomplished in Westlake Park allowing the park to be operational, but repairs in Oakland Park are contingent on funding.

Doe Branch Park

General Description: This 100-acre area is currently designated as an open hunting area with an access road to a 1 lane boat ramp.

Needed Facilities: Minor improvements are anticipated for Doe Branch Park, but for the foreseeable future, the primary focus will be basic maintenance until flood-related damages are repaired in other higher priority areas. Repairs completed in (INSERT YEAR) included installation of pipe rail barriers as needed to prevent off-road vehicle traffic.

Fish Trap Access Area

General Description: Formerly Fish Trap Park, this 40-acre area is presently closed and undeveloped, but is used extensively by fishermen and hunters for access to the Elm Fork of the Trinity River. There is a canoe launch and gravel parking area. Management Problems: The area is often used for illegal trash dumping.

Needed Facilities: As with Doe Branch Park minor improvements are anticipated for Fish Trap Access Area, but for the foreseeable future, the area will continue to serve as a walk-in access point until flood-related damages are repaired in other higher priority areas.

Big Sandy Access Area

General Description: This 20-acre park currently has approximately 3 acres developed. The area contains a 2-lane boat ramp and a paved boat trailer parking lot. This area is open year around and along with the boat ramp at Doe Branch Park is currently available for public use without charge.

Management: The courtesy dock is frequently used for fishing and loitering by non-boaters. Non-trailered vehicles frequently park in trailer spots, thereby forcing the trailers to park in prohibited areas along the roadway.

Needed Facilities: Traffic control measures and improvement of the courtesy dock were completed in 2019. No further improvements are planned.

5.3.3 Parks and/or Recreation Areas Not Operated by USACE

Lewisville Lake Park – Leased to the City of Lewisville

General Description: Lewisville Lake Park currently consists of a 151-acre multi-use area. The park is developed to near capacity and includes 51 picnic units; 106 camping units (23 with 50 AMP service); 1 group pavilion; 2 boat launching areas (7 lanes total); 1 buoyed swimming area; 12 soccer fields; 9 softball fields; 1, 18-hole golf course; 1, 9-hole, Par 3 golf course; 1 fishing barge; 1 fee control station; 2 waterborne restrooms; 2 vault restrooms, individual camper pullouts, day use and boat ramp parking.

Management: In 2014, voters approved $7.7 million in general obligation bonds to improve the day use, campground and pavilion areas of the park. The city council authorized preparation of a master plan for the park to determine priorities for use of these funds. A contract for preparation of the master plan was awarded in February, 2020 with initiation of the effort to begin in March 2020. Improvements or enhancements to existing facilities such as boat ramps, pavilions, restrooms, playgrounds, trails, the disc golf course, campgrounds and parking areas will be considered. Shoreline stabilization, mobile concession areas, an additional toll booth, reforestation/restoration of native prairie areas and additional spaces for public gathering will be considered as well.

Tower Bay Boat Ramp and Access Area – Leased to the City of Lewisville

General Description: This area includes the Tower Bay boat ramp, parking for approximately 20 private boathouses, and a trail that leads north and traverses an undeveloped peninsula of land that was formerly known as Copperas East Park. The peninsula of land in question is entirely on the east side of Interstate Highway 35E and extends north to the highway bridge. The only facilities on the peninsula are a pedestrian trail and vault toilets. The area includes a 10 acre boat launching area. The boat ramp has 4 lanes, a courtesy dock, parking lot, and a vault restroom. There is a parking lot to accommodate approximately 20 private boathouses moored along the shoreline. The City of Lewisville is not responsible for the oversight of the boathouses. The City of Lewisville has no plans for further development of the area.

Management: The boat ramp is very popular and fills to capacity on busy days. Measures are needed to control traffic in the limited available space. Conversion of the vault toilet to a waterborne toilet is needed.

Copperas Branch Park – Leased to the City of Highland Village

General Description: This 100-acre park, which includes USACE land adjacent to the west side of IH-35 E has a significant section of shoreline and includes an Environmentally Sensitive Area known as Wichita Forest, was reduced significantly in size by the construction of the south-bound bridge of IH-35E where it crosses Lewisville Lake. All park facilities and natural resources lost to the construction were fully mitigated by TXDOT. Some of the mitigation involved construction of a pedestrian bridge over a small arm of Lewisville Lake immediately south of Highland Village Road. This small arm of Lewisville Lake is commonly referred to as Copperas Branch Lake. When Lewisville Lake drops below elevation 517.0 NGVD, water no longer flows through a culvert in Highland Village Road and Copperas Branch Lake becomes isolated from the main body of Lewisville Lake. The City of Highland Village has requested to lease all USACE land located south of Highland Village Road, and surrounding Copperas Branch Lake, and proposes to construct hiking trails along portions of Copperas Branch Lake with the intent to connect to other trails running through the town of Highland Village. Adding this land to Highland Village's current park and recreation lease will roughly double the size of Copperas Branch Park. This master plan changes the land classification around Copperas Branch Lake from the prior classification of Wildlife Management to High Density Recreation. Within the 100-acre day use area, approximately 40 acres are developed. Amenities include 2 swimming areas, 19 picnicking units, 1 boat launch area, 1 courtesy dock, 2 restrooms, 1 fee control station, 2 athletic fields and parking for day use sites and boat ramp.

Needed Facilities: Construct additional amenities such as picnic units, sand volleyball court, 30 camping sites, RV Dump station, fish cleaning station, and a pavilion to increase public use. Modify the existing athletic field with multiuse lighting. Modify the existing trail.

YMCA Lease Area

General Description: The YMCA leases a 25-acre linear tract from USACE that begins at the common boundary with Copperas Branch Park, which is leased to the City of Highland Village, on the east end and proceeds up lake (generally west) to a small unnamed cove located between Highland Lakes Drive to the west and Horseshoe Drive to the east. The lease area, known as Camp Tsungani, has been in effect since 1969. Most of the area lies below the 537.0 contour and is therefore subject to flooding. The YMCA organization maintains a chapel/office buildings, storage building, two group camp areas, an archery range, swim beach, courtesy dock, and amphitheater on the site. There are currently no plans to develop the site any further.

Pilot Knoll Park

General Description: This 90-acre park, operated by the City of Highland Village under a lease agreement with USACE, is located on the Hickory Creek Arm of the Lake on the east side of FM 2499. Prior to leasing the park to the City in the mid-2000s, USACE operated Pilot Knoll Park for many years. In meetings with representatives from the City of Highland Village, the City requested that a portion of the park classified as Wildlife Management/Environmentally Sensitive Area be reclassified to Multiple Resource

Management Land – Low Density Recreation to allow for primitive camping. USACE has determined that the area in question should remain as an Environmentally Sensitive Area. The City also stated that if municipal sewer is brought close to the park, then the City would hook the park up to that service and would abandoned the current septic tank field. The City of Highland Village did not propose additional improvements to the park. The park has 56 camping sites, 3 group pavilions, 1 boat launch, 1 courtesy dock, 1 fee control station, 37 picnic sites, 1 equestrian overnight site, a trailhead for the Elm Fork Trail, 1 waterborne public restroom, 1 vault restroom, 1 shower facility, 1 dump station, 1 playground and a swim beach.

Needed facilities: The park is currently well utilized but could use additional picnic sites, a trail connecting the camping area to the day use area, and general landscaping.

Sycamore Bend Park

General Description: This 105-acre park is located on the north side of the Hickory Creek Arm of Lewisville Lake. The park is leased to the City of Hickory Creek and currently has approximately 15 acres developed. The park extends from the west end of Harbor Lane Park (also on USACE land and leased to the City of Hickory Creek) in a westerly direction to the south side of a cove that is formed by an unnamed creek that crosses Hidden Hills Road. The City of Hickory Creek currently charges a fee to enter the park via a self-pay station. Camping is allowed in the park but is primitive with no individual water or electric hook ups. The area has 1 boat ramp, random primitive campsites, 9 picnic sites, 3 parking areas, and 2 vault, non-flush restrooms.

Management: The park floods relatively easily and can remain closed for extensive periods during flood events.

Needed Facilities: In meetings with the City Manager, the City of Hickory Creek provided USACE with a list of desired improvements in the park as follows: swim beach, disc golf course, fishing dock, new bathroom in the primitive camping area, electric hookups in the primitive campsites, larger playground, access to the current pavilion by boat trailers for fishing tournaments, campsites for recreational vehicles (RVs). These proposed facilities comply with USACE policies governing recreation outgrants (leases).

Harbor Lane Park (also referred to as Harbor Grove Park)

General Description: The 25-acre day use park is bounded on the west by Sycamore Bend Park and on the east by Hickory Creek Park. Harbor Lane Park is leased to and operated by the City of Hickory Creek. Approximately 15 acres of the park are developed with 7 picnic tables, a vault toilet, a walking trail and playground.

Needed Facilities: The City of Hickory Creek has expressed interest in constructing a disc golf course and a dog park within Harbor Lane Park. USACE does not allow dog parks within High Density Recreation areas so this proposal would not be approved.

Point Vista Boat Ramp and Access Area

General Description: This 37-acre area was once operated by USACE but is now leased to, and operated by, the City of Hickory Creek. The area is operated for day use

only with the principal facility in the area being the Point Vista boat ramp, vault restroom, courtesy dock and parking area. The remainder of the area is largely undeveloped but includes an access road and primitive picnic sites

Management: Uncontrolled vehicular access can result in unwanted activity in the area. The road used to access the entire area also serves as a city street, Point Vista Road, providing access to numerous homes.

Needed Facilities: The City of Hickory Creek currently has no plans for improvements or upgrades in the Point Vista Boat Ramp and Access Area.

Arrowhead Park

General Description: This 55-acre park, formerly operated by USACE, is currently leased to, and operated by the City of Hickory Creek as a day use park. The park extends from its entrance on Kelton Drive on the east side of IH-35E to the common boundary with Oakland Park. Approximately 22 acres of the park are currently developed with 2 boat launch areas with 2 and 4 lanes respectively, 2 courtesy docks, 5 picnic sites, group shelter, 2 vault restrooms, and parking for the boat ramps. The City of Hickory Creek charges a user fee to enter the park and collects the fees at the park entrance via a self-pay station.

Management: The two boat ramps are conveniently located adjacent to IH-35E and are often used to capacity. Better traffic control and designated parking is needed to prevent unauthorized parking of boat trailers throughout the park.

Needed Facilities: Improved traffic control and parking at boat ramps. The City of Hickory Creek has also expressed interest in constructing a volleyball court and basketball court.

Willow Grove Park

General Description: This 186-acre park is currently leased to, and operated by the City of Lake Dallas as a multi-function day use area. Approximately one-half of the park is developed and currently features a single lane boat ramp, 6 picnic units, parking lots, playground, fishing pier, swimming area, kayak rentals, 2 athletic fields, 1 vault restroom, and a trail.

Needed and Proposed Facilities: Replace the entrance kiosk with a newer version. Install new solar lights at the park on the existing solar light poles. The solar lights were damaged with the park flood of 2015. Examine and possible implement an Aqua-Park similar to the one that is operational at Meadowmere Park on Grapevine Lake. Expand the trails leading north and south of Willow Grove Park. Work with the Town of Hickory Creek to determine if we are able to connect Willow Grove Park to one of their parks with a natural or crushed rocked type of trail.

Crescent Oaks Boat Ramp

General Description: The Crescent Oaks boat ramp is a small, one-lane boat ramp that is licensed by USACE to the City of Oak Point. There is boat trailer parking space near the ramp for several vehicles. The city has expressed interest in making minor

improvements to the boat ramp to make it more usable when the lake elevation is slightly above or below the normal elevation of 522.0 NGVD. The city may also propose to improve existing parking space at the ramp.

Little Elm Park

General Description: This park is conveniently located adjacent to Highway 720 (Eldorado Parkway) in the Town of Little Elm. The park is leased to and operated by the Town of Little Elm. The park is primarily a day-use park but limited camping is available. The town charges a user fee to enter the park. This park is approximately 150-acres in size with approximately 100 acres developed. The park is well developed and includes a swimming beach, playground, amphitheater, pavilion with grill, numerous picnic sites, sand volleyball court, restrooms, limited tent camping, athletic fields and a hiking/biking trail.

Cottonwood Park

General Description: This park consists of approximately 135 acres of which about 35 acres is developed. The park is leased to and operated by the Town of Little Elm and includes a sublease to Cottonwood Creek Marina. The marina will be addressed separately. The park currently includes nine lakefront picnic sites and the Cottonwood Sports Complex that feature four ball fields for organized sports activities. The Sports Complex includes a restroom.

Proposed Facilities: The Town of Little Elm completed a Master Plan for Cottonwood Park in August 2019. The plan calls for four major recreational developments within the park to include:

- Active Outdoor Recreation Area (Trails, Ropes Course, Lookout Tower, Zip Line, Fishing Pier, Overlooks, Pavilions, Buffer Zone adjacent to neighborhood)
- Lakefront Park (Pavilions, Lakefront Playground, Picnic Area, Restrooms, Restaurant)
- Nature Activities Area (Trails, Interpretive Facilities)
- Cabins and RV Park (Rental Cabins, Primitive Campsites, RV camping, Treehouse Lodging, Shoreline Dock, General Store

Hidden Cove Park

General Description: Formerly Lewisville Lake State Park (was Hackberry Park operated by USACE prior to the State Park Status). The State relinquished the park in the mid 1990's when it was taken over under a lease agreement between USACE and The Colony. The park was renamed Hidden Cove Park by The Colony when leased from USACE. The park is currently operated by Marine Quest under a sublease arrangement with The Colony. This 584 acre mixed use park includes approximately 200 developed acres with 69 picnic units, 85 camping units, 38 screened shelters, 3 group pavilions, 1 dump station, 1 fish cleaning station, 1 group camping facility, 1 boat launching area, 4 restrooms with showers, 1 maintenance area, and a sewage treatment plant, Parking areas are paved for day, overnight, and boat use, trail, and playground. The two original park staff residences have been converted to rental lodges

and additional rental cabins have been constructed. Marine Quest is currently placing movable cabins on key campsites throughout the campgrounds and has converted an original dining hall facility into a marina office. Marine Quest has also constructed a boat trailer and RV storage compound. The Hidden Cove Marina will be addressed separately.

Proposed Facilities: Marine Quest has a development plan for the park that includes the following facilities:

- New Playgrounds
- Expand Dining hall/conference center
- 125 room lodge/activity center with pool
- Additional parking for lodge/activity center
- High ropes/challenge course
- Hike/bike trail improvements
- Mountain bike trails
- Archery range
- Disc Golf course
- Renovate athletic fields
- Upgrade water and sewer system
- Renovate entry area/add automation
- 50 Cabins
- Fishing pier
- Additional RV Park host sites
- Additional tent area sites
- Laundry facility

Wynnewood Park

General Description: The park consists of approximately 600 acres and is home to the 18-hole Tribute Golf Course and the 18-hole Old American Golf Course. The park is leased to the City of The Colony who has subleased the park to Wynnewood Peninsula, L.P., who operates the two golf courses. A marina is planned for Wynnewood Park and the City of The Colony operates a trail within the park. Wynnewood Park consists of approximately 600 acres of which approximately 400 acres is developed into golf courses. Of the remaining acreage approximately 11 acres is associated with a planned marina site and The Colony directly manages approximately 189 acres as a natural area where a 1.5 mile trail is proposed.

Proposed Facilities: Additional facilities planned for Wynnewood Park include:

- Tribute and Old American Golf Courses
  - New cart barn
  - New maintenance building
  - Expand existing maintenance building
  - Cleaning station
  - Chemical storage building
  - Material bins

    - Lean to
    - Guest cabins
    - Tree plantings

- Natural Area and Trails
    - Tribute Shoreline Nature Trail (Phase 4-one mile) to be connected to the existing The Tribute Shoreline Nature Trail (4.8 miles) The 4.8 mile existing trail segment is not located within the boundary of Wynnewood Park but is located on USACE land and is maintained by The Tribute Property Owners Association under an agreement with The Colony.
    - Wildlife observation areas
    - Pollinator fields
    - Shoreline vegetation (as needed)
    - Kayak/canoe/paddleboard rental facility

- Marina and Lakeside Park (Note: The marina development is currently being addressed in a supplemental Environmental Assessment (EA) and Feasibility Study. Approval of the following list of proposed items is contingent on completion of the EA)
    - 840 wet slips
    - Floating breakwater
    - Ship store and offices
    - Fuel dock
    - Boat and jet ski rentals
    - Restaurant
    - Parking area with entry gates
    - Event lawn
    - Sand volleyball/horseshoes/ bocce ball/ pickle ball
    - Restrooms
    - Fuel storage tanks for marina
    - Storage
    - Trees and landscape plantings with some irrigation
    - Picnic tables
    - Shoreline revetment and vegetation (as needed)

Eastvale Park

General Description: This small park is located on the west side of FM 423 in The Colony. The park is leased to the City of The Colony who has subleased the park to Blue Sky Sports Center. The park features an indoor/outdoor soccer complex, several picnic sites and a single lane boat ramp. The outdoor soccer fields occupy almost the entire park with little room left for additional development.

Stewart Creek Park

General Description: This 135-acre park is leased to the City of The Colony and currently features 28 picnic sites, several camp sites, 2 launching areas, 1 courtesy dock, 1 restroom, 1 buoyed swimming area, 1 pavilion, parking lot, playground, 1 dump station, 1 9-hole, par 3 golf course and driving range. Approximately 90 acres of the park are developed. The par 3 golf course and driving range, known as Stewart Peninsula Golf Course is separated from the main body of the park and is operated as a concession under a sublease agreement.

Proposed Facilities: The Colony has plans to upgrade the portion of the park that supports lakeside recreation as follows:

- Relocate swim beach area
- Install shelters over uncovered picnic units
- Install kiosk entry system with automated gates
- Install security cameras
- Install a new gatehouse and reconfigure entry area
- Add separate exit lane to improve boat ramp circulation
- Plant additional trees
- Add dumpster enclosures
- Resurface roadways
- Install paddle sport launch and storage
- Provide paddle sport rentals
- Add 2 pavilions with picnic tables
- New restroom buildings
- Extend trail within the park
- Install a climate controlled grand event pavilion
- Add parking for event pavilion, fishing pier and swim beach
- Add more RV sites
- Maintain and upgrade other existing amenities within the park

East Hill Park

General Description: This park consists of approximately 256 acres and is operated under a direct lease to Safe Harbor Marinas. Approximately 34 acres of the park are developed and features a day use area with 28 picnic sites, 2 group shelters, courtesy dock, picnic shelter, parking area, swimming area, 4 lane boat ramp, restroom (vault w/showers). High visitation for boat ramp use has created the need for a pass system to avoid over-capacity. The park also includes the Pier 121 Marina complex addressed under a separate section in this Plan.

Management: The day use area is too small to accommodate the number of people desiring to use the area. Solutions to addressing the problem of overcrowding are being considered for the long term management and sustainability of the recreational resource.

Proposed Facilities: The lessee envisions numerous developments within the East Hill Park in areas separate from Pier 121 Marina. Proposed developments include:

- Campground
- Hotel
- Trail System
- Dog Park
- Playground
- Amphitheater
- RV Park
- Additional Parking

The marina owner has also proposed items such as a wave park, RV sales, model homes park, restaurant, and gym/spa. Some of the proposed facilities may not be authorized and approval of some items will require analysis pursuant to NEPA.

5.3.4 Marinas

There are six operational marinas on Lewisville Lake and one marina in the planning phase. Each is described as follows:

Eagle Point Marina

General Description: The Eagle Point Marina is located in Lewisville Lake Park (leased by USACE to the City of Lewisville) and is operated under a sublease arrangement with the City of Lewisville. The marina currently has approximately 738 slips for a combination of sailboats, cabin cruisers and smaller water craft. The marina offers boat sales, boat repairs and has full service restaurant on site. The marina owner prepared a development plan in 2013 that includes the following facilities:

- Hotel and Conference Center (Conceptually approved in a Lewisville Lake Master Plan supplement dated May 2004)
- Resort Lodge and Cabins
- Restaurant Complex

Note: The above proposed developments have never been submitted for formal approval by USACE and are conceptual in nature. Some items may not be authorized by USACE and some items may require additional analysis pursuant to the National Environmental Policy Act (NEPA).

Lakeview Marina

General Description: Lakeview Marina is the oldest marina on the lake and is located on approximately 72 acres and is operated under a direct lease agreement with USACE. The southern boundary of the lease area is the northern boundary of Willow Grove Park. The marina currently provides 451 wet slips. The marina owner did not wish to include future development plans in this Master Plan. An airstrip is partly located on the marina lease area and is operated by an adjacent private airplane hangar complex under a sublease agreement with the marina. The marina also operates a ski lagoon on the leased premises.

Dallas Corinthian Yacht Club

General Description: The Dallas Corinthian Yacht Club operates as a private, non-profit, corporation under a direct lease with USACE. This lease dates back many years and

such leases are no longer granted by USACE. The lease area is approximately 4.5 acres of land. Currently, DCYC has approximately 185 wet slips offered to members only. The DCYC serves primarily sailboat enthusiasts but some slips are occupied by motor-driven craft. The current lease area includes a members-only boat ramp, wet slips, and several picnic tables. Facilities located on adjacent private land include a clubhouse, swimming pool and caretaker quarters. The DCYC has plans to improve an existing rock and earth fill breakwater and has authorization for approximately 100 additional wet slips.

Cottonwood Creek Marina

General Description: Cottonwood Creek Marina is located in Cottonwood Park and is operated under a sublease agreement with the Town of Little Elm. The marina has approximately 327 wet slips. The marina offers fuel sales, boat rentals, a ship's store, and a marine sewage pump out facility. The marina has authority from USACE to expand the number of slips, but has no other plans for additional facilities. The surrounding Cottonwood Park is operated by the Town of Little Elm. See Section 5.3.3 for a description of the Town of Little Elm's plans for Cottonwood Park.

Hidden Cove Marina

General Description: Hidden Cove Marina is located within Hidden Cove Park and is operated by Marine Quest who operates all of Hidden Cove Park under a sublease agreement with The Colony. The marina currently has 340 wet slips with authority for expansion. Current services offered by the marina include fuel sales, boat rentals, ship's store, sewage pump out station, and restaurant. The marina is located near a public boat ramp within Hidden Cove Park.

Pier 121 Marina

General Description: Pier 121 Marina is located within East Hill Park and is operated by Safe Harbor Marinas under a direct lease with USACE. This is the largest marina on Lewisville Lake offering 930 wet slips and 377 dry storage units. Services offered by the marina include ship's store, fuel sales, sewage pump out, boat rentals, boat sales, and boat repair. The marina owner has proposed numerous additional facilities to be added to East Hill Park. See Section 5.3.3 of this Plan for a listing of proposed facilities.

5.3.5 Ray Roberts Lake State Park Greenbelt Corridor

General Description: The Texas Parks & Wildlife Department operates the Ray Roberts Lake State Park Greenbelt Corridor that spans a distance of approximately 10 miles from Highway 380 where it crosses Lewisville Lake, north to the dam at Ray Roberts Lake. The lower, or southern, portion of the Greenbelt is located on land that was originally acquired for Lewisville Lake in the late 1940's and early 50's. In this southern portion, the Greenbelt Corridor runs through the Clear Creek Natural Heritage Center (CCNHC) operated by the City of Denton. The upper, or northern, section of the Greenbelt was acquired as part of the separable recreation lands associated with Ray Roberts Lake. The Greenbelt Corridor is leased to the Cities of Dallas and Denton as part of their responsibilities for providing recreation facilities associated with Ray Roberts Lake. The cities, in turn, struck an agreement with TPWD for operation of the

Greenbelt as a unit of Ray Roberts Lake State Park. The Greenbelt has proven to be extremely popular with hikers, bicyclists, and equestrian users who enjoy the trails that run the length of the Corridor. The trail for hikers and bikers runs parallel to the equestrian trails so the two groups do not use the same trail. Rest stops are provided at both ends as well as near the middle of the Corridor where it is crossed by FM 428. TPWD works with multiple partners to maintain the trails on the Greenbelt. Maintaining the trails on the southern end has proven to be a challenge due to silt accumulation during major flood events on Lewisville Lake. This master plan classifies much of the Greenbelt Corridor as an Environmentally Sensitive Area although the hike/bike trails running through the Corridor are classified as High Density Recreation lands due to the need for bridges and concrete reinforcement on some portions of the trail. The High Density classification also allows TPWD to place needed recreation facilities such as benches and picnic tables along the trail.

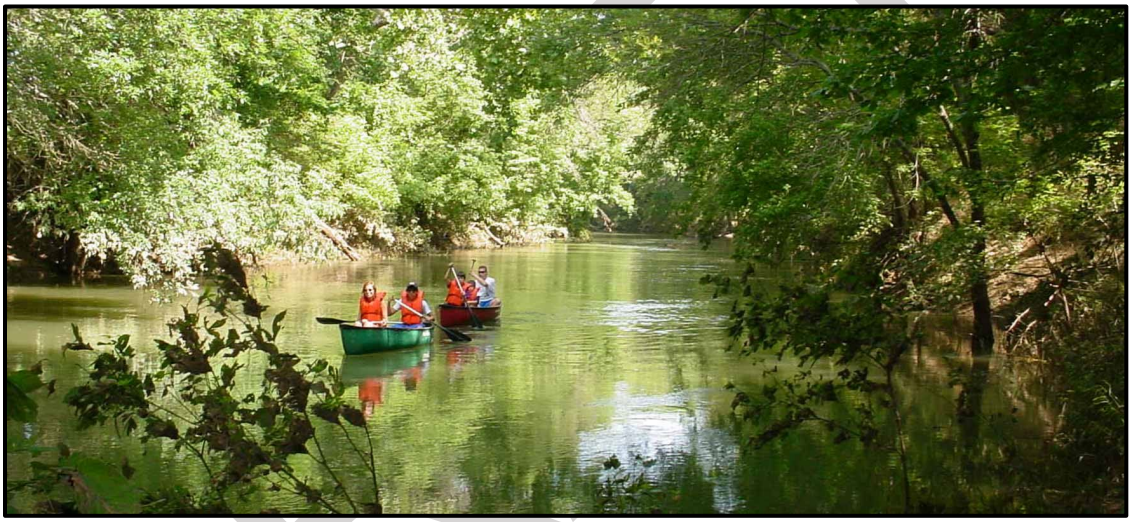


Photo 5.1 Canoes on the Elm Fork of the Trinity – Greenbelt Corridor
(Photo courtesy of TPWD)

5.4 MITIGATION

This classification is used for lands that were acquired specifically for the purpose of offsetting losses associated with development of the project. There are no acres at Lewisville Lake under this classification.

5.5 ENVIRONMENTALLY SENSITIVE AREAS (ESA)

Eighteen areas totaling approximately 10,918 acres at Lewisville Lake were selected by the planning team for classification as ESA. The results of the Wildlife Habitat Appraisal Procedure conducted on October 16-20, 2017, were used, in part, to assist in determining which areas should be classified as ESA. Other factors, including public and stakeholder comment, the presence of cultural resources, presence of

species of conservation concern, and visual esthetics were also included in the selection of ESA areas. By definition, these areas are to be protected from intense development or disturbance from future land use actions such as utility or road easements. Passive public use such as natural surface trails, bank fishing, and nature study are appropriate for these areas.

Each of these areas are numbered on the land classification maps in Appendix A. Table 5.1 provides a listing of the ESA areas, acreage, WHAP scores and a location description. Each area, including future management priorities, is briefly described as follows:

- ESA 1 – LLELA Area. This 2,704 -acre ESA represents the habitat areas below the Lewisville Lake Dam and includes bottomland hardwoods, native remnant tall grass prairie, Cross Timbers Ecoregion remnant upland hardwoods, and Elm Fork of the Trinity River riparian corridor. The area has relatively high habitat value throughout, but these values are anticipated to gradually improve on the entire area over time. Protection and restoration of native rare habitats occurs here with management by the LLELA. Control of any invasive species such as Chinese privet, Johnsongrass, and KR Bluestem is included in overall management. The discharge channel was excavated by USACE through the woodlands below the dam and is maintained by USACE. While USACE will endeavor to protect the habitat integrity of the ESA, maintenance of the channel may require periodic disturbance of the area. In addition, the current initiative to make dam safety modifications to Lewisville Lake Dam will require acquisition of borrow material from within the ESA. Disturbed areas will be fully mitigated within the ESA.

  LLELA is managed through the efforts of several partners who joined forces under a lease agreement with USACE in the early 1990's. Today the principal partners include USACE, City of Lewisville, University of North Texas, Lewisville Independent School District, Audubon, and the Friends of LLELA. The stated mission of LLELA is "To preserve and restore native Texas ecosystems and biodiversity while providing opportunities for environmental education, research and recreation". LLELA is considered to be the "Green Centerpiece" in the City of Lewisville's strategic vision document "Lewisville 2025".

Photo 5.2 Birding and bird banding research at LELLA
(photos courtesy of LLELA)

Photo 5.3 Restoring Native Prairie Grasses on LLELA
(Source: LLELA)

- ESA 2 – North Side of Lewisville Lake Dam. These two comparatively small, parcels total 173 acres and are located west of the USACE auxillary spillway on the north side of the dam. These two areas are comprised of bottomland hardwoods and native tall grass prairie. Protection of this area from disturbance is a priority. Passive use of the area for natural surface trails are appropriate. The area is managed by USACE.

- ESA 3 – Stewart Creek. This 268-acre parcel of land is located on the east side of the lake and includes the headwaters of Stewart Creek located on USACE fee property. The area consists of a riparian corridor and is adjacent to residential development upstream. Protection and potential restoration of the area are a priority maintaining the area as a visual and esthetic buffer are important for this area. The area is managed by USACE. This ESA was the site of a Section 1135 Environmental Restoration Project that was cost-shared with the City of Frisco. The project involved construction of shallow marsh areas and restoration of riparian hardwoods. As of the date of this Plan a lease has not yet been executed between USACE and the City of Frisco to enable the City to maintain the environmental restoration project that was cost-shared between USACE and Frisco in the Stewart Creek and Hackberry Creek drainages. The restoration work involved construction of several wetland cells and the planting of old agricultural fields with several species of bottomland hardwood trees. Frisco envisions maintaining natural surface trails and wildlife observation facilities on the leased premises when a lease is promulgated.

- ESA 4 – Hackberry Creek. This small 25-acre area is located on the headwaters of Hackberry Creek where it enters Lewisville Lake on the west side of FM 423. This location was included in the Frisco Section 1135 Environmental Restoration Project (see the description for ESA 3 above). The work along Hackberry Creek consisted of construction of shallow wetland cells that were planted with beneficial aquatic plants. WHAP points were low for this area but the project is just starting out and USACE and the City of Frisco see great potential for this area. The area is managed by the City of Frisco and is located on USACE fee property. USACE can work cooperatively with the city to improve the wildlife habitat value of the area. Passive use such as natural surface trails and general pedestrian access are appropriate for the area.

- ESA 5 – Cottonwood Branch. This 77-acre area consists primarily of relatively undisturbed riparian forest habitat on both sides of Cottonwood Branch upstream of where Cottonwood Branch enters Lewisville Lake on federal land. The entire area has high wildlife habitat value and serves as a filter for surface water runoff.

- ESA 6 – Doe Branch. This 441-acre area is a riparian corridor on both banks of Doe Branch. The area has relatively high wildlife habitat value and serves as a filter for surface water runoff. Supplemental plantings to improve wildlife habitat values, and control of invasive species are management priorities. Passive use of the area for natural surface trails and nature study are appropriate for the area. The area is managed by USACE.

- ESA 7 – Little Elm Creek and Pecan Creek. This 569-acre riparian area encompasses both creeks above their confluence as well as a significant area of USACE land on Little Elm Creek below the confluence of Little Elm Creek and Pecan Creek. This ESA extends downstream from the confluence of both creeks to a point where the Federal property line is near Golden Eagle Court. This ESA has relatively high wildlife habitat value and serves as a filter for surface water runoff. USACE can work cooperatively with various entities to improve wildlife habitat values on the area.

- ESA 8 – Wildridge. This 40-acre area includes upland and riparian woodlands representative of the Cross Timbers Ecoregion. This area is located due north of the unincorporated Wildridge subdivision. One of the highest WHAP scores was recorded in this area. Passive recreational use in the form of natural surface trails and nature study is appropriate.

Photo 5.4 Providing stopover habitat for migrating pollinators like this monarch butterfly is a USACE priority.
(USACE Photo by Jennifer Linde)

- ESA 9 – Rocky Point This relatively small, 36-acre parcel located West of Garza Lane and south of the Lewisville Lake Toll Bridge (El Dorado Parkway on the east end and Swisher Road on the west end) is located in an unincorporated area of Denton County commonly referred to as the Rocky Point area. This ESA is entirely within USACE fee property and has relatively high wildlife habitat value because it supports remnants of the Cross Timers Ecoregion and serves as a filter for surface water runoff. USACE can work cooperatively with various entities to improve wildlife habitat values on the area.

- ESA 10 – Nix Slough and Jefferson Slough. This 188-acre riparian area is entirely within USACE fee property and has relatively high wildlife habitat value and serves as a filter for surface water runoff. Passive recreational use in the form of natural surface trails and nature study is appropriate.

- ESA 11 – Old Lake Dallas Area. This narrow shoreline area consists of approximately 787 acres of upland forested area located south of HWY 380 and on the shoreline of Old Lake Dallas including the headwaters of Cantrell Slough. The area is managed by USACE.

- ESA 12 – Greenbelt Corridor and City of Denton Wetland Complex. This large area of 3,124 acres north of HWY 380 encompasses periodically flooded areas of the Elm Fork of the Trinity River. This area includes mature bottomland hardwoods, mature riparian corridor, and constructed shallow water wetlands managed by the City of Denton. TPWD manages the narrow portion of this area known as the Greenbelt Corridor. The corridor hike and bike trail is generally defined as an area lying 50 feet either side of the trail center line. This narrow, 100-feet wide parcel is classified for High Density Recreation use to allow for bridges, hardened trail surfaces, and amenities such as picnic sites. The remainder of the Greenbelt Corridor is available for passive recreational use in the form of natural surface trails, river fishing and nature study. USACE can work cooperatively with the various entities to improve wildlife habitat values on the area. For the purpose of this Plan, the ESA does not include the High Density Recreation lands immediately below Ray Roberts Dam, referred to as the Elm Fork Unit of Ray Roberts Lake State Park.

  The City of Denton operates the Clear Creek Natural Heritage Center (CCNHC) within ESA 12. This area of approximately 2,685 acres is located on USACE land north of, and adjacent to Highway 380. The entire area is leased to the City. The mission for CCNHC is similar to LLELA, but the geographic location is much more convenient to the large population centered near the City of Denton. The vision for the CCNHC is “To inspire environmental citizenship through an understanding of the natural heritage of North Central Texas by providing nature experiences, education and

research programs, and conservation and restoration projects. CCNHC has existed since the late 1990's when USACE and the City of Denton cooperated in an environmental restoration project pursuant to Section 1135 of the 1986 Water Resources Development Act. The restoration project involved construction of two wetland cells and the planting of several hundred acres of old agricultural fields with bottomland hardwood tree species.

Photo 5.5 Entrance to Clear Creek Natural Heritage Area and wetland cell constructed by USACE and City of Denton
(Photos courtesy of the City of Denton, Texas and USACE)

- ESA 13. West Shore. This relatively large, 1,714-acre parcel is located along the West shoreline of Lewisville Lake and runs south from the HWY 380 bridge to include the delta formed by inflow from the Elm Fork of the Trinity River. The area extends south to the northern boundary of the Big Sandy Boat Ramp and Access Area. The area includes those portions of the Pecan Creek watershed that is located on USACE land. Effluent flows from the City of Denton sewage treatment plant keeps Pecan Creek flowing on a daily basis. This parcel is made of riparian and bottomland hardwoods and shallow emergent wetlands that provide excellent habitat for wintering waterfowl. The area has relatively high wildlife habitat value and serves as a filter for surface water runoff. USACE can work

cooperatively with various entities to improve wildlife habitat values on the area.

- ESA 14 – Shady Shores Peninsula. This relatively small, 34-acre parcel is the peninsula just north of the Cielo Ranch subdivision in Shady Shores. The area has mature upland forest reminiscent of the Cross Timbers Ecoregion which has relatively high wildlife habitat value. USACE can work cooperatively with various entities to improve wildlife habitat values on the area but passive use is recommended.

- ESA 15 – Hickory Creek Park and Point Vista. This area consists of approximately 75 acres and is located along the northern shoreline of the Hickory Creek Arm of Lewisville Lake. The area supports native upland and riparian forest characteristic of the Cross Timbers Ecoregion. USACE can work cooperatively with the various entities to improve wildlife habitat values on the area.

- ESA 16 – Hickory Creek Arm. This relatively large area of approximately 908 acres supports some of the larger contiguous tracts of mature upland and bottomland hardwoods at Lewisville Lake with habitats characteristic of the Cross Timbers Ecoregion. This area starts on the east side of the north end of the FM 2499 bridge and includes all USACE land west of FM 2499. This is an ESA designation from a previous Master Plan Revision. USACE can work cooperatively with various entities to improve wildlife habitat values on the area. The Cross Timbers Equestrian Trail runs through this area to include the Old Alton Bridge, a National Historic Site.

- ESA 17 – Pilot Knoll Area. This relatively small, 42-acre parcel is immediately adjacent the park limits of Pilot Knoll Park and has relatively high wildlife habitat value and serves as a filter for surface water runoff. USACE can work cooperatively with the various entities to improve wildlife habitat values on the area.

- ESA 18 – Wichita Forest Area. This relatively small area of 25 acres is leased to the Town of Highland Village and is located south of and adjacent to Highland Village Road. The area is entirely on USACE property, has relatively high wildlife habitat value and serves as a filter for surface water runoff. USACE can work cooperatively with various entities to improve wildlife habitat values on the area.

Table 5.1 Environmentally Sensitive Area (ESA) Listing

ESA Area Number[1]	Acres	WHAP Scores Per Sample Point Number	Location/Description

LE-ESA-1	2,378	Pt 5: .63, Pt 10: .47, Pt 13: .81	LLELA leased area below Dam
LE-ESA-2	173	Pt 27: .65	Two areas just West of Auxillary Spillway, one is a peninsula.
LE-ESA-3	268	NA	Stewart Creek Frisco Section 1135 Project
LE-ESA-4	25	Pt 36: .41	Location of USACE Frisco Section 1135 Wetland Project
LE-ESA-5	77	Pt 39: .53	Cottonwood Branch Riparian Area
LE-ESA-6	441	Pt 43: .45	Doe Branch Riparian Area
LE-ESA-7	569	Pt 45: .89	Little Elm and Pecan Creek Riparian Area
LE-ESA-8	40	Pt 48: 1.00	Wildridge
LE-ESA-9	36	Pt 50: .73	Rocky Point
LE-ESA-10	188	Pt 51: .64, Pt 52: .71 Pt 53: .68	Shoreline Including portion of Nix Slough and Jefferson Slough
LE-ESA-11	787	Pt 54: .49, Pt 55: .56 , Pt 57: .52	South of HWY 380, East side of Old Lake Dallas includes portions of Cantrell Slough
LE-ESA-12	3,122	Pt 58: .62, Pt 59: .50	Encompasses most of USACE fee lands North of HWY 380, including Greenbelt Corridor and City of Denton Wetlands
LE-ESA-13	1,714	Pt 62: .72, Pt 63: .54, Pt 64: .72, Pt 65: .73	West Shore from Hwy 380 south to Big Sandy Boat Ramp
LE-ESA-14	34	Pt 66: .73	Shady Shore Peninsula
LE-ESA-15	75	Pt 79: .73, Pt 80: .62, Pt 81: .55, Pt 82:	Hickory Creek Park and Point Vista Ramp
LE-ESA-16	908	Pt 84:, Pt 85:, Pt 86: .69, Pt 87: .69 , Pt 88: .64	Hickory Creek Arm of Lewisville Lake
LE-ESA-17	42	Pt 89: .55 (point location just west of ESA)	Pilot Knoll
LE-ESA-18	25	Pt 91: .54	Wichita Forest

Photo 5.6 Migrating monarch butterflies on LLELA (ESA #1)
(Photo courtesy of LLELA)

5.6 MULTIPLE RESOURCE MANAGEMENT LANDS

Multiple Resource Management Lands (MRML) at Lewisville Lake are organized into two sub-classifications. These sub-classifications are Low Density Recreation (LDR) and Wildlife Management (WM). The following is a description of each sub-classification's resource objectives, acreages, and description of use.

- Low Density Recreation. These lands are generally narrow parcels of land that are adjacent to private residential developments, but also include lands where current or potential public use is limited to passive pedestrian-oriented recreation such as hiking, bank fishing, nature study and photography. At Lewisville Lake, approximately 19 shoreline segments were designated in 2005 as "Narrow Shoreline Variance Areas" (NSVA) during a process to revise allowable adjacent landowner activities, primarily mowing and other vegetation modification activities. These NSVAs have all been classified as MRML–LDR. In addition to the NSVAs, the lands surrounding the Camp Copass development, and a parcel of land on the Ray Roberts State Park Greenbelt Corridor along Wildcat Road, have been classified as MRML-LDR. Future management of these lands calls for maintaining a healthy, ecologically adapted vegetative cover to reduce erosion and improve aesthetics. Prevention of unauthorized use such as trespass or encroachments is an important management objective for all USACE lands, but is especially important for those lands in close proximity to private development. These lands are typically open to the public, including adjacent landowners, for pedestrian traffic and are frequently used by adjacent landowners for access to

the shoreline near their homes. With the exception of lands associated with the Greenbelt Corridor, adjacent landowners may apply for a permit to mow a meandering path to the shoreline, and may apply for a permit to mow a narrow strip along the USACE boundary line as a precaution against wildfire. The general public may use these lands for bank fishing, hiking, and for access to the shoreline. Future uses may include additional designated natural surface hike and bike trails. There are 543 acres classified as Low Density Recreation. With the exception of lands associated with the Greenbelt Corridor and managed by TPWD, and lands leased to the City of The Colony for trail development, all LDR lands are managed by USACE.

- Wildlife Management. These are lands designated primarily for the stewardship of fish and wildlife resources, but are open to passive recreation use such as natural surface trails, hiking, hunting and nature study. There are currently 3,268 acres under this classification and with the exception of those WM lands leased to the City of The Colony for trail development, all WM lands are managed by USACE. Management priority for WM lands will be to restore these lands to support native vegetation adapted to soil type and elevation with respect to the flood control pool. Where topography, soil type, and hydrology are suitable, some areas may be selected for wetland development. Within the areas classified for MRML-WM, two low density recreation leases have been granted as described below.

  Low Density Recreation Lease to The Colony

  General Description: This lease was approved between USACE and The Colony in 2009 and covers approximately 600 acres of USACE lands located on shoreline areas between major park areas. This lease enables The Colony to develop and maintain natural surface pedestrian trails, wildlife observation facilities, trailheads and parking areas, and to manage vegetation modification activities on the leased premises that may be conducted by neighbors adjoining the leased area. The lands included in the lease are classified in this Plan as MRML-WM or MRML-LDR lands.

  Low Density Recreation Lease to Little Elm

  General Description: This lease was approved between USACE and the City of Little Elm in 2016. The lease cover approximately 314 acres and is very similar to the lease executed with The Colony. The City of Little Elm maintains trails on the leased area and intends to expand trail opportunities. The lands included in the lease are classified in this Plan as MRML-WM

Photo 5.7 Photo 5.7 Waterfowl hunting is a popular recreation activity at Lewisville Lake.
(USACE Photo by Adam Tarplee)

5.7 WATER SURFACE

At conservation pool level of 522.0 NGVD there are 27,175 acres of surface water. Regulatory buoys are managed by USACE and numerous lessees. These buoys help mark hazards, swim beaches, restricted areas (boats prohibited), and no-wake areas.

- Restricted. Restricted areas are around swim beaches, public water supply intakes and near the USACE gate control tower on the dam. Vessels are not allowed to enter restricted water surface. Water surface zoned as restricted totals approximately 78 acres.
- Designated No-wake. No-wake areas are located near boat launch areas for the safety of launching and loading boats or personal watercraft, and in areas where boats approach marinas. At Lewisville Lake, no-wake buoys are posted along the Interstate Highway 35E bridge, the FM 2181 Toll Bridge, and the FM 720 (Eldorado Parkway) bridge. A small cove adjacent to Wynnewood Park and the cove referred to as Copperas Branch Lake in Highland Village are designated no wake areas for the purpose of providing paddle craft a place to maneuver without competing with high-speed boat traffic. Placement of regulatory buoys in these two no-wake areas will be the responsibility of The Colony and Highland Village

respectively. TPWD also welcomes paddle craft on the Elm Fork of the Trinity River where it meanders through the Greenbelt Corridor between Ray Roberts Lake and Lewisville Lake. USACE is open to the concept of paddle trails and will work with interested parties to further fulfill this need.

- Fish and Wildlife Sanctuary. These areas are managed with annual or seasonal restrictions to protect fish and wildlife species during periods of migration, resting, feeding, nesting, and/or spawning. There are no water surface acres under this classification at Lewisville Lake.
- Open Recreation. The remaining lake area not in the above classifications is open to recreational use. No specific zoning exists for these areas, but the buoy system mentioned above is in place to help aid in public safety. During the construction phase of Lewisville Lake, timber and man-made structures were cleared in the majority of the lake area lying below the conservation pool elevation of 515.0 feet NGVD. However, shortly after official impoundment in the mid-1950, a rapidly rising pool prevented the clearing of timber in a large area of the lake on the east side. The uncleared area is depicted on public handout maps and is generally described as the area lying between Wynnewood Park and Hidden Cove Park as well as the water surface between Hidden Cove Park and the FM 720 (El Dorado Parkway) bridge. Other areas located in the upper end of the lake and incoming tributaries were intentionally not cleared. These uncleared areas, as well as areas where the timber was cleared, are included in the Open Recreation designation. It is incumbent on boaters to be aware of lake conditions and to operate vessels responsibly. Approximately 25,542 acres of Lewisville Lake is classified for Open Recreation.

Future Management of the Water Surface. Future management of the water surface includes the maintenance of warning, information, and regulatory buoys as well as routine water safety patrols during peak use periods. Currently water safety patrols are conducted by TPWD Game Wardens, Denton County Sheriff's office, City of Little Elm police, Coast Guard Auxillary, and USACE Park Rangers. USACE conducted a comprehensive Recreational Boating Study at Lewisville Lake in 1999 and conducted a Recreational Boating Survey in 2019. The results of the 1999 study resulted in a Water Related Development Policy specific to Lewisville Lake. The results of the 2019 survey will be used by USACE to refine the Water Related Development Policy. See Chapter 6 for a summary discussion of the Water Related Development Policy for Lewisville Lake.

Photo 5.8 Parasail near North Texas Tollway Authority Bridge – July 7, 2019 (USACE Photo)

CHAPTER 6 - SPECIAL TOPICS/ISSUES/CONSIDERATIONS

6.1 UTILITY CORRIDORS

USACE policy encourages the establishment of designated corridors on project lands, where feasible, to serve as the preferred location for future outgrants such as easements for roads or utility lines. After obtaining public input and examining the location of existing roads and utility lines on project lands, USACE determined that only utility corridors would be designated at Lewisville Lake.

Thirty-eight utility corridors have been designated across USACE land at Lewisville Lake with each corridor incorporating and/or running parallel to an existing road or utility easement. These corridors have been in use since 2004. Analysis of the corridors designated in 2004 indicated that 4 corridors were no longer needed and could be deleted from the list. The 38 designated corridors are shown on maps LE20MP-OU-01 through 09 in Appendix A and are described in Table 6.1. Future use of these corridors, where the corridor is limited to or incorporates an existing easement, would in most cases require prior approval of those entities that have legal rights to the easement. Some existing easements at Lewisville Lake have not been designated as corridors. These non-corridor easements may be used for placement of additional utilities by the grantee holding the easement, but only for purposes which directly serve the grantee or are of direct benefit to the Government. Expansion or widening of existing non-corridor easements will generally not be permitted.

In summary, the following best management practices shall be applied in the future use of the seven corridors described above:

- Use existing easements before using additional space.
- Efficient use of the designated corridor space to allow the maximum number of utilities possible to occupy the space. Reduced cost is not a reason to occupy more space. A typical drawing depicting how utility lines can be placed efficiently within a corridor is provided in Appendix A following the map of corridor locations.
- In accordance with USACE policy at Chapter 17 of EP 1130-2-550, Non-Recreation Outgrant Policy, avoid placement of utility lines on USACE land unless there is no reasonable alternative route.
- Underground utilities shall be installed by boring at all creek crossings, and where feasible, across the full extent of designated corridors. Bore pits shall be a minimum of 100 feet from the centerline of creeks and, depending on site conditions, may need to be placed farther than 100 feet.
- Overhead electric and communication lines must meet minimum sag height requirements to be specified by USACE.

- Natural resources damaged or destroyed within corridors shall be mitigated per USACE requirements.
- Current and future identified cultural resources will be protected.

Table 6.1 Listing of Utility Corridors at Lewisville Lake

	Corridor Number	Location and General Description	
	Corridor 1	This corridor is restricted to a 20-foot wide strip of federal land lying parallel to the north and south right-of-way limits of Farm-to-Market Road FM 428 where it crosses the Ray Roberts Green Belt Corridor. The highway right-of-way is not under federal ownership. Therefore, the USACE does not have direct control of utilities that might be placed in the right-of-way. Future use of this corridor is restricted to sub-surface boring. No ground disturbance will be permitted on the adjacent conservation easements. The corridor on the north side of FM 428 is approximately 1,000 feet long and on the south side of FM 428 the corridor is approximately 700 feet long.	
	Corridor 2	This corridor follows the route of an existing underground natural gas pipeline. Future use of this corridor would be restricted to underground utilities placed within or as close as possible to the limits of the existing easement. Any future utility crossing of the Elm Fork of the Trinity River along this corridor would be installed by sub-surface boring and no bore pits will be permitted on USACE property in order to protect the riparian vegetation along the Elm Fork. The length of the corridor is approximately 5,500 feet.	
	Corridor 3	This corridor follows the Government property boundary where it parallels Collins Road. The federal land in this area is leased to the city of Denton and is designated by the city as the Clear Creek Natural Heritage Center. Use of this corridor in this sensitive area would be restricted to underground utilities placed within a 15-feet wide strip along Collins Road. Corridor 3 is approximately 4,200 feet long.	

	Corridor Number	Location and General Description	
	Corridor 4	This corridor parallels an existing railroad track and an existing high-voltage electric transmission line. The existing railroad track and transmission line run roughly parallel to each other separated by a distance varying from only a few feet on the east end to several hundred feet on the west end. Future utilities in this corridor must be placed on the south side of the railroad track within the existing easement for the railroad or be located completely within the existing easement for the transmission line. Corridor 4 is approximately 8,350 feet long.	
	Corridor 5	This corridor runs parallel to Rock Hill Road where the road runs across or adjacent to federal land. Future utility installations should be placed within the existing road right-of-way if possible and restricted to underground utilities only. The maximum width of the corridor extends 20 feet outside the existing east right-of-way line for Rock Hill Road. Corridor 5 is approximately 7,300 feet long.	
	Corridor 6	This corridor includes the existing right-of-way of Highway 380 where it crosses federal land. Future utility installations will be restricted to underground utilities. Attaching utilities to bridge structures will be given consideration. Corridor #6 is approximately 7,600 feet long.	
	Corridor 7	This corridor runs parallel to North Trinity Road where it crosses or runs adjacent to federal land. Future utilities should be located within 15 feet of the existing road right-of-way. Corridor 7 is approximately 1,350 feet long.	

	Corridor Number	Location and General Description	
	Corridor 8, 9, 10, 11, 17, 20	These corridors run parallel to several city streets and/or county roads which cross federal land for relatively short distances. The roads include Mosley Road, Key Lane, Mill Creek Road, and Naylor Road. All of these corridors are located in Environmentally Sensitive Areas. Therefore, future utilities in these corridors must be located within 15-feet of the existing road right-of-way and must be installed by sub-surface boring. Bore pits will not be permitted on USACE property. The approximate length of each corridor is: Corridor 8 - 2,200 feet; Corridor 9 - 1,800 feet; Corridor 10 - 1,875 feet; Corridor 11 - 500 feet; Corridor 17 - 750 feet; Corridor 20 - 1,100 feet. These corridors are in close proximity to one another.	
	Corridor 12	This corridor follows the route of a large water pipeline which spans the entire Elm Fork arm of Lewisville Lake. Future use of this corridor would be limited to subsurface utilities placed within 15-feet of the existing easement for the water pipeline. Where installation may occur above conservation pool, utilities must be installed with subsurface boring. No bore pits will be permitted on USACE property. Corridor 12 is approximately 7,750 feet long.	
	Corridor 13, 14, 21	These corridors include and run parallel to Shady Shores Road where the road crosses or is adjacent to federal land. Future use of these corridors should be within or as close as possible to the existing road right-of-way. The approximate length of each of these corridors is: Corridor 13 - 300 feet; Corridor 14 - 3,150 feet; Corridor 21 - 900 feet.	

	Corridor Number	Location and General Description	
	Corridor 15 and 15a	Corridor 15 follows the route of an existing high voltage electric transmission line for a distance of 2,750 feet. Future use of the corridor shall be within the existing easement for the transmission line. Corridor 15a follows the route of Fish Trap Road where it crosses Little Elm Creek for a distance of 6,750 feet. Future use of this corridor should be within the existing right-of-way plus an additional 20-feet parallel to the north and south right-of-way line of active and closed portions of Fish Trap Road.	
	Corridor 16	This corridor runs parallel to Highway 380 where it crosses federal land at Little Elm Creek. The highway right-of-way at this location is not under federal ownership. Therefore, the USACE does not have direct control over use of the highway right-of-way. Future use of corridors 16 shall be restricted to an area within 15-feet of the north and south right-or-way lines for Highway 380. Corridor 16 is approximately 1,000 feet long.	
	Corridor 18	This corridor follows the route of the existing Highway 720 where it crosses the Little Elm arm of Lewisville Lake. Use of this corridor would be confined to within the existing right-of-way plus an additional 50-feet on either side of the right-of-way for Highway 720. Corridor 18 is approximately 2,800 feet long.	
	Corridor 19	This corridor runs parallel to Rose Lane where it crosses federal land. Use of this corridor shall be within or as close as possible to the existing road right-of-way. Corridor 19 is approximately 550 feet long.	
	Corridor 22	This corridor includes and runs parallel to the existing route of the North Texas Tollway Authority toll bridge over the Elm Fork arm of Lewisville Lake. Use of this corridor will be within the existing right- of-way plus an additional 50-feet on either side of the right-of-way for the NTTA Toll Bridge. Corridor 22 is approximately 10,550 feet long.	

	Corridor Number	Location and General Description	
	Corridor 23	This corridor runs parallel to Interstate Highway 35E and a railroad trestle where the highway and railroad cross the Hickory Creek arm of Lewisville Lake. Use of this corridor shall be within the existing TXDOT and railroad rights-of-way plus an additional 50-feet on either side of the existing rights-of-way. Corridor 23 is approximately 8,000 feet long.	
	Corridor 24	This corridor runs within the existing easement for FM 2499 where it crosses USACE land. Future utilities would be required to be placed within the existing road easement plus an additional 50-feet on either side of the existing easement. Corridor 24 is approximately 3,250 feet long.	
	Corridor 25	This corridor follows the route of an existing underground pipeline which traverses the Hickory Creek arm of Lewisville Lake. Future use of this corridor shall be placed within 15 feet of the existing right-of-way for the underground pipeline and is restricted to sub-surface boring. No ground disturbance will be permitted and bore pits will not be allowed on USACE property. Corridor 25 is approximately 4,200 feet long.	
	Corridor 26	This corridor runs parallel to the south right-of-way line of FM 2181 where it crosses an unnamed tributary to Lewisville Lake. Future use of this corridor shall be within 20-feet of the south right-of- way line of FM 2181. Corridor 26 is approximately 650 feet long.	
	Corridor 27, 30, 31	These corridors run along and parallel to three separate high voltage electric transmission lines, all of which are located in the upper end of the Hickory Creek arm of Lewisville Lake. Future use of these corridors shall be within 20 feet of either side of the existing rights-of-way for the transmission lines. The approximate length of each of these corridors is: Corridor 27 - 7,450 feet; Corridor 30 - 4,850 feet; Corridor 31 - 3,500 feet.	

	Corridor Number	Location and General Description	
	Corridor 28	This corridor runs along and parallel to Old Alton Road where it crosses the Hickory Creek arm of Lewisville Lake. Future use of this corridor shall be restricted to underground utilities within 30 feet of the west right-of-way for Old Alton Road. Existing utilities already located in this corridor include an underground natural gas pipeline and a sewer line operated by the Upper Trinity Regional Water District. Corridor 28 is approximately 2,400 feet long.	
	Corridor 29	This corridor is along, parallel, and adjacent to a railroad track which crosses, or is adjacent to, Federal land at Lewisville Lake. Future use of this corridor should be within 20-feet of the existing right- of way for the railroad. Corridor 29 is approximately 1,800 feet long.	
	Corridor 32, 34	These two corridors run along and parallel to the route of FM 423 at all locations where it crosses federal land. Future use of this corridor shall be within or as close as possible to the existing right-of- way for FM 423. The approximate length of these two corridors is: Corridor 32 - 5,850 feet; Corridor 34 - 150 feet.	
	Corridor 33	This corridor crosses Stewart Creek at the approximate location of an old ranch road crossing where Federal land is only about 600 feet wide. Because no utilities currently exist in this corridor, the width of the corridor shall be as small as possible to accommodate the first proposed use, but in no case shall exceed 100 feet. Future use of this corridor shall be restricted to underground utilities.	
	Corridor 35	This corridor follows the route of an existing gravity- flow sewer line easement issued to the city of Lewisville. Future use of this corridor would require coordination with the Lewisville Lake Environmental Learning Area and would be restricted to underground utilities within the existing right-of-way for the sewer line. The approximate length of Corridor 35 is 7,400 feet.	

	Corridor Number	Location and General Description	
	Corridor 36	This corridor follows the route of Fish Hatchery Road. Future use of this corridor would require coordination with the Lewisville Lake Environmental Learning Area and would be within 40 feet either side of the centerline of Fish Hatchery Road. The approximate length of Corridor 36 is 11,100 feet.	
	Corridor 37	This corridor runs parallel to the north right-of-way line of State Highway 121 at all locations where it is adjacent to federal land. Future use of this corridor would require coordination with the Lewisville Lake Environmental Learning Area and would be within 20- feet of the right-of-way for SH 121. Corridor 37 is approximately 11,000 feet long.	
	Corridor 38	This corridor runs parallel to a railroad track which completely traverses the large tract of federal land below Lewisville Lake dam. Future use of this corridor would require coordination with the Lewisville Lake Environmental Learning Area and would be restricted to a 50-feet wide strip of land adjacent to the existing south right-of-way line for the railroad track. Utilities currently located within this corridor include pipelines operated by the Upper Trinity Regional Water District. The approximate length of Corridor 38 is 22,500 feet.	

Figure 6.1 Utility Corridors 14, 21 & 22
See all utility corridor maps in Appendix A

6.2 SHORELINE MANAGEMENT PLAN

On December 13, 1974 USACE published a regulation, ER 1130-2-406, in the Federal Register entitled "Civil Works Projects: Lakeshore Management." This regulation was published as Part 327.30 of Chapter III, Title 36 of the Code of Federal Regulations. A subsequent change to the regulation was published in the Federal Register on October 31, 1990, incorporating the results of recent legislation and changing the name to "Shoreline Management at Civil Works Projects." The focus of this regulation is to establish national policy, guidelines, and administrative procedures for management of certain private uses of Federal lands administered by USACE. A key requirement in the regulation is that private shoreline uses, as defined in the regulation, are not allowed at lakes where no such private uses existed as of December 13, 1974. Lewisville Lake was officially impounded in the 1950's and by 1974 numerous private floating facilities and vegetation modification by private individuals had been permitted on the lake.

The private uses described in the regulation primarily include privately-owned floating facilities such as floating boat docks, fixed or movable piers, and vegetation modification activities such as plantings, mowing, and selective removal of shrubs and

trees. USACE regulations at ER 1130-2-406 requires the preparation of a Shoreline Management Plan (SMP) for those lakes where permitted private floating facilities and/or vegetation modification activities had been permitted and existed as of December 13, 1974. In response to this requirement a SMP was prepared for Lewisville Lake and was published in July 1976. This SMP and remains in effect today except for changes resulting from a 2004-2005 review of vegetation management activities at Grapevine and Lewisville Lakes described in subsequent paragraphs. Changes in public law in the late 1980's granted grandfather rights to all private floating facilities in good standing at the time. Consequently, all existing private floating facilities on Lewisville Lake currently enjoy grandfather privileges and can be removed from the lake only under conditions of substantial non-compliance with the terms of the Shoreline Use Permit.

In 2004-2005, USACE reviewed the vegetation modification activities at Lewisville and Grapevine Lakes. This review was conducted with significant public involvement in the form of neighborhood workshops and public meetings. The end result of the review was publication of an Environmental Assessment entitled "Programmatic Environmental Assessment (2005 PEA) on Allowable Adjacent Landowner Activities Incorporating Ecosystem Management Practices on Federal Lands at Grapevine and Lewisville Lakes, Texas. The 2005 PEA concluded that all adjacent property owners could apply for a written permit to mow and remove underbrush from a narrow strip of land (50 feet at Lewisville Lake and 25 feet at Grapevine Lake) along the Federal property line. These allowable mowing distances reflected past vegetation modification guidelines at both lakes. At Lewisville Lake, the 2005 PEA also led to the designation of approximately 19 Narrow Shoreline Variance Areas (NSVA) where adjacent landowners may, with a written permit, mow to the water's edge. The 2005 PEA created a policy encouraging adjacent cities to assume responsibility for administering vegetation modification permits on the Federal land within their respective, incorporated city limits. The Colony and Little Elm did assume that responsibility. Adjacent landowners are encouraged to contact the USACE office at Lewisville and/or Grapevine Lakes for details and requirements set forth in the SMP and 2005 PEA.

6.3 RECREATIONAL BOATING STUDY

In February 1999, following a 1998 comprehensive Recreational Boating Study at Lewisville Lake, USACE adopted a Water-Related Development Policy (WRDP) specific to Lewisville Lake. The comprehensive study was a collaborative undertaking by USACE, the North Central Texas Council of Governments, and numerous municipalities and marinas surrounding the lake. The study involved thorough counting of boat trailers and empty slips at boat ramps and marinas as well as opinion surveys administered at boat ramps and sent to adjacent landowners and area stakeholders. The resulting WRDP remains effective to date and sets a target boating capacity for Lewisville Lake to the extent that boating access to the lake will be managed to prevent boating traffic from exceeding 18 acres of boatable water surface on peak use days.

In the summer of 2019, USACE conducted a Recreational Boating Survey at Lewisville Lake. The survey involved extensive counting and the use of questionnaires similar to the study conducted in the summer of 1998. Preliminary results from the 2019 survey indicate that boating traffic has not increased substantially at Lewisville Lake since the 1998 study. USACE will use the 2019 survey results to refine the current WRDP for Lewisville Lake as well as the 2002 District Policy on Water-Related Recreation Development that applies to the District's remaining 24 lakes.

Photo 6.1 2019 Boating Survey Station at Lewisville Lake

6.4 SUBURBAN EXPANSION SURROUNDING LEWISVILLE LAKE

Lewisville Lake is one of the most metropolitan lakes managed by USACE. It is bordered by 13 incorporated cities and is located completely within Denton County, Texas with a 2020 population of approximately 860,000, essentially doubling since the year 2000, and a 2045 estimated population of almost two million. Refer to Table 6.2 for population estimates within the zone of interest provided by the Census Bureau. Population growth around Lewisville Lake has been rapid for the past 40 years. This growth has brought with it increasing public demand for expanded recreation opportunities and access to public lands and water surface. This growth has also brought increased demand for utility easements and expansion of roads. Major road expansions in the recent past are described in Section 1.7 of this Plan.

Table 6.2 Population estimates for the zone of Interest – Lewisville Lake

Geographical Area	2000 Population Estimate	2018 Population Estimate	2045 Population Projection
Texas	20,851,820	27,885,195	**43,867,040**
Collin County	491,675	944,350	**2,137,242**
Dallas County	2,218,899	2,586,552	**3,667,351**
Denton County	432,976	807,047	**1,990,969**
Tarrant County	1,446,219	2,019,977	**3,023,145**
Zone of Interest Total	**4,589,769**	**6,357,926**	**10,818,707**

Using information from the 2012 and 2017 Texas Outdoor Recreation Plan, park master plans prepared by several surrounding cities, the Vision Texas – 2050 report by the NCTCOG, and public input on this Plan, the land and water surface classifications, management objectives, and utility corridors set forth in this plan present a balanced approach to meeting the many and varied needs of a rapidly expanding population. Chief among expressed needs is the protection and conservation of natural landscapes where people can hike, and enjoy nature-based activities. Photos 6-2 and 6-3 vividly show how residential growth, particularly on the east side of the lake has dramatically expanded over time from 2005 to 2019. USACE-administered Federal lands surrounding Lewisville Lake are poised to meet this need.

Figure 6.2 Aerial image of the east side of Lewisville Lake in 2005
Image courtesy of Google Earth: Landsat/Copernicus 2020

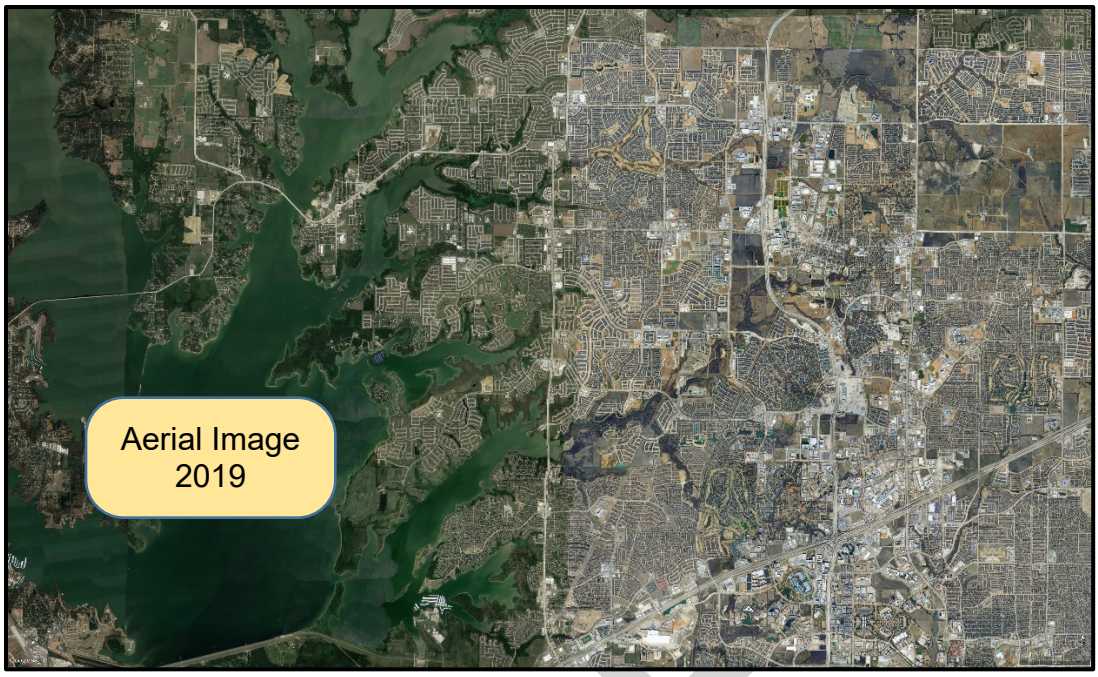


Figure 6.3 Aerial image of the east side of Lewisville Lake in 2019
Image courtesy of Google Earth: Landsat/Copernicus 2020

6.5 TRAILS

USACE lands at Lewisville Lake provide many trail opportunities to the visiting public. USACE has partnered with numerous entities to provide pedestrian, bike, and equestrian trails in every quarter of the lake. Major trail providers include TPWD, Cities of Highland Village, Copper Canyon, Corinth, Hickory Creek, Lake Dallas, Denton, Little Elm, The Colony and Lewisville. Denton County has also been a player in trail creation through their work on the Old Alton Bridge that is an important link on the Pilot Knoll Trail. A listing of active trails on USACE lands (moving clockwise around the lake starting at the dam), includes:

- Trails in LLELA. Many trails are offered within the boundaries of LLELA. These trails are limited to pedestrian traffic are designed to give visitors access to some of the outstanding natural resources found within LLELA. Future plans call for maintaining existing trails and working with partners and other LLELA consortium members to expand trails where needed.

Figure 6.4 LLELA Trails Map

- Trails in Lewisville Lake Park and Tower Bay Access Area: The City of Lewisville, Parks & Recreation Department maintains a combined pedestrian and bike path that traverses along the Lewisville Lake Shoreline in Lewisville Lake Park and the Tower Bay Access Area. The City's 2014 Trails Master Plan shows the existing trails in Lewisville Lake Park and Tower Bay Access Area. The trail in the Tower Bay Access Area was funded as a mitigation project during that resulted from the widening of IH-35E. This trail crosses IH35E and continues to the south side of Copperas Branch Lake (aka Highland Village Lake, which is part of Lewisville Lake) where the trail will link to trails in the City of Highland Village. The trail at Copperas Branch Lake includes a pedestrian bridge that spans a portion of Copperas Branch Lake.

- Trails in Highland Village: The City of Highland Village intends to link up with the Tower Bay Access Trail with a trail leading to Copperas Branch Park and to trails located on city property. The planned trail is for pedestrian use and will serve Highland Village residents and visitors to Copperas Branch Park.

- Pilot Knoll Equestrian Trail: This trail is the oldest authorized trail on USACE lands at Lewisville Lake. It has been in existence since the late 1980s. The trail was granted to the town of Copper Canyon as an easement. The trail originates in the town of Copper Canyon, traverses through Pilot Knoll Park (leased by USACE to Highland Village), and then roughly follows the USACE property

boundary line to a trail head on Old Alton road where the trail terminates. The Cross Timbers Equestrian Trails Association provides most of the maintenance on the trail. A tunnel was constructed by TXDOT under FM 2499 during construction of the road to allow trail users safe passage across FM 2499.

- Elm Fork Trail: This trail was initially constructed under a cooperative agreement between USACE, Denton County, and the cities of Corinth and Hickory Creek as an extension of the Pilot Knoll Trail. Denton County assisted with a small trail head and made repairs to the historic Old Alton Bridge to allow safe pedestrian and equestrian passage. Corinth assisted in placement of a prefabricated bridge over a deep ravine near Lake Bluff Estates. USACE granted an easement to Corinth for the bridge. Hickory Creek has assisted in constructing a trail head in Sycamore Bend Park and in maintaining that portion of the trail in their city limits. It is important to note that this trail crosses some very narrow and steep portions of USACE land and as of the preparation of this plan the trail does not meet USACE trail standards. Additionally, a portion of the trail has crossed private property in the past and that portion is currently closed. As a result, USACE cannot recommend public use of the trail until basic standards are met and legal alignment of the trail is assured. Pedestrians are free to use the trail but at their own risk. This trail is currently advertised on the Cross Timbers Equestrian Trails Association website as being open for use. Nonetheless, USACE advises trail users that trespass onto private land is not authorized and portions of the trail do not meet safety standards. USACE will continue to work with partners to resolve these issues.

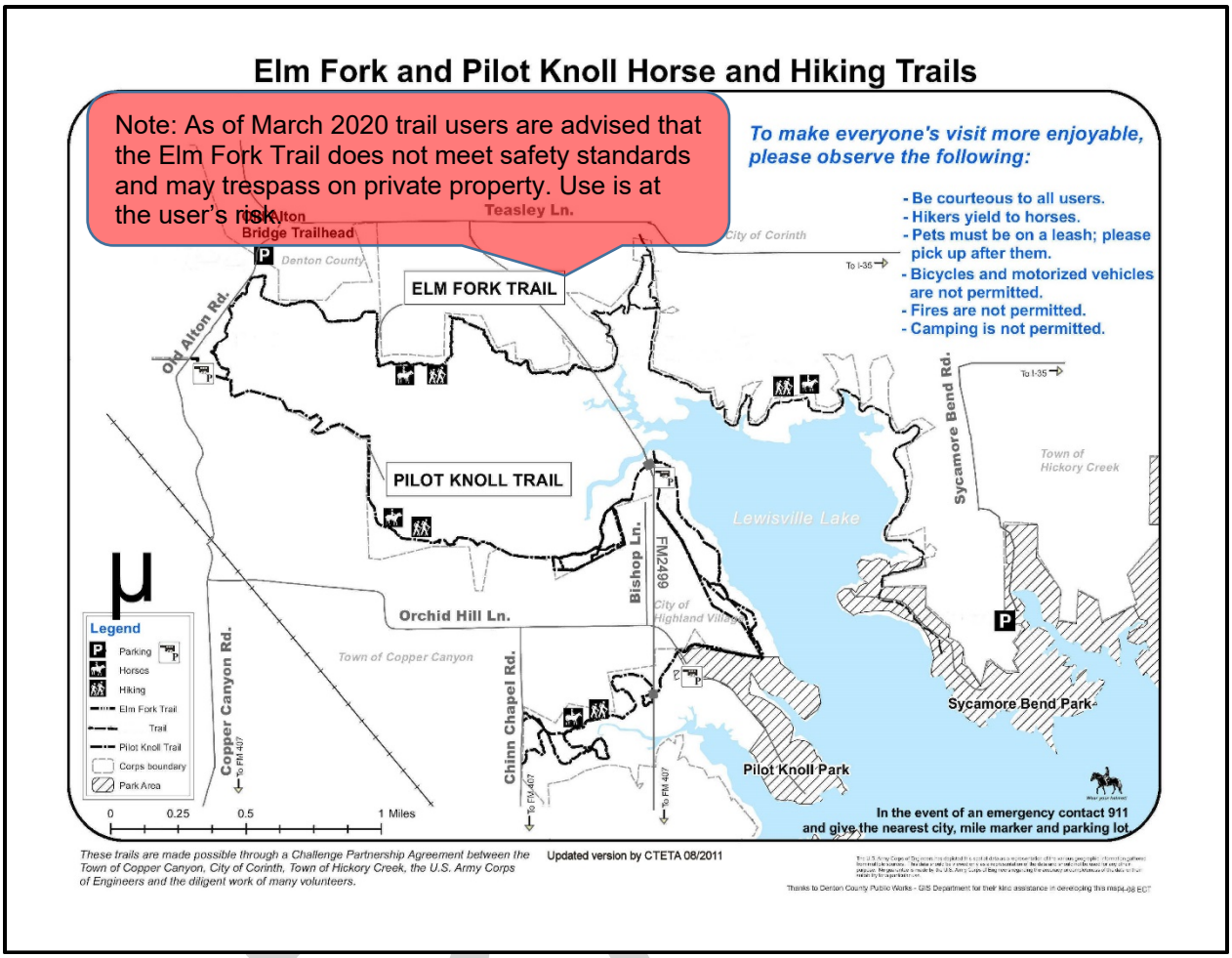


Figure 6.5 Trail map for Elm Fork and Pilot Knoll Horse and Hiking Trials
Source: Cross Timbers Equestrian Trails Association

- Hickory Creek Park: USACE maintains a small pedestrian hiking path in Hickory Cree Park intended for use by park patrons.

- Willow Grove Park: The city of Lake Dallas maintains a small hiking path in Willow Grove Park that leads from the main park area and traverses along the USACE boundary to the south. The city plans to extend the trail in the future to include the entire southern portion of Willow Grove Park.

- The Greenbelt Corridor Trails: These trails are maintained by Texas Parks and Wildlife Department and are the most prominent and longest trails on Lewisville Lake. The trails include hike, bike, and equestrian trails traversing 10 miles from Highway 380 on the south end, along the Elm Fork of the Trinity River, to the trails terminus near the dam at Ray Roberts Lake. Trailheads are maintained at both ends and in the middle at FM 428. The southern portion of the trail was damaged by flooding and silt deposition during the flood event of 2015. The trailhead at Highway 380 will remain closed until repairs are completed on the

southern portion of the trail. Equestrian groups and other non-profit entities help in maintaining the Greenbelt Corridor trails.

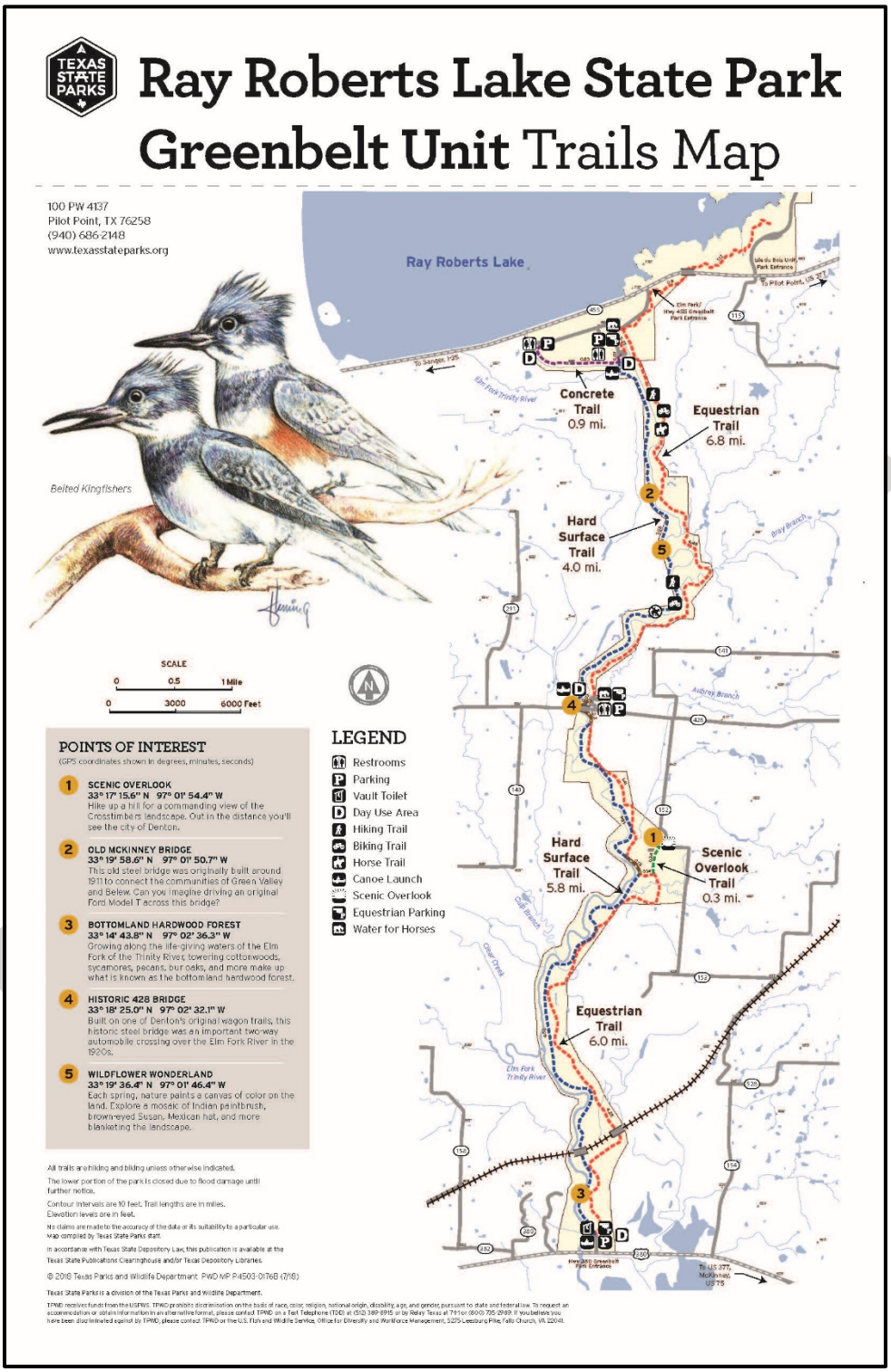


Figure 6.6 Ray Roberts Lake State Park – Greenbelt Trails Map

- Trails at Clear Creek Natural Heritage Center (CCNHC): The City of Denton maintains hiking and interpretive trails on the lands they lease from USACE as part of their CCNHC. The trails total 10 miles and traverse through large areas of the City's 2,900 acre leased area. The four trails provide access for fishing along Clear Creek, and to bottomland hardwood forests and wetlands.

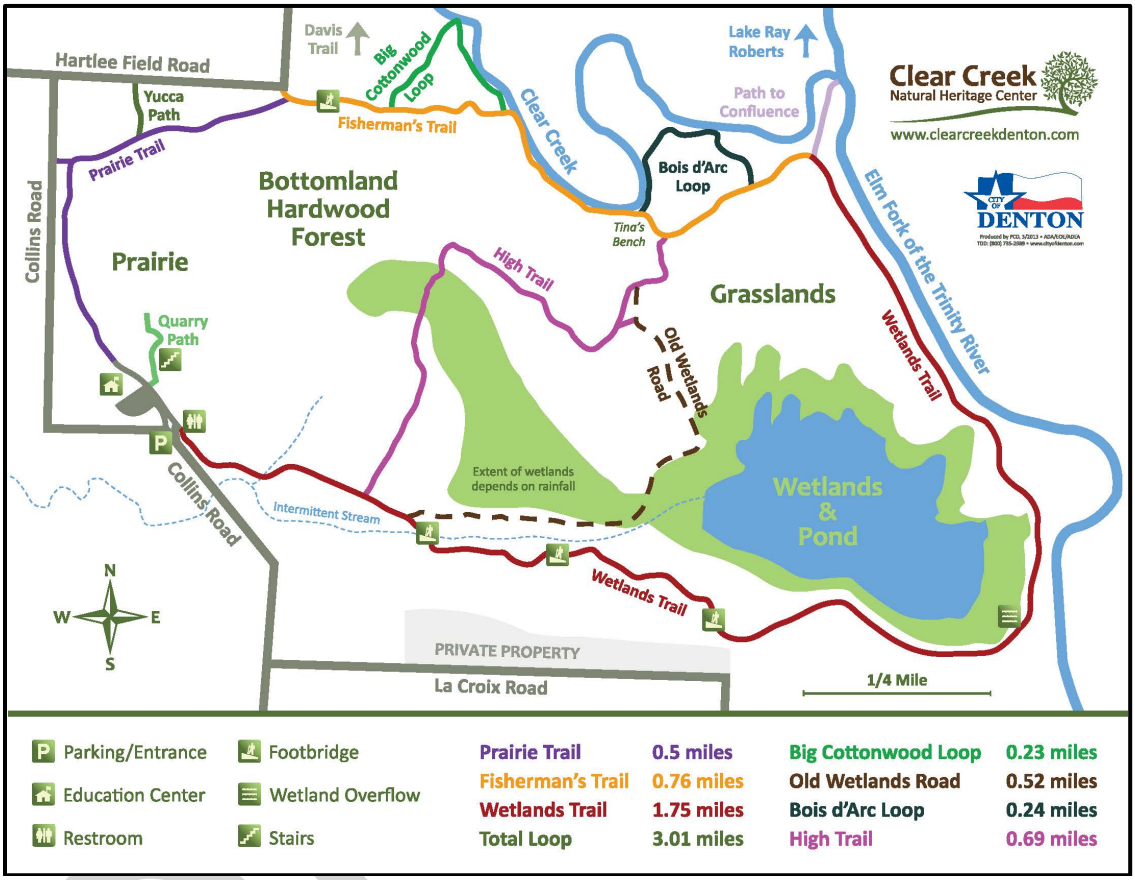


Figure 6.7 Trail map for the Clear Creek Natural Heritage Center
Source: City of Denton

- Trails in Little Elm and Cottonwood Parks: The city of Little Elm holds a lease from USACE for Little Elm Park, Cottonwood Park, and a segment of shoreline running from a trailhead near the Hula Hut restaurant, around Cottonwood Creek cove to a trailhead at McCord Park. The city provides the Johnny Broyles trail in Little Elm Park, the Cottonwood Park Nature Trail in Cottonwood Park, and the 4-mile Lakefront Trail on the segment of shoreline described above.

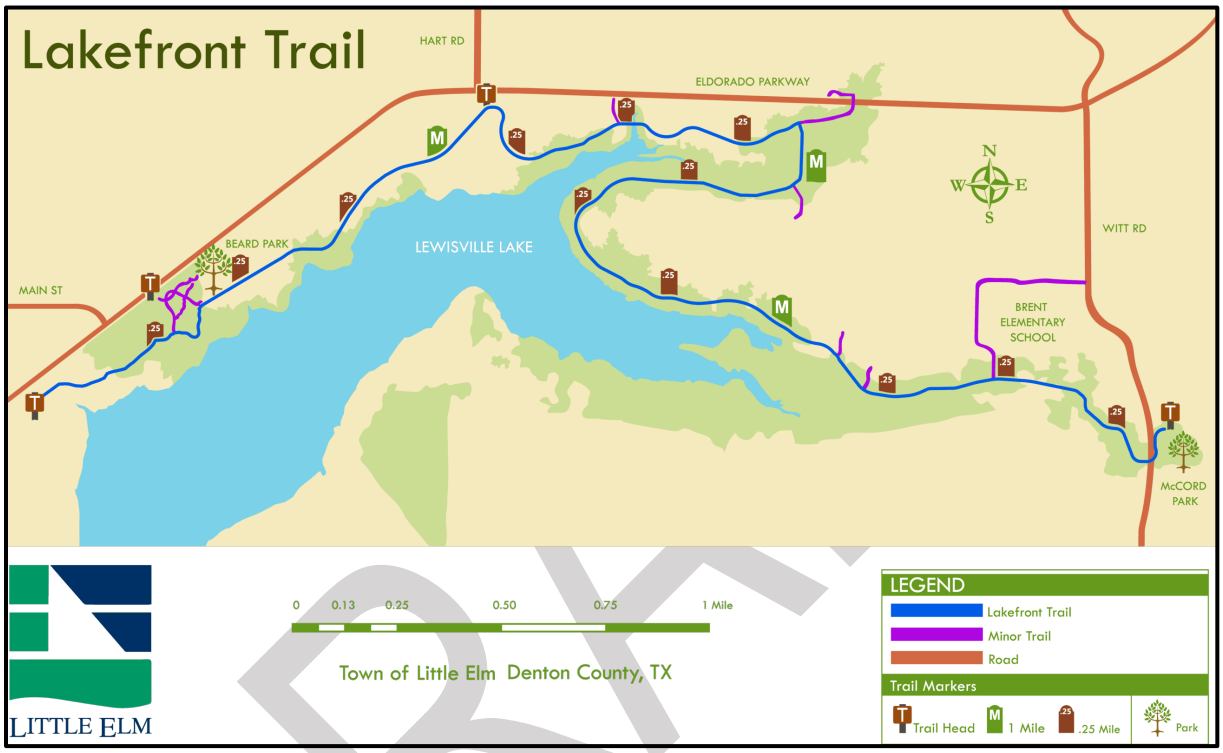


Figure 6.8 Map of the City of Little Elm's Lakefront Trail

- Trails provided by The Colony: The Colony maintains several trails on lands they have leased from USACE. The trails include The Colony Shoreline Trail, The Tribute Shoreline Nature Trail, and Hidden Cove Park Nature Trail. Combined, these trails offer approximately 8.3 miles of hiking and biking opportunities in a natural setting.

Figure 6.9 The Colony Shoreline Trail

6.6 LEWISVILLE LAKE DAM SAFETY MODIFICATIONS

USACE has determined that certain modifications to the dam at Lewisville Lake are needed to ensure that the dam continues to function safely for the foreseeable future. The effort to implement needed modifications has been ongoing for several years prior to this Plan, but the modifications are about to begin as this Plan is being published. The current construction contract includes embankment modifications which will reduce risk by constructing improved seepage collection systems, and several earthen berms. Additionally, a filter will be placed at the downstream end of the outlet works conduit and a portion of the crest road used for surveillance of the dam will be replaced. Two construction locations are in the publicly accessible part of the Lewisville Lake Environmental Learning Area. Visitors will notice modifications being made to the dam embankment in one location to control a seep in that area, as well as some modification work being done on the concrete river outlet structure. Recreation users at Lewisville Lake will see an increase in construction traffic near the dam with building of a temporary road and delivery of material and equipment. Recreation access will be

rerouted during construction, and some areas may be temporarily inaccessible during construction for the safety of our recreational users. USACE will obtain needed fill material from select locations within LLELA. Any natural resources losses associated with these locations will be fully mitigated within LLELA.

CHAPTER 7 - PUBLIC AND AGENCY COORDINATION

7.1 PUBLIC AND AGENCY COORDINATION OVERVIEW

The USACE is dedicated to serving the public interests in support of the overall development of land uses related to land management for cultural, natural, and recreational resources of Lewisville Lake. An integral part of this effort is gathering public comment and engaging stakeholders in the process of planning. USACE policy guidance in ER and EP 1130-2-550 requires thorough public involvement and agency coordination throughout the master plan revision process including any associated NEPA process. Public involvement is especially important at Lewisville Lake to ensure that future management actions are both environmentally sustainable and responsive to public outdoor recreation needs in a region, which is experiencing rapid population growth. The following milestones provide a brief look at the overall process of revising the Lewisville Lake Master Plan.

The USACE began planning to revise the Lewisville Lake Master Plan in January of 2015. The objectives for the master plan revision are to (1) update land classifications to reflect changes in USACE land management policies since 1985, prepare new resource objectives, and revise the Master Plan to reflect new agency requirements for master plan documents in accordance with ER 1130-2-550, Change 7, January 30, 2013 and EP 1130-2-550, Change 5, January 30, 2013.

- May 2015 – USACE submits budget package to initiate a Master Plan revision at Lewisville Lake in October 2016.
- December 2016 – USACE holds internal meetings to initiate master plan revision process.
- January – May 2017 – USACE gathers preliminary information to initiate revision.
- 2 & 4 May 2017 – Initial public scoping meetings held in Lewisville and Little Elm to announce initiation of the revision process and to request public input.
- June – August 2017 – Public comments considered and preparation of draft MP initiated.
- September 2017 – March 2018 – USACE conducts meetings with key individual stakeholders including marinas and park and recreation lessees.
- 16-20 October 2017 – USACE, TPWD, and USFWS conduct wildlife habitat evaluation field work on Lewisville Lake project lands.
- March 2018 – February 2020 – USACE works on draft MP and prepares new maps for the revised MP. Reminders sent to stakeholders and public meeting attendees that work is continuing. Continue gathering input from key stakeholders.

- February 2020 – Public meeting scheduled for March 2020 to announce the final draft MP.

7.2 INITIAL STAKEHOLDER AND PUBLIC MEETINGS

The first action was a scheduled public scoping meeting providing an avenue for public and agency stakeholders to ask questions and provide comments. Two public scoping meetings were held on May 2 & 4, 2017 at the Armed Forces Reserve Center in Lewisville and Lakeside Middle School Auditorium in Little Elm, Texas, respectively.. The Fort Worth District placed advertisements on the USACE webpage, social media, and print publications approximately three weeks prior to the public scoping meeting.

USACE employees hosted the meetings, which were conducted in an open format. Participants were asked to sign in at a table where staff provided the participants with information regarding the structure of the scoping meeting and comment forms. After signing in, participants were directed to be seated in the auditorium and a slide presentation was presented by the Lake Manager on behalf of the Master Plan Revision Project Delivery Team (PDT) to convey information about the following topics:

- Public Involvement Process
- Project Overview
- Overview of the NEPA process
- Master Plan and current land classifications
- How to Submit Comments

At the conclusion of the presentation USACE representatives were available to answer questions and receive written comments at information tables. Interested persons had the opportunity to comment about the project using a variety of methods, including the following:

- Filling out a comment form at the open house
- Taking a comment form home to be returned at a later date
- Submitting a comment using electronic mail
- Submitting a comment and mailing it in on letterhead or choice of paper

In total, approximately 77 individuals, not including USACE personnel, attended the two public scoping meetings. Attendees included elected officials, the public at large, interest groups, partner agencies, marina operators, other government agencies, and area businesses. Written comments were received from Texas Parks and Wildlife Department, 8 cities, one marina, and 17 individuals. Most of the cities offering comment hold park and recreation leases from USACE and two cities responded on behalf of marina sublessees. Much like national forests or parks, Lewisville Lake is a Federally-owned and managed public property. It is USACE goal to be a good neighbor

as well as steward of the public interest as it concerns Lewisville Lake. As such, USACE is bound to the equal enforcement of policies and rules for this publically held national asset. Table 7.1 gives a summary list of the comments received during and following the initial scoping comment period for the master plan, as well as the USACE response.

Table 7.1 Comments and Government Response – from Public Meetings, May 2017

COMMENT	USACE RESPONSE
COMMENTS FROM TEXAS PARKS AND WILDLIFE DEPARTMENT	
TPWD operates and maintains the Greenbelt Corridor that runs along the Elm Fork of the Trinity River between the dam at Ray Roberts and Highway 380 on Lewisville Lake. We agree with the Environmentally Sensitive Area classification of the Greenbelt Corridor as long as that classification will not prevent the Department from performing necessary trail maintenance, adding new segments of trail or adding picnic and rest areas along the trail.	The proposed land classification for the Greenbelt Corridor is Environmentally Sensitive Area (ESA) for all USACE lands within the corridor except for the immediate area where the hike and bike trail is located. The hike and bike trail, as well as associated trail head locations are proposed to be classified as High Density Recreation (HDR) areas. This HDR classification will not prohibit trail maintenance or the addition of picnic and rest areas along the trail. The addition of new trail segments within ESA would be possible if any new segments are proposed as natural surface pedestrian trails with allowances for reinforcement in wet or steep locations.
The portion of the Greenbelt lands adjacent to Wildcat Road should have a land classification that would allow for development of a trailhead and low impact trails that connect to the main Greenbelt trail when public demand warrants such development.	Concur. The area in question is proposed for classification as a Multiple Resource Management Area – Low Density Recreation which will allow for development of a low impact trailhead facility.
The Department wishes to note the existence of aggressive and invasive privet shrubs throughout the Greenbelt Corridor and that steps should be taken to reduce this invasive species.	Concur.
COMMENTS FROM CITY OF THE COLONY	

COMMENT	USACE RESPONSE
Designate "Low Impact" and/or "Wildlife Management Areas" on the lake: The Corps has this designation for federal land, and a similar designation on the lake would be beneficial. There are certain areas on the lake where motorized vessels should not be allowed or at the least, should be designated as permanent no wake zones. Examples would be: shallow or stumpy coves that are not on the main body of the lake that provide great habitat for a variety of shorebirds (herons, egrets, ducks, and migratory pelicans, etc.); and zones or "lanes" designated as Kayak/SUP paddle trails (now and in the future).	This recommendation has significant merit but will require coordination with multiple entities involved in managing the lands and waters of Lewisville Lake. Public comment, including this comment, has indicated a desire for "no wake" zones at various locations, but the designation of these areas must first be coordinated with those entities involved in the enforcement of rules that govern the water surface. Secondarily, setting aside areas as "no wake" zones must also be coordinated with marinas to ensure their voice is heard. Lastly, the designation of "no wake' zones requires on-the-water buoys and markers to make enforcement possible. USACE cannot unilaterally assume responsibility for placement and maintenance of the buoys and markers needed to set aside no wake zones.
Establish lake-wide nuisance noise regulations: One of the most frequent lake related complaints our city gets from residents is regarding loud and/or profane music being played on boats "coving out" near residents' homes. For easier and consistent enforcement, rather than each jurisdiction trying to address this, a lake-wide mandate prohibiting loud and/or profane music within a certain distance of people's homes should be implemented and enforced.	Undesirable noise related to loud and or profane music being played on boats that are moored near residential areas is a universal complaint at most USACE lakes. USACE does not have a rule that prohibits such noise except for the quiet hours rule in Title 36 of the Code of Federal Regulations that prohibits excessive noise in public use areas from 10:00 PM until 6:00 AM. This rule can be applied to the water surface, but most noise complaints occur during daylight hours.
Review and consider re-classifying designated hunting areas: In 1985 when the hunting areas were designated, there were no homes near some of those areas. Residential development over the past 30 years has been significant, and now puts many homes in close proximity to those hunting areas. Not all hunters are cognizant of or follow the regulations of how far they	Public hunting rules and areas at Lewisville Lake are reviewed by USACE each year to address public safety issues, hunting rules changes by Texas Parks and Wildlife Department, and wildlife conservation and protection needs. Currently, USACE issues 600 first-come, first-served hunting permits and all hunting is in accordance with

COMMENT	USACE RESPONSE
must be from houses before discharging their firearms. If the hunting areas aren't re-classified, better enforcement of distance regulations needs to take place during hunting season.	state law except that firearms are restricted to shotguns only with shot size no larger than #2. Archery equipment (including crossbows) may be used only for hunting feral hogs. Hunters must provide evidenced of having completed Hunter Education training and are provided a map of allowable hunting areas when permits are issued. Hunting or shooting within 600 feet of homes, developed parks, roads, fishing piers or platforms, farm and ranch yards, outlet structures, emergency spillways, or other areas is prohibited unless otherwise stated or posted. USACE encourages surrounding cities to comment on allowable hunting areas each year in order to take into account expanding residential development.
Implement a boating moratorium during flood events: During extreme flood events like in 2015, as a park leaseholder, we focus an enormous amount of time and energy on protecting park assets and the homes along our shorelines from boaters. The additional wake caused by these boats damages public and private property, and new underwater hazards exist that most boaters aren't aware of. Waiting to close the lake when it was almost at 537 msl was too long in 2015. Recommend establishing a "lake closed policy" to all motorized vessels at no higher than 533 or 534 msl. At that level, all boat ramps on the lake are inaccessible, and boats at marinas should be prohibited from leaving their docks too. This needs to be an established lake-wide policy implemented for safety so everyone knows what to expect when flood events happen.	Concur that a policy is needed to address boating traffic during high-water lake levels. Such a policy is outside the scope of this Plan but can be addressed in meetings with all concerned stakeholders to include adjoining cities, and marinas.

COMMENT	USACE RESPONSE
Streamline development review and approval process: Allow Corps staff at the local offices more flexibility and authority to approve projects that are within the scope of allowable uses of Corps property. The Corps relies on many cities and other leaseholders to operate and maintain federal parkland, but the approval process to make needed improvements or to provide better amenities and access to the public in those parks is at times ridiculously long (several months to two years). Long delays in approvals can result in lost revenue and/or added costs due to increase in construction pricing, loss of contractors, etc., To my knowledge, we have never had a project rejected at the District level after it was reviewed and vetted at the local Corps office. That indicates the local Corps staff know what they are doing, so they should be more empowered to approve projects to streamline the process.	Noted.
COMMENTS FROM CITY OF LITTLE ELM	
Adding additional recreation land area to Doe Branch Park to the west. There is a small section already recreational and it makes geographical sense that the entire tip of the peninsula be recreational. The Town would like to eventually work out a park lease to improve and maintain this area, similar to our current leased areas. Please see attached exhibit.	Nonconcur. The described area lying west of Doe Branch Park was removed from park status in 2004. USACE believes the area in question is properly classified as wildlife habitat. If the city of Little Elm wishes to someday lease Doe Branch Park, the wildlife area to the west could also be leased with the understanding it would remain as wildlife habitat with public use restricted to low impact use including but not limited to bank fishing and natural surface pedestrian trails.
Adding additional recreation area to the shoreline around our Beard Park and Lakefront area. Near Hardwicke Lane to Hillside Beach, south side of Eldorado Parkway. This area already	Nonconcur. The area in question is currently classified for Fish & Wildlife Management and under the 2020 MP the planning team determined that the area should continue to have a primary

COMMENT	USACE RESPONSE
has a recreational trail through the current wildlife management section. Within portions of Town owned land, we have public parking, Beard Park, restrooms, playgrounds. The Town would like to have this area be deemed recreation to continue to grow and manage, similar to our other park leases. Please see attached exhibit.	use as focused on wildlife benefits. The area in question will be classified as MRML-WM. The city of Little Elm currently has the area under a Low Density Recreation lease which will allow for passive uses, including the trail that the City maintains through the area.
Provide a transportation corridor adjacent to the current utility crossing between the Town of Little Elm and Hackberry for the proposed King Road Bridge. This bridge would connect King Road to Eldorado Parkway at the intersection of Crestlake Drive. It would provide a needed secondary access to the peninsula for life safety and allow pedestrians to cross. This route is historically a transportation crossing with the old "twin bridges"; Hwy 24 route. Please see attached exhibit.	Proposed roads and bridges are not addressed in the master plan revision process. USACE has examined the proposed King Road Bridge in the past and has determined that construction of a bridge along the old Highway 720 alignment would detract from the aesthetics of the USACE land and water surface in question.
COMMENTS FROM THE TOWN OF HICKORY CREEK	
Hickory Creek envisions extending walking trails in Arrowhead Park to the east where Arrowhead Park joins Oakland Park. We would like to see the entire park remain in a HDR classification.	Concur. The land classification of Arrowhead Park is proposed to remain as HDR.
The Town of Hickory Creek Parks Board discussed many topics and improvements for the Corp parks located in Hickory Creek. Below are the comments and future goals for each park: Sycamore Bend Park- Swim beach, disc golf course, fishing dock, new bathroom in the primitive camping area, electric in the primitive camp sites, larger playground, access to the current pavilion by boat	Concur with proposals with the exception of Dog Parks. The request for a dog park at Harbor Lane Park and Point Vista Access Area cannot be approved. The allowable proposed facilities will be described in Chapter 5 of the Master Plan.

COMMENT	USACE RESPONSE
trailers for fishing tournaments, RV campsites. Harbor Lane Park – Disc golf, dog park. Point Vista – Dog park. Arrowhead Park – Volleyball court, basketball court.	
COMMENTS FROM CITY OF HIGHLAND VILLAGE	
Wichita Forest, 700 Highland Village Road Currently this park site is designated as fish and wildlife/environmentally sensitive. Our recommendation is for the park site to remain with the current designation. Additionally, the City is willing to remove trail markers and allow the site to remain in its natural state to protect current and future vegetation and animal habitat. The park site would remain open to public use under the CORPS restrictions assigned to this designation, however no future planned construction of trails within the site would occur.	Concur. The land in question is proposed for reclassification to Environmentally Sensitive Area.
YMCA Leased Area, 709 Highland Village Road The YMCA has this area leased and utilizes it in the summer months for their Camp on the Lake program. The Camp on the Lake is a waterfront day camp for ages 6 – 13. The current classification for this area is fish and wildlife, however the current use is more recreation. There are several permanent structures located on the site utilized by the YMCA for their camp program. Some of the structures include	Concur. The YMCA leased area is proposed for reclassification to High Density Recreation

COMMENT	USACE RESPONSE
several restrooms, covered slab areas for outdoor games, storage building, sand volleyball court, and indoor gathering facility complete with kitchen and air conditioning. Would recommend that the designation be reclassified as high density recreation which would coincide with the current use.	
CORPS land south end of Doubletree Ranch Park (310 Highland Village Road) and runs along Copperas Branch Lake (aka, Highland Village Lake) to Highland Village Road. The area in question is currently classified for fish and wildlife purposes. In accordance with mitigation plans associated with the widening of Interstate 35, pedestrian trails, including a pedestrian bridge over Copperas Branch Lake, are being constructed to provide pedestrian trails that will connect to Copperas Branch Park and other trails in Highland Village. Recommend the land in question be reclassified to a recreation status.	Concur. The land in question is proposed for reclassification to High Density Re8creation.
Pilot Knoll Park, 218A Orchid Hill Road This active park site provides a day use area as well as overnight camping. However, there is one small section of the park that was reclassified years ago as fish and wildlife management/environmentally sensitive area. We understand that this may have been due to the loss of a similar area as a result of the construction of FM2499. As a result this area was re-classified to serve as a "swap" for that loss. We would like to have this area re-classified as low density recreation which would allow for primitive camping and hiking, but continue to protect the area for low impact activities such as bird watching, environmental education, etc. The	Nonconcur. The area in question is a good example of typical Cross Timbers habitat and as such has moderate to high ecological value. Pedestrian trails and hiking are both allowed in Environmentally Sensitive Areas. Depending on the extent and degree of primitive camping, with proper safeguards, this activity may be permitted by special event permit.

COMMENT	USACE RESPONSE
remainder of the park should continue to be classified for High Density Recreation.	
Peninsula Park, 814 Tree Haven Court Recommend this area be reclassified from the current Recreation classification to Low Density Recreation or fish and wildlife.	Concur. The area is proposed for reclassification to Multiple Resource Management Lands – Wildlife Management.
COMMENTS FROM THE TOWN OF SHADY SHORES	
We would not want any of our adjacent shoreline lands to become subject to more stringent designations of management than they currently are so designated. Example: we would not want to have lands, for instance, designated "Wildlife Refuge" if such change of designation puts more restricted access for our residents, than that which we currently are subject	Noted. With one exception, USACE lands in the vicinity of Shady Shores are proposed for classification as Multiple Resource Management Lands – Wildlife Management. The exception being a small tract east of the Cielo subdivision that is proposed for classification as an Environmentally Sensitive Area. Each of these proposed classifications would allow for passive recreational use and pedestrian, natural surface trails.
We would not particularly want a higher Conservation Pool level above 522' to be placed in operation for this Lake, specifically as it may impact that "Shady Shores Bridges" project currently under funding consideration by NCTCOG, and at such planning meetings you have jointly participated. We have not yet heard this mentioned, and I have separately e-mailed you on this subject of Conservation Pool level maintenance too.	Noted. Plans related to pool elevations are not part of the Master Plan process. Regardless, there are currently no proposals under consideration for an increase in the conservation pool elevation at Lewisville Lake.
We want to enter into discussions with you about how to better, and more proactively, manage and maintain the Big Sandy Boat Ramp in our town limits. It is consistently dotted with lots and lots of trash, in various states of disrepair, excess parking on our Lakeshore St drainage easements, etc. (example now: Post/cable fence has lots of damage, there is a rock-beached boat there that needs to be extracted, etc.)	Noted. Following receipt of this comment in July 2017, USACE has completed repairs and renovations to the boat ramp complex.

COMMENT	USACE RESPONSE
COMMENTS FROM THE TOWN OF LAKEWOOD VILLAGE	
All USACE land adjacent to Lakewood Village is classified as Wildlife Management. The town requests that a piece of USACE land at the termination of Garza Road near the north end of the Old Lake Dallas Dam be reclassified to High Density Recreation so the town can have its own park and not be subject to the non-resident fees imposed by other entities that lease USACE park land.	USACE would consider a small High Density Recreation area where Garza Road terminates, but a comprehensive proposal is needed before that land classification change is implemented. USACE would need to know what Lakewood Village proposes to construct and how the area would be maintained. The area in question is proposed to be reclassified as Multiple Resource Management Lands – Wildlife Management. Lakewood Village could lease the area under this classification, but development would be limited to natural surface pedestrian trails and minimal parking space. Changing the area to a High Density Recreation classification in future years is possible but would require a minor Master Plan supplement.
Lakewood Village fully supports the USACE mission to protect and conserve wildlife habitat	Concur
Lakewood Village supports the “narrow shoreline variance areas” identified in the 2005 USACE environmental assessment on allowable adjacent landowner activity.	The Master Plan revision does not address shoreline management issues such as the “narrow shoreline variance areas”, and USACE has no plan to change the narrow shoreline variance areas in the foreseeable future.
COMMENTS FROM THE TOWN OF CROSS ROADS	
Utility Corridors 8 and 10 on Mosely Road and Keyes Lane) are in the Town of Cross Roads. Can the master plan	The master plan revision does not address proposed road projects. USACE policy states that proposed changes to existing roads are addressed on a case-

COMMENT	USACE RESPONSE
identify these roads as needing to eventually be widened?	by-case basis. Utility Corridors 8 and 10 are proposed to remain as originally described in the 2004 Lewisville Lake Master Plan Supplement.
GENERAL PUBLIC COMMENTS	
Nine residents of Lake Bluff Estates in the City of Corinth expressed opposition to any extension of the existing trails on USACE land to a point near Lake Bluff Estates. The residents do not want the trail near their homes, nor do they want the City of Corinth to pursue additional public access points to the existing trail on city streets that are near the USACE boundary line.	Noted. USACE and trail advocates have no plans to extend the existing trail that traverses near the USACE property boundary in the City of Corinth. Communication with City staff members indicates the City has no plans for additional public access points to the trail on USACE land.
I very strongly oppose any commercial building, such as hotels, restaurants, water parks, or resorts, etc. I would also loudly oppose any permission given to a developer to cut down trees to facilitate lake views for their housing developments, as happened several years ago in Corinth along the shores (and in the water) of Lake Lewisville. The natural landscape should be managed as just that, with trails as natural as possible. No playgrounds, pavilions, baseball fields, campgrounds...there are plenty of inland locations for these types of amenities.	Any proposed commercial development such as marinas or resorts, which may include amenities such as lodging, restaurants, or appropriate recreational features may only be placed in areas designated for High Density Recreation (HDR). Refer to Chapter 5 for actions that are proposed within HDR areas and to Chapter 6 for a discussion on comprehensive resorts. Developers and/or individual property owners are never permitted to remove trees or other vegetation on USACE land for a view of the lake. Removal of vegetation may be allowed by written permit only and is governed by the USACE Shoreline Management Plan. Preservation of the natural landscape is given a high priority in all land classifications, but some development is appropriate within HDR areas to accommodate lake and natural resources related recreation such as boating, picnicking, hiking and camping.
I live in Shady Shores, but have been living around the Lewisville area for many years now. It would be great to have long hiking	Concur. USACE supports the establishment of public trails in most areas, but typically must work with

COMMENT	USACE RESPONSE
trails added around Lake Lewisville, especially on the west, north/west side of the lake, if possible. Previously, I lived in Flower Mound and the access to trails over at Lake Grapevine was fantastic. The lack of sidewalks in the area I live in, makes it dangerous to walk. So, trails would be of great value for safety reasons, too.	partners to construct and maintain any trail. Currently, Texas Parks & Wildlife Department operates the Greenbelt Corridor trail on the north end of Lewisville Lake. On the west side of the lake public trails are maintained by Copper Canyon and Highland Village. Other cities including Lake Dallas and Hickory Creek have discussed and or proposed public trails.
We would like to see more development on the lake in terms of restaurants that you can dock a boat at and eat at the lake. It seems Lake Lewisville is behind other lakes in this regard. We would also like to see more beach areas / volleyball courts like the new one in Little Elm. This is a great park, but it is way up on one side of the lake. We need another one or two on other parts of the lake.	Noted. Restaurants are currently operating at Eagle Point Marina and Pier 121 Marina. Additional restaurants are proposed by some lessees, but there are no firm plans to date. USACE does not allow stand-alone placement of restaurants on USACE land. Restaurants are generally allowed only as an amenity associated with a marina or comprehensive resort. Designated beaches must meet certain design criteria and be properly maintained. There are currently nine designated beaches at Lewisville Lake including beaches in Lewisville Lake Park, Copperas Branch Park, Pilot Knoll Park, Hickory Creek Park, Willow Grove Park, Little Elm Park, Hidden Cove Park, Stewart Creek Park and East Hill Park. Some of these beaches are equipped with amenities such as a volleyball court.
My family and friends have enjoyed the many activities that the lake has to offer. We especially enjoy waterfowl hunting the lake and hope that the Corps continues to allow access for hunting on a permit basis.	Noted. USACE intends to continue to allow hunting access as long the activity does not create a public safety hazard or conflicts with natural resources management goals. USACE evaluates the public hunting program throughout Fort Worth District lakes on an annual basis. The annual Public Hunting Guide is available online at https://www.swf.usace.army.mil/About/Lakes-and-Recreation-Information/

COMMENT	USACE RESPONSE
I am a wildlife rehabilitator permitted by the TX Parks and Wildlife department. I live in Little Elm on a lakefront property and my experience with my neighbors regarding wildlife has not been the best. Most of them simply don't understand how certain species exist and are unnecessarily scared, concerned and worried about themselves, their children and pets and end up killing animals, such as non-venomous snakes for example. Therefore I would like to suggest more education regarding this matter, maybe in form of workshops. I have written and published many articles about urban mammals and would be happy to assist.	Noted. The offer to assist is appreciated. USACE encourages wildlife rehabilitators and Master Naturalists to contact the Lewisville Lake Office to inquire about natural resources needs and programs.
We have lived on the lake for many years. Please do not let Hula Hut build a dock. The area is too shallow, narrow, and already too crowded with boats. Wakeboard boats and other boats playing loud music and using alcohol and profanity make it difficult to enjoy the area with grandkids.	Noted. USACE has no plans to authorize a commercial dock in the area. The issue of boating congestion and loud music, profanity and alcohol use by boaters is a problem lakewide. Reducing the occurrence of this nuisance activity will require a coordinated effort by USACE, Texas Parks & Wildlife, Denton County Sheriff, and law enforcement officers from communities that surround the lake.
Our home adjoins Arrowhead Park and is only about 10 feet from Corps land. We do not want a public trail to be constructed on Corps land in this location. We have lived here 30 years and will not go out on the lake on weekends due to unsafe boaters that do not know boating rules. Perhaps boaters need training. Drinking, noise and parties are also a real problem.	Noted. Trails are very popular and favored by many area residents and lake visitors alike. Placement of a trail on USACE land does require coordination with adjacent communities. Unsafe boating, and noise, profanity and parties related to boating have been identified as a problem by others. The problem is lake-wide. Refer to the above response.

7.3 PUBLIC AND AGENCY REVIEW OF DRAFT MP, EA, AND FONSI

Note: This section to be completed following the final public meeting.

Due to public health and safety issues associated with the COVID-19 virus, public meetings to announce the availability of the draft master plan and environmental assessment were canceled. USACE announced an online review of the draft documents beginning in April 2020 with a comment period ending on June 22, 2020. A total of (number) of comments were received during the comment period. Comments on the draft documents are listed in Table 7.2.

Table 7.2 - Public Comments from (date) Public Meeting to Announce the Final Draft of the Lewisville Lake Master Plan

COMMENT	USACE RESPONSE

Copies of letters received from governmental entities are included in the EA. Upon incorporation of public comment into the draft Master Plan, EA and FONSI, final versions were prepared and signed by the District Engineer for implementation. The final version is posted on the District website.

CHAPTER 8 - SUMMARY OF RECOMMENDATIONS

8.1 SUMMARY OVERVIEW

The preparation of the Lewisville Lake Master Plan followed the new USACE master planning guidance in ER 1130-2-550 and EP 1130-2-550, both dated 13 January 2013. Three major requirements set forth in the new guidance include (1) the preparation of contemporary Resource Objectives, (2) Classification of project lands using the newly approved classification standards, and (3) the preparation of a Resource Plan describing in broad terms how the land in each of the land classifications will be managed into the foreseeable future. Additional important requirements include rigorous public involvement throughout the process, and consideration of regional recreation and natural resource management priorities identified by other federal, state, and municipal authorities. The study team endeavored to follow this guidance to prepare a master plan that will provide for enhanced recreational opportunities for the public, improve environmental quality, and foster a management philosophy that promotes partnerships and the success of each stakeholder involved in the management of the lands and surface waters of Lewisville Lake. Factors considered in the Plan were identified through public involvement and review of statewide planning documents including TPWD's 2018 and 2012 TORP (synonymous with SCORP) and the TCAP – Texas Blackland Prairies Ecoregion and the Cross Timbers and Prairies Ecoregion. Also reviewed was the NCTCOG Vision 2050 report, and the parks master plans for several cities operating parks on USACE lands. This Master Plan will ensure the long-term sustainability of the outdoor recreation and environmental stewardship programs administered by USACE and a broad array of partners at Lewisville Lake.

8.2 LAND CLASSIFICATION PROPOSALS

- A key component in preparing this Master Plan was examining prior land classifications and addressing the needed transition to the new land classification standards. During the public involvement process USACE sought public input into whether, besides the simple change in nomenclature, a shift in land classification was desired (for example, should lands with a recreation classification be reclassified to a wildlife classification or vice versa.). Chapter 7 of the Plan describes the public input process.

- Written comments were received from Texas Parks and Wildlife Department, 8 cities, one marina, and 17 individuals. Most of the cities offering comment hold park and recreation leases from USACE and two cities responded on behalf of marina sublessees. The input from the public, TPWD, cities, and marinas, as well as information in the TORP, TCAP and the North Texas Vision 2050 report by NCTCOG described in Section 8.1, was used by the planning team to prepare a land reclassification proposal for Lewisville Lake. All changes reflect historic and projected public use and new guidance from ER 1130-2-550 and EP 1130-2-550.

A summary of acreage changes from prior land classifications to the current classifications is provided in Table 8.1, and key decision points in the reclassification of project lands are presented in Table 8.2.

Table 8.1 Change from Prior Land Classification to New Land Classification[1]

Prior Land Classifications (2004)	Acres		New Land Classifications	Acres
Project Operations	1,170		Project Operations	1,083
Recreation	8,935[2]		High Density Recreation	4,780[3]
Fish and Wildlife Management	6,738			
			Separable Recreation Lands[4]	1,136
Environmentally Sensitive Areas (as an overlay on certain Fish & Wildlife and Recreation lands)	7,292		Environmentally Sensitive Areas	10,918
			Multiple Resource Management - Low Density Recreation	543
			Multiple Resource Management – Wildlife Management	3,268
Permanent pool	28,980		Permanent pool	27,175[5]
Flowage Easement	5,213		Flowage Easement	8,712
Conservation Easement	500			475

***Note**: [1]The new land classification acreage figures were measured using GIS technology and may vary from prior, similar classifications, and from official land acquisition records. Also, with the exception of the Project Operations classification, there is no direct relationship between the prior land classifications and the new land classifications.

[2]The 8,935 acre number was copied from the 2004 MP supplement. Although not stated in the 2004 supplement, it is assumed that this number included the cumulative acreage of recreation-related lands identified in the 1985 MP.

[3]The 4,780 acres figure includes 1,136 acres of Separable Recreation Lands acquired for the Ray Roberts Lake State Park – Greenbelt Corridor.

[4]Separable Recreation Lands is not a land classification but is required by USACE regulations to be described in project Master Plans. Separable Recreation Lands are those lands acquired only for the purpose of recreation and are otherwise not required for the successful operation of Lewisville Lake for the primary missions of flood risk management and water conservation. The acreage of Separable Recreation Lands is included in the acreage totals for High Density Recreation lands. The 1,136 acres of Separable Recreation Lands existed in 2004 but were not identified as such in the 2004 Master Plan Supplement.

[5]As measured during the 2007 Sedimentation Survey conducted by TWDB.

Table 8.2 Reclassification Proposals

Proposal	Description	Justification
Project Operations (PO)	The Project Operations classification was reduced from 1,170 to 1,083 acres.	The small reduction in Project Operations lands is primarily the result of the GIS measurement differential from 2004 to 2020. The 2020 classification included all Project Operations lands shown in 2004 plus two small tracts totaling 10 acres and some additional acreage located along the uncontrolled spillway discharge channel up to Fish Hatchery Road.
High Density Recreation (HDR)	The 1985 master plan included four recreation-related land classifications as follows: Recreation Intensive Use – 1880 acres Future Recreation Intensive Use – 1,320 acres. Low Density Recreation Use – 5,465 acres Future Low Density Recreation Use – 970 acres The 2004 supplement changed these classifications to either Recreation or Fish and Wildlife Management and listed 8,935 acres as Recreation lands. With very few exception all of the Recreation lands shown on the maps in the 2004 MP supplement are carried over into the 2020 MP revision as HDR lands totaling 4,780 acres. The reason that 8,935 acres is	The Recreation lands shown on the maps in the 2004 master plan supplement, minus the two exceptions noted in the column to the left are now HDR lands. These lands are needed for current and planned recreational development. It is noteworthy that there are many undeveloped acres within the HDR areas that have the potential to meet future recreation needs. Many of these undeveloped acres are located in Cottonwood Park, Sycamore Bend Park, East Hill Park, Doe Branch Park, and Hidden Cove Park.

Proposal	Description	Justification
	shown as Recreation lands in the 2004 MP is not fully explained but may have included all recreation-related lands that were included in the 1985 MP as well as errors made in consolidating land classifications at the time. The 2004 acreage is being used as the base acreage because that is what is being used for the other land class comparisons. The 2020 MP takes into account the possible errors of the 2004 supplement and proposes 4,780 acres classified as High Density Recreation (HDR). The only acreage removed from Recreation Intensive Use status from 2004 to 2020 was approximately 75 acres in Hickory Creek Park and 10 acres of the area leased to the University of North Texas, both of which are proposed as ESA.	
Environmentally Sensitive Areas (ESA)	Approximately 11,767 acres have been classified as ESA areas. Approximately 7,292 acres in the 2004 MP supplement were designated as an ESA overlay on another primary classification. The ESA overlay afforded the same protection as the 2020 ESA classifications, but national guidance now requires areas classified as ESA to be a stand-alone classification. Most of the	The 2004 ESA classification overlays did not include important east-side riparian areas, including two areas where an environmental restoration project on Hackberry Creek and Stewart Creek tributaries has been completed. Other areas added as ESA in this 2020 Plan include select portions of Hickory Creek Park, as well as an area that

Proposal	Description	Justification
	acreage added to the ESA classification were formerly classified as Fish and Wildlife Management Area. The change to ESA provides the highest level of environmental protection in the USACE land classification system.	includes Nix and Jefferson Sloughs and the Rocky Point ESA near the north end of the old Lake Dallas Dam and the 2,704 –acre Lewisville Lake Environmental Learning Area (LLELA) that was shown as Fish and Wildlife Management. The change from FWM to ESA was based on input from LLELA management.
MRML – Low Density Recreation (LDR)	Approximately 543 acres were reclassified from a 2004 Fish and Wildlife Management classification to a MRML-LDR classification.	In 2005, USACE published a Programmatic Environmental Assessment (PEA) focused on vegetation modification activities undertaken by adjacent landowners. This PEA led to the designation of 19 Narrow Shoreline Variance Areas where USACE ownership is approximately 50 feet wide to approximately 100 feet wide. Landowners adjacent to the NSVA areas may apply for a written permit to mow USACE land to the water's edge. Each of the 19 NSVA areas has been reclassified from a Fish & Wildlife Management classification to a MRML-LDR classification.
MRML – Wildlife Management (WM)	The 2004 MP Supplement classified approximately	

Proposal	Description	Justification
	6,738 acres as Fish & Wildlife Management areas. This 2020 MP classifies 3,268 acres as MRML-WM.	
Water Surface Restricted	Approximately 79 acres of water surface has been classified as Restricted water surface where boats are not allowed.	Areas included in the 79 acres are comparatively small parcels that surround water intake structures, the USACE gate control tower, the approach to the uncontrolled spillway, and designated swimming beaches.
Water Surface Designated No Wake	Approximately 1016 acres of water surface has been classified as Designated No Wake area where vessels are not allowed to create a wake when underway.	Areas included in this water surface classification include areas surrounding boat ramps, marina areas, and two coves selected to meet the need of paddle craft.
Water Surface Open Recreation	Approximately 25,542 acres of Lewisville Lake is classified for Open Recreation area where year round or seasonal water-based recreational use is permitted.	Areas included in this water surface classification includes the majority of the lake water surface area. The exception is the areas around boat ramps, marinas, and navigational hazards.

Note: The land classification changes described in this table are the result of changes to 44 individual parcels of land ranging from a few acres to several hundred acres. Acreages were measured using GIS technology. The acreage numbers provided are approximate.

CHAPTER 9 - BIBLIOGRAPHY

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