WALLISVILLE LAKE
DRAFT MASTER PLAN

TRINITY RIVER BASIN

LIBERTY AND CHAMBERS COUNTY, TEXAS

MAY 2022

US Army Corps
of Engineers ®
Galveston District

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EXECUTIVE SUMMARY

Wallisville Lake Draft Master Plan

U.S. Army Corps of Engineers

Prepared by Galveston District and the Regional Planning and Environmental Center

May 2022

PURPOSE

The revision of the 1996 Wallisville Lake 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 Wallisville Lake over the next 25 years. The 1996 Wallisville Lake Master Plan Update has served its intended 25-year planning horizon and does not adhere to the current guidance set forth in Engineering Regulation (ER) 1130-2-550 Change 7, and the accompanying Engineer Pamphlet (EP) 1130-2-550 Change 5. The Master 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. Today, the project provides for multiple purposes including salinity control, navigation, water supply, fish and wildlife enhancement, and recreation. In addition to the primary purposes, the USACE also carries out the inherent mission of environmental stewardship on the Federal lands water surface at Wallisville Lake.

PUBLIC INPUT

To ensure a balance between operational, environmental, and recreational outcomes, public and agency input toward the Master Plan was obtained. 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.

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 Wallisville Lake. This Plan also establishes a classification of surface waters related to outdoor recreation. 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 environmental assessment process. Public involvement is especially important at Wallisville Lake to ensure that future management actions are both environmentally sustainable and responsive to public outdoor recreation needs in the region. The following milestones provide a brief look at the overall process of revising the Wallisville Lake Master Plan.

The USACE began planning to revise the Wallisville Lake Master Plan in 2016. The objectives for the Master Plan revision were to (1) update land classifications to reflect changes in USACE land management policies since 1996 and (2) update 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.

The USACE received 68 comments from 6 different entities including government agencies (3) and non-governmental organizations (3). Issues that were addressed in the comments included invasive species management, climate change, water management, land and water surface classification, recreational use, wildlife management, tourism, hunting and fishing, and hydrology. Wallisville Lake is a federally owned and managed public property, and it is the USACE's goal to be a good neighbor, as well as steward for public interest as it concerns Wallisville Lake. As such, the USACE is bound to the equal enforcement of policies and fees for this publicly held national asset. Table 7-1 provides a summary list of the comments received during the initial scoping comment period for the Master Plan, followed by the USACE response.

Second Public meeting information will be included in final draft.

RECOMMENDATIONS

The following land classifications changes (detailed in Chapter 8, Table 8-2) resulted from the inventory, analysis, and synthesis of data, documents, and public and agency input. The 1996 Wallisville Lake Master Plan describes the presence of land use classifications on project fee lands (defined as a type of ownership giving the owner maximum interest in the land, in this case the government) but omits details regarding maps and acreages for the land classifications. The Master Plan revision will not be able to describe any prior land classification acres however it will define new land classification acres and associated maps. In general, 22,666 total acres were classified, 15,817 land acres, and 6,849 water acres.

The changes in total acres reported in the Master Plan from 1996 to 2022 can be attributed to changes in measurement technology. The 2022 acres are based entirely on available Geographical Information System (GIS) data provided for the project and often differ from previously reported acres and official land acquisition real estate records.

Table ES-1 Land Use Acreage Changes

Prior Land Classifications (1996)	Acres	New Land Classifications (2022)	Acres (*)
Operations	n/a	Project Operations (PO)	160
		High Density Recreation (HDR)	64
Environmentally Sensitive Areas	n/a	Environmentally Sensitive Areas (ESA)	14,679
Low Density Recreation	n/a	Multiple Resource Management – Low Density Recreation (LDR)	121
Fish and Wildlife	n/a	Multiple Resource Management – Wildlife Management (WMA)	787
		Future/Inactive Recreation Areas	6
TOTAL	18,949		15,817
Water Surface	5,140	Open Recreation	4,963
		Designated No-Wake	1,498
		Fish and Wildlife Sanctuary	384
		Restricted	4
TOTAL	5,140		6,849
TOTAL FEE	24,089		22,666

* Note: Acreage figures were measured using GIS technology and may vary slightly from official land acquisition records.

PLAN ORGANIZATION

Chapter 1 of the Master Plan presents an overall introduction of Wallisville 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 Wallisville 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 Wallisville 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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TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF FIGURES

LIST OF TABLES

LIST OF PHOTOS

1 INTRODUCTION

1.1 GENERAL OVERVIEW

The Wallisville Lake Project is a multipurpose water resources project constructed and operated by the U.S. Army Corps of Engineers (USACE), Galveston District. The Project and associated federal lands are in Liberty and Chambers Counties, Texas (TX). The Project is located (Figure 1-1) near the mouth of the Trinity River between Houston and Beaumont, Texas. The locks and associated infrastructure, as well as all lands acquired for the Wallisville Lake Project, are federally owned and administered by the USACE.

Figure 1-1 Wallisville Lake Vicinity Map

This 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 Wallisville Lake. The Plan does not address the water level management, navigation, or water supply purposes of the Wallisville Lake Project, those are addressed in the Water Control Manual for Wallisville Lake. The previous Wallisville Lake Master Plan was prepared in 1996, which is past the intended planning horizon.

1.2 PROJECT AUTHORIZATION

The Wallisville Lake Project was authorized by the River and Harbor Act of 1962 (House Document No. 215, 87th Congress) [Public Law 87-874]. The authorization was for a reservoir consisting of 19,700 acres, a lock for barge traffic, four recreation facilities, a dam in the Trinity River for saltwater intrusion, and fish and wildlife enhancement.

The authorized project has undergone significant construction and operation changes since its inception in 1962 to eliminate or reduce environmental impacts. The Project has been scaled-down from the original 19,700-acre reservoir in several stages to reduce environmental impacts. The first reduction in size was to a 5,600-acre reservoir, followed by a 3,800-acre reservoir, and finally to the present Project with no reservoir which will act as a saltwater barrier during low river-flow conditions. Therefore, as presently designed, the authorized Project will not serve as a reservoir and will emulate pre-Project conditions as closely as possible. The 19,700 acres of Trinity River bottom and delta, which would have been inundated by the original Project, are owned in fee (defined as a type of ownership giving the owner maximum interest in the land, in this case the government) by the Federal Government and will be managed by the USACE for salinity control, navigation, water supply, fish and wildlife enhancement, and recreation.

1.3 PROJECT PURPOSE

The Wallisville Lake Project was originally authorized by Congress for five purposes: navigation, salinity control, water supply, fish and wildlife enhancement, and recreation with the primary purpose to provide salinity control into the Trinity River system. These purposes are still current today even though the Project is much different now than originally conceived.

Environmental stewardship is not listed as a primary project purpose but is mentioned here as a major responsibility that is inherent in the administration of Federally owned lands. Other laws, including but not limited to Public Law 91-190, National Environmental Policy Act of 1969 (NEPA) and Public Law 86-717, Forest Cover Act, place emphasis on the environmental stewardship of Federal lands and USACE-administered Federal lands, respectively.

1.4 PURPOSE AND SCOPE OF MASTER PLAN

In accordance with Engineering Regulation (ER) 1130-2-550 Change 07, dated 30 January 2013 and Engineering Pamphlet (EP) 1130-2-550 Change 05, dated 30 January 2013, master plans are required for most USACE water resources development projects having a federally-owned land base. This revision of the Wallisville Lake Project Master Plan is intended to bring the master plan up to date to reflect current ecological, socio-demographic, and outdoor recreation trends that are impacting the Project Area, as well as those anticipated to occur within the planning period of 2022 to 2047 (i.e., 25 years).

The Wallisville Lake Project Master Plan (hereafter Plan or Master Plan) is the strategic land use management document that guides the efficient, cost-effective, comprehensive management, development, and use of recreation, natural resources, and cultural resources throughout the life of the Wallisville Lake Project. It is a vital tool for responsible stewardship and sustainability of the project's natural and cultural resources. It makes provision for outdoor recreation facilities and opportunities on federal land associated with Wallisville Lake Project for the benefit of present and future generations. The Plan guides and articulates USACE responsibilities pursuant to federal laws to preserve, conserve, restore, maintain, manage, and develop the land, water, and associated resources. It is a dynamic and flexible tool designed to address changing conditions. The Plan focuses on carefully crafted resource-specific goals and objectives. It ensures that equal attention is given to the economy, quality, and needs in the management of Wallisville Lake Project resources and facilities, and that goals and objectives are accomplished at an appropriate scale. The master planning process encompasses a series of interrelated and overlapping tasks involving the examination and analysis of past, present, and future environmental, recreational, and socioeconomic conditions and trends. With a generalized conceptual framework, the process focuses on four primary components, as follows:

- Regional and ecosystem needs
- Project resource capabilities and suitability
- Expressed public interests that are compatible with the Wallisville Lake Project's authorized purposes
- Environmental sustainability elements.

It is important to note what the Master Plan does not address. Details of design, management and administration, and implementation are not addressed here; but are covered in the Wallisville Lake Operational Management Plan (OMP). In addition, the Master Plan does not address the specifics of regional water quality, shoreline management, water level management, navigation, or water supply purposes of the Wallisville Lake Project. The operation and maintenance of primary project operations facilities; including but not limited to the locks, dam, and levees; are not included in this Plan.

The 1996 Master Plan was sufficient for prior land use planning and management. Changes in outdoor recreation trends, regional land use, population,

current legislative requirements, and USACE management policy have occurred over the past decades. Additionally, increasing fragmentation of wildlife habitat, national policies related to land management, climate change, and growing demand for recreational access and protection of natural resources are all factors affecting Wallisville Lake Project and the region in general. In response to these continually evolving trends, the USACE determined that a full revision of the 1996 Plan is required as set forth in this Plan.

1.5 BRIEF WATERSHED AND PROJECT DESCRIPTION

Located in the Trinity River Basin, Wallisville Lake Project is nearly 23,000 acres of total Project Area. The Trinity River rises in Archer County in north central Texas and flows some 700 miles in a southeasterly direction across the state of Texas to Trinity Bay in the vicinity of Anahuac. The basin has a length of about 360 miles and a maximum width of about 100 miles near the upper end. The basin is bounded on the north east by the Neches and Sabine River Basins and on the south and west by San Jacinto and Brazos River Basins. The river drains a watershed area of 17,967 square miles. The physiographic expression of the Trinity River Basin ranges from treeless prairies to rolling timbered hills with land surface elevations ranging from sea level at the mouth of the river to about 1,400 feet above sea level in the upper reaches of the basin. The Trinity River has developed a delta at its mouth which has been extended into upper Trinity Bay.

The Trinity River is navigable by pleasure boats from its mouth and north as far as Liberty, Texas. The Galveston Bay area shrimp fleet utilizes the Trinity as safe harbor during major hurricane events. The Wallisville Lock and Dam and Structure A provide for salinity control by opening and closing depending on tides, river flows, winds, and drought conditions. The Trinity River is a major source of water for both the Houston and Dallas-Fort Worth metro areas, for several smaller communities, and for irrigation canal districts in both Liberty and Chambers Counties. Unlike most other USACE projects, Wallisville has no impounded reservoir so the bottomland forests, grasslands, streams, marshes, swamps, and pools are still preserved as natural habitats for a wide variety of fish and aquatic animals. Depending on tides and fish movements, anglers could find marine species one day and fresh species the next. Birds, such as colonial waders, shore birds, waterfowl, songbirds, and raptors call Wallisville home for breeding, wintering, or temporary residence during migration. Mammals large and small find forage and shelter in the grasslands, forests, and swamps. Many reptiles including the large American alligator also call the swamps and wetlands home. Except for the coldest part of the winter, visitors can expect to see alligators sunning along stream or pool banks or swimming in the Project's waters. Parks, Recreation Areas, and the Visitor Center provide opportunities for picnicking, hiking, birding, primitive camping, fishing, canoeing, kayaking, and other activities for visiting families. Fishing can be enjoyed year-round, and hunting migrating waterfowl is permitted during waterfowl season.

Efforts to construct a saltwater barrier and/or reservoir at Wallisville on the Trinity River began in 1952. Congress first authorized the construction of the project through

the River and Harbor Act of October 22, 1962. The government purchased the property and construction began in 1966. At this point, the project would have been a 19,700 acre reservoir with surface elevation of four feet above mean sea level. A contract for water supply, salinity control, and recreation was signed between the U.S. Army Corps of Engineers, the Trinity River Authority, the Chambers-Liberty Counties Navigation District, and the City of Houston and was approved by the Secretary of the Army on February 2, 1968. In September 1971, a lawsuit was filed by the Sierra Club in U.S. District Court against the construction of the project. At approximately 72 percent complete, the construction was halted in 1973 by a summary judgment decision of the court. Between 1973 and 1987 the project was revised and reevaluated. And in May of 1987, the Fifth Circuit Court of Appeals dismissed the lawsuit in favor of the government and lifted the injunction against continuing construction. Then in November of 1989, a pair of nesting bald eagles was discovered near Miller Lake, and the project was reevaluated again. It was this reevaluation that gave rise to the project as it stands today: a set of levees along the east and west banks of the Trinity in conjunction with the dam across the Trinity, the navigation lock and engineered navigation channel, the gated control structure on main stem of the Trinity, Structure A in the Cut-Off near Pickett's Bayou, Structure B at the head of Lost River, and the parks and recreation areas. The original 39,000 feet long concrete dam structure across the marsh was abandoned after it was breached in 2001 to allow for normal water flows of the Old River and several smaller streams and bayous. Cedar Hill Park was completed in October 2000 and is leased to Chambers County for operation and maintenance. The J.J. Mayes Wildlife Trace was opened to the public in May 2003. Hugo Point Park was opened in August 2003 and is leased to Chambers County for operation and maintenance.

Photo 1-1 Wallisville Lake dam (Source: USACE)

1.6 DESCRIPTION OF PROJECT AREA

The Wallisville Project is located near the mouth of the Trinity River in Chambers and Liberty Counties, Texas (Figure 1-2) between the major metropolitan areas of Houston, Beaumont, and Galveston. An estimated 23,277 acres of bottomland delta and adjacent terrace margins were acquired for the original Project. These lands extend from approximately 2.5 miles north of the Chambers/Liberty County line southward through the lowland delta for approximately 6 miles. The southern margin of Federal property is approximately 2 miles from Trinity Bay, the northeastern lobe of the greater Galveston Bay estuary system. While the Project has changed and there is no longer a plan for a reservoir pool, the Project boundary has not changed.

The Trinity River delta is an integral part of Trinity Bay and Galveston Bay system, one of the largest and most productive estuaries on the Texas coast, and is the site of the mouth of the Trinity River, the major source of fresh water to the Galveston Bay system. The Project Area is typified by relatively flat terrain interspersed with numerous bayous, abandoned channels, ponds, and lakes. The land areas consist of marsh, swamps, bottomland hardwoods, upland pine and hardwoods, and prairies.

Trinity Bay, the eastern part of upper Galveston Bay, is about 15 miles long and 10 miles wide. The delta of the Trinity River lies in the northeast end of the Bay and is

being extended into the bay by deposition of the sediment load of the Trinity River. The natural depth in the bay increases from one or two feet along the shoreline to a maximum of about 8 feet in the lower bay. A depth of 6 feet extends over a large portion of the bay. Trinity Bay comprises about 25 percent of the water area and about 19 percent of the emergent marsh of the Galveston Bay system. It has variable salinity levels because of the influence of Trinity River inflow and supports only a limited quantity of submerged aquatic vegetation because of generally high-water turbidity.

Outside the Wallisville Lake project boundary, several hunting and fishing camps and clubs are located along both banks of the Trinity River and in the delta marsh. Some fishing camps have facilities available for public use, but many are private and require membership for utilization of the facilities. The area along the west bank of the Old River contains tracts with numerous weekend cabins or permanent homes. Much of the land east of the Trinity River is used for livestock grazing or rural homesteads. Subdivisions containing permanent homes and weekend cabins are developing along the banks of the Trinity River 18 miles above the river mouth.

Industrial development in the Project vicinity has occurred in the Trinity River floodplain and coastal marshes and prairies. Texas Gulf Incorporated employed about 100 persons, produced sulphur from deposits east of the Project Area, and had a barge dock on a channel tributary to the Trinity River near river mile 11. The barge dock had facilities for loading liquid sulphur but is no longer in use. Dow Chemical Company has a storage facility located near Wallisville. Houston Lighting and Power Company has constructed two electric power generator units on Cedar Bayou, a coastal stream emptying into upper Galveston Bay about 12 miles southwest of the mouth of the Trinity River. In conjunction with the plant, the company constructed a 2,600-acre cooling pond in the delta marshlands below Cotton Lake and a six-mile long diversion channel to discharge cooling water effluent into Trinity Bay at a point about 5 miles west of the Trinity River mouth.

Chambers and Liberty Counties were the leading crude oil producers in the Trinity River Basin in 1974. Several oil and gas fields are in the general Project vicinity. The Lost Lake Oil and Gas Field is located west of river mile 9 and in the lower portion of the delta and has experienced irregular production of oil since 1929. Oil fields have developed on the Pleistocene uplands at Moss Bluff and in the marshlands below Cotton Lake. Numerous oil and gas pipelines run across the Wallisville Project. These pipelines extend to terminals and refineries at Houston, Beaumont, and Port Arthur, and they serve the oil fields in the area.

The mining of sulphur at Moss Bluff east of the Wallisville Project constituted a large percentage of the mineral production in the area. Sulphur was produced by Texas Gulf, Inc. from wells drilled into the caprock of a shallow subsurface salt dome. In the area near the Project, sand for concrete of industrial quality is produced from several pits in Pleistocene and Holocene Modern river deposits.

1.7 PROJECT ACCESS

Highway access to the Wallisville Lake Project is achieved primarily via Interstate 10 (IH-10), which bisects the project lands and provides several exits to the Project. The roads to the project office, Cedar Hill Park and the J.J. Mayes Trace are the only existing roads to provide access into portions of the project, and there are no plans for additional roads. The road to the Lost Lake Oil Field is a restricted access road and not open to the public. All vehicular access is limited to the perimeter of the Project. Because of the primitive development of the area, access to the inner portions of the Project is restricted to shallow-draft boats which can negotiate the bayous and sloughs connecting the rivers and lakes.

The Trinity River is the primary waterway passing through the Project Area. Public access to the Trinity River within the project boundaries is currently limited to 2 boat launches. A third boat launch is available into Old River Lake within Hugo Point Park. Other major waterways and lakes at the Project include, Old River Lake, Old River, Lost River, Long Island Bayou, The Cutoff, Lost Lake, Lake Charlotte, Lake Miller, Mud Lake, Mac Bayou and Round Lake. Access to most of these waterways and lakes is not dependable because of fluctuating water levels and frequent snags and windfalls clogging the connecting sloughs.

Cedar Hill Park can be reached by automobile by exiting IH-10 at exit 810, Farm-to-Market Road (FM) 563, traveling north 3 miles to Lake Charlotte Road, and turning west ¾ miles to the park boundary located on the south side of Lake Charlotte Road. FM 563 is in good condition and capable of transporting large vehicles and trailers. Lake Charlotte Road is a narrow, asphalt-surfaced road that can restrict the size of vehicles due to its width and condition.

Cedar Hill Park can be reached by boat through Lake Charlotte. Boats can be launched in the Trinity River under the IH-10 bridge and then motor upstream to Lake Pass which connects directly to the southern end of Lake Charlotte. Another access point to Lake Charlotte is by taking the Sulphur Cut off the Trinity River further upstream from Lake Pass and then following Mac Bayou down to the north end of Lake Charlotte. Access through both passes can be difficult, depending on water levels and debris/obstructions in the pass. Direct boat launching into Lake Charlotte is not available from Federal lands.

1.8 PRIOR DESIGN MEMORANDA

No list of prior design memoranda is available to insert into document.

1.9 PERTINENT PROJECT INFORMATION

Pertinent project information on Wallisville Project design is provided in Feature Design Memorandum No. 11, 1994 and summarized in Table 1-1.

Table 1-1 Pertinent data on Wallisville Project Design (Source: USACE Water Control Manual)

Location	Drainage Area (below Livingston Reservoir)	1,262 square miles
	Livingston Reservoir)	River mile 3.9
Inflow	Standard Project Flood (SPF)	196,000 cfs
	Maximum Probable Flood	451,000 cfs
Design Outflow	SPF Existing conditions	196,000 cfs
Tainter Gates	Number	4
	Gate Width	46 ft
	Gate Radius	24 ft
	Sill Elevation	-12 ft NGVD
	Top of Gate (closed)	+4 ft NGVD
Sector Gates	Number	2 sets of 2
	Gate Radius	45 ft
	Gate Height	25 ft
	Sill Elevation	-16 ft NGVD
	Top of Gate (closed)	+9 ft NGVD
West Non-Overflow Dam	Length	17,310 ft
	Top elevation	11-13 ft (S to N)
	Crown Width	20 ft
South Non-Overflow Dam	Length	3,000 ft
	Top elevation	+8 ft NGVD
	Crown Width	20 ft
East Non-Overflow Dam	Length	10,842 ft
	Top elevation	12-14 ft (S to N)
	Crown Width	38 ft
Control Structure A	Type	Closure gate (single span)
	Width	26 ft
	Height	7 ft 6-1/2 inches
	Sill Elevation	-3.75 ft NGVD
	Top of Closure Gate	+4 ft NGVD
Control Structure B	Type	Earthen Dam
	Length	125 Ft (approx.)
	Crown Width	50 Ft (approx.)
Control Structure C	Type	Temporary sheet pile
	Width	150 ft (approx.)
	Top of Sheetpile	+2 ft NGVD

Proposed acreages for the various land and water surface classifications at Wallisville Lake Project are shown in Table 1-2. These land classifications are standard throughout USACE and are set forth in EP 1130-2-550, dated January 2013. Acreages have been revised and updated to reflect current and projected land use and resource

management objectives. These acreages were calculated using Geographic Information Systems (GIS).

Table 1-2 Acreage by Land and Water Surface Classification

Classification	Acres
Project Operations	160
High Density Recreation	64
Environmentally Sensitive Areas	14,679
Multiple Resource Management Lands:	
Low Density Recreation	121
Wildlife Management	787
Vegetative Management	0
Future/Inactive Recreation Areas	6
Water Surface:	
Restricted	4
Designated No-wake	1,498
Fish and Wildlife Sanctuary	384
Open Recreation	4,963
Total Acreage	22,666

NOTE: Acreages are approximate and are based on GIS data.

2 PROJECT SETTING AND FACTORS INFLUENCING MANAGEMENT AND DEVELOPMENT

2.1 PHYSIOGRAPHIC REGION

2.1.1 Ecological Setting

This description of the ecological setting for the Wallisville Lake Project region uses the EPA's ecological region (ecoregion) framework which describes ecoregions on a hierarchical basis from Level I (coarsest level) to Level IV (finest level). At Level I, North America is divided into 15 ecoregions, and at Level III there are 84 ecoregions in the conterminous United States. Level IV is a further refinement of Level III. The majority of the Wallisville Lake Project is located in the Level IV Texas-Louisiana Coastal Marshes ecoregion. A smaller portion of USACE land on the northern and northeastern edge of the project is located in the Floodplains and Low Terraces Level IV ecoregion. The Level IV Texas-Louisiana Coastal Marshes ecoregion is part of the much larger Western Gulf Coastal Plain Level III ecoregion that covers a relatively flat strip of land, generally 50 to 90 miles wide, adjacent to the Gulf of Mexico. The Level IV Floodplains and Low Terraces is part of the much larger South Central Plains Level III ecoregion that is locally termed the "piney woods", this region of mostly irregular plains represents the southern edge of the southern coniferous forest. Refer to Figure 2-1 for a map of Level IV ecoregions applicable to Wallisville Lake Project.

The Western Gulf Coastal Plain's principle distinguishing characteristics are its relatively flat topography and mainly grassland potential natural vegetation. Inland from this region the plains are older, more irregular, and have mostly forest or savanna-type vegetation potentials. Largely because of these characteristics, a higher percentage of the land is used as cropland than in bordering ecological regions. Rice, grain sorghum, cotton, and soybeans are the principal crops. Urban and industrial land uses have expanded greatly in recent decades, and oil and gas production are common. The Texas-Louisiana Coastal Marshes (Ecoregion IV) is characterized by its extensive freshwater and saltwater coastal marshes. There are many rivers, lakes, bayous, tidal channels, and canals. Extensive cordgrass marshes occur.

Although the South Central Plains (Ecoregion III) was once blanketed by a mix of pine and hardwood forests, much of the region is now loblolly and shortleaf pine plantations. Covering parts of Louisiana, Arkansas, east Texas, and Oklahoma, only about one sixth of the region is in cropland, primarily within the Red River floodplain, while about two thirds of the region is in forests and woodland. Lumber, pulpwood, oil, and gas production are major economic activities. The Floodplains and Low Terraces (Ecoregion IV) of the South Central Plains in Texas is characterized as southern bottomland hardwood communities where water oak, willow oak, sweet gum, blackgum, elm, southern red oak, swamp chestnut oak, and loblolly pine are typical. Baldcypress and water tupelo also occur.

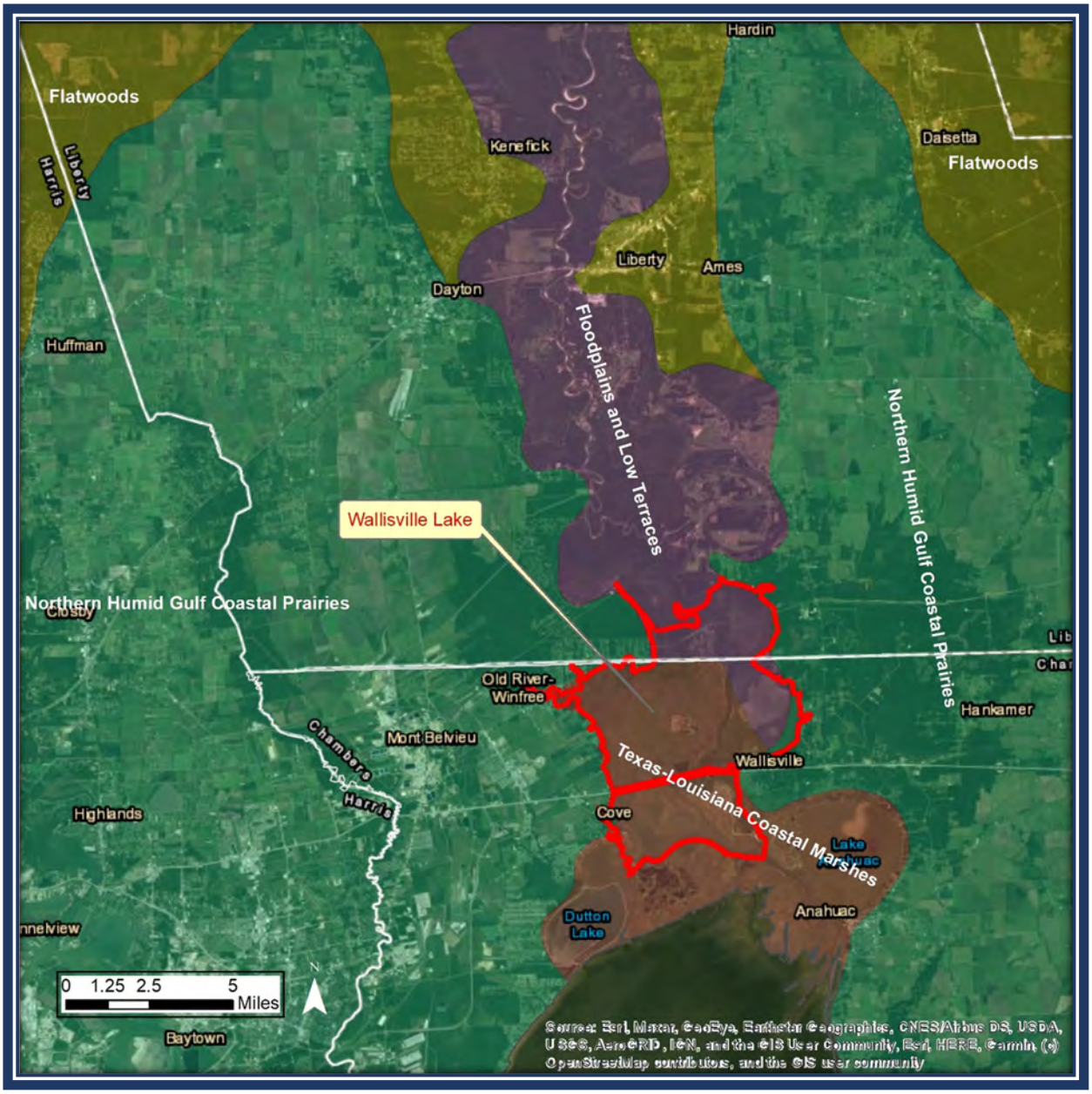


Figure 2-1 Ecoregions of Wallisville Lake (Source: EPA)

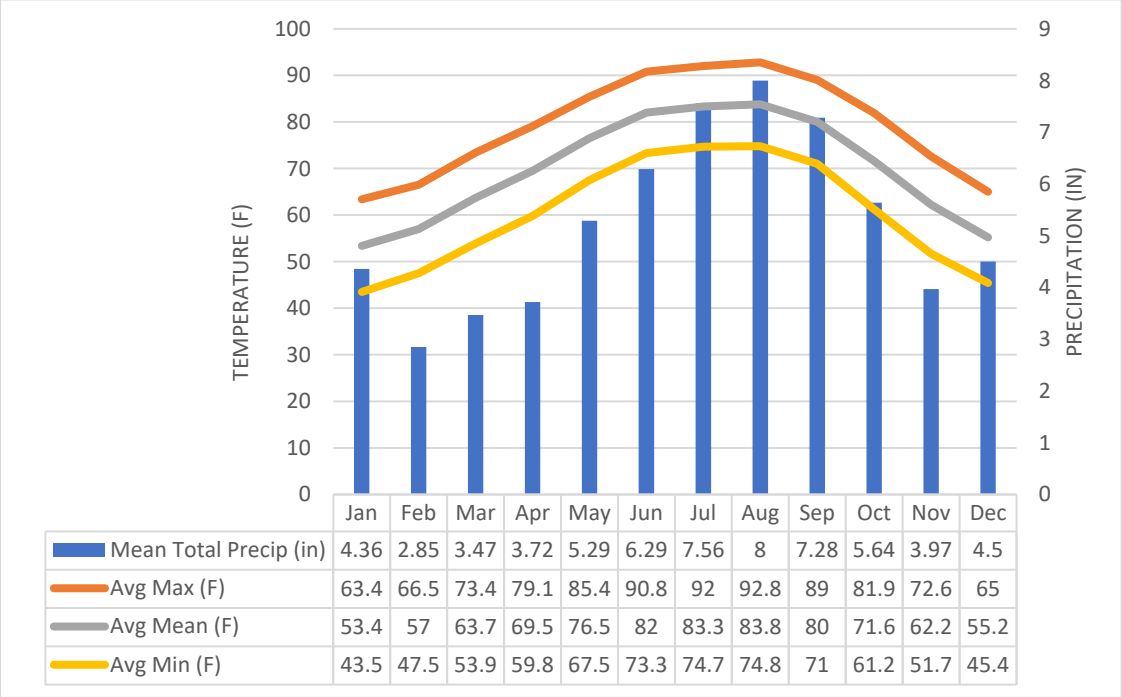
2.1.2 Climate

The lower Trinity River watershed lies in a humid subtropical region with hot summers and mild winters. The proximity of the area to the Gulf of Mexico and the Galveston Bay system, the prevalence of southerly winds, and the absence of topographic relief result in high relative humidity and uniformity of climate. Average monthly temperatures in the Project Area range from 52 °F in January to about 82 °F in July and August. Freezing temperatures are infrequent and of very short duration. Fog can occur in the area at any time of the year but is most frequent in winter. The average growing season between frosts is about 300 days. The principal wind regimes

dominating the Project Area are persistent southeasterly winds from March through November associated with marine tropical air masses. Short-lived but strong northerly winds can occur from December through February, generally in association with passage of polar fronts.

The mean annual precipitation in the Project Area is about 51 inches and the average annual lake evaporation rate is 46 to 47 inches. Precipitation in the Project Area occurs in the form of rainfall from intense local thunderstorms of short duration, general storms which extend over a period of several days, and torrential rainfall associated with tropical disturbances and hurricanes. The Wallisville area is subject to occasional periods of intense precipitation, occasionally reaching 10 to 14 inches in 24 hours. Such rains may occur at any time of the year but are commonly associated with tropical storms and hurricanes during the months of May through November. See Figure 2-3 for average monthly climate data for Beaumont-Port Arthur, TX from 2000-2020.

The frequency that any point on the Texas coast may be subjected to destructive wind forces of hurricane intensity is estimated to be once every ten years. Because of the proximity of the Wallisville area to the Gulf of Mexico, it would be subject to influence by tropical storms or hurricanes. A storm surge of + 13.5 feet mean sea level (msl) near the City of Anahuac can be expected to occur about once in 100 years and a storm tide of +4 feet msl can be expected about once in 3.7 years.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean Total Precip (in)	4.36	2.85	3.47	3.72	5.29	6.29	7.56	8	7.28	5.64	3.97	4.5
Avg Max (F)	63.4	66.5	73.4	79.1	85.4	90.8	92	92.8	89	81.9	72.6	65
Avg Mean (F)	53.4	57	63.7	69.5	76.5	82	83.3	83.8	80	71.6	62.2	55.2
Avg Min (F)	43.5	47.5	53.9	59.8	67.5	73.3	74.7	74.8	71	61.2	51.7	45.4

Figure 2-2 Average Monthly Climate Beaumont-Port Arthur, Texas, 2000-2020 (Source: NOAA)

2.1.3 Geology

The stratigraphic units in the Wallisville area consist of the Beaumont and Deweyville terrace deposits and the modern alluvial-deltaic plain of the Trinity River (Bureau of Economic Geology, 1968). The Beaumont terrace was deposited during one of the last interglacial episodes of the Pleistocene. The terrace occurs in the Project Area as high-level deposits, ranging from 20 to 30 feet above the Modern alluvial-deltaic plain, which flank the Trinity River. The Beaumont terrace deposits occur as relatively low relief surfaces with poorly preserved point bars, levees, and abandoned meander loops which reflect abandoned channel courses of the Pleistocene Trinity River. The Deweyville terrace deposits lie between the Beaumont and Modern alluvial deltaic plain. They were formed during a period of constant sea level caused by minor stillstands or temporary readvances of glaciation during the last rise in sea level which occurred 18,000 to 4,500 years ago. The Deweyville deposits occur as two to three terraces east of the Trinity River and are generally less than 10 feet above the Modern alluvial-deltaic plain. The Deweyville deposits are characterized by filled abandoned channel courses, meander scars of large radii, and well preserved point-bar ridges and swales. The Modern alluvial-deltaic plain of the Trinity River valley consists of meander belt sands and floodplain deposits flanking the present stream and a deltaic plain composed of distributary channels with associated marsh, pond, and lake environments. Pleistocene deposits underlie the delta plain at depths of about 8 feet at Lake Anahuac and depths of about 50 feet in the northern part of the delta.

2.1.4 Topography

The land surface of the Project Area (Figure 2-3) dips gently seaward and has elevations ranging from sea level in the Trinity River delta to about 35 feet on the Pleistocene coastal prairie uplands. Uplifted salt domes have elevated the land surface at Barbers Hill near Mont Belvieu, at Moss Bluff north of Lake Charlotte, and at Lost Lake in the immediate Project Area. The modern Trinity River floodplain lies between river-cut scarps formed in Pleistocene deposits and ranges from 2 to 6 miles in width. Topographic features in the Trinity River floodplain include abandoned channel courses, oxbow lakes, point bars, and natural levees. Abandoned channel courses reflect ancestral meandering patterns of the Trinity River and form topographic lows on the river floodplain. Some abandoned channel courses have formed oxbow lakes such as Lake Charlotte, Lake Miller, and Lost Lake. Other oxbows support swamp or freshwater vegetation. Point bars along the Trinity River are a result of deposition of bedload material on the inside of curved loops or meanders. Natural levees, which result from overflow deposition of muds and silts during flood periods, have developed along the lower reaches of the Trinity River and along channels and bayous flowing through the valley marshlands. Numerous Indian shell mounds attain heights of 6 to 8 feet in the Project Area and may extend for several hundred feet along beaches or natural levees. In addition, artificial levees around the Lost Lake Oil and Gas Field and East and West Non-Overflow Dams have been constructed, or partially constructed, as part of the original Project.

Figure 2-3 Wallisville Lake Topography (Source: ESRI)

Photo 2-1 Sunrise at Wallisville Lake (Source: USACE)

2.1.5 Hydrology and Groundwater

Commonly inundated areas lacking emergent vegetation or tree cover are mapped as water. Major water bodies in the Project Area include the Trinity River, Old River, Lost River, Lake Charlotte, Lost Lake, Round Lake, Lake Miller, Mud Lake, and numerous smaller lakes, ponds, creeks, bayous, and old river channels. The extent of water areas is highly variable, depending on current hydrological conditions.

The primary source of groundwater in the Wallisville Lake area is the Gulf Coast aquifer. The Gulf Coast aquifer runs parallel to the Gulf of Mexico coastline from the Louisiana border to the border of Mexico. The Gulf Coast aquifer consists of multiple other aquifers including the Jasper, Evangeline, and Chicot aquifers. The Gulf Coast aquifer's waters are used for municipal, industrial, and irrigation purposes.

Water quality varies with depth and locality. It is generally good in the central and northeastern parts of the aquifer, where total dissolved solids concentrations are less than 500 milligrams per liter but is more saline to the south, where total dissolved solids are typically 1,000 to more than 10,000 milligrams per liter and where the productivity of the aquifer decreases. Areas of increased salinity along the central and eastern Gulf Coast may be associated with saltwater intrusion in response to groundwater pumping or to brine

migration in response to oil field operations and natural flows from salt domes intruding into the aquifer.

2.1.6 Soils

The soil taxonomy developed by the U.S. Department of Agriculture (USDA) and the National Cooperative Soil Survey organizes soils in a hierarchical system including the following categories: Order, Suborder, Great Group, Subgroup, Family, and Series. The soil series provides the finest level of detail and is often aggregated into soil associations which combine one or more series. Approximately 20 soil associations occur within the project boundaries of Wallisville Lake. The five most prevalent soils associations that occur on USACE land are described in Table 2-1.

Table 2-1 Common Soils Associations and Series on USACE Lands at Wallisville Lake Project (Source: NRCS Web Soil Survey)

Soils Association/Series	Description	Percent of Total
Kaman Clay	The Kaman series consists of very deep, somewhat poorly drained, very slowly permeable soils that formed in clayey alluvium. These nearly level soils occur on floodplains. Slope ranges from 0 to 1 percent.	25.49
Zummo muck	The Zummo series consists of very deep, very poorly drained, very slowly permeable soils formed in clayey sediments from firm clayey backswamp deposits of Holocene age. These nearly level soils occur in coastal freshwater marshes. Slope ranges from 0 to 1 percent.	23.80
Cowmarsh mucky silty clay	The Cowmarsh series consists of very deep, very poorly drained soils that formed in clayey alluvial deposits of Holocene age. These depressional soils are oxbows and relict channels of rivers. Slope ranges from 0 to 1 percent but mainly less than 1 percent.	10.03
Voss Sand	The Voss series consists of very deep, moderately well drained, rapidly permeable soils that formed from deep sandy sediments. These nearly level to	3.45

Soils Association/Series	Description	Percent of Total
	very gently sloping soils are on flood plains. Slopes range from 0 to 3 percent.	
Dylan Clay	The Dylan series consists of very deep, moderately well drained soils. These gently sloping to sloping soils formed in clayey alluvium. Slope ranges from 3 to 5 percent.	2.60

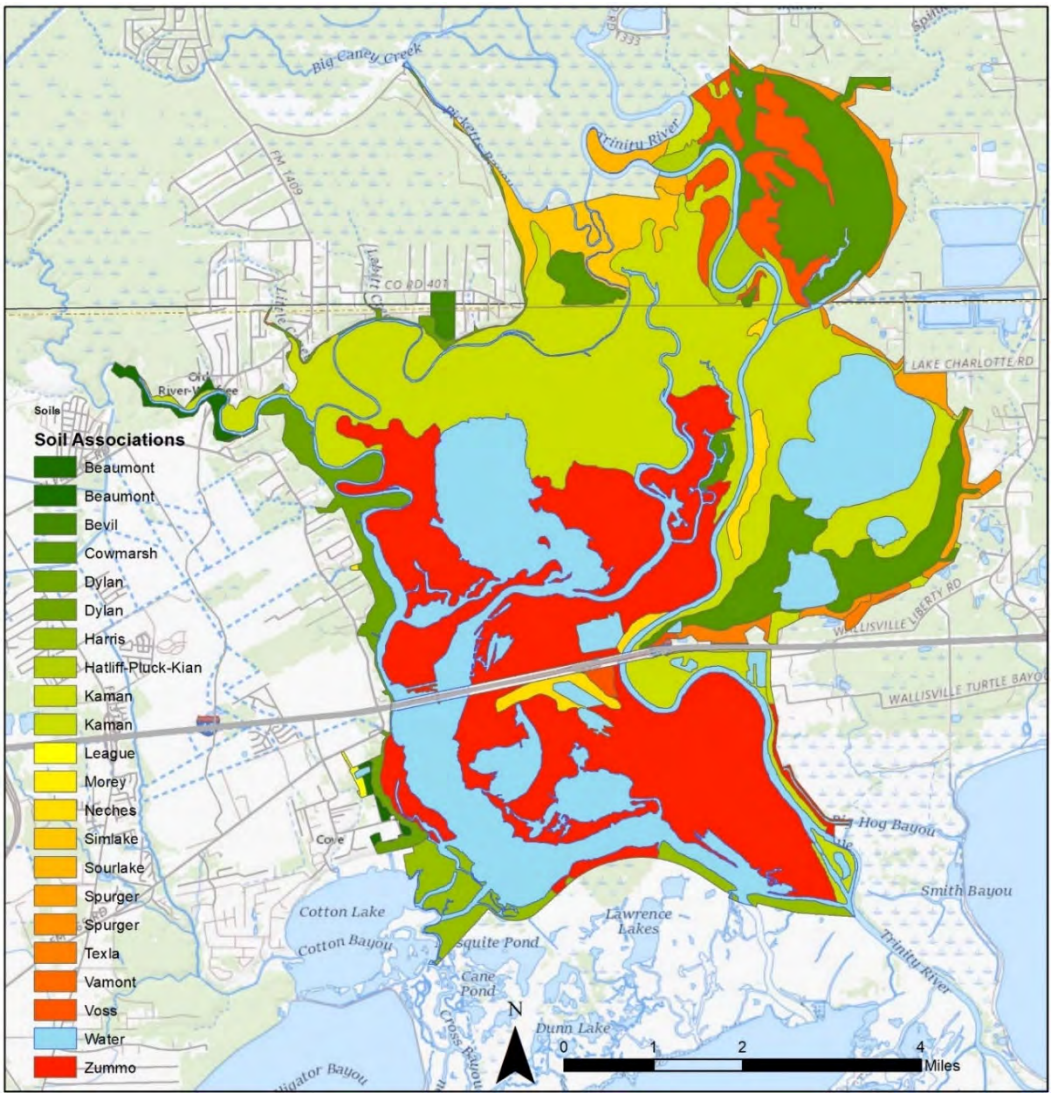


Figure 2-4 Soil Associations Map of Wallisville Lake Project (Source: NRCS Web Soil Survey)

A soil survey by the Natural Resource Conservation Service (NRCS) shows there are seven out of the eight possible general classifications (Classes I through Class VIII) occurring at the Project 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 soils class data for project lands is provided in Table 2-2. 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) through the Natural Resource Management (NRM) Assessment Tool.

Table 2-2 Soil Classes at Wallisville Lake Project

Soil Class	Percent Acreage
Class I	0
Class II	1.1
Class III	7.7
Class IV	6.1
Class V	37.5
Class VI	31.5
Class VII	2.8
Class VIII	13.3

A general description of the soils at Wallisville Lake Project and the land capability classes are described below:

- *Class I* soils have slight limitations that restrict their use.
- *Class II* soils have moderate limitations that reduce the choice of plants or require moderate conservation practices.
- *Class III* soils have severe limitations that reduce the choice of plants or require special conservation practices, or both.
- *Class IV* soils have very severe limitations that restrict the choice of plants or require very careful management, or both.
- *Class V* 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.
- *Class VI* 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.

- *Class VII* soils have very severe limitations that make them unsuited to cultivation and that restrict their use mainly to grazing, forestland, or wildlife.
- *Class VIII* 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 aesthetic purposes.

Detailed information on all soil types surrounding the Wallisville Lake Project is available on websites maintained by the NRCS, U.S. Department of Agriculture.

2.2 NATURAL RESOURCE ANALYSIS

Natural resources present at Wallisville Lake include the waters, wetlands, soils, 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 stewardship of natural resources on USACE administered lands adheres to ecosystem management principles as described in USACE regulations ER and EP 1130-2-540. Effective stewardship is imperative to the sustainability and use of project resources.

2.2.1 Vegetative Resources

The vegetation of the Project Area forms a complex mosaic of plant communities, the distribution is dictated by patterns of inundation and salinities, which in turn are dictated by often very minor elevation changes and proximity to riverine and estuarine drainage features. The various vegetation types are often characterized by only very subtle differences, often having many species in common. Boundaries between habitat types may be ill defined, existing only as a continuum of gradually shifting ratios of species composition. The following major habitat types (Figure 2-5) were identified during study of the Wallisville area: saltwater marshes, freshwater marshes, grasslands, wooded uplands, swamps, bottomland/riparian forest, mixed hardwood, and pine forest.

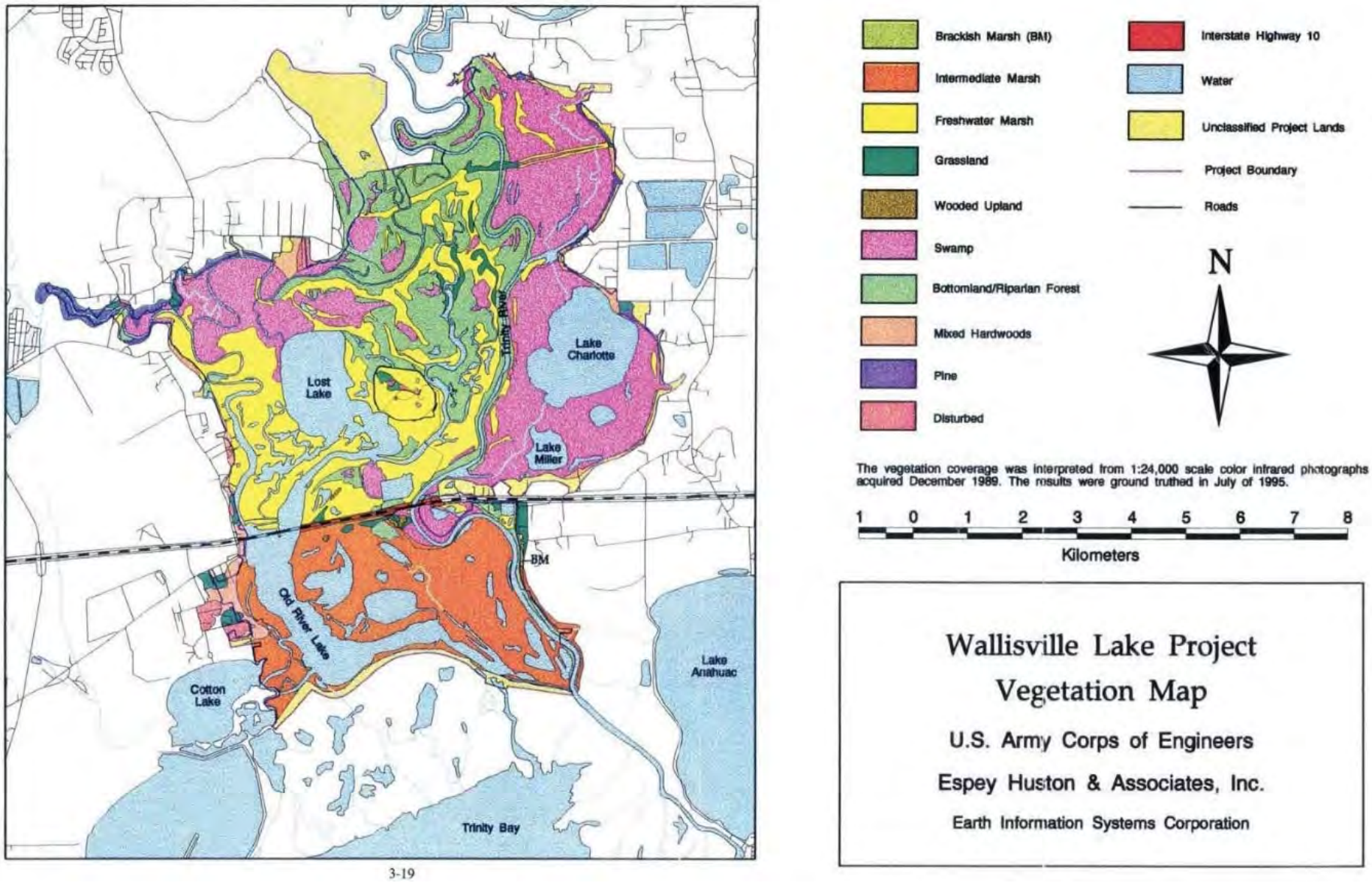


Figure 2-5 Vegetation Map (Source: 1996 Wallisville Lake Master Plan)

Saltwater Marshes

The three types of saltwater marsh (saline, brackish, and intermediate) are not sharply delineated from each other, but reflect subtle shifts in species composition across the salinity gradient. These marsh types share many species in common with each other and with freshwater marshes.

Saline marsh, dominated by smooth cordgrass (*Spartina alterniflora*) and black rush (*Juncus roemarianus*), was not observed during the field investigations of July 1995. Extensive areas of saltmarsh south of the Old River, as mapped by Smith (1973), are isolated from the study area by a levee along the south side of the Old River. A small amount of brackish marsh was mapped on the east side of the East Non-overflow dam and access road. Higher elevations here were dominated by bushy sea-ox-eye (*Borrichia frutescens*) and bermudagrass (*Cynodon dactylon*), with marshay cordgrass *(Sporobolus pumilus*) also common.

The majority of the study area south of IH-10 is mapped as intermediate marsh, indicating a transitional zone between brackish marsh to freshwater marsh. Species composition during the July 1995 field investigations indicated that this area had been more influenced by freshwater than saltwater. This could change from year to year, as determined by rainfall, storm events, or other changes to the hydrology.

Important species in this area during July of 1995 included longtom (*Paspalum lividum*), alligator weed (*Alternanthera philoxeroides*), Florida crinum (*Crinum americanum*), spider lilies (*Hymenocallis sp*.), marshhay cordgrass, gulf cordgrass (*Spartina spartinae*), arrowhead (*Sagittaria* spp.), hierba del marrano (*Aster subulatus*), common water hyacinth (*Eichhomia crassipes*), Drummond sesbania (*Sesbania drummondii*), deer pea (*Vigna luteola*), smartweeds (*Polygonum* spp.), softstem bullrush (*Scirpus validus*), marsh millet (*Zizaniopsis milliacea*), and various bulrushes (*Scirpus* spp.), spikerushes (*Eleocharis* spp.), flatsedges (*Cyperus* spp.), and fimbries (*Fimbristylis* spp.).

Freshwater Marshes

Freshwater marshes are abundant and widespread in the study area north of IH-10. Important species are longtom, alligator weed, seacoast sumpweed (*Iva annua*), hierba del marrano, Florida crinum, spider lily, smartweed, marshmillet, common water hyacinth, Drummond sesbania, deer pea, frog-fruit (*Phyla* spp.), water hyssop (*Bacopa* spp.), cocklebur (*Xanthium strumarium*), creeping spotflower (*Spilanthes americana*), shore milkweed (*Asclepias perennis*), docks (*Rumex* spp.), flatsedges, bullrushes, and sedges (*Carex* spp.).

Grasslands

Grasslands occur at slightly higher elevations than the marshes, usually on land that has been significantly disturbed. Typically, these areas support a number of exotic species, have been heavily grazed, and are not representative of the original tallgrass prairies of this area, which have been virtually eliminated from Chambers County

(Harcombe, 1974; USACE, 1981). An important category of grassland within the study area lies within the corridors maintained as pipeline rights-of-way.

Important species in the grassland area include bermudagrass, smutgrass (*Sporobolis indicus*), bahiagrass (*Paspalum notatum*), longtom, crabgrass (*Digitaria* spp.), common carpetgrass (*Axonopus ajfinis*), St. Augustine grass (*Stenotaphrwn secundatum*), sedges, flatsedges, frog-fruit, goldenrods (*Solidago* spp.), verbena (*Verbena* spp.), ragweed (*Ambrosia* spp.), cocklebur, sensitive briar (*Mimosa* spp.), hierba del marrano, and seacoast sumpweed. These grasslands are interspersed to varying degrees with trees and shrubs such as yaupon (*Ilex vomitoria*), hawthorn (*Crataegus* spp.), Chinese tallow (*Sapium sebiferum*), and gum bumelia (*Sideroxylon lanuginosum*). Wet depressional areas are scattered throughout the grasslands, forming small pockets of marshland.

Wooded Uplands

A few well-drained areas have developed woodland vegetation, ranging from dense thickets of the woody species mentioned in the grassland section, to forests dominated by live oak (*Quercus virginiana*) and sugar hackberry (*Celtis laevigata*). Openings within these woodlands are occupied by grassland species.

Swamps

Swamps occupy extensive areas north of IH-10. They are widely distributed but are often associated with former river channels. Swamps in the study area vary in type and structure from homogenous stands of large bald cypress (*Taxodium distichum*) to shrubby thickets of swamp-privet (*Forestiera acuminata*) and water honey locust (*Gleditsia aquatica*). Other trees occurring in these swamps, especially near the upper elevational boundaries, include black willow (*Salix nigra*), red ash (*Fraxinus pennsylvanica*), water elm (*Planera aquatica*), water hickory (*Carya aquatica*), red maple (*Acer rubrum*), and Chinese tallow. American buckwheat vine (*Brunnichia ovata*) and climbing hempweed (*Mikania scandens*) are common vines. Common buttonbush (*Cephalanthus occidentalis*) and water tupelo (*Nyssa aquatica*), although present in the Project Area, are not important components of the swamp flora here. Understory and herbaceous layers are typically not well developed, but species present include common lizard-tail (*Saururus cernuus*), small-spike false nettle (*Boehmeria cylindrica*), smartweed, dwarf palmetto (*Sabal minor*), Florida crinum, spiderlily, pickerel weed (*Pontederia cordata*), common water hyacinth, seedbox (*Ludwigia* spp.), horned beakrush (*Rhynchospora corniculata*), savannah panicum (*Panicum gymnocarpon*), rushes, and bulrushes.

Bottomland/Riparian Forests

Often occurring at slightly higher elevations than neighboring swamps and marshes, bottomland forests are most common in the northern portion of the Project Area. They often occur upon natural levees and follow the banks of the Trinity River for most of its length through the Project Area. All of the species mentioned in the swamp

section could occur in lower or wetter areas of bottomland forests and are joined by a rich assortment of additional species in this vegetative type. Additional tree species occurring in these bottomland forests include sugar hackberry, American sycamore (*Platanus occidentalis*), eastern cottonwood (*Populus deltoides ssp. deltoides*), hickories (*Carya* spp.), American elm (*Ulmus americana*), cedar elm (*Ulmus crassifolia*), yaupon, hawthorn, water oak (*Quercus nigra*), and overcup oak (*Quercus lyrata*). Vines are common, including Alabama supplejack (*Berchemia scandens*), poison ivy (*Toxicodendron radicans*), peppervine (*Ampelopsis arborea*), greenbriars (*Smilax* spp.), and American buckwheat vine. Plants present in the shrub and herbaceous layers include dwarf palmetto, alligatorweed, St. Augustine grass, longtom, savannah panicum, goldenrods, flatsedges, and rushes.

Mixed Hardwood

Areas mapped as mixed hardwood are relatively small and are located mainly around the periphery of the Project Area, on and above the slopes which define and contain the Trinity River floodplain. These well-drained upland forests support a diverse, well-structured forest. Important species include sweetgum (*Liquidambar styraciflua*), water oak, hickory (*Carya sp.*), loblolly pine (*Pinus taeda*), pecan (*Carya illinoinensis*), swamp chestnut oak (*Quercus michauxii*), sugar hackberry, American elm, arrowwood viburnum (*Viburnum dentatum*), American beautyberry (*Callicarpa americana*), yaupon, common persimmon (*Diospyros virginiana*), and roughleaf dogwood (*Cornus drummondii*). The wide variety of vines includes muscadine grape (*Vitis rotundifolia*), saw greenbriar (*Similax bona-nox*), peppervine, Alabama supplejack, crossvine (*Bignonia capreolata*), poison ivy, trumpet creeper (*Campsis radicans*), and Japanese honeysuckle (*Lonicera japonica*). Species in the herbaceous layer include elephant foot (*Elephantopus* spp.), smartweed, and narrowleaf woodoats (*Chasmanthium sessiliflorum*).

Pine Forest

Pine forests in the Project Area have a distribution similar to that of the mixed hardwoods, mainly on slopes and uplands around the periphery of the Project Area. These well drained forests are dominated by loblolly pine. Many of the species from the mixed hardwood forests occur in the pine forest, although with less frequency in the canopy. These species may occur in the shrub and sub-canopy layers with a greater frequency than in the canopy. In areas of thick pine canopy, the herbaceous layer is scant and is replaced by a thick carpet of pine needles.

Photo 2-2 Cypress swamp supports rookery at Wallisville Lake (Source: USACE)

2.2.2 Wetlands

In accordance with national USACE policy, wetlands at operational projects are inventoried using the protocol established by the USFWS in their *Classification of Wetlands and Deepwater Habitats of the United States*. The majority of wetlands at Wallisville Lake are in the palustrine system; however, wetlands classified as estuarine, lacustrine and riverine systems are also present. Wetlands classified as palustrine are further classified as aquatic bed, emergent, forested, scrub-shrub and unconsolidated bottom dominated by forested class. Estuarine systems include intertidal (emergent, unconsolidated shore) and subtidal (unconsolidated bottom) sub-system classifications. Lacustrine systems include limnetic (unconsolidated bottom) and littoral (unconsolidated bottom) sub-systems classifications. Riverine systems include intermittent (streambed), lower perennial (unconsolidated bottom) tidal (aquatic bed, unconsolidated bottom) and unknown perennial (unconsolidated bottom) sub-system classifications.

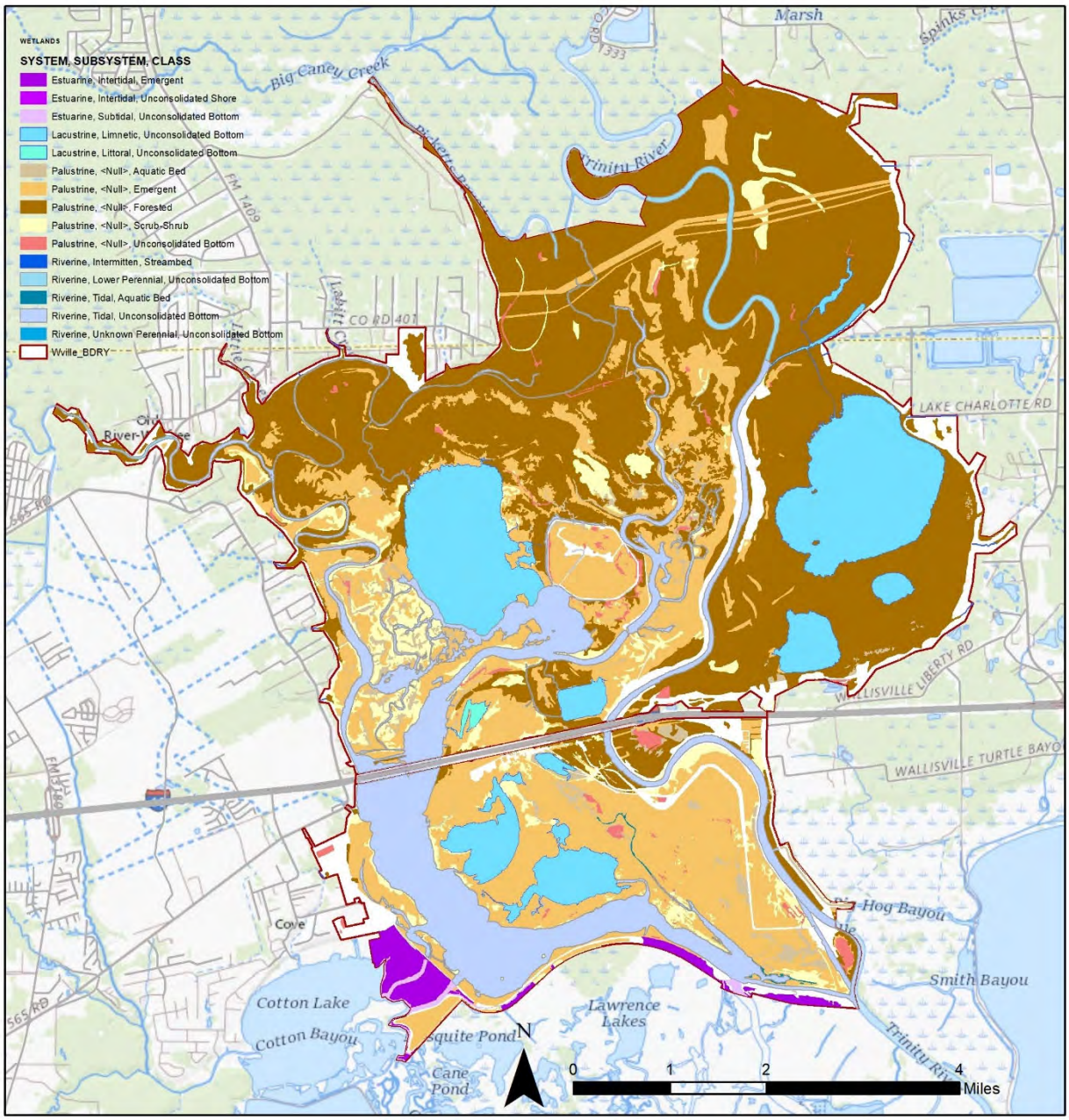


Figure 2-6 Wetland Classification Inventory Map (Source: USFWS National Wetlands Inventory)

Table 2-3 list the acreages of the various types of wetlands present at the Wallisville Lake Project. Data was retrieved from the USFWS National Wetlands Inventory website.

Table 2-3 Wetland Classification Inventory (Source: USFWS)

System	Sub-system	Class	Class Acres
Estuarine	Intertidal	Emergent	1,768
Estuarine	Intertidal	Unconsolidated Shore	2
Estuarine	Subtidal	Unconsolidated Bottom	1,926
Lacustrine	Limnetic	Unconsolidated Bottom	2,618
Lacustrine	Littoral	Unconsolidated Bottom	28
Palustrine	-	Aquatic Bed	480
Palustrine	-	Emergent	5,229
Palustrine	-	Forested	9,154
Palustrine	-	Scrub-Shrub	1,127
Palustrine	-	Unconsolidated Bottom	173
Riverine	Intermittent	Streambed	21
Riverine	Lower Perennial	Unconsolidated Bottom	4,005
Riverine	Tidal	Aquatic Bed	13
Riverine	Tidal	Unconsolidated Bottom	2,574
Riverine	Unknown Perennial	Unconsolidated Bottom	4

2.2.3 Fish and Wildlife Resources

Wallisville Lake is known to provide habitat for a variety of sportfish such as Southern Flounder (*Paralichthys ligostoma*), Red Drum (*Sciaenops ocellatus*), Bullhead Catfish (*Ameiurus melas*), and even Bull Sharks (*Carcharhinus leucas*). The estuarine and tidal nature of the existing habitat at Wallisville Lake allows for a wide variety of species to both occupy and reproduce in this area.

Photo 2-3 Catfish caught at Wallisville Lake (Source: USACE)

Wallisville Lake provides habitat for an abundance of wildlife species, including game and non-game species, migratory waterfowl, resident and migratory songbirds, wading birds, reptiles, amphibians, and insects. The area offers a variety of habitat features such as riparian forest, wetlands, stream, and river habitats. The variety of habitat supports mammal species such as white-tailed deer (*Odocoileus virginianus*), American Alligator (*Alligator Mississippians* Virginia Opossum (*Didelphis virginiana*), Eastern Cottontail (*Sylvilagus flordianus*), Eastern Gray Squirrel (*Sciurus carolninensis*), and bird species such as Anhinga (*Anhinga anhinga*), Northern Harrier (*Circus hudsonius*), Little Blue Heron (*Egretta caerulea*), Great Egret (*Ardea alba*), Whooping Crane (*Grus americana*), and many others.

Photo 2-4 Alligators at Wallisville Lake (Source: USACE)

2.2.4 Threatened and Endangered Species

An endangered species is a species officially recognized by the USFWS as being in danger of extinction throughout all or a significant portion of its range. A threatened species is a species likely to become endangered within the foreseeable future throughout all or a significant portion of its range. The USFWS also identifies species that are candidates for listing as a result of identified threats to their continued existence. The Candidate designation includes those species for which USFWS has enough information to support proposals to list as endangered or threatened under the Endangered Species Act; however, proposed rules have not yet been issued because such actions are precluded at present by other listing activity. Proposed species are those candidate species that are found to warrant listing as either threatened or endangered, after completion of a scientific review including biology, ecology, abundance and population trends, and threats.

There are 10 federally listed species that could be found at Wallisville Lake based on information from USFWS' Information for Planning and Consultation website (Consultation Code: 02ETTX00-2021-SLI-2732 and USFWS 2021B). A list of these species is presented in Table 2-4.

Table 2-4 Federally Listed Endangered and Threatened Species with Potential to Occur at Wallisville Lake (Source: USFWS 2020B)

Common Name	Scientific Name	Federal Status	Occurrence
West Indian Manatee	*Trichechus manatus*	Threatened	Migratory
Eastern Black Rail	*Laterallus jamaicensis jamaicensis*	Threatened	Resident
Piping Plover	*Charadrius melodus*	Threatened	Migratory
Red Knot	*Calidrid canutus rufa*	Threatened	Migratory
Red-Cockaded Woodpecker	*Picoides borealis*	Endangered	Migratory
Whooping Crane	*Grus americana*	Endangered	Migratory
Green Sea Turtle	*Chelonia mydas*	Threatened	Migratory
Hawksbill Sea Turtle	*Eretmochelys imbricata*	Endangered	Migratory
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*	Endangered	Migratory
Leatherback Sea Turtle	*Dermochelys coriacea*	Endangered	Migratory
Loggerhead Sea Turtle	*Caretta caretta*	Threatened	Migratory
Monarch Butterfly	*Danaus plexippus*	Candidate	Migratory

2.2.5 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 and are often associated with disturbed ecosystems and human activities.

Table 2-5 lists many of the invasive and noxious native species found at Wallisville Lake. Other species are currently being researched for their invasive characteristics.

Table 2-5 Invasive Species (Source: USACE, NRM Assessment Tool)

Common Name	Scientific Name	Native/ Nonnative
PLANTS		
Alligator weed	*Alternanthera philoxeroides*	Non-native
Balloon vine	*Cardiospermum halicacabum*	Non-native
Bermudagrass	*Cynodon dactylon*	Non-native
Chinese tallow tree	*Triadica sebifera*	Non-native
Common salvinia	*Salvinia minima*	Non-native
Giant reed	*Arundo donax*	Non-native
Giant salvinia	*Salvinia molesta*	Non-native
Johnson grass	*Sorghum halepense*	Non-native
Mimosa	*Albizia julibrissin*	Non-native
Water hyacinth	*Eichhornia crassipes*	Non-native
Yaupon	*Ilex vomitoria*	Native
Hydrilla	*Hydrilla verticillata*	Non-native
Elephant ears	*Colocasia esculenta*	Non-native
Privet	*Ligustrum spp.*	Non-native
Deep-rooted sedge	*Cyperus entrerianus*	Non-native
Water lettuce	*Pistia stratiotes*	Non-native
Trifoliate orange	*Poncirus trifoliata*	Non-native
ANIMALS		
Nutria	*Myocaster coypus*	Non-native
Wild boar	*Sus scrofa*	Non-native
Red imported fire ant	*Solenopsis invicta*	Non-native
European starling	*Sturnus vulgaris*	Non-native
House sparrow	*Passer domesticus*	Non-native
Rock dove	*Columba livia*	Non-native
Cattle egret	*Bubulcus ibis*	Non-native

2.2.6 Visual and Scenic Resources

Visual and scenic resources is a subjective perception of natural beauty in a landscape. As with other resources, visual quality must be recognized and planned for and recognized for their importance.

Wallisville Lake includes many acres of unique natural beauty, water 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 Wallisville Lake is located near the large metropolitan area of Houston, people come

from local urban communities to enjoy the scenic and naturalistic views offered at the lake. Most of the areas have been designated as Environmentally Sensitive Areas to preserve specific animal, plant, or environmental features that 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.

Areas of high aesthetic value are those of remarkable scenic quality which at Wallisville Lake includes the cypress swamps, bird rookeries, mature live oaks along the J.J. Mayes Wildlife Trace, and the vast acres of marshlands throughout the project. In addition, accessible areas which are designated public recreation facilities are of a high sensitivity to the public.

Areas of the project that exhibit lower visual or aesthetic quality are primarily due to degrees of human development or alteration. At Wallisville Lake, these areas include the Lost Lake Oil Field, the water control structures and lock, and other manmade features and disturbances.

Photo 2-5 Mature Live Oaks along the J.J. Mayes Wildlife Trace (Source: USACE)

2.2.7 Water Quality

Wallisville Lake is identified as part of the lower portion of Segment ID 0801 within the Trinity River Basin. According to the 2020 Texas Commission on Environmental Quality (TCEQ) Texas Integrated Report for Clean Water Act Section 305(b) and 303(d), Wallisville Lake had impairments for recreational use due to bacteria in the water and depressed dissolved oxygen in the water (TCEQ 2020). Both impairments were listed as category 5c, meaning more data is needed to determine a management strategy or a Total Maximum Daily Load (TMDL).

Additionally, TCEQ screens bodies of water for multiple uses such as Aquatic Life Use, Recreation Use, General Use, and Domestic Water Supply Use. Wallisville Lake is listed as Fully Supporting (FS) for Aquatic Life Use, Recreation Use, and Domestic Water Use. For General Use, Wallisville Lake had one rating for Screening Level Concern (CS) for the Chlorophyll-a parameter, all other parameters for General Use were either FS or No Concern (NC).

The salinity of the Trinity River Delta marshes varies greatly. Tidal heights in Trinity Bay have an important influence on salinity, but the day-to-day fluctuations in salinity are tied more closely to the magnitude of freshwater inflows from the river.

The waters of the Trinity River are extensively used for irrigation and other water supply needs, and these uses require an adequate supply of good quality fresh water. During periods of low flow, the river discharges are not adequate for flushing out the saltwater entering from Trinity Bay. During such periods, the saltwater travels up the river and enters the irrigation intakes, causing salt damages to the crop if irrigation is continued or loss of the crop if it is not. The saltwater intrusion is the result of both natural causes, low river flow and high tides caused by strong southerly winds, and man-made causes, such as channel dredging, which allows the denser saltwater to flow upstream along the bottom of the channel.

2.2.8 Sustainability

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 helps to create a more resilient and sustainable region for the health, welfare, and energy security of its citizens. Mitigation, while not a formal mission at USACE projects, may be implemented to achieve the fish and wildlife and recreation missions. Maintaining a healthy vegetative cover and including a native prairie or tree cover 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 moderate temperatures. To this end, the USACE has developed the following statements.

The USACE Sustainability Policy and Strategic Plan states:

> *"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 for the Responses to Climate Change Program states:

> *"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."*

2.2.9 Mineral and Timber Resources

Minerals

Mining lands within the Project Area consist of the Lost Lake Oil and Gas Field located between Lost River and Lost Lake. The oil field predates the Project and is not operated by the Government. The oil field is operated under private leases. The field includes a total of 31 wells and a saltwater disposal system. The Federal Government owns the minerals under a portion of the oil field. Six of the wells are used in the production of Government-owned minerals.

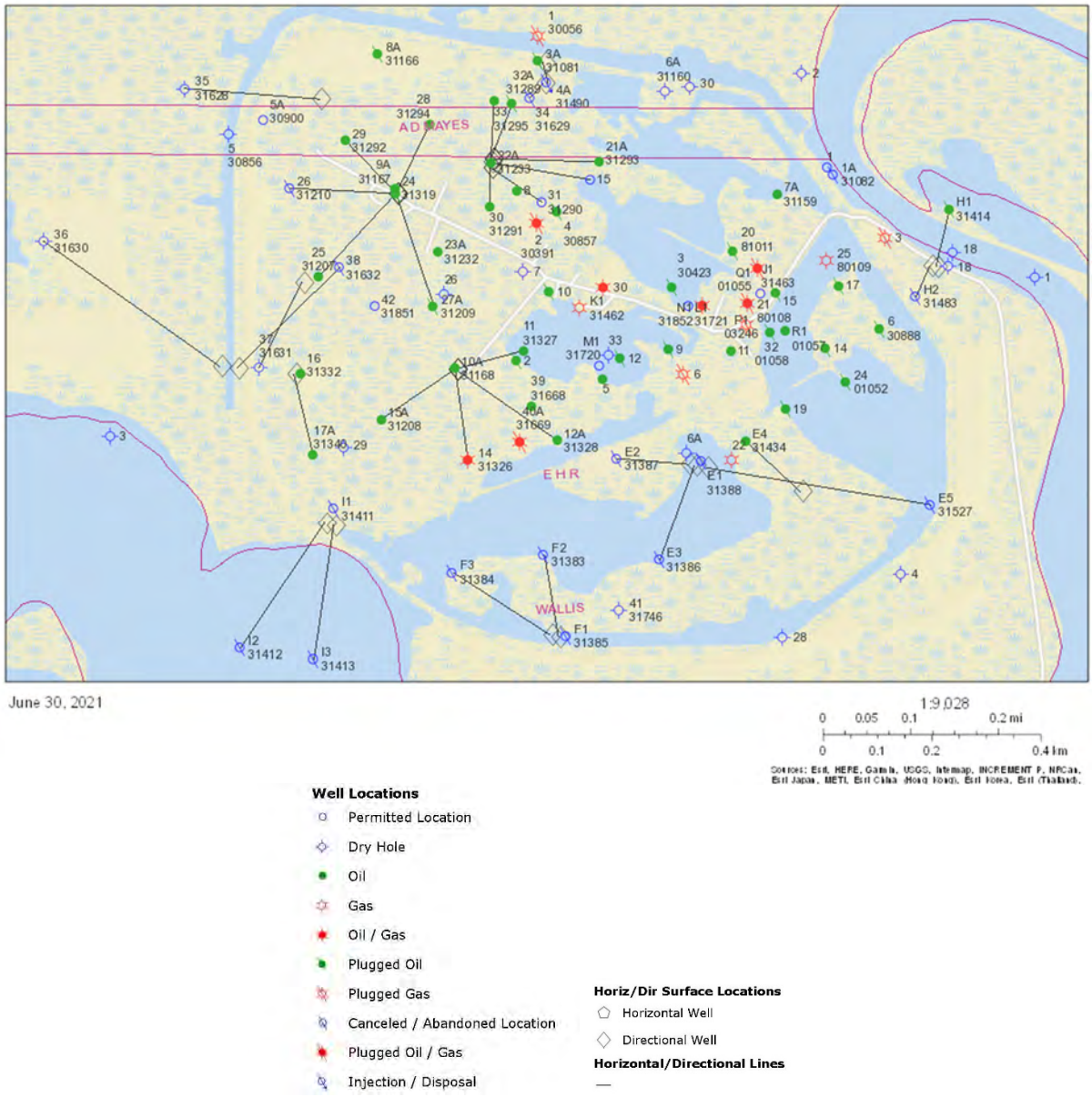


Figure 2-7 Lost Lake Oil and Gas Field (Source: Texas Railroad Commission website)

Timber

Wallisville Lake does not have a timber management program due the lack of timber resources on the project. Project lands suitable for such activities are very limited due topography and abundance of wetlands. The USACE has no plans to start a timber management program at Wallisville Lake.

2.3 CULTURAL RESOURCES

Cultural resources preservation and management is an equal and integral part of all resource management at USACE-administered operational projects. The term

“cultural resources” is a broad term that includes but is not limited to, historic and prehistoric archaeological sites, deposits, and features; burials and cemeteries; historic and prehistoric districts comprised of groups of structures or sites; cultural landscapes; built environment resources such as buildings, structures (such as bridges), and objects; traditional cultural properties; and sacred sites. These property types may be listed on the National Register of Historic Places (NRHP) if they meet the criteria specified by the NRHP (36 CFR 60), reflecting significance in architecture, history, archaeology, engineering, and culture. Cultural resources that are identified as eligible for listing in the NRHP are referred to as “historic properties,” regardless of category. A Traditional Cultural Property (TCP) is a property that is eligible for inclusion in the NRHP based on its associations with the cultural practices, traditions, beliefs, lifeways, arts, crafts, or social institutions of a living community. Ceremonies, hunting practices, plant-gathering, and social practices which are part of a culture’s traditional lifeways, are also cultural resources.

Stewardship of cultural resources on USACE Civil Works water resources projects is an important part of the overall Federal responsibility. Numerous laws pertaining to identification, evaluation, and protection of cultural resources, Native American Indian rights, curation and collections management, and the protection of resources from looting and vandalism, establish the importance of cultural resources to our Nation’s heritage. With the passage of these laws, the historical intent of U.S. Congress has been to ensure that the Federal government protects cultural resources. Additionally, as stewards of cultural resources and in compliance with federal laws, it is incumbent upon the USACE to consult with the State Historic Preservation Officer (SHPO), Tribal Nations, the Advisory Council on Historic Preservation (ACHP), and other interested stakeholders in the preservation and management of cultural resources.

Guidance is derived from a number of cultural resources laws and regulations, including but not limited to Sections 106 and 110 (54 U.S.C. 306101-306114) of the National Historic Preservation Act (NHPA) of 1966 (as amended); Archaeological Resources Protection Act (ARPA) of 1979; Native American Graves Protection and Repatriation Act (NAGPRA); and 36 CFR Part 79, Curation of Federally-Owned and Administered Archeological Collections. Implementing regulations for Section 106 of the NHPA and NAGPRA are 36 CFR Part 800 and 43 CFR Part 10, respectively. All cultural resources laws and regulations should be addressed under the requirements of the National Environmental Policy Act (NEPA) of 1969 (as amended), as applicable. The USACE summarizes the guidance provided in these laws in ER and EP 1130-2-540.

2.3.1 Summary of Resources and Previous Investigations

Cultural resources within Wallisville Lake include a record of occupations by indigenous populations from as early as the Middle Archaic (ca. 4,500 BP), colonial Europeans, and early Texans. The most prevalent sites in the Project Area are prehistoric shell middens containing projectile points, awls, beads, ceramics, lithic debitage, and the remains of deer, shellfish, fish, and other fauna. Human burials and grave goods may also occur at these sites. Many of these prehistoric sites have

significant deposits and due to their density within Wallisville Lake, the entire original lake Project Area (19,700 acres) was determined eligible for inclusion in the NRHP as the Wallisville Archeological District by the Keeper of the National Register in 1984.

Historic occupation in the area began around 1754 with the establishment of a French trading post along the south shore of Lake Miller and subsequently, the Spanish built the Presidio San Augustin de Ahumada and Mission Nuestra Senora de la Luz at El Orcoquisac in 1756 near the same location. The Spanish abandoned these areas in 1772. This area was listed on the NRHP in 1971 as the Orcoquisac Archeological District and includes contributing elements from both the Spanish occupation and the indigenous Akokisa population. In 1824, the Wallis Family established the settlement of Wallis Hill, which later became the town of Wallisville in 1845, on the banks of the Trinity River southwest of Lake Miller. Wallisville was an active trade center along the Trinity River accommodating keel boats and steam ships, as well as hosting a brick yard, lumber mills, boat landings, farmsteads, cemeteries, a courthouse, and a jail. The town was nearly destroyed by a hurricane in 1915 and eventually abandoned in the middle of the 20th Century. The Old Wallisville Town Site, including the original town site and the mill area, was listed as a NRHP archeological district in 1981.

There have been 92 previous cultural resources investigations within Wallisville Lake beginning in the 1960s. These investigations have covered approximately 6,700 acres of the Project Area. The most substantive investigations of the lake occurred between the 1960s and 1980s by the National Park Service under the Texas Archaeological Salvage Project (responsible for the listing of the Orcoquisac Archeological District) , the Center for Archaeological Research (CAR) at the University of Texas at San Antonio (responsible for the listing of the Old Wallisville Town Site), and research conducted by Lawrence Aten (1979; 1983) and Janelle Stokes (1985, responsible for the Wallisville Archeological District NRHP determination). The most comprehensive inventory of the cultural resources at Wallisville Lake was conducted by Brockington and Associates between 2009 to 2010 (Dunn et al. 2011). This analysis was contracted by the USACE Galveston District under the American Recovery and Reinvestment Act of 2009 (ARRA) to conduct an inventory of all cultural resources within the upland areas of the lake in support of NHPA Section 110 compliance. The ARRA survey included a reevaluation of 193 sites and the identification of five new sites, as well as an overview of the environmental and cultural history and previous investigations. A redacted copy of the report is included in Appendix E.

As a result of the previous investigations, a total of 201 archeological sites have been identified within the Wallisville Lake Project Area. This site total includes contributing elements to the Old Wallisville Town Site Archeological District, Orcoquisac Archeological District, and the Wallisville Archeological District. Two historic age cemeteries, Cove Cemetery west of Lost Lake and Hugo Point Cemetery north of Cotton Lake, are also located within the Project Area. Finally, there are four possible shipwrecks within the Project Area. These wrecks include Joseph Blancplain's Sloop (lost 1754) and *Governor Pease* (lost 1858), both in the Trinity River upstream from Interstate 10, *Cayuga* (lost 1839) in the Old River upstream from Winfree, and *Donna Jean* (lost 1966) in the Trinity River near the confluence with the Old River.

2.3.2 Long-Term Cultural Resource Objectives

The ARRA survey (Dunn et al. 2011) and others have noted several cultural and environmental formation processes that have affected cultural resources within the Wallisville Lake project. Looting has had a significant impact on both prehistoric and historic sites at the lake and has been documented since the initial investigations over 50 years ago. Historical impacts have included the mining of shell middens for road construction and impacts from oil and gas exploration and transportation, most of which occurred prior to abandonment of these practices or the implementation of laws and regulations governing cultural resources. The primary ongoing threat to cultural resources within the lake area is erosion resulting from wave action, inundation, and coastal storms, all of which is exacerbated by regional subsidence. Since most of the cultural resources within the lake project are either on or near the shore or at low elevations, these environmental formation processes will become more pronounced as sea level rises.

A comprehensive Integrated Cultural Resources Management Plan (ICRMP) has not been developed for the Wallisville Lake project. In 1984, the USACE executed a Memorandum of Agreement (MOA) between the USACE, the Texas SHPO, and the ACHP to manage the treatment of cultural resources as they related to project construction and maintenance. In accordance with the MOA, the USACE drafted a Feature Design Memorandum in 1993 to serve as a Historic Properties Mitigation Plan for managing treatment of historic properties during additional improvements and operations. Both the MOA and the Feature Design Memorandum were incorporated into a 1996 Master Plan for the Wallisville Lake project. Regarding cultural resources, the USACE has an abundance of data for the Wallisville Lake project but lacks a robust synthesis of these data. Furthermore, while significant investigations and research have been conducted in the Project Area, the federal investigations occurred prior to statutorily required consultation with Tribal Nations. It is recommended that the USACE develop a comprehensive ICRMP in consultation with the Texas SHPO, Tribal Nations, and other stakeholders to synthesize the existing data, address the effects of cultural and environmental processes on cultural resources and recommendations for managing these impacts, and outline procedures for management of these resources during construction and operations activities. Until an ICRMP is developed, future activities that have a potential to affect cultural resources should look to the 1984 MOA, the 1993 Feature Design Memorandum, and the 2011 ARRA survey for guidance. Finally, any future activities that have a potential to affect cultural resources must comply with Section 106 and 110 of the NHPA, NAGPRA, and ARPA.

2.4 DEMOGRAPHIC AND ECONOMIC RESOURCES

The following information covers the current demographic and economic data for counties near Wallisville Lake (Zone of Influence). This basic information gives a snapshot of the current population and looks at growth trends for the area.

2.4.1 Zone of Influence

The Wallisville Lake Project lies near the mouth of the Trinity River in Chambers and Liberty Counties, Texas, and is situated between the metropolitan areas of Houston and Beaumont, Texas. The zone of influence for the purposes of the master plan is defined as the counties within 50 miles of the project, which includes the following eleven counties: Brazoria, Chambers, Fort Bend, Galveston, Hardin, Harris, Jefferson, Liberty, Montgomery, Orange, and San Jacinto. This area of influence includes the Houston-The Woodlands-Sugar Land and Beaumont-Port Arthur metropolitan statistical areas (MSAs).

2.4.2 Population by Gender and Age

The 2019 population estimates for the counties within the zone of influence are presented in Table 2-6 along with the estimates for the state of Texas for comparison. The total population for the zone of influence is estimated at 7.2 million people, which approximately 26 percent of the state's total population of 28 million people. This is largely due to the city of Houston lying in the zone of influence. The population of the zone of influence is projected to grow at an annual rate of 2.0 percent between 2019 and 2050, reaching 13.5 million people by 2050. This growth rate for Texas overall is also 1.7 percent per year.

Table 2-6 2010 and 2019 Population Estimates and 2050 Projections

Geographic Area	2010 Population	2019 Population Estimate	2050 Population Projection
Texas	25,145,561	28,260,856	47,342,105
Brazoria County	313,166	360,677	632,160
Chambers County	35,096	41,305	77,491
Fort Bend County	585,375	765,394	2,267,998
Galveston County	291,309	332,885	580,247
Hardin County	54,635	56,765	54,630
Harris County	4,092,459	4,646,630	7,933,397
Jefferson County	252,273	254,340	256,131
Liberty County	75,643	83,702	118,300
Montgomery County	455,746	571,949	1,487,366
Orange County	81,837	84,069	88,002
San Jacinto County	26,384	28,180	35,627
Zone of Influence	6,263,923	7,225,896	13,531,349

2010 Population, U.S. Bureau of the Census, 2010 Decennial Census
2019 Population Estimate, U.S. Bureau of the Census, American Community Survey, 2019 5 Year Estimate
2050 Projections, Texas State Demographer

The distribution of the population by gender is shown in Table 2-7. For the zone of influence, the population is 49.7 percent male and 50.3 percent female, which is

same for the state overall. All the remaining counties are very similar to near 50 percent/50 percent distributions between male and female.

Table 2-7 2019 Population by Gender

Geographic Area	Total Population	Male	Female
Texas	28,260,856	14,034,009	14,226,847
Brazoria County	360,677	182,333	178,344
Chambers County	41,305	20,939	20,366
Fort Bend County	765,394	375,912	389,482
Galveston County	332,885	163,877	169,008
Hardin County	56,765	27,374	29,391
Harris County	4,646,630	2,309,012	2,337,618
Jefferson County	254,340	130,051	124,289
Liberty County	83,702	41,320	42,382
Montgomery County	571,949	283,117	288,832
Orange County	84,069	41,719	42,350
San Jacinto County	28,180	13,797	14,383
Zone of Influence	7,225,896	3,589,451	3,636,445

U.S. Bureau of the Census, American Community Survey, 2019 5 Year Estimate

The breakdown of the population by age group is shown in Table 2.8. For the zone of influence. Approximately 15 percent each is in the 25 to 34 year old age group and the 5 to 14 year age group. The next largest group, with approximately 14 percent, is the 35 to 44 age group. Approximately 13 percent of the population is in each the 45 to 54 years old and 15 to 24 years old age group. A around 7 percent are in each of the Under 5, and 56 to 74 years old groups. The percentage are very similar for the state overall.

Table 2-8 Percent of Population by Age Group

Age Group	Texas	Zone of Influence	Chambers County	Liberty County
Under 5 years	7.1%	7.3%	6.7%	7.1%
5 to 14 years	14.6%	14.9%	16.2%	14.6%
15 to 24 years	14.2%	13.4%	13.8%	13.5%
25 to 34 years	14.7%	15.1%	12.9%	14.3%
35 to 44 years	13.5%	14.2%	13.8%	12.6%
45 to 54 years	12.5%	12.8%	13.8%	12.8%
55 to 59 years	5.9%	6.0%	6.6%	6.8%
60 to 64 years	5.3%	5.3%	5.3%	5.3%
65 to 74 years	7.4%	6.9%	7.0%	8.1%
75 to 84 years	3.6%	3.0%	2.9%	3.8%
85 years and over	1.3%	1.1%	1.1%	1.0%

U.S. Bureau of the Census, American Community Survey, 5 Year Estimate, 2019

2.4.3 Population by Race and Hispanic Origin

The 2019 population by race and Hispanic origin is shown in Table 2-9. In the zone of influence, approximately 37 percent of the population is White, 26 percent are Hispanic or Latino, 17 percent Black, 7 percent Asian, and 2 percent two or more races. Each of the other races make up less than 1 percent each of the total population. The zone of influence is similar to the state's breakdown. For the state, 42 percent are White, 39 percent are Hispanic or Latino, 12 percent each for Black, and 5 percent Asian, with each of the remaining races making up less than 1 percent each.

Table 2-9 2019 Population by Race and Hispanic Origin

Geographic Area	Total Population	White alone	Black or African American alone	Hispanic or Latino (of any race)	American Indian and Alaska Native alone	Asian alone	Native Hawaiian and Other Pacific Islander alone	Some other race alone	Two or more races
Texas	28,260,856	11,856,336	3,328,707	11,116,881	71,081	1,340,554	21,739	44,465	481,093
Brazoria County	360,677	170,272	49,226	110,463	1,288	23,803	21	542	5,062
Chambers County	41,305	27,661	2,997	9,267	63	465	0	0	852
Fort Bend County	765,394	253,263	153,972	187,500	1,713	153,245	396	1,559	13,746
Galveston County	332,885	190,948	41,105	82,003	785	10,840	110	282	6,812
Hardin County	56,765	49,096	3,153	3,230	148	351	0	96	691
Harris County	4,646,630	1,374,905	863,044	1,995,115	8,105	321,392	2,441	11,171	70,457
Jefferson County	254,340	103,229	85,092	52,708	515	9,493	130	220	2,953
Liberty County	83,702	52,983	8,239	20,788	411	439	8	37	797
Montgomery County	571,949	377,623	27,435	138,081	1,085	16,677	207	664	10,177
Orange County	84,069	67,807	7,302	6,456	244	980	0	39	1,241
San Jacinto County	28,180	21,043	2,517	3,693	218	9	10	0	690
Zone of Influence	**7,225,896**	**2,688,830**	**1,244,082**	**2,609,304**	**14,575**	**537,694**	**3,323**	**14,610**	**113,478**

U.S. Bureau of the Census, American Community Survey, 2019 5 Year Estimate

2.4.4 Education

Educational attainment for the population 25 years of age and older is shown in Table 2-10. In the zone of influence, approximately 24 percent of the population subgroup have a high school diploma (or equivalent) as their highest level of education, with 21 percent completing some college but no degree. Approximately 21 percent have earned a bachelor's degree and 12 percent have earned a graduate or professional degree. Approximately 9 percent have less than a 9th grade education. Approximately 8 percent have a completed between 9 and 12 years of education, but have not earned a diploma, and 7 percent have an associate degree as their highest level of education. The distribution for the zone of influence is similar to that of Texas overall.

Table 2-10 2019 Population Estimate by Highest Level of Educational Attainment, Population 25 Years of Age and Older

Geographic Area	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	18,131,554	1,482,952	1,475,007	4,525,099	3,918,815	1,309,005	3,534,714	1,885,962
Brazoria County	235,400	12,677	15,730	60,073	56,126	20,100	46,212	24,482
Chambers County	26,117	1,553	1,441	7,039	7,704	2,439	3,980	1,961
Fort Bend County	490,211	23,393	22,618	87,576	94,511	35,536	137,933	88,644
Galveston County	223,167	9,492	15,029	55,542	52,590	21,077	45,665	23,772
Hardin County	38,280	1,300	3,307	14,616	9,217	3,394	4,624	1,822
Harris County	2,963,957	306,924	243,987	693,463	587,843	199,571	594,342	337,827
Jefferson County	169,034	12,412	14,291	53,941	41,892	13,282	22,617	10,599
Liberty County	54,264	5,279	7,012	20,533	12,959	3,202	3,692	1,587
Montgomery County	373,374	18,939	26,841	85,201	85,299	28,166	85,948	42,980
Orange County	56,139	1,827	4,951	20,906	14,141	5,606	6,996	1,712
San Jacinto County	19,953	1,205	1,886	9,580	4,224	814	1,506	738
Zone of Influence	**4,649,896**	**395,001**	**357,093**	**1,108,470**	**966,506**	**333,187**	**953,515**	**536,124**

U.S. Bureau of the Census, American Community Survey, 2019 5 Year Estimate

2.4.5 Employment

Table 2-11 shows the 2019 employment by sector expressed as a percent of total employment for the zone of influence and the number employed by sector for Texas, the area of influence and the constituent counties is presented in Table 2-12. For the zone of influence, 20 percent of the employment is in the educational, health care and social assistance services sector, followed by 12 percent professional, scientific, and management sector. Approximately 11 percent are in the retail trade. Approximately 10 percent are in each of the construction and manufacturing sectors and 9 percent in the arts, entertainment, and recreation sector. About 6 percent are in the transportation, warehousing, and utilities sector, and 5 percent in the other services sector. The remaining sectors represent 5 percent or less each of total employment.

Table 2-11 Percent Employment by Sector for Area of Influence (2019)

Employment Sector	Zone of Influence
Agriculture, forestry, fishing and hunting, and mining	3.4%
Construction	9.9%
Manufacturing	9.8%
Wholesale trade	3.3%
Retail trade	10.6%
Transportation and warehousing, and utilities	6.3%
Information	1.3%
Finance and insurance, and real estate and rental and leasing	5.9%
Professional, scientific, and management, and administrative and waste management services	12.4%
Educational services, and health care and social assistance	20.4%
Arts, entertainment, and recreation, and accommodation and food services	8.6%
Other services, except public administration	5.4%
Public administration	2.8%

U.S. Bureau of the Census, American Community Survey, 2019 5 Year Estimate

Table 2-12 Employment by Sector (2019)

Employment Sector	Texas	Brazoria County	Chambers County	Fort Bend County	Galveston County	Hardin County	Harris County	Jefferson County	Liberty County	Montgomery County	Orange County	San Jacinto County	Zone of Influence
Civilian employed population 16 years and over	13,253,631	169,376	18,917	367,035	157,014	24,076	2,248,663	106,092	30,771	272,189	37,674	10,300	**3,442,107**
Agriculture, forestry, fishing and hunting, and mining	397,032	3,117	587	18,775	3,512	665	72,917	1,424	1,300	14,403	475	600	**117,775**
Construction	1,137,958	18,734	2,103	21,825	12,505	2,758	231,835	13,497	4,949	25,279	3,912	1,843	**339,240**
Manufacturing	1,125,176	22,749	3,779	32,433	14,895	2,816	211,388	12,158	4,520	24,835	6,355	889	**336,817**
Wholesale trade	378,542	3,984	676	12,309	3,387	738	76,844	2,534	984	9,962	878	276	**112,572**
Retail trade	1,507,002	13,745	1,579	41,559	14,537	3,078	239,890	12,954	3,149	28,189	4,161	1,492	**364,333**
Transportation and warehousing, and utilities	777,044	10,080	1,683	18,892	8,019	1,149	149,386	5,516	2,557	17,807	2,126	774	**217,989**
Information	227,928	2,498	140	5,768	1,746	165	28,062	862	238	3,834	297	168	**43,778**
Finance and insurance, and real estate and rental and leasing	884,408	8,935	1,046	25,220	9,804	1,376	132,749	4,046	937	15,517	1,684	289	**201,603**
Professional, scientific, and management, and administrative and waste management services	1,524,750	17,394	1,338	48,110	18,366	2,099	290,715	9,154	2,085	33,084	3,407	829	**426,581**
Educational services, and health care and social assistance	2,863,828	42,171	3,607	89,976	40,743	4,465	430,264	23,998	5,347	51,660	7,964	1,446	**701,641**
Arts, entertainment, and recreation, and accommodation and food services	1,216,771	10,625	1,241	26,308	15,682	2,193	202,887	9,152	1,855	22,885	3,317	628	**296,773**
Other services, except public administration	684,780	8,002	689	15,410	7,280	1,366	126,847	5,846	1,646	15,983	1,786	560	**185,415**
Public administration	528,412	7,342	449	10,450	6,538	1,208	54,879	4,951	1,204	8,751	1,312	506	**97,590**

U.S. Bureau of the Census, American Community Survey, 2019 5 Year Estimate

The civilian labor force for the zone of influence makes up about 3 percent of the civilian labor force for the entire state, as shown in Table 2-13. The unemployment rate for the zone of influence was 5.5 percent, similar to the state overall, which had an unemployment rate of 5.1 percent. The constituent counties ranged from 3.5 percent in Hardin County to 6.4 percent in San Jacinto County.

Table 2-13 Civilian Labor Force, Employment and Unemployment (2019)

Geographic Area	Civilian Labor Force	Number Employed	Number Unemployed	Unemployment Rate
Texas	13,962,458	13,253,631	708,827	5.1%
Brazoria County	177,197	169,376	7,821	4.4%
Chambers County	20,044	18,917	1,127	5.6%
Fort Bend County	386,796	367,035	19,761	5.1%
Galveston County	167,437	157,014	10,423	6.2%
Hardin County	24,954	24,076	878	3.5%
Harris County	2,387,583	2,248,663	138,920	5.8%
Jefferson County	111,559	106,092	5,467	4.9%
Liberty County	33,072	30,771	2,301	7.0%
Montgomery County	284,265	272,189	12,076	4.2%
Orange County	39,653	37,674	1,979	5.0%
San Jacinto County	10,999	10,300	699	6.4%
Zone of Influence	3,643,559	3,442,107	201,452	5.5%

U.S. Bureau of the Census, American Community Survey, 2019 5 Year Estimate

2.4.6 Households, Income and Poverty

Table 2-14 shows the number and size of households for Texas and the zone of influence. The zone of influence has approximately 2.5 million households, which makes up about 26 percent of the number of households statewide. About 65 percent of the households are in Harris County (1.6 million) and about 10 percent are in Fort Bend County (237.883), 8 percent in Montgomery County (198,649), and about 5 percent each in Brazoria County (121.523) and Galveston County (121,438). The remainder of the counties make up less than 5 percent each. The average household size for the zone of influence is 2.91 persons, with the constituent counties ranging from 2.56 to 3.19. The household size for the zone of influence is just slightly higher than the state overall, which has 2.85 persons per household.

Table 2-14 Number of Households and Average Household Size (2019)

Geographic Area	Total Households	Average Household Size
Texas	9,691,647	2.85
Brazoria County	121,523	2.87
Chambers County	14,069	2.92
Fort Bend County	237,883	3.19
Galveston County	121,438	2.69
Hardin County	20,626	2.73
Harris County	1,605,368	2.87
Jefferson County	92,988	2.56
Liberty County	26,873	2.84
Montgomery County	198,649	2.87
Orange County	31,694	2.63
San Jacinto County	10,043	2.79
Zone of Influence	2,481,154	2.91

U.S. Bureau of the Census, American Community Survey, 2019 5 Year Estimate

Median household income and per capita income are shown in Table 2-15. While the median household income for the zone of influence was not available, for the constituent counties, it ranged from $41,614 in San Jacinto Counties to $97,743 in Fort Bend County. By comparison, the state's median household income was $61,874.

The per capita income for the zone of influence was approximately $34,100 was greater than the state's per capita income of $31,277. The constituent counties per capita income ranged from $23,312 in San Jacinto and Liberty Counties to $41,211 in Montgomery County.

Table 2-15 Median and Per Capita Income (2019)

Geographic Area	Median Household Income	Per Capita Income
Texas	$61,874	$31,277
Brazoria County	$81,447	$34,561
Chambers County	$91,141	$35,916
Fort Bend County	$97,743	$39,994
Galveston County	$73,330	$36,819
Hardin County	$60,339	$30,399
Harris County	$61,705	$32,765
Jefferson County	$51,248	$27,094
Liberty County	$51,494	$23,461
Montgomery County	$80,902	$41,211
Orange County	$59,399	$30,114
San Jacinto County	$41,614	$23,312
Zone of Influence	N/A	$34,100

U.S. Bureau of the Census, American Community Survey, 2019 5 Year Estimate

Percentages of families and persons falling below the poverty level is shown in Table 2-16. The percent of all families for the zone of influence was not available, but for the constituent counties, it ranged from 5.8 percent in Fort Bend County to 12 percent in Harris and Jefferson Counties. By comparison, the number of families below the poverty level for the state was 11 percent.

Approximately 14 percent of all persons in the zone of influence had incomes below the poverty level, slightly lower than the state's percentage of 15 percent. Harris, Jefferson Liberty and San Jacinto Counties had a higher percentage of people below the poverty level than the zone of influence overall, with the remaining counties having fewer families below the poverty level.

Table 2-16 Percentage of Families and People Whose Income in the Past 12 Months is Below the Poverty Level (2019)

Geographic Area	All Families	All People
Texas	11.3%	14.7%
Brazoria County	6.8%	8.7%
Chambers County	9.8%	12.1%
Fort Bend County	5.8%	7.4%
Galveston County	9.5%	12.4%
Hardin County	8.5%	12.1%
Harris County	13.0%	15.7%
Jefferson County	13.4%	17.7%
Liberty County	10.8%	14.1%
Montgomery County	6.8%	9.3%
Orange County	9.3%	13.3%
San Jacinto County	9.2%	15.2%
Zone of Influence	N/A	13.8%

U.S. Bureau of the Census, American Community Survey, 2019 5 Year Estimate

2.5 RECREATION FACILITIES, ACTIVITIES, NEEDS, AND TRENDS

2.5.1 Zone of Influence

The visitation market area, or zone of influence, is the area from which the majority of visitors to the lake originate. This zone is the area within approximately a 50-mile radius of Wallisville Lake, with the majority of visitation from within 25 miles.

2.5.2 Visitation Profile

Wallisville Lake visitors are a diverse group that includes residents of the immediate area, hunters, fishermen, kayakers, bird watchers, trail users, and day users who picnic, boat, observe wildlife, and sightsee. The peak visitation months are June through October, with June and July typically being the highest visitation months. At Wallisville Lake, day use and camping visitation is estimated for each Project Site Area (PSA) by the USACE and results for Fiscal Year (FY) 2020 are presented in Table 2-17. The estimated day use visitation numbers indicate that Cedar Hill Park receives the highest amount of visitation followed by Trinity River Island Recreation Area and J.J. Mayes Wildlife Trace.

Table 2-17 Estimated Visitation by PSA for Wallisville FY20 Data (Source: VERS, USACE)

LOCATION (PSA)	Oct 2019	Nov 2019	Dec 2019	Jan 2020	Feb 2020	Mar 2020	Apr 2020	May 2020	Jun 2020	Jul 2020	Aug 2020	Sep 2020	Total FY20
Cedar Hill Park (Day use)	873	608	510	473	541	162	52	378	1,567	1,667	1,399	1,399	25,417
Cedar Hill Park (Camping)	2,021	1,078	751	692	805	375	1	742	2,757	2,735	2,375	1,516	15,848
Hugo Point Park	599	491	399	351	268	74	24	168	708	660	486	425	4,653
J.J. Mayes Wildlife Trace	1,848	1,513	1,229	1,081	827	228	75	519	2,182	2,034	1,499	1,311	14,346
Mouth of Trinity River Waterbird Rookery	319	264	224	231	210	53	15	96	398	556	389	293	3,048
Trinity River Island Recreation Area	2,273	1,860	1,512	1,329	1,017	280	92	638	2,683	2,501	1,843	1,612	17,640
Trinity River Island Visitor Center	805	718	528	409	478	155	53	376	1,541	1,628	1,397	1,359	9,447
Grand Total	8,738	6,532	5,153	4,566	4,146	1,327	312	2,917	11,836	11,781	9,388	7,855	128,601

2.5.3 Recreation Areas and Facilities

Recreational opportunities at the Project differ from other typical reservoir projects in the area as Wallisville Lake is not developed to the same degree and can, therefore, offer scenic and wildlife opportunities lacking at other sites. The basic difference in recreational development at the Project is that although the name Wallisville Lake implies a reservoir or large body of water is present, that is not the case. The Wallisville Lake Project is atypical in that it does not impound a reservoir, but consists of naturally occurring numerous small ponds, shallow lakes, rivers, and interconnecting channels and bayous between lakes and rivers. The water depth of the lakes varies according to frequently fluctuating water levels, but are generally less than 5 feet, whereas the water depth of the Trinity River and Old River vary from 15 to 25 feet. Recreation activities that are popular at Wallisville Lake include birding, fishing, and hunting. As a site partner with the Gulf Coast Bird Observatory, the Wallisville Lake Project is recognized as a crucial habitat area for both neotropical migrants and resident avian species. The Trinity River is a major corridor for migration both north and south. The Mouth of the Trinity River Waterbird Rookery hosts 12 species of nesting colonial waterbirds. Both Cedar Hill Park and Hugo Point Park have trails and boardwalk areas for hiking and birding. The J.J. Mayes Wildlife Trace is both a driving and walking birder's paradise. Anglers can explore the waters of the Wallisville Lake Project. Depending on tides, winds, and fish movements. Saltwater species can be caught one day and freshwater species the next, or maybe even on the same day. Hunting on the Wallisville Lake Project is typically limited to feral hogs and the waterfowl season for ducks and geese. Hunting is managed in cooperation with TPWD. The project does host an annual Wounded Warrior alligator hunt. Recreational activities include the annual duck hunting program, fishing, canoeing/kayaking, recreational boating, wildlife observation, and hiking.

Recreation areas and facilities are provided by the USACE and Chambers County at Wallisville Lake. Table 2-18 lists the various parks with their associated services and managing agencies. Wallisville Lake has 6 developed recreation areas including 4 areas managed by the USACE, (Trinity River Island Recreation Area, J.J. Mayes Wildlife Tract, Mouth of the Trinity River Waterbird Rookery, and the Trinity River Island Visitor Center) and 2 areas managed by Chambers County (Cedar Hill Park and Hugo Point Park).

Detailed descriptions of public use areas can be found in Chapter 5 of this Plan, where a listing of areas as well as a general summary of the primary facilities and future management is provided. Additionally, Appendix A of this Plan contains park plates and location maps.

Due to the modernization of the National Vehicle Estimating and Reporting System (VERS), the method of estimating and reporting visitation has changed dramatically. A new VERS system was created and launched in Fiscal Year 2014. The USACE Districts with the help of ERDC/IWR are working together to make the

necessary corrections to both USACE parks and leased areas to provide the most accurate visitation estimation possible.

Table 2-18 Recreational Facilities by Location at Wallisville Lake (Source: USACE, NRM Assessment Tool)

LOCATION	Agency	FACILITIES							
		Designated Campsites	Boat Launching	Restrooms	Viewing Platform	Group Shelter	Designated Picnic	Nature Trail	Playground
Cedar Hill Park	Chambers Co.	*		*	*	*	*	*	
Hugo Point Park	Chambers Co.		*	*	*	*	*	*	*
Trinity River Island Recreation Area	USACE		*	*	*		*		
J.J. Mayes Wildlife Trace	USACE			*	*	*	*	*	
Mouth of the Trinity River Waterbird Rookery	USACE				*				
Trinity River Island Visitor Center	USACE			*	*		*		

Opportunities for outdoor family fun and recreation at the park areas surrounding Wallisville Lake include camping, boating, picnicking, hiking, birdwatching, fishing, and sightseeing. Facilities available at these areas include picnic and camping sites, boat ramps, and sanitary facilities.

Fishing and Hunting

Fishing is a common activity at Wallisville Lake and can be accomplished from either a boat or along the shoreline. Fishing is allowed just about everywhere on project waters with the following few exceptions: no fishing is allowed at the Mouth of the Trinity River Waterbird Rookery, no fishing is allowed off the bridge at the entrance to the project office, and no fishing is allowed off the dam structure. Fishing is permitted at the

project in accordance with local, State, and Federal regulations. A canoe launch is available at Cedar Hill Park, but power boats may not launch there. Other boat launches at Hugo Point, the Trinity River Island Recreation Area, and under IH-10 are available for launching power boats.

During 2021, the USACE managed three hunting programs open to the public at Wallisville Lake including small game, waterfowl, and feral hogs. Each program requires a permit and is subject to change or suspension based on management recommendation. Permit applications are available on the USACE Galveston District website. Waterfowl hunting is allowed for licensed hunters on a day-use basis and on a permitted seasonal blind basis.

Photo 2-6 Hunting at Wallisville Lake (Source: USACE, SWG PAO)

Camping and Picnicking

Primitive overnight camping is available only at Cedar Hill Park which is managed by Chambers County. The county charges a fee for overnight camping. Opportunities for picnicking are available at many of the recreation areas throughout the project including Cedar Hill Park, Hugo Point Park, Trinity River Island Recreation Area, J.J. Mayes Wildlife Trace, and the Trinity River Island Visitor Center. No fee is charged for the use of picnic sites.

Photo 2-7 Picnic Sites at Trinity River Island Recreation Area (Source: USACE)

Boating

Wallisville Lake offers visitors different types of boating experiences that many other USACE projects cannot match. The uniqueness of the project creates incredible opportunities for flatwater recreation including both canoeing and kayaking. Many areas are not accessible by large vessels making paddling a sought-out activity by enthusiasts looking to enjoy the remote wilderness of the project. In the larger open water areas of the project along the Trinity and Old Rivers, motorized vessels used for fishing and recreation are present. Designated no-wake water surface classifications are zoned for many of the sensitive lakes limiting boating activities for the conservation of natural resources.

Photo 2-8 TPWD Game Wardens on Wallisville Lake (Source: USACE)

Birdwatching

As a site partner with the Gulf Coast Bird Observatory, the Wallisville Lake Project is recognized as a crucial habitat area for both neotropical migrants and resident avian species. The Trinity River is a major corridor for migration both north and south. The Mouth of the Trinity River Waterbird Rookery hosts 12 species of nesting colonial waterbirds. Both Cedar Hill Park and Hugo Point Park have trails and boardwalk areas for hiking and birding. The J.J. Mayes Wildlife Trace is both a driving and walking birder's paradise. The Visitor's Center at Trinity River Island Recreation Area provides maps and further information.

Photo 2-9 Yellow-crowned Night-Heron at Wallisville (Source: USACE)

Trails

Nature trails are available at Cedar Hill Park, Hugo Point Park, and J.J. Mayes Wildlife Trace. In Cedar Hill Park, almost three miles of graveled trails with boardwalks out into the cypress swamp along the bank of Lake Charlotte are excellent for birding and small animal wildlife viewing. Bald eagles are known to fish from Lake Charlotte. A handicap accessible trail out into the marsh with an accessible tower is present at Hugo Point Park. At J.J. Mayes Wildlife Trace, the Sawmill Trail begins at the parking area just beyond the four-way intersection and meanders along the riverbank down to the lock. About halfway down the trail runs into the handicap accessible loop which can be accessed from the main Trace at two parking areas. The loop, just under one mile in length also has boardwalks, benches, and overlooks on the west bank of the Trinity.

Photo 2-10 J.J. Mayes Wildlife Trace boardwalk (Source: USACE)

2.5.4 Commercial Concession Leases

Concessionaires provide valuable services to the public at USACE lakes across the United States. The USACE makes efforts to attract concessionaires that can establish suitable, well-maintained businesses that will offer desirable natural resource related services to the public. Presently, at Wallisville Lake, there are no commercial concession leases nor is there any interest in establishing a commercial concession at the project.

Photo 2-11 Hugo Point Park boat launch (Source: USACE)

2.5.5 Recreation Analysis – Trends and Needs

The 2018 Texas Outdoor Recreation Plan (TORP) published by TPWD is a comprehensive recreational demand study that evaluates recreation trends and needs across Texas and in subdivided regions. Some of the information in the TORP was extracted from the National Survey on Recreation and the Environment (NSRE) and reports generated by the USFWS. Much of the data in the TORP was from a survey conducted in 2017 titled Texas Residents' Participation in and Attitudes Toward Outdoor Recreation by Responsive Management (Survey) on behalf of TPWD. Wallisville Lake provides many recreation opportunities that help to meet the recreation needs identified in the TORP.

The TORP indicated the rates of participation for various outdoor activities in Texas, with Chambers and Liberty Counties, and Wallisville Lake located in TORP Region 4. Across the entire state and in Region 4, walking for pleasure is the most popular outdoor activity, while the next most popular being picnicking, cookouts, and other gatherings. The top ten areas of participation for outdoor recreation are indicated in Figure 2-8.

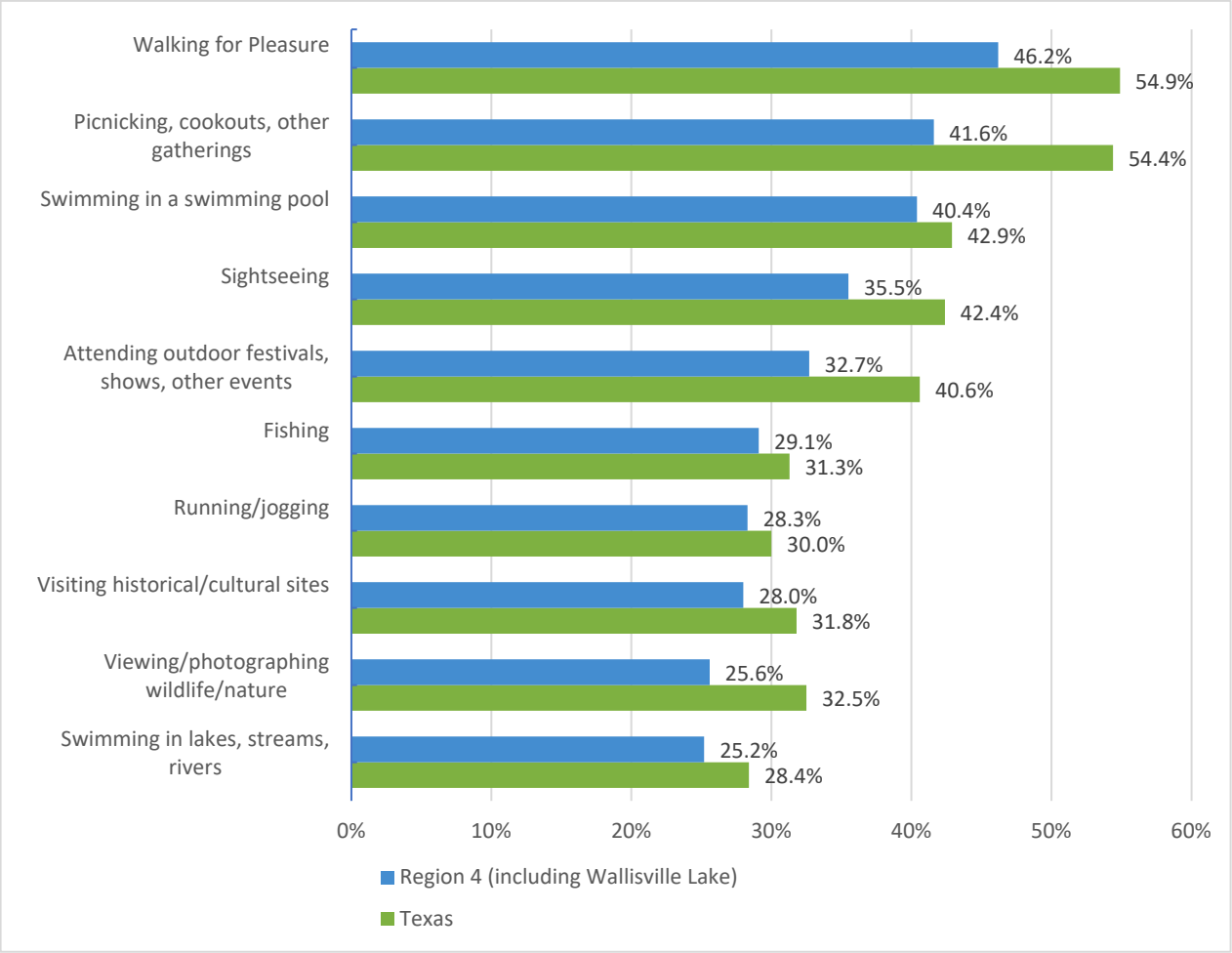


Figure 2-8 Top 10 Areas of Participation for Outdoor Recreation Activities (Source: TPWD TORP 2018)

Asked "which outdoor recreation opportunities does your community currently lack or would like to see more of in your community," the top answer across the state was trails/places to hike/bike, and the next highest response was pools/swimming facilities (other than lakes). In Region 4, the second highest response was more parks/more park capacity. The top ten responses are indicated in Figure 2-9.

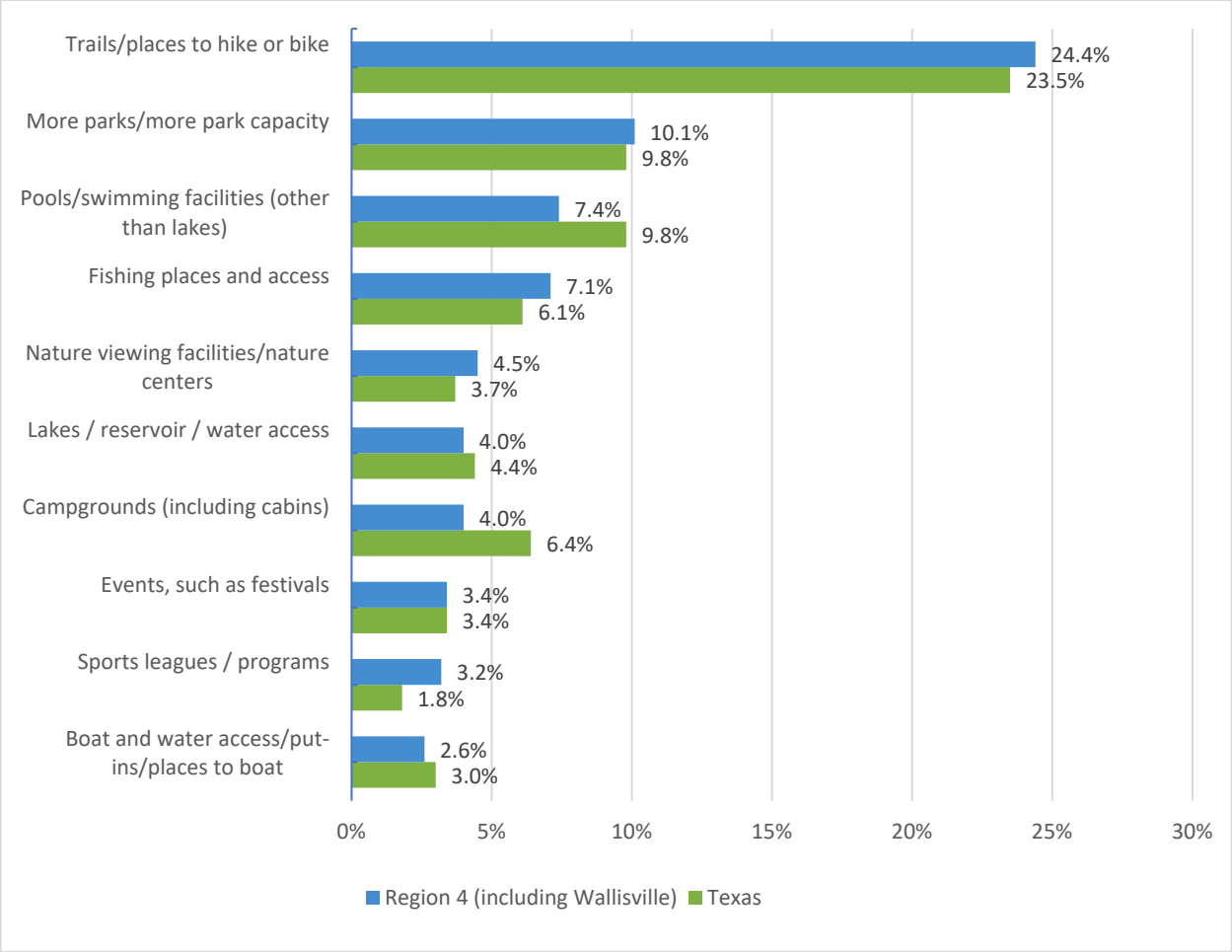


Figure 2-9 "Which outdoor recreation opportunities does your community currently lack or would like to see more of in your community?" (Source: TPWD TORP 2018)

Additional findings from the Survey found that 34 percent of Texas residents and 34 percent of Region 4 residents have visited a state park during the past 12 months. Furthermore, 58 percent of Texas residents and 56 percent of Region 4 residents have visited a local park in the past 12 months (local park was defined as 30 minutes from respondents' home and not a state or national park). Within Region 4, 58 percent of survey respondents have visited a local park at least 5 times in the last 12 months, while 58 percent have visited a local park at least once in the past 12 months. Asked "which features, or facilities do your local parks currently lack, or would you like to see more of at your local parks," the overwhelming response was more restroom facilities at 28.0 percent across Region 4 and 20.5 percent across Texas. The top ten responses to that survey question are indicated in Figure 2-10.

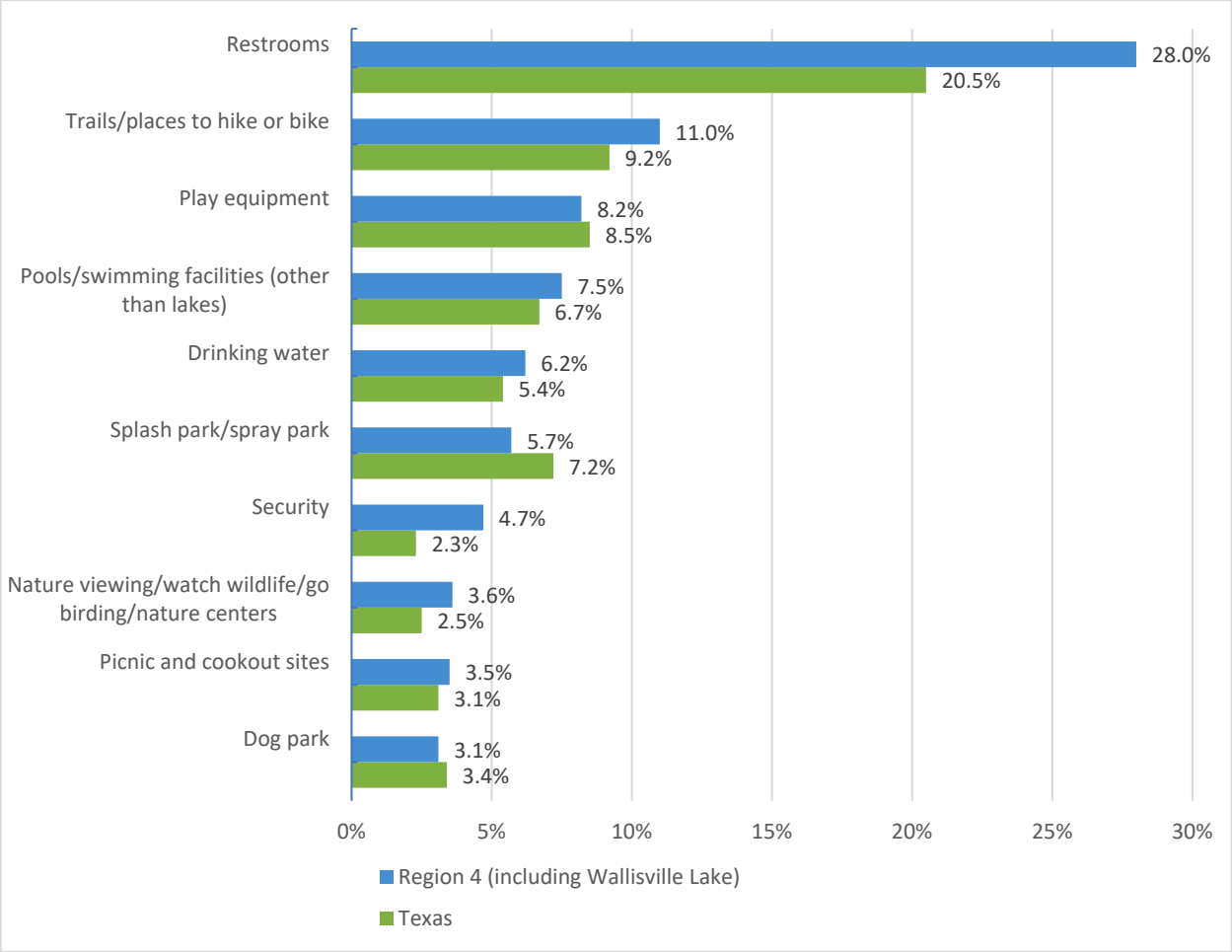


Figure 2-10 "Which features, or facilities do your local parks currently lack, or would you like to see more of at your local parks?" (Source: TPWD TORP 2018)

In accordance with historical visitation rates and recent outdoor recreation trends documented in the 2012 and 2018 TORP, camping in developed and primitive settings has declined significantly since 2000. In contrast, the TORP documented an increase in demand for day trip activities including hiking/walking for pleasure; picnicking, cookouts, or other gatherings; sightseeing; swimming in pools; attending outdoor festivals, shows, or events; and viewing/photographing wildlife/nature. The recreation activity most people say their community lacks is hiking/biking trails, more park capacity, swimming pool facilities and fishing places and access; with the demand for fishing places and access being much higher in the Region 4 than the entire state. In response to trends documented in the TORP, the USACE will endeavor to improve fishing places and access and to develop trails in or adjacent to park areas as funding permits. The USACE encourages partnerships with agencies who lease and manage parks to respond to increasing demands and build on the current quality of USACE parks for present and future visitors. Comments from the public mirrored the demand published in the TORP, as there were many comments from the public showing interest in additional trails at lake, including paddle trails.

2.5.6 Recreation Carrying Capacity

The plan formulated herein proposes to provide a variety of activities and to encourage optimal, safe use of present public use areas without causing irreparable harm to natural resources. The carrying capacity of the land is determined primarily by the distinct characteristics of the site including but not limited to soil type, steepness of topography and available moisture. Recreational carrying capacity of the lake's water surface is based primarily on available space and numbers of users. These characteristics, both natural and manmade, are development constraints that often determine the type and number of facilities that should be provided.

No recreation carrying capacity studies have been conducted at Wallisville Lake. Presently, the USACE manages recreation areas using historic visitation data combined with best professional judgment to address recreation areas, including the water surface, considered to be overcrowded, overused, underused, or well balanced. Compared to other USACE lakes, Wallisville Lake experiences relatively low visitation, ranking in the lower third of all USACE projects. This trend has the potential to change as the regional population is projected to grow with the proximity to Harris County coupled with a growing national interest in public lands and outdoor recreation activities. However, the USACE will continue to work with Chambers County to identify possible causes and effects of overcrowding and overuse and apply appropriate best management practices including site management, regulating visitor behavior, and modifying visitor behavior as needed.

2.6 REAL ESTATE

The total Project Area at Wallisville Lake encompasses 24,089 acres acquired in fee simple title by the USACE. Above the area acquired in fee simple title, 1,169 acres were encumbered with a perpetual flowage easement. These are the official acres and may differ from those in other parts of this plan due to better measurement technology, erosion, and sedimentation.

Purchase of a flowage easement by the Government constitutes payment for the right to flood and for the damage and expense to the landowner resulting from project operation. Construction of buildings or facilities for human habitation, or alteration of the existing terrain to the extent that storage of flood water is reduced, will not be permitted on flowage easement lands. Construction of most structures and improvements on flowage easement lands will require formal written authorization from the USACE.

Prospective buyers of property adjacent to Wallisville Lake are strongly encouraged to determine the location of the flowage easement line on any property they are considering purchasing. Flowage easements may or may not be located on deeds or plats provided by the seller(s).

2.6.1 Encroachments and Trespass

Government property is monitored by Wallisville Lake USACE personnel to identify and correct instances of unauthorized use, including trespasses and encroachments. The term “trespass” includes unauthorized transient use and occupancy, such as mowing, tree cutting and removal, livestock grazing, cultivation and harvesting crops, and any other alteration to Government property done without USACE approval. Unauthorized trespasses may result in a Title 36 citation to appear in Federal Magistrate Court, which could subject the violator to fines or imprisonment (See 36 Code of Federal Regulations [CFR] Part 327 Rules and Regulations Governing Public Use of Water Resources Development Projects Administered by the Chief of Engineers). More serious trespasses will be referred to the USACE Office of Counsel for enforcement under state and federal law, which may require restoration of the premises and collection of monetary damages.

The term “encroachment” pertains to an unauthorized structure or improvement on Government property. When encroachments are discovered, lake personnel will attempt to resolve the issue at the project level. Where no resolution is reached, or where the encroachment is a permanent structure, the method of resolution will be determined by USACE Real Estate Division, with recommendations from Operations Division and Office of Counsel. The USACE’s general policy is to require removal of encroachments, restoration of the premises, and collection of appropriate administrative costs and fair market value for the term of the unauthorized use. Questions regarding this topic can be directed to the lake office.

2.6.2 Outgrants

Real Estate outgrants at Wallisville Lake include easements, licenses, leases, and other formal real estate documents. A summary of outgrants at Wallisville Lake is provided as follows:

- Consents: 4
- Easements: 23
- Leases: 2
- Licenses: 4

Personnel of the Galveston District Real Estate Division and Operations Division, in coordination with Operations Division staff at Wallisville Lake, conduct compliance inspections of major outgrants, including concessions, public parks, and wildlife areas annually in accordance with applicable regulations.

Individuals and entities interested in lease acquisition to provide services to the public on USACE fee lands should be aware that specific restrictions and procedures apply to such leases. In many cases, individuals or entities will be encouraged to pursue a sublease with an existing lessee, such as with a marina. Any leases for new services are subject to a competitive bidding process following market studies and a determination by the USACE that the prospective service or product would be beneficial

to users at Wallisville Lake. Questions regarding this topic can be directed to the lake office.

2.7 PERTINENT PUBLIC LAWS

The following Public Laws are applicable to Wallisville Lake Project. Additional information on Federal Statutes applicable to Wallisville Lake Project can be found in the Environmental Assessment for the Wallisville Lake Project Master Plan revision in Appendix B of this Plan.

- Public Law 59-209, Antiquities Act of 1906. - The first federal law established to protect what are now known as "cultural resources" on public lands. It provides a permit procedure for investigating "antiquities" and consists of two parts: An act for the Preservation of American Antiquities, and Uniform Rules and Regulations.
- Public Law 74-292, Historic Sites Act of 1935. - Declares it to be a national policy to preserve for (in contrast to protecting from) the public, historic (including prehistoric) sites, buildings, and objects of national significance. This act provides both authorization and a directive for the Secretary of the Interior, through the National Park Service, to assume a position of national leadership in the area of protecting, recovering, and interpreting national archeological historic resources. It also establishes an "Advisory Board on National Parks; Historic Sites, Buildings, and Monuments, a committee of eleven experts appointed by the Secretary to recommend policies to the Department of the Interior".
- Title 16 U.S. Code §§ 668-668a-d, 54 Stat. 250, Bald Eagle Protection Act of 1940, as amended. This Act prohibits anyone, without a permit issued by the Secretary of the Interior, from taking bald eagles, including their parts, nests, or eggs. The Act provides criminal penalties for persons who take, possess, sell, purchase, barter, offer to sell, transport, export or import, at any time or any manner, any bald eagle [or any golden eagle], alive or dead, or any part, nest, or egg thereof. The Act defines “take” as pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb.
- 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 the 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. This law also authorized the creation of the Southwestern Power Administration (SWPA), then within the Department of the Interior and now within the Department of Energy, as the agency responsible for marketing and delivering the power generated at federal reservoir projects.
- Public Law 79-525, Rivers and Harbors Act of 1946. - This act authorizes the construction, repair, and preservation of certain public works on rivers and harbors for navigation, flood control, and for other purposes.

- PL 79-526, Flood Control Act of 1946. - This act amends PL78-534 to include authority to grant leases to non -profit organizations at recreational facilities in reservoir areas at reduced or nominal fees.
- Public Law 83-780, Flood Control Act of 1954. - This act authorizes the construction, maintenance, and operation of public park and recreational facilities in reservoir areas under the control of the Department of the Army and authorizes the Secretary of the Army to grant leases of lands in reservoir areas deemed to be in the public interest.
- 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 86-523, Reservoir Salvage Act of 1960, as amended. This Act provides for (1) the preservation of historical and archeological data that might otherwise be lost or destroyed as the result of flooding or any alteration of the terrain caused as a result of any Federal reservoir construction projects; (2) coordination with the Secretary of the Interior whenever activities may cause loss of scientific, prehistoric, or archeological data; and (3) expenditure of funds for recovery, protection, and data preservation. This Act was amended by Public Law 93-291.
- Public Law 86-717, Forest Cover Conservation Act, 6 Sept. 1960. - This act provides for the protection of forest cover for reservoir areas under this jurisdiction of the Secretary of the Army and the Chief of Engineers.
- Public Law 87-88, Federal Water Pollution Control Act Amendments of 1961, as amended. Section 2(b)(1) of this Act gives the USACE responsibility for water quality management of USACE reservoirs. This law was amended by the Federal Water Pollution Control Act Amendment of 1972, Public Law 92-500.
- Public Law 87-874, Rivers and Harbors Act of 1962. - This act authorizes the construction, repair, and preservation of certain public works on rivers and harbors for navigation, flood control, and for other purposes.
- Public Law 88-29, May 28, 1963, authorizes the Secretary of the Interior to inventory and classify outdoor recreation needs and resources and to prepare a comprehensive outdoor recreation plan taking into consideration the plans of the various Federal agencies undertaking recreational activities shall consult with the Secretary of the Interior concerning these activities and shall carry out such responsibilities in general conformance with the nationwide plan.
- Public Law 88-578, Land and Water Conservation Fund Act of 1965. - This act established a fund from which Congress can make –appropriations for outdoor recreation. Section 2(2) makes entrance and user fees at reservoirs possible by deleting the words "without charge" from Section 4 of the 1944 Flood Control Act as amended.

- 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 USACE/OMB implementation policy made these provisions applicable to projects completed prior to 1965.
- Public Law 89-90, Water Resources Planning Act (1965). - This act established the Water Resources Council and gives it the responsibility to encourage the development, conservation, and use of the Nation's water and related land resources on a coordinated and comprehensive basis.
- Public Law 89-272, Solid Waste Disposal Act, as amended by PL 94-580, dated October 21, 1976. - This act authorized a research and development program with respect to solid-waste disposal. It proposes (1) to initiate and accelerate a national research and development program for new and improved methods of proper and economic solid-waste disposal, including studies directed toward the conservation of national resources by reducing the amount of waste and unsalvageable materials and by recovery and utilization of potential resources in solid waste; and (2) to provide technical and financial assistance to State and local governments and interstate agencies in the planning, development, and conduct of solid-waste disposal programs.
- Public Law 89-665, National Historic Preservation Act of 1966, as amended. - 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.
- Public Law 90-483, Rivers and Harbors and Flood Control Act of 1968, Mitigation of Shore Damages. - Section 210 restricted collection of entrance fee at USACE lakes and reservoirs to users of highly developed facilities requiring continuous presence of personnel.
- 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.

- Public Law 91-611, River and Harbor and Flood Control Act of 1970. - Section 234 provides that persons designated by the Chief of Engineers shall have authority to issue a citation for violations of regulations and rules of the Secretary of the Army, published in the Code of Federal Regulations.
- Public Law 92-347, Golden Eagle Passbook and Special Recreation User Fees. - This act revises Public Law 88-578, the Public Land and Water Conservation Act of 1965, to require Federal agencies to collect special recreation user fees for the use of specialized sites developed at Federal expense and to prohibit the USACE from collecting entrance fees to projects.
- Public Law 92-500, Federal Water Pollution Control Act Amendments of 1972. - The Federal Water Pollution Control Act of 1948 (PL 845, 80th Congress), as amended in 1956, 1961, 1965 and 1970 (PL 91- 224), established the basic tenet of uniform State standards for water quality. Public Law 92-500 strongly affirms the Federal interest in this area. "The objective of this act is to restore and maintain the chemical, physical and biological integrity of the Nation's waters."
- Public Law 92-516, Federal Environmental Pesticide Control Act of 1972. - This act completely revises the Federal Insecticide, Fungicide and Rodenticide Act. It provides for complete regulation of pesticides to include regulation, restrictions on use, actions within a single State, and strengthened enforcement.
- Public Law 93-81, Collection of Fees for Use of Certain Outdoor Recreation Facilities. - This act amends Section 4 of the Land and Water Conservation Act of 1965, as amended to require each Federal agency to collect special recreation use fees for the use of sites, facilities, equipment, or services furnished at Federal expense.
- Public Law 93-205, Conservation, Protection, and Propagation of Endangered Species Act of 1973, as amended. This law repeals the Endangered Species Conservation Act of 1969. It also directs all Federal departments/agencies to carry out programs to conserve endangered and threatened species of fish, wildlife, and plants and to preserve the habitat of these species in consultation with the Secretary of the Interior. This Act establishes a procedure for coordination, assessment, and consultation. This Act was amended by Public Law 96-159.
- Public Law 93-251, Water Resources Development Act of 1974. - Section 107 of this law establishes a broad Federal policy which makes it possible to participate with local governmental entities in the costs of sewage treatment plant installations.
- Public Law 93-291, Archeological Conservation Act of 1974. - The Secretary of the Interior shall coordinate all Federal survey and recovery activities authorized under this expansion of the 1960 act. The Federal Construction agency may transfer up to one percent of project funds to the Secretary with such transferred funds considered non-reimbursable project costs.
- Public Law 93-303, Recreation Use Fees. - This act amends Section 4 of the Land and Water Conservation Act of 1965, as amended, to establish less

restricted criteria under which Federal agencies may charge fees for the use of campgrounds developed and operated at Federal areas under their control.

- Public Law 93-523, Safe Drinking Water Act of 1974. - The act assures that water supply systems serving the public meet minimum national standards for protection of public health. The act (1) authorizes the Environmental Protection Agency to establish Federal standards for protection from all harmful contaminants, which standards would be applicable to all public water systems, and (2) establishes a joint Federal-State system for assuring compliance with these standards and for protecting underground sources of drinking water.
- Public Law 94-422, Amendment of the Land and Water Conservation Fund Act of 1965. - Expands the role of the Advisory Council. Title 2 - Section 102a amends Section 106 of the Historical Preservation Act of 1966 to say that the Council can comment on activities which will have an adverse effect on sites either included in or eligible for inclusion in the National Register of Historic Places.
- Public Law 95-217, Clean Water Act of 1977, as amended. This Act amends the Federal Water Pollution Control Act of 1970 and extends the appropriations authorization. The Clean Water Act is a comprehensive Federal water pollution control program that has as its primary goal the reduction and control of the discharge of pollutants into the nation's navigable waters. The Clean Water Act of 1977 has been amended by the Water Quality Act of 1987, Public Law 100-4.
- Public Law 95-341, American Indian Religious Freedom Act of 1978. The Act protects the rights of Native Americans to exercise their traditional religions by ensuring access to sites, use and possession of sacred objections, and the freedom to worship through ceremonials and traditional rites.
- Public Law 95-632, Endangered Species Act Amendments of 1978. This law amends the Endangered Species Act Amendments of 1973. Section 7 directs agencies to conduct a biological assessment to identify threatened or endangered species that may be present in the area of any proposed project. This assessment is conducted as part of a Federal agency's compliance with the requirements of Section 102 of NEPA.
- Public Law 96-95, Archeological Resources Protection Act of 1979. This Act protects archeological resources and sites that are on public and tribal lands and fosters increased cooperation and exchange of information between governmental authorities, the professional archeological community, and private individuals. It also establishes requirements for issuance of permits by the Federal land managers to excavate or remove any archeological resource located on public or Indian lands.
- Public Law 98-63, Supplemental Appropriations Act of 1983. This Act authorized the USACE Volunteer Program. The United States Army Chief of Engineers may accept the services of volunteers and provide for their incidental expenses to carry out any activity of the USACE, except policymaking or law or regulatory enforcement.
- Public Law 99-662, The Water Resources Development Act (WRDA) 1986. - Provides for the conservation and development of water and related resources

and the improvement and rehabilitation of the Nation's water resources infrastructure. Establishes new requirements for cost sharing.

- Public Law 101-233, North American Wetland Conservation Act (13 Dec 1989), directs the conservation of North American wetland ecosystems and requires agencies to manage their lands for wetland/waterfowl purposes to the extent consistent with missions.
- Public Law 101-336, Americans with Disabilities Act of 1990 (ADA), 26 July 1990, as amended by the ADA Amendments Act of 2008 (PL110-325), prohibits discrimination based on disabilities in, among others, the area of public accommodations and requires reasonable accommodations for persons with disabilities.
- Public Law 101-601, Native American Graves Protection and Repatriation Act (16 Nov 1990), requires Federal agencies to return Native American human remains and cultural items, including funerary objects and sacred objects, to their respective peoples.
- Public Law 102-580, Water Resources Development Act (WRDA) of 1992 (31 Oct 1992) authorizes the USACE to accept contributions of funds, materials, and services from non-Federal public and private entities to be used for managing recreational sites and facilities and natural resources.
- Public Law 103-66 Omnibus Reconciliation Act-Day use fees (10 Aug 1993), authorizes the USACE to collect fees for the use of developed recreational sites and facilities, including campsites, swimming beaches, and boat ramps.
- Public Law 104-303, WRDA 1996. Authorizes recreation and fish and wildlife mitigation as purposes of a project, to the extent that the additional purposes do not adversely affect flood control, power generation, or other authorized purposes of a project.
- Public Law 104-333, Omnibus Parks and Public Lands Management Act of 1996, (12 Nov 1996). - This act created an advisory commission to review the current and anticipated demand for recreational opportunities at lakes or reservoirs managed by the Federal Government and to develop alternatives to enhance such opportunities for such use by the public.
- Public Law 106-147, Neo-tropical Migratory Bird Conservation Act (20 July 2000). - This act promotes the conservation of habitat for neo-tropical migratory birds.
- The Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c), enacted in 1940, and amended several times since then. - This act prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The Act provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof." The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb."

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 the Wallisville Lake Project. 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 goals are the priorities for consideration when determining management objectives and development activities. Implementation of these goals is based upon time, manpower, and budget. The objectives provided in this chapter are established to provide high levels of stewardship to USACE managed lands and resources while still providing a high level of public service. These goals will be pursued through the use of a variety of mechanisms such as: assistance from volunteer efforts, hired labor, contract labor, permit conditions, remediation, and special lease conditions. It is the intention of Wallisville Lake staff to provide a realistic approach to the management of all resources. The following statements, based on *EP 1130-2-550*, Chapter 3, express the goals for the Wallisville 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 defined as 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 Galveston District, Wallisville 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 take public input into consideration. Recreational and natural resources carrying capacities are also accounted for during development of the objectives found in this Master Plan, as well as regional and state planning documents.

The objectives in this Master Plan are intended to provide project benefits, meet public needs, and foster environmental sustainability for Wallisville Lake Project to the greatest extent possible. The following tables list the objectives for Wallisville Lake Project.

Table 3-1 Recreational Objectives

Recreational Objectives	Goals				
	A	B	C	D	E
In cooperation with Chambers County as well as TPWD, evaluate the demand for improved recreation facilities and increased public access on USACE-administered public lands and water for recreational activities (e.g., fishing, picnicking, bird watching, and paddle sports) and facilities (e.g., 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 USACE managed and leased areas including but not limited to roads, tent pads, restrooms, trails, pavilions, and park entrances.	*		*		
Optimize opportunities for hunting game wildlife species on all USACE lands where such activities are appropriate and in accordance with natural resource management objectives. Maintain the Wallisville Lake Project Map and Guide to accurately reflect the status of hunting opportunities and special restrictions for all USACE lands.	*		*	*	*
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.	*				
Encourage an increase of universally accessible facilities on Wallisville Lake.	*		*		*
Ensure consistency with USACE Natural Resource Management Strategic Plan.					*
Monitor the TCAP and TORP to ensure that USACE is responsive to outdoor recreation trends, public needs, and resource protection within a regional framework. All plans by others will be evaluated considering USACE policy and operational aspects of the Wallisville Lake Project.					*

*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
Give priority to the preservation and improvement of wild land values in public use planning, design, development, and management activities. Give high priority to examining project lands for the presence of marshes and forests characteristic of the Level IV Texas-Louisiana Coastal Marshes, and Floodplains and Low Terraces Ecological Regions as well as other priority habitats identified by TPWD.	*	*		*	*
Consider water management policy to ensure that natural resources are managed in ways that are compatible with project purposes.	*	*		*	
Actively manage and conserve fish and wildlife resources, especially threatened and endangered species and Species of Greatest Conservation Need by implementing ecosystem management principles. Key among these principles is the use of native species adapted to the Level IV Texas-Louisiana Coastal Marshes, and Floodplains and Low Terraces Ecological Regions in restoration and mitigation plans.	*	*		*	*
Actively manage principal game wildlife species by establishing means of taking within specified public hunting areas in accordance with the regulatory processes of TPWD.	*	*	*		*
Manage high density and low density recreations lands in ways that enhance benefits to wildlife.					*
Optimize resources, labor, funds, and partnerships for protection and restoration of fish and wildlife habitats.		*			*
Minimize activities which disturb the scenic beauty and aesthetics of the project.	*	*	*	*	
Ensure that adverse impacts resulting from land use actions, including outgrants, are appropriately mitigated to restore the value of the land to the nation.		*		*	*
Implement prescribed fire as a management tool to promote the vigor and health of the Coastal Plains and Piney Woods forests, including woodlands and prairie.	*	*			*
Stop unauthorized uses of public lands such as off-road vehicle (ORV) use, trash dumping, unauthorized fires, fireworks, poaching, clearing of vegetation, agricultural trespass, timber theft, unauthorized trails and paths, and placement of advertising signs that create negative environmental impacts.	*	*	*	*	*

Natural Resource Management Objectives	Goals				
	A	B	C	D	E
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.	*	*		*	*
Protect and/or restore important native habitats such as marshes, piney woods, cypress swamps, and wetlands where they occur, or historically occurred on project lands. Emphasize actions that promote butterfly and /or pollinator habitat, migratory bird habitat, and habitat for birds listed by USFWS as Birds of Conservation Concern.	*	*		*	*

*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 (e.g., comment cards, updates to local municipalities, web page) for communication with agencies, special interest groups, and the general public. Utilize social media to inform visitors.	*			*	*
Implement more educational, interpretive, and outreach programs at the lake office and around the project. Include the following topics: history, lake operations (navigation, salinity control, water supply, fish and wildlife enhancement, and recreation), water safety, recreation, cultural resources, ecology, invasive species, and USACE missions.	*	*	*	*	*
Work closely with local interest groups.	*			*	*
Promote the 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	Goals				
	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 best management practices in green design, construction, and operation practices, such as the Leadership in Energy and					*

General Management Objectives	Goals				
	A	B	C	D	E
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 climate change mitigation goals, including but not limited to climate change resilience and carbon sequestration, as set forth in applicable USACE policy and Executive Orders.					*

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

Table 3-5 Cultural Resources Management Objectives

Cultural Resources Management Objectives	Goals				
	A	B	C	D	E
As funding permits, complete an inventory of cultural resources and implement the Cultural Resources Management Plan.	*	*		*	*
Increase public awareness and education of regional history.		*		*	*
Stop unauthorized excavation and removal of cultural resources.		*		*	*
Provide access by Tribal members to any cultural resources, sacred sites, or other Traditional Cultural Properties.	*	*			
Preserve and protect cultural resources sites in compliance with existing federal statutes and regulations.		*			

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

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 the 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 Wallisville Lake the only land allocation category that applies is Operations. Operations is defined as those lands that are required to operate the project for the primary authorized purposes of flood risk management and water conservation. The remaining allocations of Recreation, Fish and Wildlife and Mitigation would apply only if lands had been acquired specifically for these purposes. The entire fee simple federal estate at Wallisville Lake is 22,666 acres of land, all of which are allocated to Operations.

4.2 LAND CLASSIFICATION

4.2.1 General

The objective of classifying project lands is to identify how a given parcel of land shall be used now and in the foreseeable future. Land classification is a central component of this plan, and once a particular classification is established any significant change to that classification would require a formal process including public review and comment.

4.2.2 Prior Land Classifications

The 1996 Wallisville Lake Master Plan describes the presence of land use classifications on project fee lands but omits details regarding maps and acreages for the land classifications. The Master Plan revision will not be able describe any prior land classification acres however it will define new land classification acres and associated maps.

In the 20-plus years since the previous Master Plan 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 4.1 for a summary of land classification changes from the prior classifications to the current classifications.

4.2.3 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
    - Low Density Recreation
    - Vegetation Management
    - Wildlife Management
    - Future or Inactive Recreation Areas
- Water Surface
    - Restricted
    - Designated No-Wake
    - Fish and Wildlife Sanctuary
    - Open Recreation

The land and water surface classifications for Wallisville Lake were established after considering 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.

4.2.4 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 project purposes. In addition to the operational activities taking place on these lands, limited recreational use may be allowed for activities such as public access to the fishing piers. Regardless of any limited recreation use allowed on these lands, the primary classification of Project Operations will take precedent over other uses. There are 160 acres of Project Operations land specifically managed for this purpose.

4.2.5 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 Wallisville Lake there are 64 acres classified as High-Density Recreation land. Each of the High-Density Recreation areas is described briefly in Chapter 5 of this Plan.

4.2.6 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 Wallisville Lake with this classification.

4.2.7 Environmentally Sensitive Areas

These are areas where scientific, ecological, cultural, and aesthetic features have been identified to be protected or preserved. At Wallisville 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 14,679 acres classified as ESA at Wallisville Lake.

4.2.8 Multiple Resource Management Lands (MRML)

This classification is divided into four sub-classifications identified as: Low Density Recreation, Wildlife Management, Vegetative Management, and Future or 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 spaces, a small boat ramp, and/or primitive sanitary facilities. There are 914 acres of land under this classification at Wallisville Lake. The following paragraphs list each of the sub-classifications, and the number of acres and primary uses of each.

- *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 the 1996 Master Plan, several relatively large tracts were classified for Low Density Recreation, but during the study process to develop this Plan, these larger tracts were reclassified under the sub-classification of Environmentally Sensitive Areas or Wildlife Management. The Low Density Recreation lands at Wallisville Lake includes narrow areas associated with trails and accessible areas near the J.J. Mayes Wildlife Trace, Cedar Hill Park, and Hugo Point Park to allow passive public recreation activities including hiking and wildlife viewing. There are 121 acres under this land classification at Wallisville Lake.
- *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. 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 787 acres of land included in this classification at Wallisville Lake.
- *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 0 acres of land included in this classification at Wallisville Lake.
- *Future or Inactive Recreation*. These are lands with site characteristics compatible with High Density Recreation development. These are areas where High Density Recreation development was anticipated in prior land classifications, but the development either never took place or was minimal. These areas are typically closed to vehicular traffic and will be managed as multiple resource management lands until development takes place. There are 6 acres of land included in this classification at Wallisville Lake.

4.2.9 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 Classification map can be 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 the water surface upstream and downstream of the Wallisville Lake Dam. There are 4 acres of restricted water surface at Wallisville 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. There are 3 boat ramps at Wallisville Lake where no-wake restrictions are in place for reasons of public safety and protection of property. No-wake designation are in place on several lakes to protect wildlife and shorelines. There are 1,498 acres of designated no-wake water surface at Wallisville 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. Wallisville Lake has 384 water surface acres 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 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 4,963 acres of open recreation water surface at Wallisville 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.

Table 4-1 provides a summary of land and water surface classifications at Wallisville Lake. Acreages were calculated by historical and GIS data. A map representing these areas can be found in Appendix A.

Table 4-1 Proposed Land and Water Surface Classification Acres at Wallisville Lake

Prior Land Classifications (1996)	Acres	Proposed Land Classifications (2022)	Acres (*)
Operations	n/a	Project Operations (PO)	160
		High Density Recreation (HDR)	64
Environmentally Sensitive Areas	n/a	Environmentally Sensitive Areas (ESA)	14,679
Low Density Recreation	n/a	Multiple Resource Management – Low	121

Prior Land Classifications (1996)	Acres	Proposed Land Classifications (2022)	Acres (*)
		Density Recreation (LDR)	
Fish and Wildlife	n/a	Multiple Resource Management – Wildlife Management (WMA)	787
		Future/Inactive Recreation Areas	6
TOTAL	18,949		15,817
Water Surface	5,140	Open Recreation	4,963
		Designated No-Wake	1,498
		Fish and Wildlife Sanctuary	384
		Restricted	4
TOTAL	5,140		6,849
TOTAL FEE	24,089		22,666

* Acreages were measured using GIS technology and may vary from the official land acquisition records.

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 Wallisville 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 flooding and to prohibit activities on the flowage easement that would interfere with operations such as placement of fill material or construction of habitable structures. There are 1,169 acres of Flowage Easement lands at Wallisville Lake.

5 RESOURCE PLAN

5.1 RESOURCE PLAN OVERVIEW

This chapter describes in broad terms how each land classification within the Master Plan will be managed. All management goals described in Section 3.2 apply to each of the land classifications, but the primary goal(s) for each classification is listed below for emphasis. Refer to section 3.3 for a listing of resource objectives applicable to each management goal. Refer to Appendix A for maps showing the various land classifications.

Management of all lands, recreation facilities, and related infrastructure must take into consideration the effects on authorized project purposes. Management actions are dependent on congressional appropriations, the financial capability of lessees and other key stakeholders, and the contributions of labor and other resources by volunteers. The land and water surface classifications and applicable management goals for each classification for Wallisville Lake include the following:

- Project Operations — Goal A
- High Density Recreation — Goal C
- Environmentally Sensitive Areas — Goal B, D, E
- Multiple Resource Management Lands for:
    - Low Density Recreation — Goal C
    - Wildlife Management — Goal B, E
    - Future or Inactive Recreation — Goal B, E
- Water Surface
    - Open Recreation — Goal A, C
    - Designated No-Wake — Goal B, D, E
    - Restricted — Goal C
    - Fish and Wildlife Sanctuary — Goal B, D, E

The management plans describe how these project lands will be managed in broad terms. A more descriptive and detailed plan for managing project lands is developed in the Wallisville Lake OMP. The OMP is an annually-updated, task and budget oriented plan identifying tasks necessary to implement the Resource Plan and achieve the goals and objectives of the Master Plan.

5.2 PROJECT OPERATIONS

Project Operations is land associated with the dam, lock, water control structures, levees, project office, maintenance facilities, and other areas solely for the operation of the project. There are 160 acres of lands under this classification, all of which are managed by the USACE. The management plan for the Project Operations area is to continue providing physical security necessary to ensure sustained operations

of the locks, water control structures, and related facilities including restricting public access in hazardous locations near the lock and dam.

Recommended future actions for these areas include facility upgrades to meet USACE sustainability objectives as funding and personnel allow. Opportunities to incorporate environmental stewardship objectives for land management such as invasive species control and wildlife management through use of food or pollinator plots will be implemented as appropriate.

5.3 HIGH DENSITY RECREATION

The USACE is the largest federal provider of outdoor recreation, managing 12 million acres of lands and waters across the county. The recreation mission and overarching strategy of the USACE is to manage and conserve natural resources while continuing to deliver a quality recreation program that is resilient considering today's fiscal realities and be responsive to the changing needs of the American people.

Wallisville Lake has 64 acres classified as High Density Recreation. These lands were developed for intensive recreational activities for the visiting public including day use and campgrounds. National USACE policy set forth in ER and EP 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 include 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 theme parks or ride-type attractions, sports or concert stadiums, and stand-alone facilities such as restaurants, bars, motels, hotels, and golf courses.

The High Density Recreation areas at Wallisville Lake include 3 park areas that are managed either by the USACE or others under a lease agreement. The USACE reviews requests and ensures compliance with applicable laws and regulations for proposed activities in all USACE-operated HDR areas. There are no plans for development or expansion of the HDR areas at Wallisville Lake. The USACE works with partners to ensure that recreation areas are managed and operated in accordance with the objectives prescribed in Chapter 3.

The following is a description of the parks operated by USACE and others on USACE lands at Wallisville Lake, some of which are modestly developed, while others have only basic facilities and limited development. Classifications for the various parks at Wallisville Lake include overnight camping and day use. Maps showing existing parks and facilities can be found in Appendix A.

5.3.1 USACE Managed Parks

Facilities provided are sufficient in Wallisville parks to meet current demand. The USACE intends to continue to operate the park areas by maintaining and improving existing facilities but has no long-range plans to add additional parks or campsites. In

response to trends documented in the TORP, the USACE will endeavor to improve access to trails in or adjacent to some park areas as funding permits. The USACE encourages partnerships with agencies who lease and manage parks to respond to increasing demands and build on the current quality of USACE parks for present and future visitors.

Day Use Parks

The management plan for the USACE day use parks is to continue to operate them as day use areas by maintaining and improving existing facilities. Emphasis will be placed on improvements such as upgrading aging water and electrical infrastructure, repairing or replacing outdated restrooms, maintaining roads, parking areas, vehicle delineation, and maintaining site amenities such as tables, fire rings, lantern posts, and cookers. Trails within parks will be considered in cooperation with other agency partners for development and operation.

- *J.J. Mayes Wildlife Trace* – Consists of a four-mile all weather road atop the levee along the west bank of the Trinity River. Opened in 2003, the Trace gives visitors a close-up view of the marshes and river-bank habitats and many of the wildlife species living within the boundaries of the Wallisville Project. A picnic area under a forest of stately old live oaks, planted by the Mayes family, near the entrance welcomes visitors to the Trace. There are no plans for expansion or development of the J.J. Mayes Wildlife Trace.

Photo 5-1 Picnic sites at the J.J. Mayes Wildlife Trace (Source: USACE)

5.3.2 Leased Park Areas

Overnight Camping Parks

- *Cedar Hill Park* – Opened in 2000 and is managed by Chambers County under a lease agreement. On the northeast bank of Lake Charlotte, Cedar Hill Park is named for the large cedar trees throughout the park. Cedar Hill Park is located off Lake Charlotte Road, on the northeast perimeter of the project. Turn left (west) onto Lake Charlotte Road. The park entrance is on the left just across from the Sherman family's cemetery. A pavilion with tables, grills, and trash cans can accommodate large groups. Small groups may also use the individual covered and/or shaded picnic tables. Vault toilets are available for visitor convenience. Almost three miles of graveled trails with boardwalks out into the cypress swamp along the bank of Lake Charlotte are excellent for birding and small animal wildlife viewing. Bald eagles are known to fish from Lake Charlotte. The cypress swamps along the banks of Lake Charlotte are also excellent for paddling canoes and kayaks. A hand-launch area is located at the lakeshore side of the loop road in the park. A limited amount of primitive style camping is allowed at Cedar Hill Park. There are no plans for expansion or development of Cedar Hill Park.

Photo 5-2 Cedar Hill Park facilities (Source: USACE)

Day Use Parks

- *Hugo Point Park* – Opened in 2003 and is also managed by Chambers County under a lease agreement. Hugo Point is located off Gou Hole Road, on the southwest perimeter of the project. Day use facilities include a large pavilion, individual picnic tables, restrooms, playground, a two-lane boat ramp, and parking for vehicles with or without trailers. Hugo Point is a day use park only; no overnight camping is allowed. There are no plans for expansion or development of the Hugo Point Park.

Photo 5-3 Hugo Point Park boat launch (Source: USACE)

5.3.3 Trails

There are a few trails on USACE lands, all of which are managed by the USACE. All trails are open year round and offer a variety of activities and experiences.

- Within the J.J. Mayes Wildlife Trace, the Sawmill Trail begins at the parking area just beyond the “four way” intersection. This trail is non-contiguous at this time. This trail meanders along the riverbank down to the lock. About half-way down the trail runs into the handicap accessible loop. The loop can be accessed from

the main Trace at two parking areas. The loop also has boardwalks, benches, and overlooks on the west bank of the Trinity. The loop is just under a mile in length. At the lower end of the Trace, a pavilion, restrooms, (vault toilets) and parking area are available.

- Within the Cedar Hill Park, almost three miles of graveled trails with boardwalks out into the cypress swamp along the bank of Lake Charlotte are excellent for birding and small animal wildlife viewing.
- In Hugo Point Park, a handicap accessible trail leads out into the marsh with an accessible observation tower.
- There are no plans for expansion or development of the trails at Wallisville Lake.

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 0 acres at Wallisville Lake under this classification.

5.5 ENVIRONMENTALLY SENSITIVE AREAS (ESA)

ESAs are areas where scientific, ecological, cultural or aesthetic features have been identified to be protected or preserved. Designation of these lands is not limited to just lands that are otherwise protected by laws such as the Endangered Species Act, the National Historic Preservation Act or applicable state statues. These areas must be managed to ensure the features are not adversely impacted. Typically, limited or no development of public use is allowed on these lands. No agricultural or grazing uses are permitted on these lands unless necessary for a specific resource management benefit, such as prairie restoration and management.

These areas are typically distinct parcels located within another, and perhaps larger, land classification area, however at Wallisville the scope of ESA's is very large compared to a typical project. There are 14,679 acres at Wallisville Lake under this classification. These acres are managed by the USACE for the protection of unique habitat, protected wildlife, aesthetic quality, or cultural resources. Management of ESA areas will be designed to protect and improve the resources that qualify these areas for ESA classification. ESA areas will allow for development of natural surface pedestrian trails unless the areas are critically important as habitat for sensitive species. Hunting is also allowed on these areas, taking into consideration public safety and resource protection. Management actions that may be implemented include planting suitable native vegetation, the use of prescribed burns to maintain desired vegetative cover, forbidding tillage of the ground surface. Specific management measures may include but are not limited to the following:

- Cultural Resource Sites: Known sites will be protected from vandalism and/or erosion. Additional reconnaissance surveys will be conducted as needed to

determine the extent of cultural resource sites. Tribal coordination will continue to insure proper management and/or protection of known sites.

- Sites supporting Species of Conservation Concern: The site characteristics that cause these areas to be favored by individual species will be protected and improved. Perch and/or nesting sites for the southern bald eagle are examples of site characteristics that need protection.

Photo 5-4 Marsh wetlands at Wallisville Lake (Source: USACE)

5.6 MULTIPLE RESOURCE MANAGEMENT LANDS

Multiple Resource Management Lands (MRML) are organized into four sub-classifications. These sub-classifications are: Low Density Recreation, Wildlife Management, Vegetative Management, and Future/Inactive Recreation Areas. The following is a description of each sub-classification's resource objectives, acreages, and description of use.

5.6.1 MRML - Low Density Recreation

These lands have minimal development or infrastructure that support passive public use such as hiking, nature photography, bank fishing, and hunting. 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. Prevention of unauthorized use on this land, such as trespassing or encroachment, is an important management and stewardship objective for all USACE lands but is especially important for lands in close proximity to private development. Future management of these lands calls for maintaining a healthy, ecologically-adapted vegetative cover to reduce erosion and improve aesthetics. Maintenance of an identifiable property boundary is also a high priority in these areas. There are 121 acres of MRML – Low Density Recreation at Wallisville Lake.

5.6.2 MRML - Wildlife Management

There are 787 acres of MRML – Wildlife Management at Wallisville Lake. These lands are designated for the stewardship of fish and wildlife resources and are managed by the USACE. In general, this land classification calls for managing the habitat to support native, ecologically adapted vegetation, which in turn supports native game and non-game wildlife species, with special attention given to federal and state-listed threatened and endangered species (see Table 2-4 in Chapter 2.). Future management practices by the USACE may include such activities as placement of nesting structures, construction of brush piles, prescribed fire, fencing, removal of invasive species, and planting of specific food-producing plants that may be necessary to support wildlife needs.

There are federally-listed threatened or endangered species that could and do utilize habitat within the Wallisville Lake area. Therefore, any work conducted on this project will be in accordance with the Endangered Species Act and will be appropriately coordinated with the USFWS. The species of focus within this area of consideration are animals listed as a threatened or endangered species under the Endangered Species Act. These species (see Table 2-4 in Chapter 2) will continue to receive attention to ensure they are managed in accordance with their habitat needs.

The broad objective of fish and wildlife management is to conserve, maintain, and improve the fish and wildlife habitat to produce the greatest dividend for the benefit of the public. Implementation of a fish and wildlife management plan is the first step toward achieving the goals of the Fish and Wildlife Coordination Act (Public Law 85-624). The TPWD and the USFWS share responsibility with the USACE for managing fish and wildlife, primarily through enforcement of laws and regulations and establishing seasons and bag limits for game species. Future management plans for wildlife areas include continued cooperation with partners and managing and improving wildlife management areas under this land classification.

The USACE also manages non-game wildlife, with some non-game programs, such as songbird nest box construction and installation of bat boxes, performed on an

intermittent basis. The plan is to continue these initiatives in order to sustain populations of non-game species.

Photo 5-5 Wetland area at Wallisville Lake (source: USACE)

5.6.3 MRML - Vegetative Management

These are lands designated for stewardship of forest, prairie, and other native vegetative cover. Passive recreation activities, such as hiking on natural surface trails, wildlife photography, and hunting may be allowed in these areas. There are 0 acres of Vegetative Management at Wallisville Lake.

5.6.4 Future or Inactive Recreation Areas

These areas either have site characteristics compatible with potential future development or are currently closed recreation areas. Until there is an opportunity to develop or reopen these areas, they will be managed for multiple resources. There are 6 acres of Future or Inactive Recreation at Wallisville Lake.

5.7 WATER SURFACE

Zoning of the water surface is intended to ensure the security of key operations infrastructure, promote public safety, and protect habitat. In accordance with national USACE policy set forth in EP 1130-2-550, the water surface of the lake may be classified using the following classifications:

- Restricted
- Designated No-Wake
- Fish and Wildlife Sanctuary
- Open Recreation

At Wallisville Lake there are 6,849 acres (measured using GIS dataset) of surface water. Buoys are managed by the USACE. These buoys help mark hazards, keep-out for boats, and no-wake areas. The following water surface classifications are designated at Wallisville Lake.

5.7.1 Restricted

Restricted water surface includes those areas where recreational boating is prohibited or restricted for project operations and safety and security purposes. The total acreage of Restricted water surface is approximately 4 acres. The Restricted water surface at Wallisville Lake includes areas near the dam. Future management calls for one or more of the following management measures: placement of buoys, placement of signs near boat ramps, and describing the areas on maps available to the public.

5.7.2 Designated No-Wake

Designated No-Wake areas are intended to protect environmentally sensitive shorelines and improve visitor safety near key recreation water access areas such as boat ramps. There are 2 boat ramp areas at Wallisville Lake where no-wake restrictions are in place for public safety and protection of property. Designated No-Wake areas at Wallisville Lake include approximately 1,498 acres. Large areas of open water including but not limited to Lake Charlotte and Lake Miller are included in this designation for the projection of the sensitive habitats and shorelines from the erosion caused by wave action. Future management of these areas' rests with the USACE at Wallisville Lake. Specific measures to be taken include placement of buoys, placement of signs near boat ramps, and describing the areas on maps available to the public.

5.7.3 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. There are 384 acres of Fish and Wildlife Sanctuary water surface at Wallisville Lake.

Photo 5-6 Fish and Wildlife Sanctuary water surface for rookery (Source: USACE)

5.7.4 Open Recreation

Open Recreation includes all water surface areas available for year round or seasonal water-based recreational use. Approximately 4,963 acres of Wallisville Lake water surface are designated as Open Recreation. Navigation hazards such as standing dead timber, natural blind spots in the marsh areas, shallow water, and floating debris may be present at any time and location and hazards are not typically marked with warning buoys, and it is incumbent upon boat operators to exercise caution. Boating on the project is in accordance with USACE regulations and water safety laws of Texas. 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. The USACE always encourages all boaters and swimmers to wear their lifejackets and to learn to swim well.

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, pipelines, and utility lines on project lands, the USACE determined that utility corridors would be designated at Wallisville Lake. USACE policy EP 1130-2-550, Chapter 17 states that project lands will generally be available only for roads that are considered regional arteries or freeways. Changes to existing roadways, such as those described in regional and county mobility plans that call for widening of some existing roadways across USACE lands, will be addressed on a case-by-case basis.

The following four utility corridors have been designated across USACE land at Wallisville Lake with each corridor incorporating and/or running parallel to an existing easement. The corridors are numbered from 1 to 4 starting with the northern most corridor and are shown on the maps provided in Appendix A. Each corridor contains multiple pipelines. Future use of these corridors, where the corridor is limited to an existing easement, would in most cases require prior approval of those entities that have legal rights to the easement. Some existing easements at Wallisville Lake are designated as restricted and 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 these restricted existing corridor easements will generally not be permitted.

- Corridor 1 (UC-01): Corridor UC-01 is located entirely in Liberty County and crosses the project in a general east-west direction. Average dimensions of the corridor are approximately 4 miles in length and 870 feet in width. Multiple pipelines cross the Wallisville Lake fee boundary within Corridor UC-01 including mostly highly volatile liquids as well as natural/other gas, refined liquid products, and crude oil.
- Corridor 2 (UC-02): Corridor UC-02 is located entirely in Chambers County and crosses the project in a general east-west direction. Average dimensions of the corridor are approximately 5 miles in length and 389 feet in width. Multiple pipelines cross the Wallisville Lake fee boundary within Corridor UC-02 including highly volatile liquids.
- Corridor 3 (UC-03): Corridor UC-03 is located entirely in Chambers County and crosses the project in a general east-west direction. Average dimensions of the corridor are approximately 3 miles in length and 349 feet in width. Multiple pipelines cross the Wallisville Lake fee boundary within Corridor UC-03 including mostly highly volatile liquids as well as natural/other gas.
- Corridor 4 (UC-04): Corridor UC-04 is located entirely in Chambers County and crosses the project in a general east-west direction. Average dimensions of the

corridor are approximately 4 miles in length and 383 feet in width. Multiple pipelines cross the Wallisville Lake fee boundary within Corridor UC-04 including highly volatile liquids, natural/other gas, and crude oil.

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

- 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.
- In accordance with USACE policy Chapter 17 of EP 1130-2-550, Non-Recreation Outgrant Policy, the USACE will prohibit 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 the USACE.
- Natural resources damaged or destroyed within corridors shall be mitigated per USACE requirements.
- Current and future identified cultural resources will be protected.

6.2 BALD CYPRESS REPORT

Changing hydro patterns within the Wallisville Lake Project, near the mouth of the Trinity River in Chambers and Liberty Counties, Texas, have the potential to alter bald cypress forest resiliency. Increasing water levels support saltwater barrier operations while maintaining navigation and recreational access. However, potential impacts of increased water levels on the bald cypress forests are of particular concern because these ecosystems provide unique ecological value and wildlife habitat. The maintenance, succession, and resiliency of bald cypress under various flooding, salinity, and inundation regimes remain poorly defined and pose challenges to resource managers. The USACE Engineering Research and Development Center (ERDC) report reviews available literature pertaining to salinity and inundation impacts to bald cypress forests. Specific emphasis is placed on the ecological effects of water quality and quantity on the health and persistence of bald cypress. The information gathered in the report is intended to supplement material in the Wallisville Lake Project Water Control Manual to improve management of bald cypress forest conditions and avoid negative ecological impacts. Additionally, this report provides management considerations designed to maintain or enhance bald cypress forests within the Wallisville Lake Project.

6.3 GRAZING

The 1996 Wallisville Lake Master Plan identified twenty-two contracts for cattle grazing totaling approximately 10,865 acres at the project. In that plan, a controlled grazing program was proposed as a tool to manage vegetation communities by suppressing the encroachment of brush within upland grassland areas. Cattle grazing on the lands surrounding the project remains a dominant land use activity particularly on the lands east of the project boundary. A determination by the Galveston District to no longer allow grazing as a land management tool was made and as a result grazing at the Wallisville Lake Project is no longer occurring as of 31 December 2018. There are no plans to allowing grazing in the future.

6.4 WATER CONTROL PLAN FOR SALINITY CONTROL

Wallisville project is operated with the main purpose of salinity control. The main function of the project is to protect the fresh water supply for City of Houston and Lake Anahuac withdrawals on the lower Trinity River from salinity intrusion. During low flow periods (flow approximately less than 2000cfs) a salinity wedge moves up the river from Trinity Bay and threatens the fresh water supply. Salinity control is achieved by operation of Wallisville project. Releases from Livingston Dam (Operated by Trinity River Authority) aid in prevention of upstream movement of the saltwater wedge.

The East, South and West Non-Overflow Dams will function with the Controlled Spillway and the Navigation Lock to form a closure to prevent salinity intrusion. The closure will prevent movement of the saltwater wedge and prevent tides up to +4 feet from back flowing into the project.

Upstream of Interstate 10 the salinity barrier is formed along the west bank of the Trinity River by the natural high bank that varies from +4.0 feet to +6.0 feet. Control structures A, B, and C will prevent saline water from backing up from the Old River and from the Lost River into Trinity River. The controlled spillway and the lock chamber provide the primary outlet capacity from the salinity closure.

Management of the water level is described in detail in the Water Control Manual for the project. Changes to water level management for environmental stewardship of project lands and management will require further study by USACE.

7 PUBLIC AND AGENCY COORDINATION

7.1 PUBLIC AND AGENCY COORDINATION

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 Wallisville 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 Wallisville 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 Wallisville Lake Master Plan.

The USACE began planning to revise the Wallisville Lake Master Plan in 2016. The objectives for the Master Plan revision were to (1) update land classifications to reflect changes in USACE land management policies since 1996 and (2) update 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.

7.2 INITIAL STAKEHOLDER INPUT 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. The public scoping meeting was held on 12 March 2019 from 6:00-7:30 PM at the Whites Park Community Center, 222 White Park Rd, Wallisville, TX 77597. The Galveston District placed advertisements on the USACE webpage, social media, and print publications two weeks prior to the public scoping meeting.

The meeting began with a brief presentation at 6:00 PM followed by an open house for the public to view the current project maps, ask questions and provide comments about the project and future land use classification. 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 for a presentation by the USACE for 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

The USACE received 68 comments from 6 different entities including government agencies (3) and non-governmental organizations (3). Issues that were addressed in the comments included invasive species management, climate change, water management, land and water surface classification, recreational use, wildlife management, tourism, hunting and fishing, and hydrology. Wallisville Lake is a federally owned and managed public property, and it is the USACE's goal to be a good neighbor, as well as steward for public interest as it concerns Wallisville Lake. As such, the USACE is bound to the equal enforcement of policies and fees for this publicly held national asset. Table 7-1 provides a summary list of the comments received during the initial scoping comment period for the Master Plan, followed by the USACE response.

Table 7-1 Public Comments from March 12, 2019 Scoping Meeting

Comment	Response
COMMENTS FROM HOUSTON SIERRA CLUB	
Non-native invasive plant and animal species (NNIPAS) must be controlled to reduce negative impacts that they have on natural ecosystems, native plants and animals, and human structures. The Corps should put together a list of NNIPAS, the problems they create, and how they will be controlled for the draft MP and solicit input from the public about this issue. I have found it of particularly concern that obvious NNIPAS, like Chinese Tallow, are very evident in high use places where the public has easy access. As a citizen and user of the Wallisville Lake Area (WLA) the appearance is that the Corps is not interested in controlling NNIPAS because even in easy access, high public use areas, the NNIPAS are evident. Aquatic NNIPAS like Hydrilla, Water Hyacinth, and Giant Salvinia must be controlled to reduce their impacts on native aquatic plants, native fish and wildlife	Preservation of natural areas is of great importance to the USACE, as well as other natural resource agencies. Invasive species is an ongoing concern throughout the U.S., including Wallisville Lake Project. The USACE will continue to pursue a number of programs and best management practices to help control the establishment or spread of these species, including collaborating with private and public agencies for invasive species control at Wallisville Lake Project. Chapter 2 provides a brief summary of invasive species being currently monitored at Wallisville Lake, and the USACE will continue to monitor for other exotic species.

Comment	Response
species, and native ecosystems. Whatever can be done to combat Zebra Mussels should be done now before this problem animal arrives. Feral hogs and nutria must be controlled. It is way past time for the Corps to cooperate with other agencies, counties, cities, towns, and citizens to come up with a regional plan to reduce the numbers significantly of feral hogs and nutria. This can be done but requires patience and dedication. Control of NNIPAS should be a pillar of the MP.	
Climate change, and its effects, like more frequent and intense rainfalls, sea level rise, and more frequent and intense storms must be addressed. The Trinity River Delta and the WLA will be significantly affected by climate change. There must be an acknowledgment of this and how the WLA will be managed for this in the MP. By managed I do not mean by the construction of barriers. The best thing to do is to ensure that ecosystems are healthy and the natural processes they perform function so that they can adapt to climate change. This includes buffers to allow marshes and other ecosystems to migrate inland as sea level rises. The Corps needs a plan. There will come a time when the Wallisville Dam may need to be abandoned. The Corps needs to think at least 200 years in the future and have points in time where it will implement certain actions when certain climate changes or magnitude of changes occur. This is adaptive management and includes strategic withdrawal. All of this must be covered in the MP. “Management for the long-term” is a key philosophy along with “work with Nature, not against”, and “keep people out of harm’s way”.	As a general management objective, USACE is committed to the management of project lands to advance broad national climate change mitigation goals. The USACE Sustainability Policy and Strategic Plan establishes USACE role in compliance with applicable environmental and energy statues, regulation and Executive Orders. Management of project lands for broad national climate change mitigation goals aligns with the master plans management objectives. The master plan is a document structured to project management on a 20-25 year planning horizon, it will also be reviewed and updated to stay current with project goals and objectives as needed.
Environmentally sensitive areas are important. What is equally important is the level of protection from human action and activities that these areas receive. It is very important that there be adequate personnel to conduct patrols to ensure that illegal uses,	Concur. Patrols and enforcement are important in providing protection for environmentally sensitive areas and are a crucial piece of the management strategy of all federal lands. Patrols and enforcement at Wallisville Lake

Comment	Response
actions, trespassing, and damaging activities are limited, minimized, and avoided. Some of this can be done with public education but we need strong enforcement and compliance rules and the personnel to implement these. This includes interactions with landowners and ensuring that they do not trespass or attempt to use federal public land to enhance themselves economically or personally. Development has closed in on the western part of the WLA. The Corps must plan for more intense pressures from development and its environmental impacts on the WLA. Boundary marking and enforcement is very important for the MP to address.	Project are conducted but are limited by the number of personnel authorized to enforce and patrol USACE lands which is restricted by the amount of budget the project receives to operate.
Water instream flows and inflows into Galveston Bay are paramount to the health of the WLA. In the future, the entire system will change. The City of Houston, along with others, is building the Luce Bayou Diversion Canal which will take at least 400 million gallons a day of Trinity River water from flows released from Lake Livingston (where the City of Houston owns most of the water rights) to Lake Houston. This means that freshwater that ordinarily would go down the Trinity River and into Galveston Bay will now go to Lake Houston and be distributed to northeastern, central, and western Harris County and Montgomery County and will flow down the San Jacinto River, and perhaps other rivers to the west, to enter Galveston Bay. This will cause a reduction of not only water but sediment, organic matter, and nutrients that fertilize and maintain the Trinity River, its floodplain, the WLA, the Trinity River Delta, and the Trinity Bay portion of Galveston Bay. Additional erosion should be expected from this water regime change and from sea level rise. This will have a tremendous impact on the WLA and the Corps must determine how it will protect the WLA and manage it so that impacts are as small as possible. There have been proposals to dredge the ancient Trinity River Delta and place the dredge material on	Concur. Water management is critical to thriving habitats of not only the Wallisville Lake Project but also the region. The master plan document is primarily a land use and outdoor recreation strategic plan and does not address water management for either storage or water conservation. Discussion regarding water management is addressed in the Water Control Manual. The Luce Bayou Diversion Canal will impact the flow of water down the Trinity and the water management of the Wallisville Lake Project, potentially requiring the USACE to start low flow operations sooner than current operations.

Comment	Response
Galveston Island or Bolivar Peninsula beaches. There is continuing subsidence of the Trinity River Delta as sediments compress the ground or bay. The Corps must determine how such processes and actions may affect the WLA and deal with them in the MP. The public expects no less from the Corps.	
All lands in the MP should be given a "Mitigation" label so that mitigation can occur on them, either directly or indirectly, due to environmental impacts they will receive from human sources.	Non-concur. The land classification Mitigation is used only for lands allocated for mitigation for the purpose of offsetting losses associated with the development of the project. 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. Mitigation is one of the four possible categories of land allocation, however none of the project lands acquired at Wallisville Lake Project were congressionally authorized for mitigation thus no lands can be classified as mitigation at Wallisville Lake Project.
Any recreation allowed in the MP should be low impact and compatible with the protection of ecosystems and management (light-handed management) of natural ecological systems and processes. I do not support any use of motorized vehicles, except on existing roads. No public recreational off-road vehicle use should be allowed. I do not support the use of mountain bikes on hiking or walking trails. In general, the speed and experiences are different for these two trail uses and there are matters of safety, compatibility, and user conflict that do not need to be introduced by the MP into the WLA. Any terrestrial trails must be compatible with the ecosystems they exist in. Since the WLA consists primarily of riparian and aquatic ecosystems, terrestrial trails, in most cases, are not appropriate and should not be built. Operation and	Protection of ecosystems is a goal of the USACE at Wallisville Lake. The recreational use activities at Wallisville Lake are varied, and the USACE is dedicated to providing diverse user experiences for each user type as appropriate without negatively impacting the ecosystem. The project is primarily water and marshes, so areas that are conducive to trails development are very limited and not widespread. How the project is accessed for recreational activities by water or land is dependent on the type of user activity. Maintaining certain areas for no wake zones as well as providing areas for other types of boating activities will all be considered.

Comment	Response
maintenance of terrestrial trails is difficult in such ecosystems without permanent soil erosion, compaction, rutting, puddling, sedimentation, and other problems. Additional rainfall due to climate change will make the use of trails even more difficult. Appropriate access for canoes and kayaks should be provided. Trolling motor use and "No wake zones" should be widespread to reduce soil erosion, noise pollution, and water pollution impacts.	
I do not support, in general, commercial concessions and quasi-public development of any of the WLA in the MP. Making money should not be the reason for any activity on public lands in the WLA. Low Density Recreation should be emphasized because it is cheaper to build, maintain, and can be lower impact and more compatible with other management of the WLA.	The USACE currently does not have any plans to provide any commercial concessions and quasi-public developments at Wallisville Lake. However, policy does allow the USACE to partner with other governmental entities including cities, counties, and other state and federal agencies to develop and manage recreational opportunities. At this time, no partners have been identified or interest has been proposed beyond those that currently exist.
I agree that certain areas should be designated as Fish and Wildlife Sanctuary with restrictions so that fish and wildlife species have places where they can rest, migrate, feed, nest, and spawn. One obvious place, which also is an Environmentally Sensitive Area, is the bird rookery on the southeast side of Interstate 10. Others would be Cypress swamps on or near Lakes Charlotte, Mud, Miller, and Mac and bottomland hardwood forested wetlands in the WLA. Bald Eagle areas, wading bird areas, and Wood Stork areas are all places that should be protected in the MP. Restoration and maintenance of native prairies is also an important element that should be addressed in the MP.	Designation of unique areas of the water surface as Fish and Wildlife Sanctuary can be effective in protecting wildlife and habitat. Currently, the USACE does not have any designated sanctuary areas but would consider using them after coordination with TPWD and USFWS so specific management plans and seasonal restrictions can be properly developed if applicable.
I do not support logging forests in the guise of "Vegetation Management", "Wildlife Management", or any other land classification. It is one thing to cut down	Concur. The USACE has no plans to conduct any logging operations at Wallisville Lake now or in the future. There are not enough forest resources

Comment	Response
Chinese Tallow or other NNIPAS. But logging pine or hardwood trees cannot be justified in the WLA. There is no need for it. I urge the Corps not to allow logging of uplands, slopes, and bottomlands in the MP.	at the project to conduct any type of substantial logging operations.
I do not have any problems with fishing and hunting in the MP in the WLA as long as they are conducted according to state law. I do not support any American Alligator hunting on the WLA. Let the WLA be a refuge for these living ancients.	All hunting activities at Wallisville Lake are in compliance with Texas state law and enforced by TPWD. The project does host a Warrior Hunt for alligators that is limited to only Wounded Warriors.
I agree that utility corridors should be used as much as possible to reduce fragmentation of the WLA. The Corps should also discuss mineral rights and the Lost Lake Oil Field and how management of that area will fit in with the management of the rest of the WLA in the MP.	Establishing utility corridors for USACE projects will limit the impact of such activities and aid in reducing impacts to project fee lands. A discussion of both Utility Corridors and the Lost Lake Oil Field is presented in Chapter 6, Special Topics.
I support cultural resources protection and interpretation in the MP.	Concur. A summary discussion of the cultural resources and history of the Wallisville Lake Project Area is included in Chapter 2.
COMMENTS FROM CHAMBERS COUNTY	
The biodiversity of the area is suffering from the unchecked growth of invasive species. USACE needs desperately to employ biologist to prescribe a program to stem the tide of these invasive species with prescribed burns, grazing or any other measures necessary.	Invasive species management is very difficult, but it is an on-going land management activity at Wallisville Lake and across the USACE as funding allows. Working to remove invasive species is progressing however with limited staffing and funds its progress is limited and treatments and activities are prioritized.
At one point the presentation mentioned RV sites either at Cedar Hill or somewhere on the Project. Due to a period of major construction in both West Chambers County and the Golden Triangle to the East, there are numerous RV parks that could service the public. These RV Parks will desperately need tourism dollars as that construction phase in the local petrochemical industry now begins to phase down. Dollars to build those sites within the Project Area could be used to add	Currently there are no RV camping sites at Wallisville Lake project or plans to add RV camping sites. The only established camping sites are primitive camping sites and are available at Cedar Hill Park which is managed by Chambers County. The original plans for Hugo Park included a much larger footprint than the current park and the USACE is open to the expansion of Hugo Park by Chambers County to add RV sites.

Comment	Response
other amenities and allow the private sector to reap the benefits of tourism.	
Attention, specifically biologist attention, needs to be given to the area's alligator population. Nest counts of the past several years have been low for the vast area that exits. This would seem to point to a larger, older cannibalistic population and not that many of the smaller breeding females that are necessary to keep this apex predator's existence in the food chain healthy. Again, biologist could manage the hunts requiring that hunters take the largest of the population and allow the smaller breeding stock to flourish. An unhealthy alligator population will ultimately lead to an increase in the nutria population. That increase in nutrias could cause disastrous erosion throughout the Project Area.	The USACE has no intent to expand the current alligator hunt at Wallisville Lake beyond the established Warrior Hunt. The hunt addresses the largest alligators in the population and is run by an NGO and supported by both the USACE and TPWD.
Are there plans to address the silt load coming down Mac (sic) Bayou into Lake Charlotte?	The master plan will not address silt loading, but the Water Control Manual currently under development by Galveston District will study issues related to water level management.
COMMENTS FROM TEXAS PARKS AND WILDLIFE DEPARTMENT	
Recommendation: TPWD recommends referring to the TCAP, RTEST, and TXNDD for information regarding sensitive resources potentially occurring in the area, priority habitats, and issues affecting sensitive resources within the Gulf Coast Prairies and Marshes Ecoregion.	Concur.
Recommendation: In addition to addressing sensitive resources, TPWD recommends the Master Plan include natural resource inventories and monitoring goals to identify habitat changes that may occur over the life of the project and trigger adaptive management, when needed.	Concur. The USACE conducted a WHAP (Wildlife Habitat Appraisal Procedure) survey in August 2017 to evaluate general habitat quality and the results are included in the appendices of the master plan document. WHAP is a model developed by TPWD. Conducting additional studies is dependent on availability of funds and project needs.
Recommendation: TPWD recommends utilizing EMST data during the revision of the Master Plan. Such data may be useful in	Concur.

Comment	Response
examining project lands and identifying appropriate land use classifications. In addition to datasets managed by TPWD, there are other publicly available sources of quality natural resource occurrence data which may be useful in developing the Master Plan revision. The iNaturalist application, available online, is a global citizen science project that contains "research-grade" data. The iNaturalist application can be queried based on species or location. Another publicly available data source which is specific to avifauna is eBird, also a global citizen science project with data available online.	
Recommendation: TPWD recommends accessing the iNaturalist and eBird applications to supplement the occurrence data provided within the TXNDD.	Concur.
Recommendation: To contribute to pollinator conservation efforts, TPWD encourages USACE to incorporate pollinator conservation into the Master Plan to promote and sustain the availability of floral resources throughout the growing season. Species appropriate for the Project Area can be found by accessing the Lady Bird Johnson Wildflower Center, working with TPWD biologists to develop an appropriate list of species, or utilizing resources found at the Xerces Society's Guidelines webpage.	Concur. The USACE natural resource management objectives highlight the need to provide special emphasis for actions to promote butterfly and/or pollinator habitat.
Recommendation: To aid in the scientific knowledge of species' status and current range, TPWD encourages reporting encounters of SGCN to the TXNDD according to the data submittal instructions found at the TPWD Texas Natural Diversity Database: Submit Data webpage. If such data are available from past surveys conducted by USACE, TPWD would appreciate those data being submitted for inclusion in the TXNDD.	Concur.
COMMENTS FROM HOUSTON AUDUBON	
We recognize the unique nature of the Wallisville area. It is unlike any other USACE project in Texas and possibly the entire country. Our top priority is to maintain the	Concur. The USACE recognizes the uniqueness of the Wallisville Lake Project and its importance to a wide range of wildlife species. Resource

Comment	Response
area that is beneficial to the many birds and other wildlife that thrive there. The list of birds seen regularly and during migration is long and impressive. Everything must be done to protect that. There are several rookeries in the Project Area that should be protected.	goals include the protection and management of natural resources through sustainable environmental stewardship programs.
We would like to see any recreation enhancements be only done with passive, nature based recreation in mind. This does not seem to be a place for ball fields.	Concur. Future recreation must comply with the USACE Recreation Development Policy for Outgranted Corps Land. The policy states "The primary rationale for any future recreation development must be dependent on the project's natural and other resources."
Facilities at Cedar Hill Park should be maintained with low impact camping in mind as it is. Electric hook-ups, RV spaces, paved roads and lighting do not seem appropriate at this location.	Concur. Cedar Hill Park is currently a primitive recreation area with no plans to make upgrades to accommodate RV camping.
The beach at Cedar Hill Park is very conducive to human powered watercraft launching and we would not like to see any type of launch that encourages more power boat activity in the Lake Charlotte area.	Concur. No improvements are planned to allow for power boat launching to occur at Lake Charlotte. The lake is very shallow and a designated no-wake area in the revised master plan so power boats are not encouraged in that area.
Invasive species have been a concern in recent years. Feral hogs, water hyacinth and Giant Salvinia need to be controlled.	Invasive species management is very difficult, but it is an ongoing land management activity at Wallisville Lake and across the USACE as funding allows. Working to remove invasive species is progressing however with limited staffing and funds its progress is limited and treatments and activities are prioritized.
Maintaining some areas as no-wake zones or human powered craft zones could protect certain areas from degradation and undue sound pollution. The area into and around Mud Lake and the south end of Lake Charlotte seems appropriate for that kind of zone. Some of the lakes are too shallow for power craft and should be so designated for safety.	Concur. The revised master plan will review the water surface classifications for the entire project and assign no-wake areas where use and management is appropriate to do so; Lake Charlotte and Mud lake are candidates for no-wake designation.

Comment	Response
Inviting USFWS and TPWD enforcement of fishing and hunting regulations is a good idea. There are areas where people feed fish parts to alligators which can cause them to become a threat to humans. Overfishing of gar has also been observed.	Noted. The USACE will continue to manage hunting and fishing programs through TPWD regulations.
Official maps used by the USACE need to show a more accurate distinction between the water ways, lakes and land. Only a few lakes are shown in blue, implying only those lakes are accessible. There are other lakes and waterways that, while dependent on water level, are usually accessible by human powered watercraft.	Noted. Funds are not available to create a detailed survey map of the project but the USACE will use available data sources and improve on the accuracy of mapping for the Wallisville Lake Project.
COMMENTS FROM U.S. FISH AND WILDLIFE SERVICE	
Please take measures to assure that the new plan is up to date with current Threatened and Endangered Species and other federally protected species. As you know, Bald Eagle use on your project is common and appears to be increasing. A program to assure adequate protection of eagle nests should be part of the planning process. In addition, the Eastern Black Rail has been proposed to be listed as threatened. There are potential implications to your plan with emphasis on grazing, haying and fire programs on Federal Land. Although the proposed rule is not final, it would warrant close consideration for this project as it is likely that Eastern Black Rails use habitats within the Project. You may wish to consider a survey effort to document locations with Black Rails.	Noted. The USACE will provide the most current information regarding Threatened and Endangered Species in the revised master plan document. No grazing leases are active at the project since 31 December 2018, and there are no plans to allow further grazing in the future.
A new inventory of wading bird rookery areas should be developed as the colonial bird rookeries are important. Please coordinate with the Ecological Services Field Office to assure that the information that USFWS has on these areas is captured in your plan.	Noted. A new inventory is dependent on funding.
In high use areas, treatment for fire ants should be considered. This species seems to have a stronghold in some areas and a semi-annual treatment for these ants with a growth hormone regulator would improve some areas of high concentration of ants. These ants'	Noted. The amount of invasive species management at Wallisville is limited by funding resources. Fire ants are known to occur but have not been treated for at Wallisville Lake.

Comment	Response
impact native insect fauna and are a problem for many species in addition to direct human conflicts. The cost of these treatments may be offset with Chambers County who currently leases these areas as parklands.	
Feral pig control should be increased for the Project. Many of the delicate resources in the Project may be impacted by feral pigs. Increased rooting activity may change plant species composition and impact park areas. Abundant feral pig populations also pose a safety issue for motorist on the Project and elsewhere.	Noted. The amount of invasive species management at Wallisville is limited by funding resources.
These invasive plants impact freshwater systems along the lower Trinity River and into freshwater systems used for drinking water in Chambers County and ultimately into Anahuac NWR. It would be a wonderful partnership to work cooperatively in an effort to seek funding to release weevil or other natural control measures to reduce water hyacinth in wetlands on the Project. These efforts would improve conditions on this Project and ultimately affect freshwater waterways downstream. I am confident that Trinity Bay Conservation District, and hopefully that the Chambers and Liberty County Navigation District would also be interested in a partnership effort to control of this species using non-toxic biological methods approved by USDA. We should discuss this effort's potential further as your planning work continues.	Noted. The amount of invasive species management at Wallisville is limited by funding resources. The USACE is interested in partnerships in the treatment of aquatic invasive species.
The Project needs to consider a recurring invasive program to protect biodiversity and reduce unwanted impacts from invasive species. Consideration of Right of Way (R-O-W) fee cost being used to help with the management if the Project. In your meeting there was a discussion of R-O-W. The planning team should look at the possibility of using any fees collected in the issuance of R-O-Ws or surface occupancy of oil field infrastructure to help with invasive work on the project. Pipelines and other R-O-Ws are a	Noted. The amount of invasive species management at Wallisville is limited by funding resources. The USACE is not allowed to collect and use pipeline fees for the management of the project or invasive species.

Comment	Response
corridor for many invasive species and fragment habitat. If allowed under law, the USACOE should consider using fees to help offset the impacts of invasive species and fragmentation at the Project.	
The Project should consider what its dedicated high use areas should look like in 25 years. As outlined in your presentation, the area's population growth is staggering and pressure on your parks will increase in this next planning horizon. It would be good to focus significant effort on planning for increased public use in Project parks. The natural land areas offered by the Project are unique in this area. For example, the nature trail and grassland at Lake Charlotte Park is used by birders and should be maintained as an area that is high use, but primitive in nature. This is a unique offering in the area and valued by nature based visitors. Efforts should be made to insure that the natural portions of the Project remain intact as increased population demands will increase burdens on these park areas in the next 25 years.	The USACE has no plans or funding at the Wallisville Lake Project to create new or expand existing high density recreation areas. Any future development would need to be through a grantee or partner to build and manage the area. The amount of fee land conducive to development at Wallisville is not available and would require extensive study prior to approval. No new parks are planned for the project.
Some of the Projects grasslands and marshlands would benefit from carefully applied prescribed fire. Careful application of fire may avoid a catastrophic fire and serves to help plant communities sustain themselves through time. The presence of significant development all around the Project would make this difficult, but failure to implement a program to reduce fuels may lead to a significant risk of catastrophic wildfire. Patch burning and other techniques may be employed as appropriate at the Project to maintain biodiversity, protect native species, and reduce losses in diversity related to a catastrophic wildfire.	Noted. The USACE is open to the use of controlled burns as a vegetative management tool and has used it on other projects throughout Southwest Division.
COMMENTS FROM BAYOU PRESERVATION ASSOCIATION	
The Project Area is used throughout the year for informal canoe/kayak outings as well as for outings that are organized by the Houston Canoe Club, Houston Association of Sea	Noted. Wallisville Lake Project provides numerous low impact recreational opportunities for a wide array of users. Access to the project

Comment	Response
Kayakers, Houston Sierra Club, and others. An article by Charlie Llewellin in the May 2010 issue of Texas Monthly magazine, which listed Lake Charlotte as one of the twenty best river trips in Texas, noted the availability of guided trips. Visitors from Finland, Japan, France, and many locations throughout the United States have joined canoe/kayak outings in the Project Area because of its scenic beauty and ecological significance. One of them commented: “This looks like National Geographic.”	by canoe/kayak is a great way to explore areas that are not accessible by any other means.
Based on observations that were made by using kayaks and a canoe to access difficult-to-reach areas, a detailed report on overbank flows of floodwater from the Trinity River, between the Chambers County/Liberty County boundary and Hugo Point, was submitted to The US Geological Survey, Trinity River Authority, and Texas Water Development Board. (full report is available upon request)	Noted.
Mac Lake is used as an aesthetic site (Sections 3.4 and 5.4) where participants in paddling outings led by the nonprofit organization Artist Boat create watercolor paintings. https://www.artistboat.org/event/kayak-adventure-cypress-swamp/2018-10-27/	Noted.
What is the status of the covered pavilion located immediately to the west of the locks/saltwater barrier? This is a valuable amenity at the south end of the JJ Mayes Wildlife Trace.	The covered pavilion in question is still in use.
The statement that: “Natural conditions preclude intensive public use development because extensive alterations of natural systems would be required. Cedar Hill Park will be allocated for low-density recreation because of the sensitive wetland habitat surrounding the park.” (Section 4.2.2) continues to apply. So does the more general statement that “There are no lands designated in this project for intensive recreation.” (Section 4.2.1)	Concur.

Comment	Response
The provision that: "…a canoe launch will be provided at Cedar Hill Park, but power boats may not launch there." (Section 5.1.1) should be retained. It would not be appropriate to add hard-surface ramps for power boats at Cedar Hill Park	Concur.
The statement that: "Launching of motorized craft from the canoe launch sites will be prohibited." (Section 6.4.3) should be retained, but references to floating docks (Section 6.5.6) should be removed.	Concur. No floating docks are necessary.
Now that Cedar Hill Park is in place, Section 6.2 (Local and Regional Recreational Opportunities and Needs) should be updated to reflect the actual (less extensive) development that has taken place at Cedar Hill Park: for example, retaining only the one existing (unpaved) canoe launch access point (Figure 6-6). Section 6.6 (Economic Analysis) and Section 6.4.1 (Proposed Development) should take account of what is now known regarding utilization rates for Cedar Hill Park.	The master plan will reflect the most current utilization information available as well as current and projected uses for all project lands including Cedar Hill Park.
What is the current status of the proposed paddle trail on the eastern side of the Project? An article entitled "What is the Wallisville Lake Project?", which appeared in the May 2012 release of the News Story Archive stated that "The Corps is working with its partners to develop a paddle trail on the eastern side of the project off of FM 563. The paddle trail will pass through part of the largest remaining cypress swamp remaining on the Texas gulf coast. The Corps has surveyed the area and determined the layout of the trail and will begin installing the trail markers in the coming months with the trail expected to be completed by fall. Though the trail is not yet marked, visitors are welcomed to paddle the area." https://www.swg.usace.army.mil/Media/News-Stories/Article/480378/what-is-the-wallisville-lake-project/	The referenced paddle trail has not yet been established. Lack of manpower and resources have hindered progress on a paddle trail. The USACE is looking for partners to help with the development and maintenance of a paddle trail.
Water flow from the main stem of the Trinity River, through the barge canal associated with the now-inactive sulphur mine, and into	The USACE recognizes the impacts the removal of the south levee at the channel from the barge canal into

Comment	Response
Lake Charlotte via Mac Bayou, is causing a rapid deposition of sediment at the north end of Lake Charlotte. Closing off the connection between the barge canal and the Trinity River would stop this from happening. This would restore the original hydrology, in which water flowed down Mac Bayou into Lake Charlotte, and thence from the south end of Lake Charlotte to the Trinity River via Lake Pass. Trinity River water could still reach Lake Charlotte during floods, when the river's natural levees are overtopped.	Lake Charlotte is having on the sedimentation load. A thorough study of the area to include acceptable solutions is needed.
Remove the statement that: "….power boats may gain access to Lake Charlotte through Mac Bayou or Lake Pass when water conditions permit." from Section 5.1.1 (Fisheries Management Plan), and the statement that: "Another access point to Lake Charlotte is by taking the Sulphur Cut off the Trinity River further upstream from Lake Pass and then following Mac Bayou down to the north end of Lake Charlotte." from Section 6.3.4 (Transportation and Circulation).	Noted.
A condition that is essential for preservation of a healthy cypress swamp is noted in Section 5.1.2, which states that: "Under the revised Project, the cypress swamps will seasonally flood and drain under natural conditions which should not result in increased stress to the cypress swamps."	Noted.
Retain the statement in Section 5.2 (Vegetation Management Plan) that: "A monitoring program of the cypress swamps is being performed to determine health and vigor of the cypress swamps surrounding Lake Charlotte and Mac Bayou. This monitoring program will become part of the management plan in order to assess health and trends in the cypress swamps." This is mirrored in Section 2.2, which provides: "Continue the Monitoring Program of the cypress swamps to assess overall health and vigor." Updated vegetational mapping (Section 3.2.1) is warranted, due to changes that have occurred since 1996. Also retain the	Noted.

Comment	Response
provision: “The revised Project will also serve to maintain the health and vigor of the cypress swamps which provide some of the most picturesque views of the Project Area.” (Section 5.4).	
Consider adding a list of exotic species, in light of the provision (Section 1.5.1, amplified in Section 1.5.3) that: “These reasonable and prudent measures included: … explore and implement environmentally safe methods to control large infestations of aquatic weeds.” Examples of such species include: water hyacinth, giant salvinia, alligator weed, Chinese tallow, and Japanese honeysuckle. Consult www.texasinvasives.org, for example, Species Observation #17098 on giant salvinia in Mud Lake Bayou. https://www.texasinvasives.org/observations/detail.php?site_id=17098	Noted. The master plan addresses invasive species in chapter 2.
Is the now-inactive sulphur mine north of Lake Charlotte covered in the Master Plan (Sections 2.6, 3.5, and 6.3.5)?	No. The referenced mine is not on USACE fee property.
The status of the Lost Lake Oil and Gas Field (Sections 4.6 and 5.5) needs to be updated. The levee around the field appears not to have been maintained.	Noted. The master plan discusses the topic of the Lost Lake Oil and Gas Field.
Feral hogs Sus scrofa are properly classified as mammals, but not a wildlife (Sections 3.1.2 and 5.1.2).	Noted.
The concept that: “The extent of water areas is highly variable, depending on current hydrological conditions.” (Section 3.9, Water) continues to be of primary importance. In this respect, this project differs greatly from most other lakes administered by the Army Corps of Engineers.	Noted.
The statement that: “Therefore, the Project has no need for a reservoir.” continues to apply, as does the goal to “…manage the Project in such a manner that the water resources of the Project Area and downstream of the Project Area will remain undisturbed by Project actions and Project personnel and other users of the Project Area.” (Section 2.4)	Noted. No changes are anticipated.

Comment	Response
Is the control structure that is located on The Cutoff at 29.900743°N 94.768915°W still functional, and if so, is it providing a needed function? If not, would its removal be appropriate?	The control structure is still functional and provides a vital component of the saltwater intrusion system.
At the boundary between Chambers County and Liberty County, County Line Road extends out into the Trinity River Basin, crossing the Cutoff, then extending to the east and northeast. Its raised roadbed presents a concave shape to the north, which acts as a levee that gathers and re-directs the overland flow of water during floods. It should be shown in Figure 3-5a.	Noted.
Another artificial structure that affects the flow of floodwaters on the west side of the Trinity River Basin is the (poorly maintained) levee surrounding the Lost Lake Oil and Gas Field. It prevents a convex shape to the north, thus causing flood waters to be deflected around it, both to the east and to the west.	Noted.
Both of these phenomena were observed directly during the collection of data regarding floodwater flows (listed above under the heading “Recreation is Tied to Public Education, Research, and Aesthetics”.)	Noted.
Application of Public Laws (Section 1.4) needs to be updated to include legislation subsequent to 1996.	Noted and concur.
The maps of the Project (Figures 1-3 through 1-6) need to be supplemented to reflect the current status, including breaches that have been made in the originally-proposed Low Overflow Dam.	The master plan will correct, and update maps based on the best available data. A survey will not be conducted to update the maps.
New studies of fish and plankton populations are warranted, because of possible effects of the saltwater barrier. (Section 3.1.1, Aquatic Biology)	Noted. The master plan will not include conducting any new fish and plankton population studies.
References to river miles (Page 3-6) may need to be revised to match the current numbers used by the Trinity River Authority. http://www.trinityra.org/default.asp?contentID=97	Noted.

Comment	Response
The list of outgranted lands (Table 3-2 and Section 4.6) needs to be updated.	Noted.
Section 6.3.6 (Utility Services) needs to be updated.	Noted.
The list of lands classified for operations (Section 4.1, Operations) needs to be updated to reflect the current status of the Project. For example, part of what was originally proposed as the West Non-Overflow Dam is now designated as a hiking trail with its head at the Hugo Point Park.	Noted.

7.3 PUBLIC AND AGENCY REVIEW OF DRAFT MASTER PLAN, EA AND FONSI

This section will be completed following the draft release public meeting and 30-day comment period.

8 SUMMARY OF RECOMMENDATIONS

8.1 SUMMARY OVERVIEW

The preparation of the Wallisville Lake Master Plan followed the current 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) preparation of contemporary Resource Objectives, (2) Classification of project lands using the newly approved classification standards, and (3) 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 conducive to existing and projected staff levels at Wallisville Lake. Factors considered in the Plan were identified through public involvement and review of statewide planning documents including TPWDs 2017 TORP (synonymous with SCORP) and the TCAP Texas-Louisiana Coastal Marshes ecoregion. This Master Plan will ensure the long-term sustainability of the USACE managed recreation program and natural resources associated with Wallisville Lake.

8.2 LAND RECLASSIFICATION PROPOSAL

A key component in preparing this Master Plan was examining prior land classifications and addressing the needed transition to new land classification standards that reflect how lands are being managed now and in the foreseeable future. The new land classification standards will also comply with current USACE guidance. Public comment was solicited to assist in making these land reclassification decisions. Chapter 7 of this Plan describes the public involvement process and provides a summary of public comments received. After analyzing public comment, examining recreational trends, and considering regional natural resource management priorities, USACE team members reclassified the Federal lands associated with Wallisville Lake. Note: the 1996 Wallisville Lake Master Plan did not designate on a map the land use classifications or provide corresponding acre measurements making a direct comparison of locations and acres changed not possible. All land classifications designated in the 2022 Wallisville Lake Master Plan revision are new map designations and acreage measurements and are described in Tables 8-1 and 8-2.

Table 8-1 Changes in Land and Water Surface Classification

Prior Land Classifications (1996)	Acres	New Land Classifications (2022)	Acres (*)
Operations	n/a	Project Operations (PO)	160
		High Density Recreation (HDR)	64
Environmentally Sensitive Areas	n/a	Environmentally Sensitive Areas (ESA)	14,679
Low Density Recreation	n/a	Multiple Resource Management – Low Density Recreation (LDR)	121
Fish and Wildlife	n/a	Multiple Resource Management – Wildlife Management (WMA)	787
		Future/Inactive Recreation Areas	6
TOTAL	18,949		15,817
Water Surface	5,140	Open Recreation	4,963
		Designated No-Wake	1,498
		Fish and Wildlife Sanctuary	384
		Restricted	4
TOTAL	5,140		6,849
TOTAL FEE	24,089		22,666

*** Note**: The new and total acreage figures were measured using GIS technology and may vary slightly from official land acquisition records.

Table 8-2 lists the descriptions and justifications for the reclassification of USACE lands at Wallisville Lake. Some variation in total acreages occurred due to better measuring technology and changes in landforms over the past 20+ years due to sedimentation and erosion.

Table 8-2 Changes and Justifications for Land Classifications[(1)]

Land Classification	Description of Changes	Justification
Project Operations (PO)	A land classification of Operations is discussed in the 1996 Plan and various fee lands are described to be designated as Operations. The areas described include much of the same lands as the 2022 Plan is presenting as Project Operations. No map or measurement of acres is provided in the 1996 Plan. Changes include a name change per guidance to Project Operations and classifying 160 acres or 1 percent of project fee lands to PO.	All lands classified as PO are managed and used primarily in support of critical operational requirements related to the project missions of navigation, salinity control, and water supply. These include lands located near the Project Office, lock and dam, non-overflow dams and other water control structures. The Trinity River Island Visitor Center area and associated lands contain incidental day use recreational elements under the PO classification as public access can be controlled as needed and the primary purpose of the lands is used for the operation of the project.
High Density Recreation (HDR)	No lands in the 1996 Plan are designated as HDR. Changes include classifying 64 acres or less that 1 percent of project fee lands to HDR.	The designation of HDR lands is limited to day use and campground areas associated with Cedar Hill Park, Hugo Point Park, and portions of the J.J. Mayes Wildlife Trace. The amount of intensive recreational activities at each of the locations is minimal and will remain at that level. The designated HDR areas include more than passive recreational uses including the development of restrooms, parking lots and picnic structures.

Land Classification	Description of Changes	Justification
Environmentally Sensitive Areas (ESA)	A land classification of Environmentally Sensitive Area is presented in the 1996 Plan and various fee lands are described to include at the time of publication the Endangered Species Management Zones, bird rookeries, and a portion of land near the Old Wallisville Townsite. The areas described include the same lands as the 2022 Plan is presenting as ESA. No map or measurement of acres is provided in the 1996 Plan. Changes include classifying 14,679 acres to ESA or 93 pecent of project fee lands.	Classification of 14,679 acres was determined by the study team to be necessary to provide a high level of protection for those areas supporting significant habitat, views, or cultural sites. Classifying these areas as ESA will afford these areas with the highest level of protection from disturbance. The reclassification of 14,679 acres to ESA will have no effect on current or projected public use.
MRML – Low Density Recreation (LDR)	A land classification of Low-Density Recreation is presented in the 1996 Plan which included Cedar Hill Park. Changes include classifying 121 acres to MRML-LDR or less than 1 pecent of project fee lands.	Classification of 121 acres of MRML-LDR includes changing the fee lands at Cedar Hill Park to HDR. Also, designating the trails at both J.J. Mayes Wildlife Trace and Hugo Point as LDR to support the passive recreation uses.
MRML – Wildlife Management (WM)	A land classification of Fish and Wildlife is presented in the 1996 Plan. Changes include a name change per guidance to MRML-Wildlife Management and classifying 787 acres to MRML-WM or 5 percent of project fee lands.	Classification of 787 acres was determine by the study to be necessary to support the hunting areas to allow the stewardship of fish and wildlife resources. The Lost Lake Oil and Gas Field is included in this classification.
MRML – Vegetation Management (VM)	No lands in the 1996 Plan are designated as VM. No MRML-VM lands are proposed in the 2022 Plan.	n/a

Land Classification	Description of Changes	Justification
Future or Inactive Recreation Areas (FIR)	No lands in the 1996 Plan are designated as FIR. Changes include classifying 6 acres to FIR or less than 1 percent of project fee lands.	Sites for future recreation area include a boat access point along the Trinity River north of Interstate 10 and in the proximity of the Old Wallisville Townsite. Until there is an opportunity to develop the areas, they will be managed for multiple resources.

(1)The land classification changes described in this table are the result of changes to individual parcels of land ranging from a few acres to several hundred acres. New acreages were measured using more accurate GIS technology. The acreage numbers provided are approximate.

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9 BIBLIOGRAPHY

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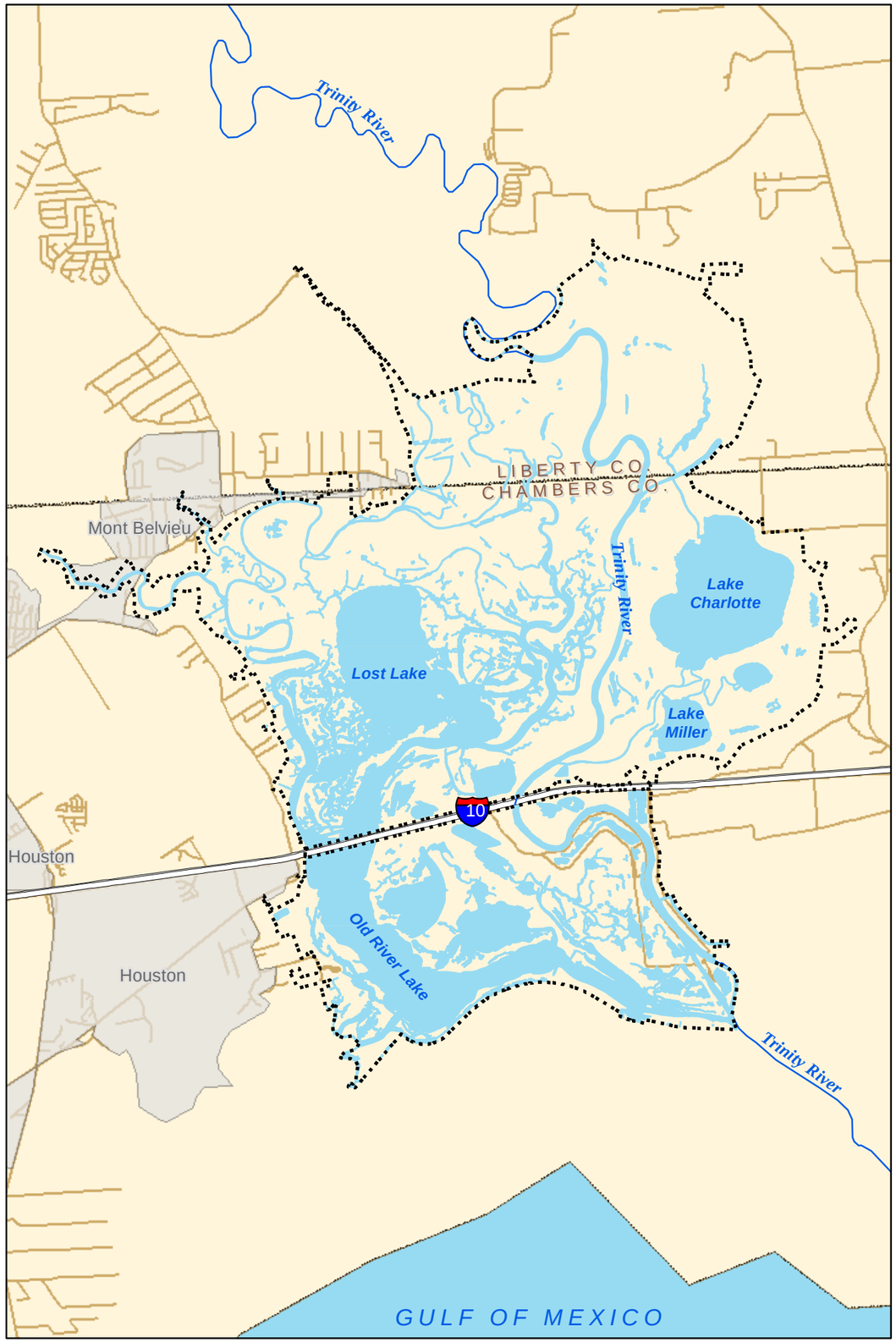
APPENDIX A - LAND CLASSIFICATION, MANAGING AGENCIES, AND RECREATION MAPS



INDEX TO MASTER PLAN MAPS

GENERAL

MAP NO.	TITLE
WL20MP-OI-00	PROJECT LOCATION & INDEX TO MAPS
WL20MP-OM-01	LAND MANAGING ENTITIES
WL20MP-OW-01	WATER SUFACE CLASSIFICATIONS
WL20MP-UC-01	UTILITY CORRIDORS

LAND CLASSIFICATION

MAP NO.	TITLE
WL20MP-OC-00	LAND CLASSIFICATION SHEET (00)
WL20MP-OC-01	LAND CLASSIFICATION SHEET (01)
WL20MP-OC-02	LAND CLASSIFICATION SHEET (02)
WL20MP-OC-03	LAND CLASSIFICATION SHEET (03)
WL20MP-OC-04	LAND CLASSIFICATION SHEET (04)

RECREATIONAL AREAS

MAP NO.	TITLE
WL20MP-OR-0A	MANAGED RECREATIONAL AREAS
WL20MP-OR-0B	PARK PLATE INDEX
WL20MP-OR-01	TRINITY RIVER ISLAND RECREATION AREA
WL20MP-OR-02	J.J. MAYES WILDLIFE TRACE
WL20MP-OR-03	MOUTH OF THE TRINITY RIVER WATERBIRD ROOKERY
WL20MP-OR-04	OLD WALLISVILLE TOWNSITE
WL20MP-OR-05	HUGO POINT PARK
WL20MP-OR-06	CEDAR HILL PARK

FEE BOUNDARY

WATER SURFACE

THIS PRODUCT IS REPRODUCED FROM GEOSPATIAL INFORMATION PREPARED BY THE U.S. ARMY CORPS OF ENGINEERS. GIS DATA AND PRODUCT ACCURACY MAY VARY. THEY MAY BE DEVELOPED FROM SOURCES OF DIFFERING ACCURACY. ACCURATE ONLY FOR CERTAIN SCALES, BASED ON MODELING OR INTERPRETATION, INCOMPLETE WHILE BEING CREATED OR REVISED. USING GIS PRODUCTS FOR PURPOSES OTHER THAN THOSE FOR WHICH THEY WERE CREATED MAY YIELD INACCURATE OR MISLEADING RESULTS.

U.S. ARMY CORPS OF ENGINEERS
GALVESTON DISTRICT

WALLISVILLE LAKE — TRINITY RIVER, TEXAS

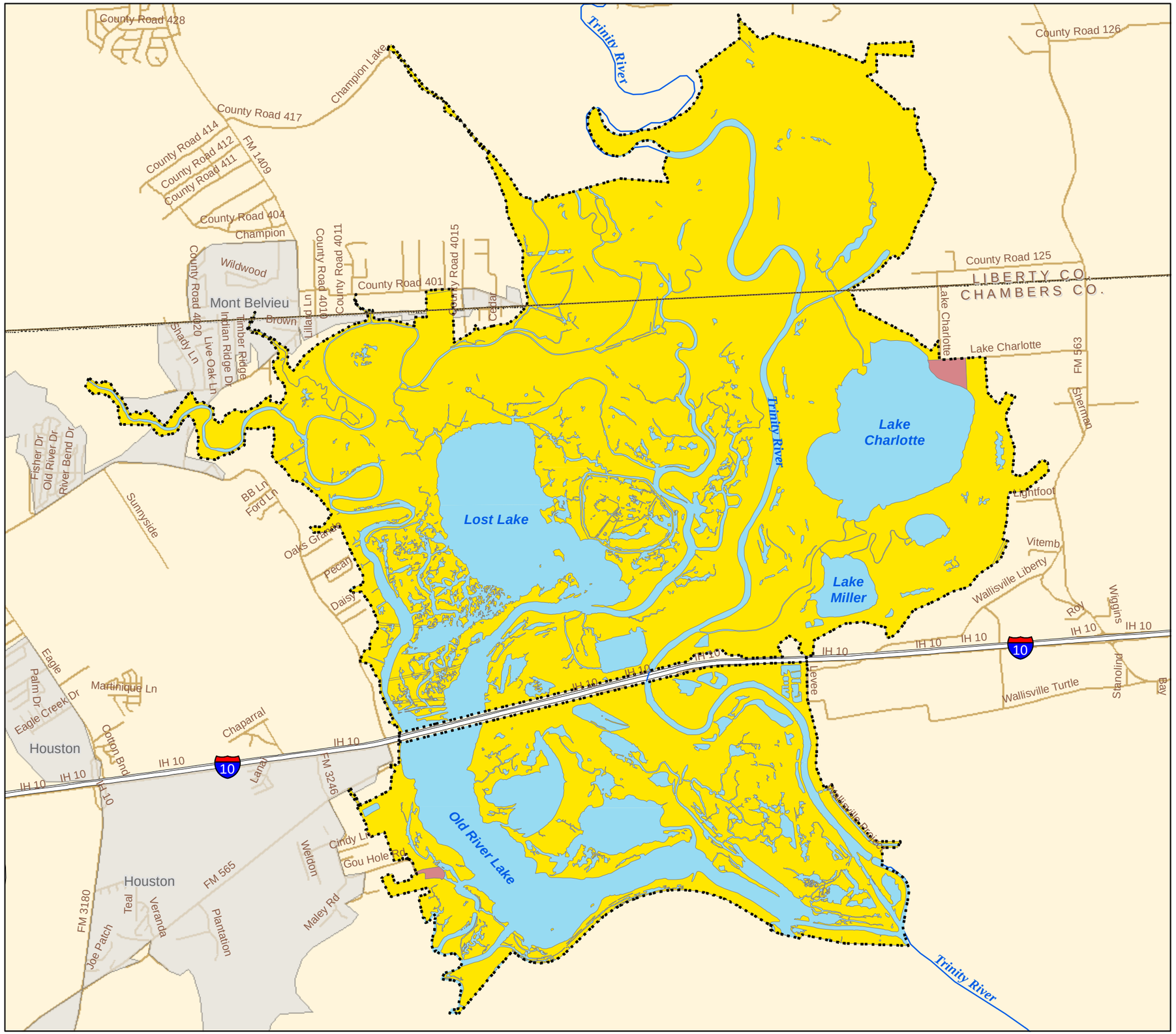
WALLISVILLE LAKE MASTER PLAN

PROJECT LOCATION AND MAP INDEX

N

0 0.75 1.5 3 Miles

DATE:	MAP NO.
MAY 2022	WL20MP-OI-00



U.S. ARMY CORPS OF ENGINEERS
GALVESTON DISTRICT

WALLISVILLE LAKE — TRINITY RIVER, TEXAS

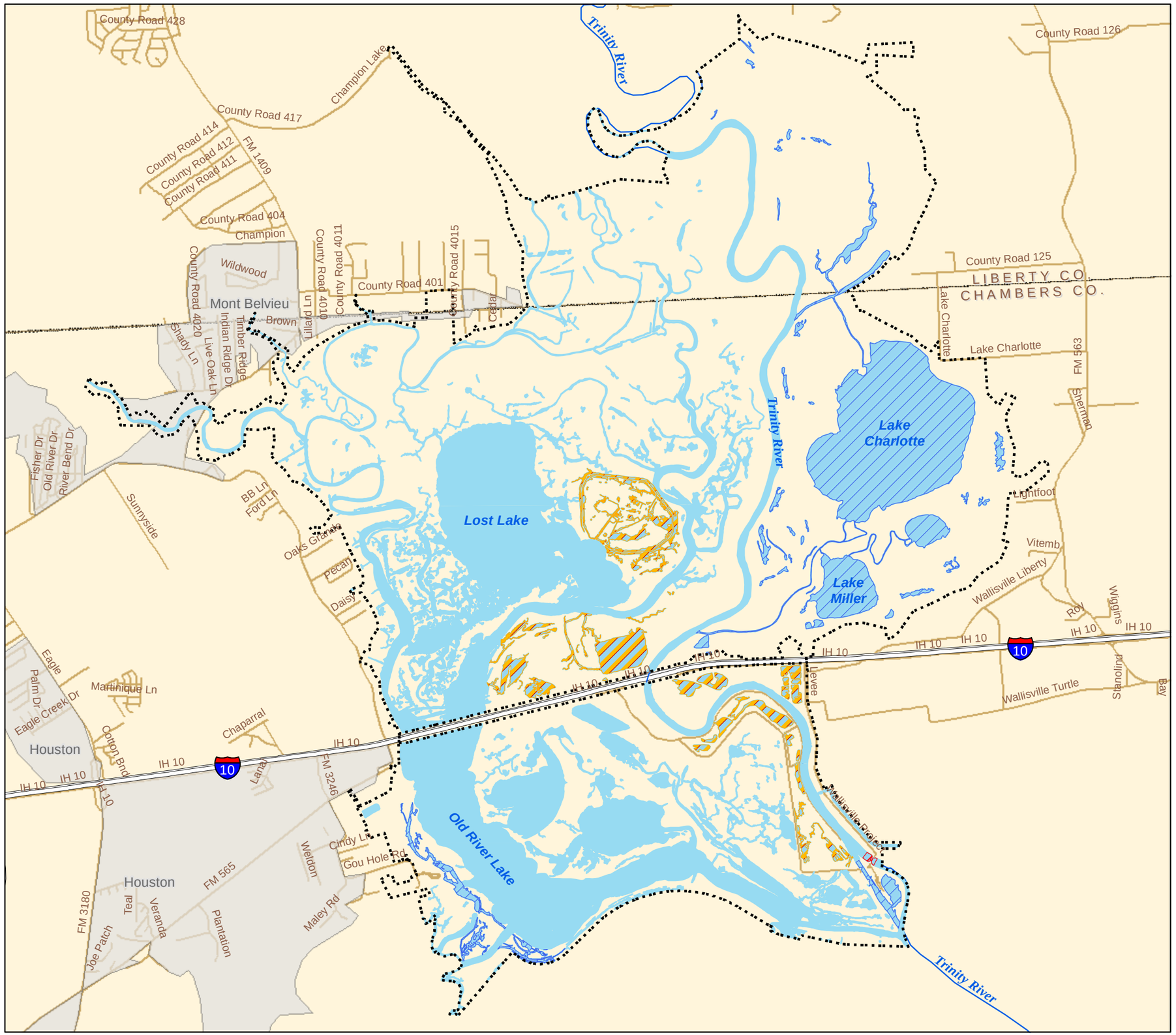
WALLISVILLE LAKE MASTER PLAN

LAND MANAGING ENTITIES

N

0 0.5 1 2 Miles

DATE:	MAP NO.
MAY 2022	WL20MP-OM-01



WATER SURFACE: DESIGNATED NO WAKE AREAS

WATER SURFACE: FISH AND WILDLIFE SANCTUARY

WATER SURFACE: RESTRICTED

WATER SURFACE: OPEN RECREATION

FEE BOUNDARY

U.S. ARMY CORPS OF ENGINEERS
GALVESTON DISTRICT

WALLISVILLE LAKE — TRINITY RIVER, TEXAS

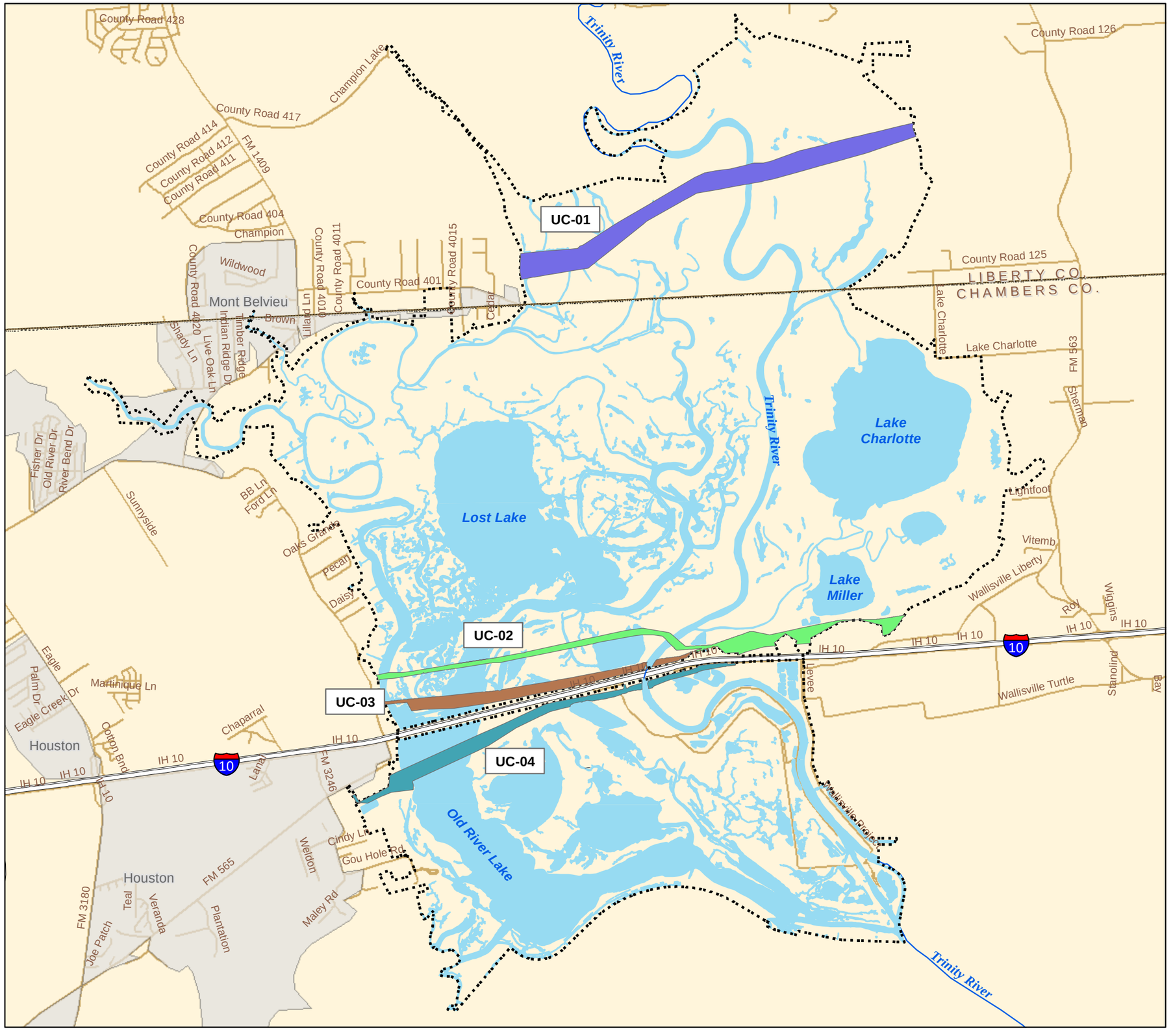
WALLISVILLE LAKE MASTER PLAN

WATER SURFACE CLASSIFICATIONS

N

0 0.5 1 2 Miles

DATE:	MAP NO.
MAY 2022	WL20MP-OW-01



UTILITY CORRIDOR #1
UTILITY CORRIDOR #2
UTILITY CORRIDOR #3
UTILITY CORRIDOR #4
FEE BOUNDARY
WATER SURFACE

U.S. ARMY CORPS OF ENGINEERS
GALVESTON DISTRICT

WALLISVILLE LAKE — TRINITY RIVER, TEXAS

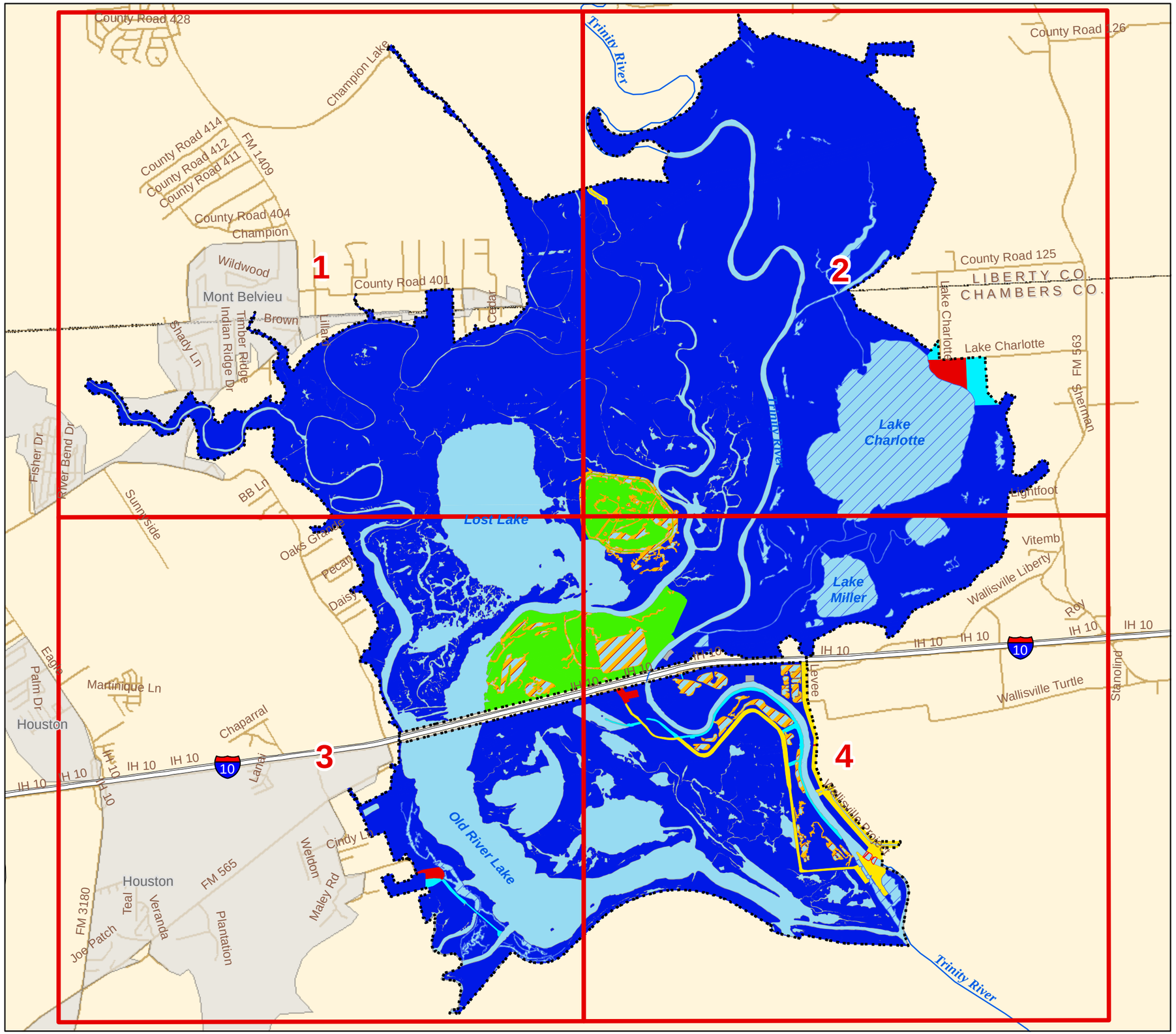
WALLISVILLE LAKE MASTER PLAN

UTILITY CORRIDORS

N

0 0.5 1 2 Miles

DATE:	MAP NO.
MAY 2022	WL20MP-UC-01



- INDEX GRID
- ENVIRONMENTALLY SENSITIVE AREA
- FUTURE OR INACTIVE RECREATION
- HIGH DENSITY RECREATION
- LOW DENSITY RECREATION
- PROJECT OPERATIONS
- WILDLIFE MANAGEMENT
- WATER SURFACE: DESIGNATED NO WAKE AREAS
- WATER SURFACE: FISH AND WILDLIFE SANCTUARY
- WATER SURFACE: RESTRICTED
- WATER SURFACE: OPEN RECREATION
- FEE BOUNDARY

U.S. ARMY CORPS OF ENGINEERS
GALVESTON DISTRICT

WALLISVILLE LAKE — TRINITY RIVER, TEXAS

WALLISVILLE LAKE MASTER PLAN

LAND AND WATER CLASSIFICATIONS (INDEX SHEET 00)

N

0 0.5 1 2 Miles

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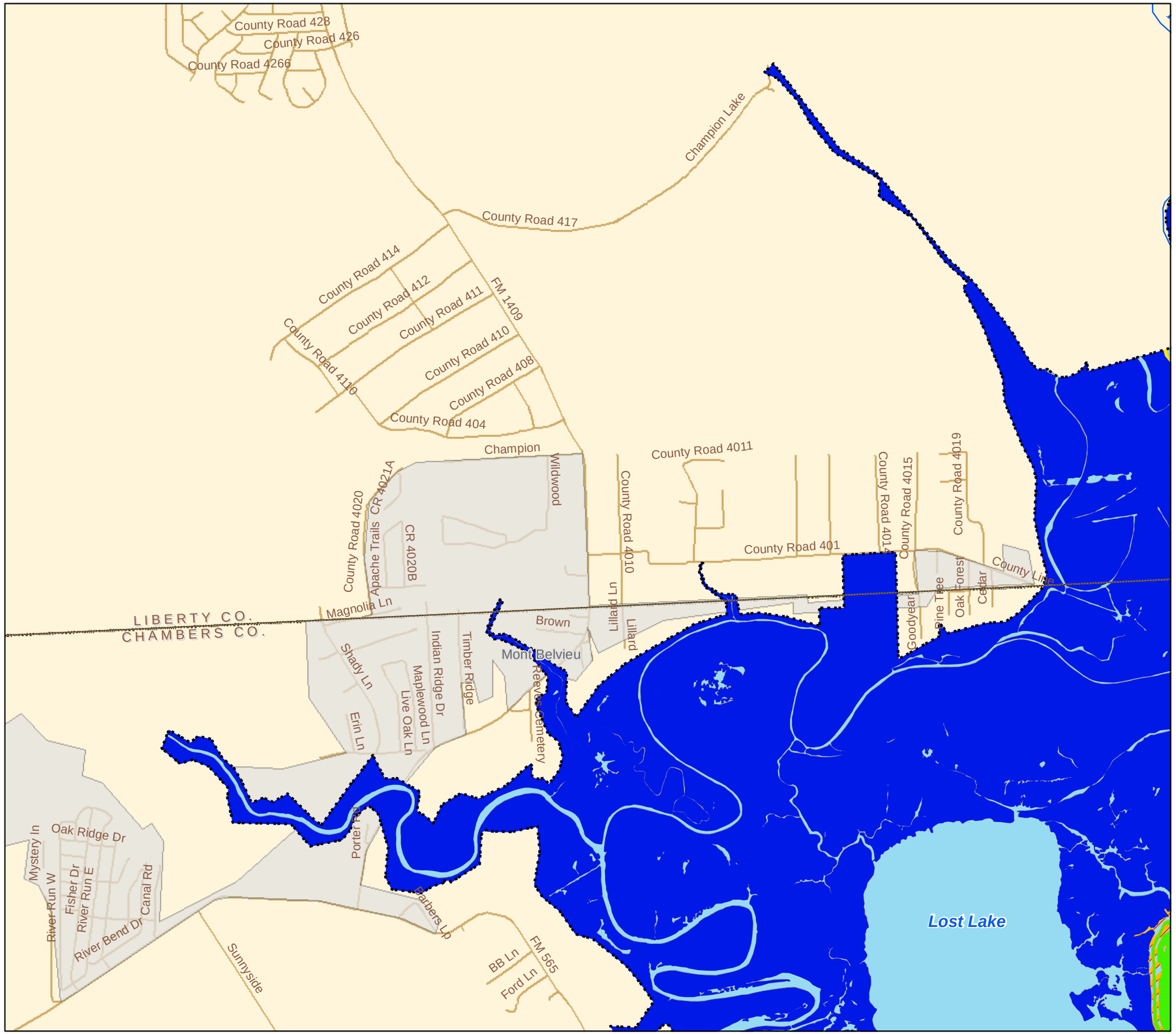
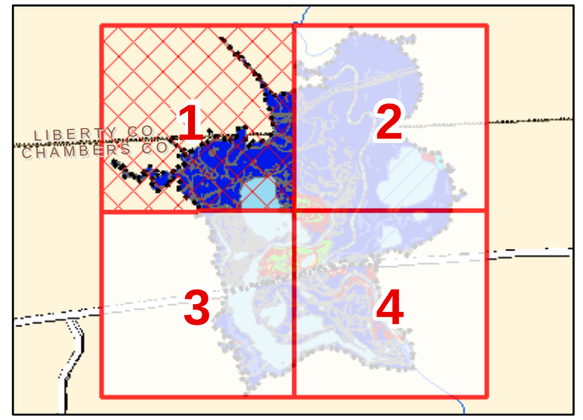
MAY 2022	WL20MP-OC-00





- ENVIRONMENTALLY SENSITIVE AREA
- PROJECT OPERATIONS
- WILDLIFE MANAGEMENT
- WATER SURFACE: FISH AND WILDLIFE SANCTUARY
- WATER SURFACE: OPEN RECREATION
- FEE BOUNDARY

U.S. ARMY CORPS OF ENGINEERS
GALVESTON DISTRICT

WALLISVILLE LAKE — TRINITY RIVER, TEXAS

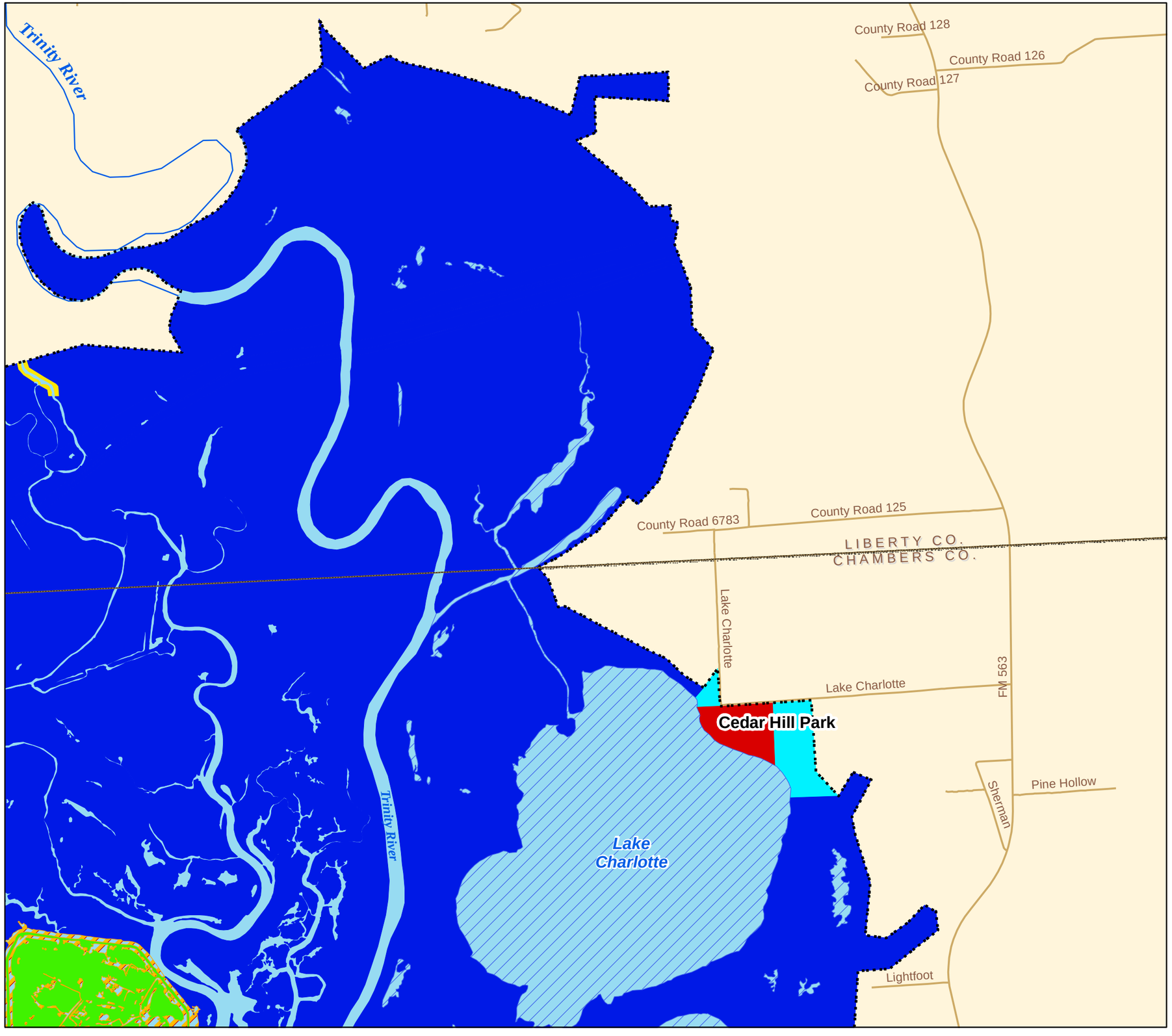
WALLISVILLE LAKE MASTER PLAN

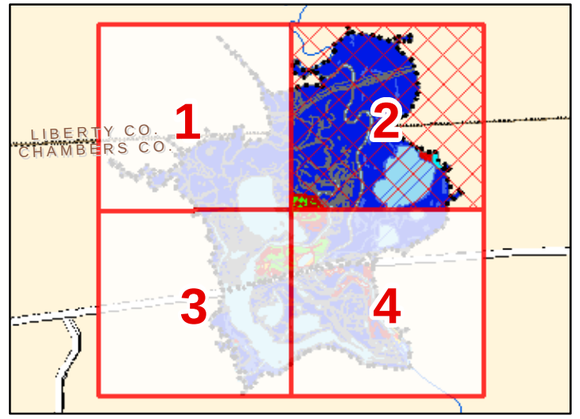
LAND AND WATER CLASSIFICATIONS (INDEX SHEET 01)

N

0 0.25 0.5 1 Miles

DATE:	MAP NO.
MAY 2022	WL20MP-OC-01





- ENVIRONMENTALLY SENSITIVE AREA
- HIGH DENSITY RECREATION
- LOW DENSITY RECREATION
- PROJECT OPERATIONS
- WILDLIFE MANAGEMENT
- WATER SURFACE: DESIGNATED NO WAKE AREAS
- WATER SURFACE: FISH AND WILDLIFE SANCTUARY
- WATER SURFACE: OPEN RECREATION
- FEE BOUNDARY

U.S. ARMY CORPS OF ENGINEERS
GALVESTON DISTRICT

WALLISVILLE LAKE — TRINITY RIVER, TEXAS

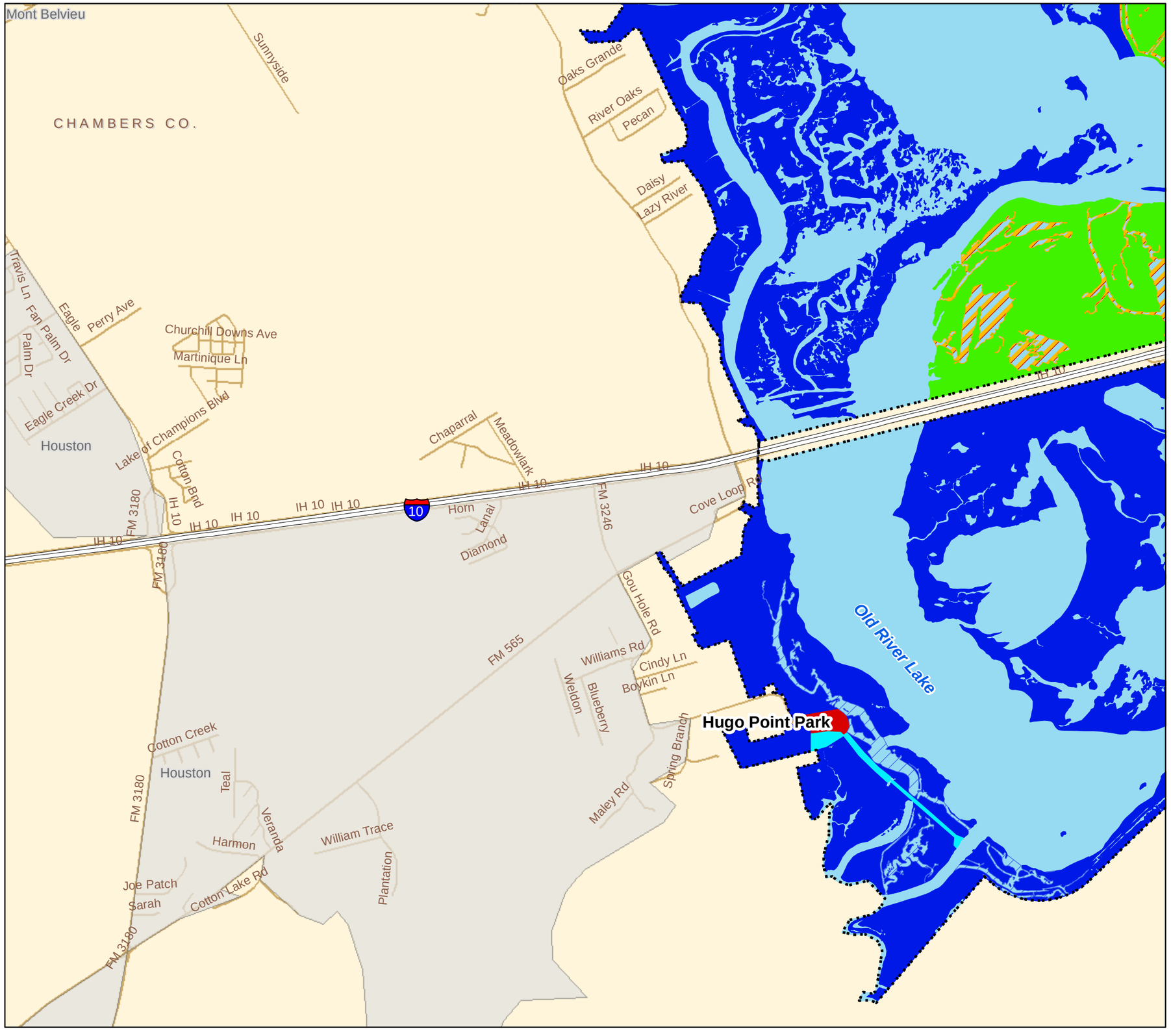
WALLISVILLE LAKE MASTER PLAN

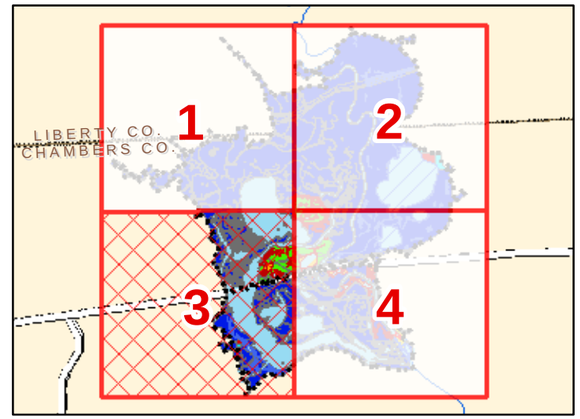
LAND AND WATER CLASSIFICATIONS (INDEX SHEET 02)

N

0 0.25 0.5 1 Miles

DATE:	MAP NO.
MAY 2022	WL20MP-OC-02





- ENVIRONMENTALLY SENSITIVE AREA
- HIGH DENSITY RECREATION
- LOW DENSITY RECREATION
- WILDLIFE MANAGEMENT
- WATER SURFACE: DESIGNATED NO WAKE AREAS
- WATER SURFACE: FISH AND WILDLIFE SANCTUARY
- WATER SURFACE: OPEN RECREATION
- FEE BOUNDARY

U.S. ARMY CORPS OF ENGINEERS
GALVESTON DISTRICT

WALLISVILLE LAKE — TRINITY RIVER, TEXAS

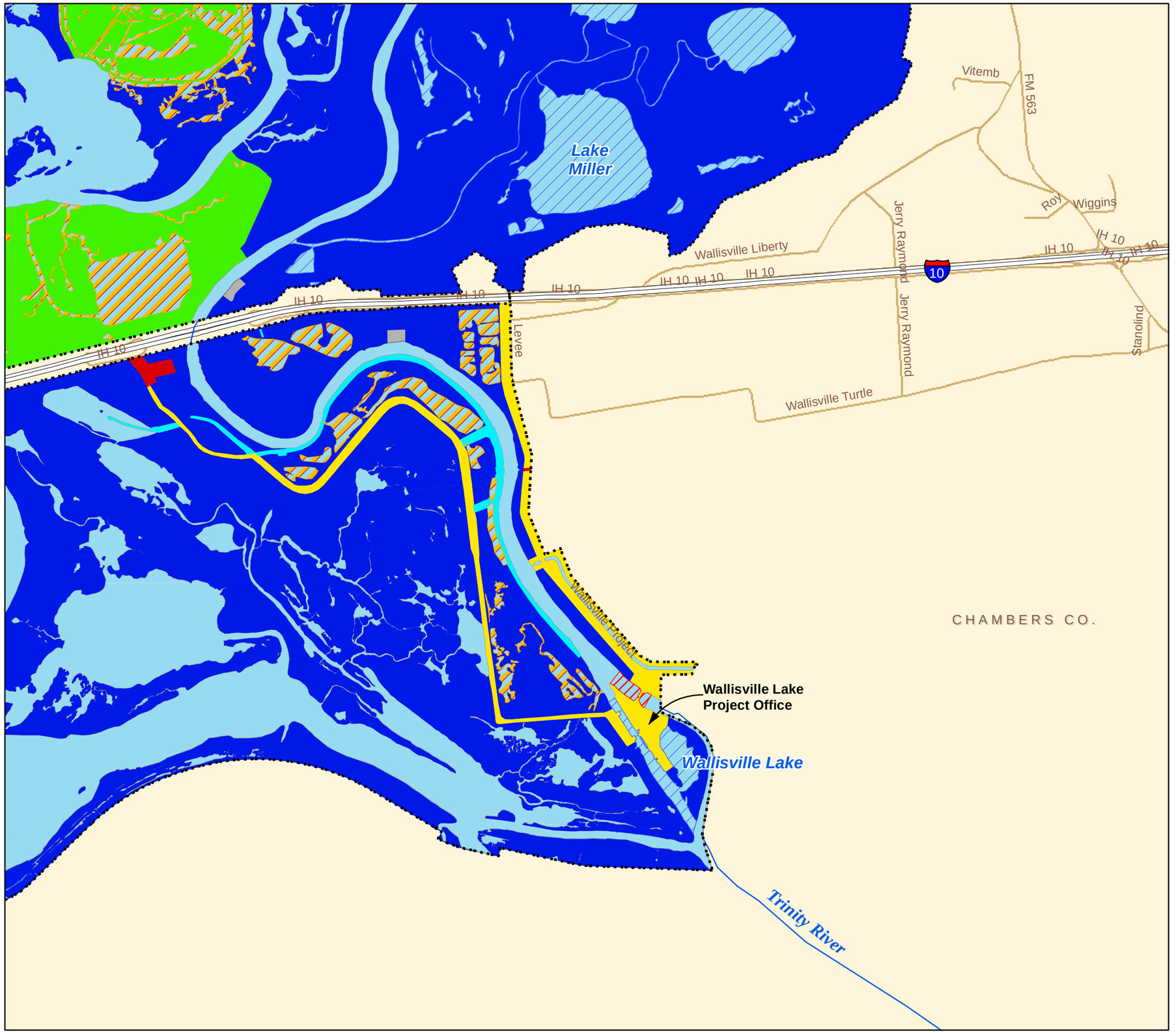
WALLISVILLE LAKE MASTER PLAN

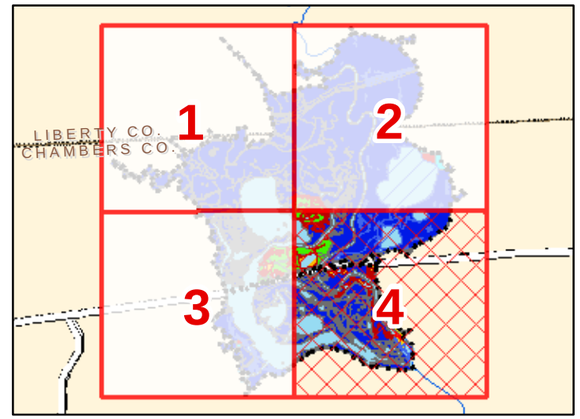
LAND AND WATER CLASSIFICATIONS (INDEX SHEET 03)

N

0 0.25 0.5 1 Miles

DATE:	MAP NO.
MAY 2022	WL20MP-OC-03





- ENVIRONMENTALLY SENSITIVE AREA
- FUTURE OR INACTIVE RECREATION
- HIGH DENSITY RECREATION
- LOW DENSITY RECREATION
- PROJECT OPERATIONS
- WILDLIFE MANAGEMENT
- WATER SURFACE: DESIGNATED NO WAKE AREAS
- WATER SURFACE: FISH AND WILDLIFE SANCTUARY
- WATER SURFACE: RESTRICTED
- WATER SURFACE: OPEN RECREATION
- FEE BOUNDARY

U.S. ARMY CORPS OF ENGINEERS
GALVESTON DISTRICT

WALLISVILLE LAKE — TRINITY RIVER, TEXAS

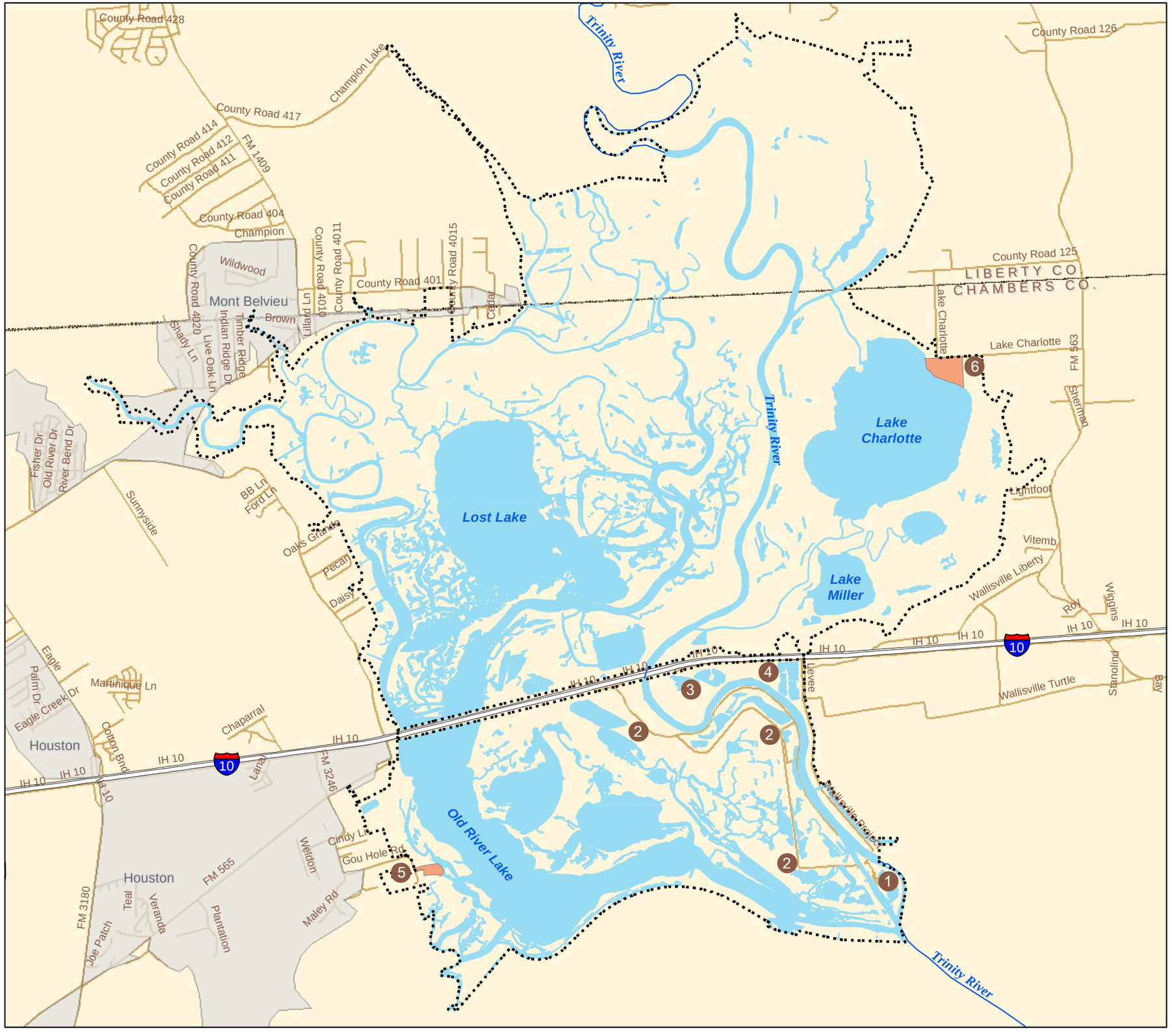
WALLISVILLE LAKE MASTER PLAN

LAND AND WATER CLASSIFICATIONS (INDEX SHEET 04)

N

0 0.25 0.5 1 Miles

DATE:	MAP NO.
MAY 2022	WL20MP-OC-04



CHAMBERS COUNTY

KEY TO RECREATION AREAS

1. TRINITY RIVER ISLAND RECREATION AREA
2. J.J. MAYES WILDLIFE TRACE
3. MOUTH OF THE TRINITY RIVER WATERBIRD ROOKERY
4. OLD WALLISVILLE TOWNSITE
5. HUGO POINT PARK
6. CEDAR HILL PARK

U.S. ARMY CORPS OF ENGINEERS
GALVESTON DISTRICT

WALLISVILLE LAKE — TRINITY RIVER, TEXAS

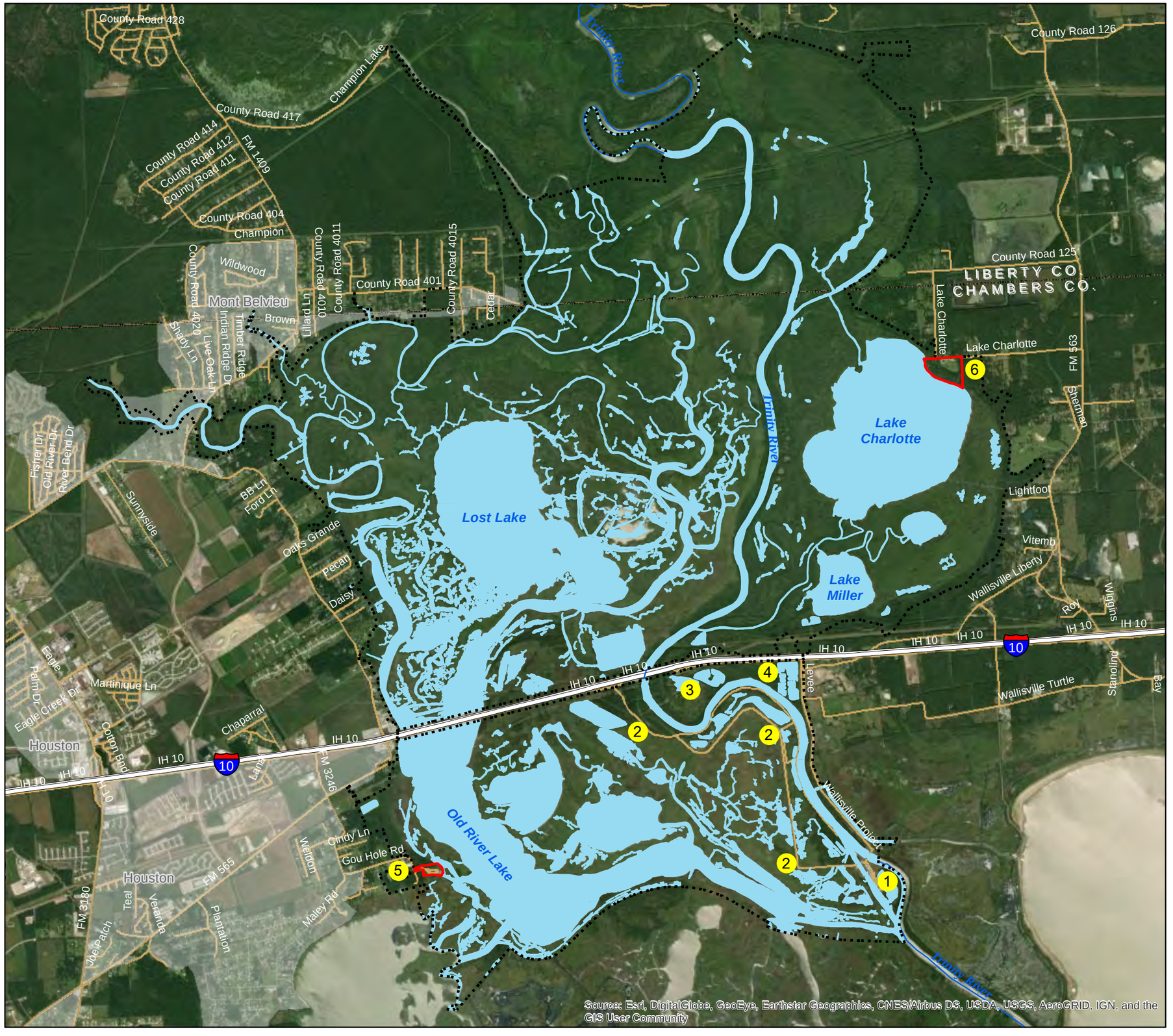
WALLISVILLE LAKE MASTER PLAN

MANAGED RECREATIONAL AREAS

N

0 0.5 1 2 Miles

DATE:	MAP NO.
MAY 2022	WL20MP-OR-0A



RECREATION AREAS		
ID #	NAME	SHEET #
1	TRINITY RIVER ISLAND RECREATION AREA	WL20MP-OR-01
2	J.J. MAYES WILDLIFE TRACE	WL20MP-OR-02
3	MOUTH OF THE TRINITY RIVER WATERBIRD ROOKERY	WL20MP-OR-03
4	OLD WALLISVILLE TOWNSITE	WL20MP-OR-04
5	HUGO POINT PARK	WL20MP-OR-05
6	CEDAR HILL PARK	WL20MP-OR-06

U.S. ARMY CORPS OF ENGINEERS
GALVESTON DISTRICT

WALLISVILLE LAKE — TRINITY RIVER, TEXAS

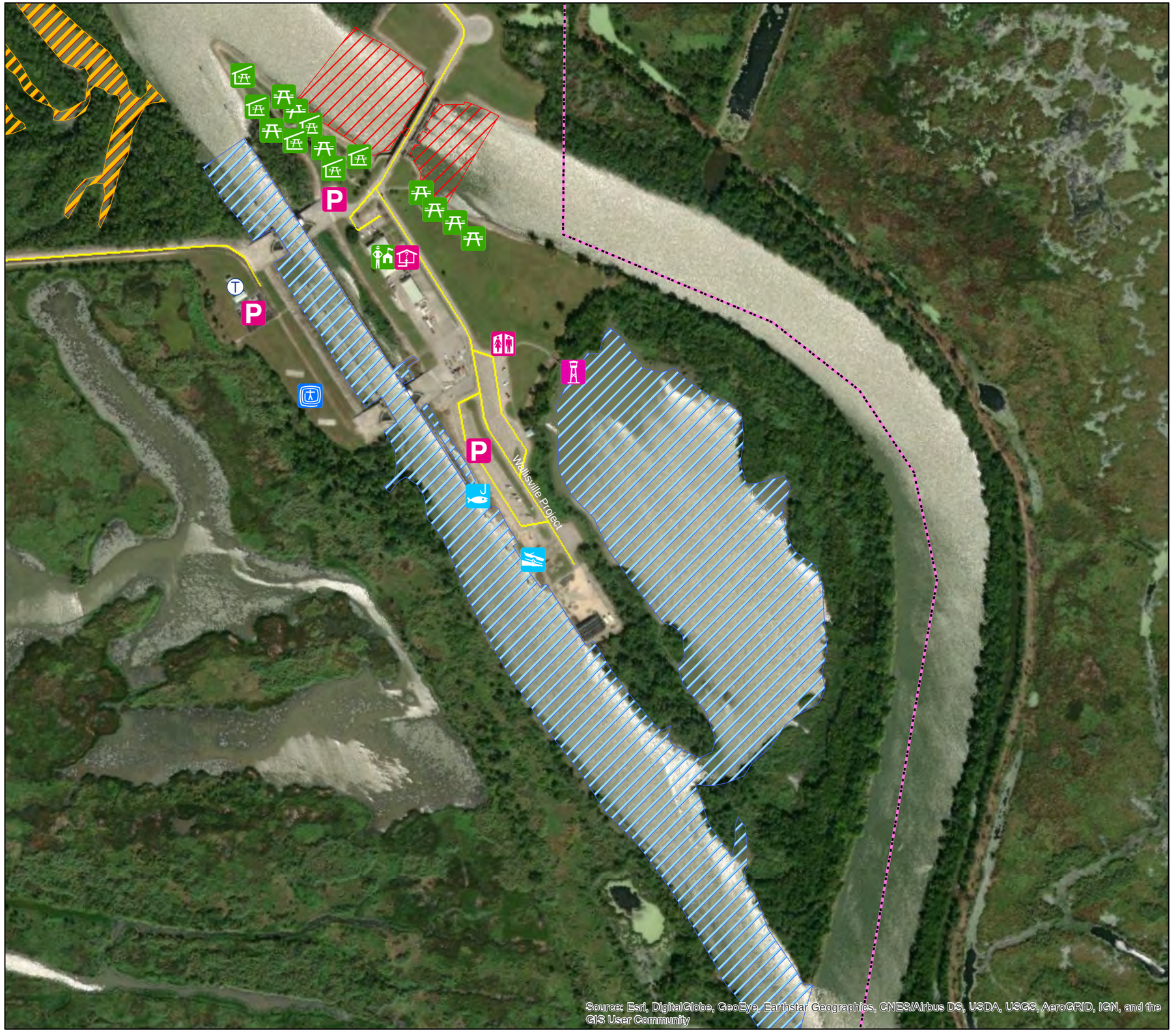
WALLISVILLE LAKE MASTER PLAN

PARK PLATE INDEX

N

0 0.5 1 2 Miles

DATE:	MAP NO.
MAY 2022	WL20MP-OR-0B



ITEM	EXISTING
BOAT RAMP	
COURTESY DOCK	
GROUP CAMPSITES	
CAMPSITES	
ELECTRICAL HOOK-UP	
PICNIC SHELTER	7
PICNIC SITES	10
VAULT TOILET	1
RESTROOMS	1
SHOWERS	
DUMP STATION	

- BOAT RAMP
- FISHING DOCK/PIER
- OBSERVATION POINT
- PARKING
- PICNIC SHELTER
- PICNIC SITE
- RANGER STATION
- RESTROOM
- VAULT TOILET
- VISITOR INFORMATION
- VOLUNTEER VILLAGE
- WATER SURFACE: DESIGNATED NO WAKE AREAS
- WATER SURFACE: FISH AND WILDLIFE SANCTUARY
- WATER SURFACE: RESTRICTED
- FEE BOUNDARY

U.S. ARMY CORPS OF ENGINEERS
GALVESTON DISTRICT

WALLISVILLE LAKE — TRINITY RIVER, TEXAS

WALLISVILLE LAKE MASTER PLAN

RECREATIONAL AREAS (TRINITY RIVER ISLAND RECREATION AREA)

N

0 200 400 800 Feet

DATE:	MAP NO.
MAY 2022	WL20MP-OR-01

ITEM	EXISTING
BOAT RAMP	1
COURTESY DOCK	
GROUP CAMPSITES	
CAMPSITES	
ELECTRICAL HOOK-UP	
PICNIC SHELTER	
PICNIC SITES	1
VAULT TOILET	
RESTROOMS	
SHOWERS	
DUMP STATION	

- BOAT RAMP
- OBSERVATION POINT
- PARKING
- PICNIC SITE
- WILDLIFE VIEWING
- NATURAL SURFACE TRAIL
- BOARDWALK
- WATER SURFACE: FISH AND WILDLIFE SANCTUARY
- FEE BOUNDARY

U.S. ARMY CORPS OF ENGINEERS
GALVESTON DISTRICT

WALLISVILLE LAKE — TRINITY RIVER, TEXAS

WALLISVILLE LAKE MASTER PLAN

RECREATIONAL AREAS (J.J. MAYES WILDLIFE TRACE)

N

0 625 1,250 2,500 Feet

DATE:	MAP NO.
MAY 2022	WL20MP-OR-02

ITEM	EXISTING
BOAT RAMP	1
COURTESY DOCK	
GROUP CAMPSITES	
CAMPSITES	
ELECTRICAL HOOK-UP	
PICNIC SHELTER	
PICNIC SITES	
VAULT TOILET	
RESTROOMS	
SHOWERS	
DUMP STATION	

CANOE

PARKING

WILDLIFE VIEWING

NATURAL SURFACE TRAIL

WATER SURFACE: FISH AND WILDLIFE SANCTUARY

FEE BOUNDARY

U.S. ARMY CORPS OF ENGINEERS
GALVESTON DISTRICT

WALLISVILLE LAKE — TRINITY RIVER, TEXAS

WALLISVILLE LAKE MASTER PLAN

RECREATIONAL AREAS (MOUTH OF THE TRINITY RIVER WATERBIRD ROOKERY)

N

0 225 450 900 Feet

DATE:	MAP NO.
MAY 2022	WL20MP-OR-03

ITEM	EXISTING
BOAT RAMP (CANOE)	
COURTESY DOCK	
GROUP CAMPSITES	
CAMPSITES	
ELECTRICAL HOOK-UP	
GROUP PICNIC SHELTER	
PICNIC SITES	
RESTROOMS	
VAULT TOILET	
SHOWERS	
DUMP STATION	

NATURAL SURFACE TRAIL

WATER SURFACE: FISH AND WILDLIFE SANCTUARY

FEE BOUNDARY

U.S. ARMY CORPS OF ENGINEERS
GALVESTON DISTRICT

WALLISVILLE LAKE — TRINITY RIVER, TEXAS

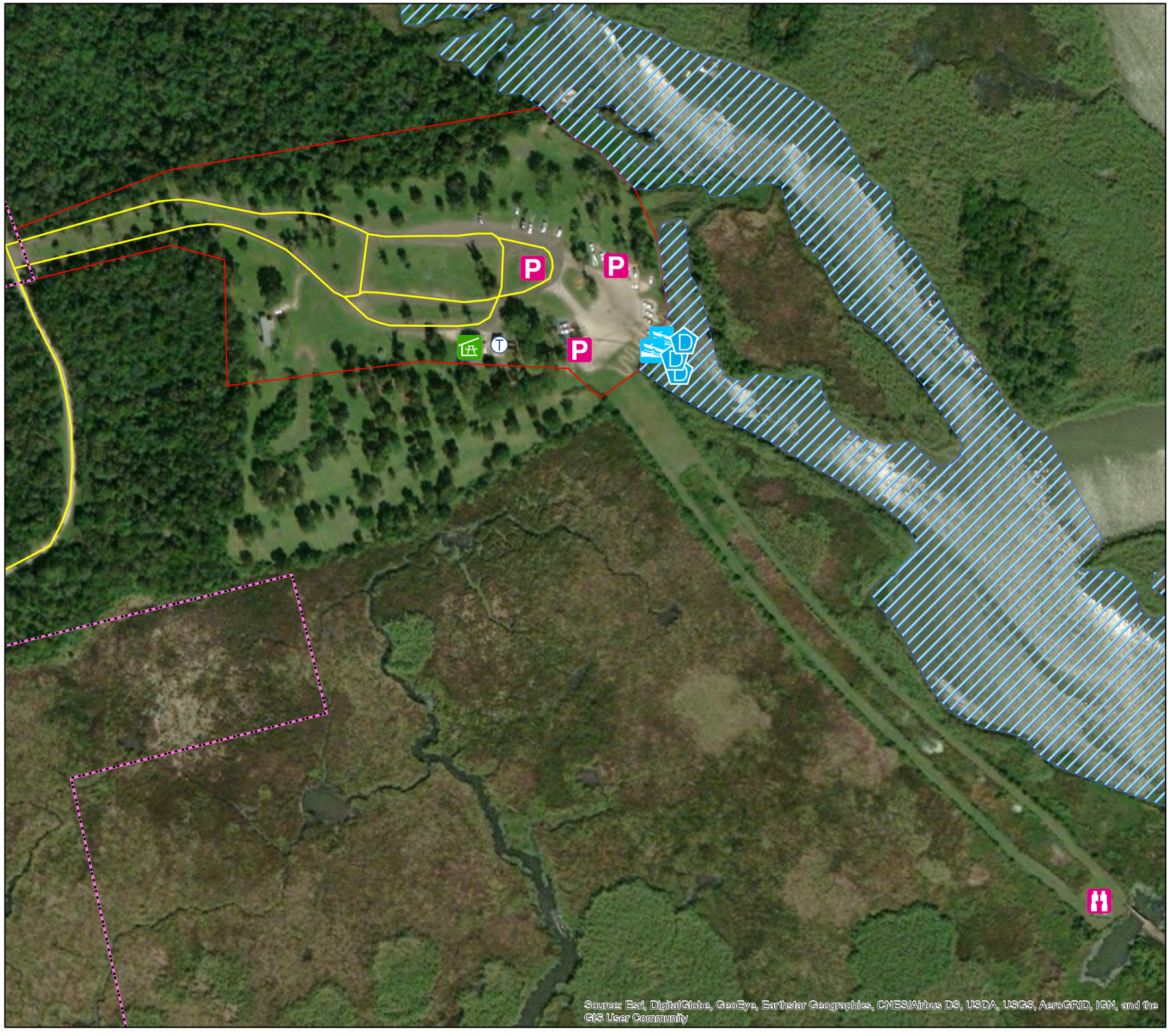
WALLISVILLE LAKE MASTER PLAN

RECREATIONAL AREAS (OLD WALLISVILLE TOWNSITE)

N

0 125 250 500 Feet

DATE:	MAP NO.
MAY 2022	WL20MP-OR-04



ITEM	EXISTING
BOAT RAMP	1
COURTESY DOCK	3
GROUP CAMPSITES	
CAMPSITES	
ELECTRICAL HOOK-UP	
GROUP PICNIC SHELTER	1
PICNIC SITES	
VAULT TOILET	1
RESTROOMS	
SHOWERS	
DUMP STATION	

BOAT RAMP

COURTESY DOCK

GROUP PICNIC SHELTER

PARKING

VAULT TOILET

WILDLIFE VIEWING AREA

PARK LIMITS

WATER SURFACE: DESIGNATED NO WAKE AREAS

FEE BOUNDARY

U.S. ARMY CORPS OF ENGINEERS
GALVESTON DISTRICT

WALLISVILLE LAKE — TRINITY RIVER, TEXAS

WALLISVILLE LAKE MASTER PLAN

RECREATIONAL AREAS (HUGO POINT PARK)

N

0 125 250 500 Feet

DATE:	MAP NO.
MAY 2022	WL20MP-OR-05

ITEM	EXISTING
BOAT RAMP	
COURTESY DOCK	
GROUP CAMPSITES	
CAMPSITES	
ELECTRICAL HOOK-UP	
GROUP PICNIC SHELTER	1
PICNIC SITES	10
VAULT TOILET	1
RESTROOMS	
SHOWERS	
DUMP STATION	

- CANOE ACCESS
- FISHING DOCK/PIER
- GROUP PICNIC SHELTER
- PICNIC SITE
- VAULT TOILET
- WILDLIFE VIEWING AREA
- WALKING/HIKING TRAIL
- PARK LIMITS
- WATER SURFACE: DESIGNATED NO WAKE AREAS
- FEE BOUNDARY

U.S. ARMY CORPS OF ENGINEERS
GALVESTON DISTRICT

WALLISVILLE LAKE — TRINITY RIVER, TEXAS

WALLISVILLE LAKE MASTER PLAN

RECREATIONAL AREAS (CEDAR HILL PARK)

N

0 100 200 400 Feet

DATE:	MAP NO.
MAY 2022	WL20MP-OR-06

APPENDIX B - NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) DOCUMENTATION

Draft
Environmental Assessment for the Wallisville Lake Master Plan

Trinity River
Trinity River Basin

Liberty and Chambers Counties, Texas

US Army Corps of Engineers ®
Galveston District

DRAFT May 2022

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ENVIRONMENTAL ASSESSMENT ORGANIZATION

This Environmental Assessment (EA) evaluates the potential environmental and socioeconomic impacts of the Wallisville Lake Master Plan revision. This EA will facilitate the decision process regarding the Proposed Action and alternatives.

SECTION 1	*INTRODUCTION* of the Proposed Action summarizes the purpose of and need for the Proposed Action, provides relevant background information, and describes the scope of the EA.
SECTION 2	*PROPOSED ACTION AND ALTERNATIVES* examines alternatives for implementing the Proposed Action and describes the recommended alternative.
SECTION 3	*AFFECTED ENVIRONMENT* describes the existing environmental and socioeconomic setting.
	ENVIRONMENTAL CONSEQUENCES identify the potential environmental and socioeconomic effects of implementing the Proposed Action and alternatives.
SECTION 4	*CUMULATIVE IMPACTS* describes the impact on the environment that may result from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions.
SECTION 5	*COMPLIANCE WITH ENVIRONMENTAL LAWS* provides a listing of environmental protection statutes and other environmental requirements.
SECTION 6	*IRRETRIEVABLE AND IRREVERSIBLE COMMITMENT OF RESOURCES* identifies any irreversible and irretrievable commitments of resources that would be involved in the Proposed Action should it be implemented.
SECTION 7	*PUBLIC AND AGENCY COORDINATION* provides a listing of individuals and agencies consulted during preparation of the EA.
SECTION 8	*REFERENCES* provide bibliographical information for cited sources.
SECTION 9	*ACRONYMS/ABBREVIATIONS*
SECTION 10	*LIST OF PREPARERS* identifies persons who prepared the document and their areas of expertise.
APPENDIX B	National Environmental Policy Act Coordination and Scoping

TABLE OF CONTENTS

DRAFT ENVIRONMENTAL ASSESSMENT
Wallisville Lake Master Plan
Liberty and Chambers Counties, TX

SECTION 1: INTRODUCTION

The 2022 Wallisville Lake Master Plan (Master Plan or Plan) is the strategic land use management document that guides the comprehensive management and development actions related to all project recreational, natural, and cultural resources throughout the life of the water resource project. The Master Plan guides the execution of efficient and cost-effective management, development, and use of project lands. The Master Plan is a vital tool for the responsible stewardship and sustainability of project resources for the benefit of present and future generations.

1.1 PROJECT LOCATION AND SETTING

The Wallisville Lake Project and Dam are located near the mouth of the Trinity River in Chambers and Liberty Counties, Texas, between the major metropolitan areas of Houston, Beaumont, and Galveston. An estimated 23,277 acres of bottomland delta and adjacent terrace margins were acquired for the original Project. These lands extend from approximately 2.5 miles north of the Chambers/Liberty County line southward through the lowland delta for approximately 6 miles. The southern margin of Federal property is approximately 2 miles from Trinity Bay, the northeastern lobe of the greater Galveston Bay estuary system. While the Project has changed and there is no longer a reservoir pool, the Project boundary has not changed.

The dam and associated infrastructure, as well as all the project lands which were acquired for the Wallisville Lake project, are federally owned and are managed by the U.S. Army Corps of Engineers Galveston District (USACE-SWG).

Congressional authority for the construction of Wallisville Lake and programs are found in Chapter 1 of the 2022 Wallisville Lake Master Plan. The entire 2022 Master Plan and Appendices are incorporated herein by reference.

1.2 PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of the Proposed Action is to ensure that the conservation and sustainability of the land, water, and recreational resources on Wallisville Lake comply with applicable environmental laws and regulations and to maintain quality lands for future public use. The 2022 Master Plan is intended to serve as a comprehensive land and recreation management plan with an effective life of approximately 25 years.

The need for the Proposed Action is to bring the 1996 Master Plan up-to-date and to reflect ecological, socio-political, and socio-demographic changes that are currently impacting Wallisville Lake, as well as those changes anticipated to occur through 2047. Changes in outdoor recreation trends, regional land use, population, current legislative requirements and USACE management policy have indicated the need to revise the plan. Additionally, increasing fragmentation of wildlife habitat, national policies related to climate change and growing demand for recreational access and protection of natural resources are all factors affecting Wallisville Lake and the

surrounding region in general. In response to these continually evolving trends, the USACE determined that a full revision of the 1996 plan would be required.

The following factors may influence reevaluation of management practices and land uses:

- Changes in national policies or public law mandates
- Operations and maintenance budget allocations
- Recreation area closures
- Facility and infrastructure improvements
- Cooperative agreements with stakeholder agencies (such as Texas Parks and Wildlife Department [TPWD]) to operate and maintain public lands
- Outdoor recreation trends identified in the Texas Outdoor Recreation Plan (TORP)
- Ecoregion priorities identified in the Texas Conservation Action Plan (TCAP)
- Evolving public concerns

As part of the master planning process, the project delivery team evaluated public comments and current land uses, determined any necessary changes to land classifications, and formulated proposed alternatives. As a result of public coordination and a public information meeting, alternatives were developed, and this EA was initiated.

1.3 SCOPE OF THE PROPOSED ACTION

This EA was prepared to evaluate existing conditions and potential impacts of proposed alternatives associated with implementation of the 2022 Master Plan. The alternative considerations were formulated with special attention given to revised land classifications, new resource management objectives, and a conceptual resource plan for each land classification category. This EA was prepared pursuant to NEPA, Council on Environmental Quality (CEQ) regulations (40 CFR 1500–1508), and the USACE implementing regulations, Policy and Procedures for Implementing NEPA, ER 200-2-2.

SECTION 2: PROPOSED ACTION AND ALTERNATIVES

The project need is to revise the 1996 Master Plan so that it is compliant with current USACE regulations and guidance, incorporates public needs, and recognizes surrounding land use and recreational trends. As part of this process, which includes public outreach and comment, two alternatives were developed for evaluation, including a No Action Alternative. The alternatives were developed using land classifications that indicate the primary use for which project lands would be managed. USACE regulations specify five possible categories of land classification: Project Operations (PO), High Density Recreation (HDR), Mitigation, Environmentally Sensitive Areas (ESA), and Multiple Resource Managed Lands (MRML). The MRML classification is divided into four subcategories: Low Density Recreation (MRML-LDR), Wildlife Management (MRML-WM), Vegetative Management (MRML-VM), and Future/Inactive Recreation (MRML-IFR) Areas.

The Proposed Action evaluated in this EA is compared to the No Action Alternative. The USACE guidance recommends the establishment of resource goals and objectives for purposes of development, conservation, and management of natural, cultural, and man-made resources for a project. Goals describe the desired end state of overall management efforts, whereas objectives are concise statements describing measurable and attainable management activities that support the stated goals. Goals and objectives are guidelines for obtaining maximum public benefits while minimizing adverse impacts on the environment and are developed in accordance with 1) authorized project purposes, 2) applicable laws and regulations, 3) resource capabilities and suitability, 4) regional needs, 5) other governmental plans and programs, and 6) expressed public desires.

In the context of the 2022 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 Master Plan goals. The objectives in the 2022 Master Plan are intended to provide project benefits, meet public needs, and foster environmental sustainability of Belton Lake to the greatest extent possible. The goals for the Wallisville Lake Master Plan are:

- Goal A: Provide the best management practices (BMPs) 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 natural objectives and other state and regional goals and programs.

A detailed discussion of these goals can be found in Chapter 3 of the 2022 Master Plan. Specific resource objectives to accomplish these goals can be found in Chapter 3.3 of the 2022 Master Plan.

In addition to the above goals, USACE management activities are also 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 on 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.

The Proposed Action would meet regional goals associated with good stewardship of land and water resources, would meet regional recreation goals, would address identified recreational trends, and would allow for continued use and development of project lands without violating national policies or public laws.

2.1 ALTERNATIVE 1: NO ACTION

The No Action Alternative serves as a basis for comparison to the anticipated effects of the other action alternatives, and its inclusion in this EA is required by NEPA and CEQ regulations (40 CFR § 1502.14(d)). Under the No Action Alternative, no new resource analyses or land-use classifications would occur at the project. Instead, the USACE would continue to manage Wallisville Lake’s natural resources as set forth in the 1996 Master Plan. The 1996 Master Plan would continue to provide the only source of comprehensive management guidelines and philosophy. However, the 1996 Master Plan is out of date and does not reflect the current ecological, socio-political, or socio-demographic conditions of Wallisville Lake. The No Action Alternative, while it does not meet the purpose of, or need for, the Proposed Action, serves as a benchmark of existing conditions against which federal actions can be evaluated, and as such, the No Action Alternative is included in this EA, as prescribed by CEQ regulations.

2.2 ALTERNATIVE 2: PROPOSED ACTION

Under the Proposed Action, the 2022 Master Plan would be reviewed, coordinated with the public, revised to comply with USACE regulations and guidance,

and to reflect changes in the land management and land uses that have occurred over time or are expected to occur during the lifespan of the revised MP. Key components include the reclassifications of land and the water surface, adoption of new resource objectives, and preparation of a resource plan that would guide the management of each classification to sustain the lake's natural resources and provide recreational experiences for the next 25 years.

The proposed land classification categories are defined as follows:

- Project Operations (PO): Lands required for the dam, spillway, switchyard, levees, dikes, offices, maintenance facilities, and other areas used solely for the operation of Wallisville Lake.
- High Density Recreation (HDR): Lands developed for the intensive recreational activities for the visiting public including day use and campgrounds. These areas could also be for commercial concessions and quasi-public development.
- Environmentally Sensitive Areas (ESA): Areas where scientific, ecological, cultural, or aesthetic features have been identified.
- Multiple Resource Management Lands (MRML): Allows for the designation of a predominate use with the understanding that other compatible uses may also occur on these lands.
    - Wildlife Management (WM): Lands designated for stewardship of fish and wildlife resources.
    - Low Density Recreation (LDR)**:** Lands with minimal development or infrastructure that support passive recreation use (primitive camping, fishing, hunting, trails, wildlife, viewing, etc.).
    - Vegetative Management (VM): Lands designated for stewardship of forest, prairie, and other native vegetative cover.
    - Future or Inactive Recreation Areas: Areas with site characteristics compatible with potential future recreational development or recreation areas that are closed. Until there is an opportunity to develop or reopen these areas, they will be managed for multiple resources.
- Water Surface: Allows for surface water zones.
    - Restricted: Water areas restricted for Wallisville Lake operations, safety, and security.
    - Designated No-Wake: Water areas to protect environmentally sensitive shoreline areas and recreational water access areas from disturbance and areas to protect public safety.
    - Open Recreation: Water areas available for year-round or seasonal water-based recreational use.

Section 4.2 of the 2022 Master Plan provides details of these classifications. Table 1 lists the proposed land and water surface classification changes and acres. Table 2 provides the justification for the proposed reclassifications.

Table 1 - Change from Prior Land Classification to New Land Classification

Prior Land Classifications (1996)	Acres	New Land Classifications (2022)	Acres
Operations	-	Project Operations (PO)	160
		High Density Recreation (HDR)	64
Environmentally Sensitive Areas	-	Environmentally Sensitive Areas (ESA)	14,679
Low Density Recreation	-	Multiple Resource Management – Low Density Recreation (LDR)	121
Fish and Wildlife	-	Multiple Resource Management – Wildlife Management (WMA)	787
		Future/Inactive Recreation Areas	6
TOTAL	**18,949**		**15,817**
Water Surface	5,140	Open Recreation	4,963
		Designated No-Wake	1,498
		Fish and Wildlife Sanctuary	384
		Restricted	4
TOTAL	**5,140**		**6,849**
TOTAL FEE	**24,089**		**22,666**

Table 2 - Justification for the Proposed Reclassification

Land Classification	Description of Changes	Justification
Project Operations (PO)	A land classification of Operations is discussed in the 1996 Plan and various fee lands are described to be designated as Operations. The areas described include much of the same lands as the 2022 Plan is presenting as Project Operations. No map or	All lands classified as PO are managed and used primarily in support of critical operational requirements related to the project missions of navigation, salinity control, and water supply. These include lands

Land Classification	Description of Changes	Justification
	measurement of acres is provided in the 1996 Plan. Changes include a name change per guidance to Project Operations and classifying 160 acres or 1% of project fee lands to PO.	located near the Project Office, lock and dam, non-overflow dams and other water control structures. The Trinity River Island Visitor Center area and associated lands contain incidental day use recreational elements under the PO classification as public access can be controlled as needed and the primary purpose of the lands is used for the operation of the project.
High Density Recreation (HDR)	No lands in the 1996 Plan are designated as HDR. Changes include classifying 64 acres or less that 1% of project fee lands to HDR.	The designation of HDR lands is limited to day use and campground areas associated with Cedar Hill Park, Hugo Point Park, and portions of the JJ Mayes Wildlife Trace. The amount of intensive recreational activities at each of the locations is minimal and will remain at that level. The designated HDR areas include more than passive recreational uses including the development of restrooms, parking lots and picnic structures.
Environmentally Sensitive Areas (ESA)	A land classification of Environmentally Sensitive Area is presented in the 1996 Plan and various fee lands are described to include at the time of publication the Endangered Species Management Zones, bird rookeries, and a portion of land near the Old Wallisville Townsite. The areas described include the same lands as the 2022 Plan is presenting as ESA. No map or measurement of acres is provided in the 1996 Plan. Changes include classifying 14,679 acres to ESA or 93% of project fee lands.	Classification of 14,679 acres was determined by the study team to be necessary to provide a high level of protection for those areas supporting significant habitat, views, or cultural sites. Classifying these areas as ESA will afford these areas with the highest level of protection from disturbance. The reclassification of 14,679 acres to ESA will have no effect on current or projected public use.

Land Classification	Description of Changes	Justification
MRML – Low Density Recreation (LDR)	A land classification of Low-Density Recreation is presented in the 1996 Plan which included Cedar Hill Park. Changes include classifying 121 acres to MRML-LDR or less than 1% of project fee lands.	Classification of 121 acres of MRML-LDR includes changing the fee lands at Cedar Hill Park to HDR. Also, designating the trails at both JJ Mayes Wildlife Trace and Hugo Point as LDR to support the passive recreation uses.
MRML – Wildlife Management (WM)	A land classification of Fish and Wildlife is presented in the 1996 Plan. Changes include a name change per guidance to MRML-Wildlife Management and classifying 787 acres to MRML-WM or 5% of project fee lands.	Classification of 787 acres was determine by the study to be necessary to support the hunting areas to allow the stewardship of fish and wildlife resources. The Lost Lake Oil and Gas Field is included in this classification.
MRML – Vegetation Management (VM)	No lands in the 1996 Plan are designated as VM. No MRML-VM lands are proposed in the 2022 Plan.	n/a
Future or Inactive Recreation Areas (FIR)	No lands in the 1996 Plan are designated as FIR. Changes include classifying 6 acres to FIR or less than 1% of project fee lands.	Sites for future recreation area include a boat access point along the Trinity River north of Interstate 10 and in the proximity of the Old Wallisville Townsite. Until there is an opportunity to develop the areas, they will be managed for multiple resources.

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

2.3 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER CONSIDERATION

Other alternatives to the Proposed Action were initially considered as part of the scoping process for this EA. However, none met the purpose of and need for the Proposed Action or the current USACE regulations and guidance. Furthermore, no other alternatives addressed public concerns. Therefore, no other alternatives are being carried forward for analysis in this EA.

SECTION 3: AFFECTED ENVIRONMENT AND CONSEQUENCES

This section of the EA describes the natural and human environments that exist at the project and the potential impacts of the No Action Alternative (Alternative 1) and Proposed Action (Alternative 2), outlined in Section 2.0 of this document. Only those issues that have the potential to be affected by any of the alternatives are described, per CEQ guidance (40 CFR § 1501.7 [3]). Some topics are limited in scope due to the lack of direct effect from the Proposed Action on the resource or because that resource is not located within the project area. For example, no body of water in the Wallisville Lake watershed is designated as a federally designated Wild or Scenic River, so this resource will not be discussed.

Impacts (consequence or effect) can be either beneficial or adverse and can be either directly related to the action or indirectly caused by the action. Direct effects are caused by the action and occur at the same time and place (40 CFR § 1508.8 [a]). Indirect effects are caused by the action and are later in time or further removed in distance but are still reasonably foreseeable (40 CFR § 1508.8 [b]). As discussed in this section, the alternatives may create temporary (less than one year), short-term (up to three years), long-term (three to ten years following the master plan revision), or permanent effects.

Whether an impact is significant depends on the context in which the impact occurs and the intensity of the impact (40 CFR § 1508.27). The context refers to the setting in which the impact occurs and may include society as a whole, the affected region, the affected interests, and the locality. Impacts on each resource can vary in degree or magnitude from a slightly noticeable change to a total change in the environment. For the purpose of this analysis, the intensity of impacts would be classified as negligible, minor, moderate, or major. The intensity thresholds are defined as follows:

- Negligible: A resource would not be affected, or the effects would be at or below the level of detection, and changes would not be of any measurable or perceptible consequence.
- Minor: Effects on a resource would be detectable, although the effects would be localized, small, and of little consequence to the sustainability of the resource. Mitigation measures, if needed to offset adverse effects, would be simple and achievable.
- Moderate: Effects on a resource would be readily detectable, long-term, localized, and measurable. Mitigation measures, if needed to offset adverse effects, would be extensive and likely achievable.
- Major: Effects on a resource would be obvious and long-term and would have substantial consequences on a regional scale. Mitigation measures to offset the adverse effects would be required and extensive, and success of the mitigation measures would not be guaranteed.

3.1 LAND USE

Construction of the Wallisville Lake Dam began in 1966 and due to multiple delays and project re-evaluations, the project was never constructed as intended. The total project area at Wallisville Lake encompasses 22,666 acres in fee owned land and

water, in addition to 1,169 acres of flowage easement lands. Wallisville Lake contains 64 acres designated as High Density Recreation. These lands are developed for intensive recreational activities for the visiting public including day use and campgrounds.

In addition to the USACE-operated areas, USACE has 33 outgrants issued in the form of permits or leases to recreational partners, referred to as grantees. Section 2.6.2 of the Master Plan has more information on outgrant specifics. Each grantee is responsible for the operation and maintenance of their leased area, and although USACE does not provide direct maintenance within any of the leased locations, it may occasionally lend support where appropriate. The USACE reviews requests and ensures compliance with applicable laws and regulations for proposed activities in all leased and USACE-operated HDR areas. USACE works with partners to ensure that recreation areas are managed and operated in accordance with the objectives prescribed in Chapter 3 of the Master Plan.

Section 5.3 of the 2022 Master Plan further describes recreational areas at Wallisville Lake.

3.1.1 ALTERNATIVE 1: NO ACTION

The No Action Alternative for Wallisville Lake is defined as the USACE taking no action, which means the operation and maintenance of USACE lands at Wallisville Lake would continue as outlined in the existing 1996 Master Plan. No new resources analysis, resources management objectives, or land-use classifications would occur. Although this alternative does not result in a Master Plan that meets current regulations and guidance, there would be no direct or indirect impacts on land uses surrounding Wallisville Lake.

3.1.2 ALTERNATIVE 2: PROPOSED ACTION

The objectives for revising the Wallisville Lake Master Plan were to describe current and foreseeable land uses while considering expressed public opinion and USACE policies that have evolved to meet day-to-day operational needs.

The USACE intends to continue to operate the day use areas and access points by maintaining and improving existing facilities with no plans for expansion. Emphasis will be placed on improvements such as upgrading aging water and electrical infrastructure, improving service facilities such as restrooms, improving energy efficiency, and sustainability of facilities.

The recommended changes for the Proposed Action were developed to help fulfill the regional goals associated with good stewardship of natural resources that would allow for the continued use and development of project lands. For example, 14,679 acres would be reclassified as ESA compared to the No Action Alternative which contains 0 acres (see Table 1 and Table 2). The ESA reclassifications, as well as the WMA reclassifications would afford protection to and potentially benefit wildlife, wildlife habitats, sensitive species habitat, and cultural resources. The protection and appropriate management of these areas aligns with Resource Goals B, C, D, and E as described in Section 3.2 of the revised Master Plan, as well as numerous cultural and natural resource objectives listed in Tables 3.3-3.5 of the revised Master Plan. The

reclassification of 64 acres as HDR, 121 acres as LDR, and approximately 5,000 acres as Open Recreation will serve to implement the recreation goals and objectives as outlined in the Master Plan.

No changes in land use are expected, as recreation and project maintenance areas and operation areas will largely remain the same. As such, no direct or indirect impacts are anticipated as a result of implementing the 2022 Wallisville Lake Master Plan.

3.2 WATER RESOURCES

The 17,913 square mile Trinity River Basin, which feeds Wallisville Lake, is one of the largest river basins within Texas. The total basin is 550 miles long with an average annual flow of 5.7 million acre-feet. From the confluence of its Elm and West Forks near Dallas, the Trinity River flows to Trinity Bay, which drains to the Gulf of Mexico. Smaller streams within the basin include the Clear, East, Elm, and West forks of the Trinity River and Cedar, Chambers, and Richland creeks.

The water resources for Wallisville Lake can be classified into three categories; surface water, groundwater, and wetlands. The primary water resource in the Wallisville Lake area is surface water.

3.2.1 SURFACE WATER

The Wallisville Project is located near the mouth of the Trinity River in Chambers and Liberty Counties, Texas between the major metropolitan areas of Houston, Beaumont, and Galveston. The Wallisville Lock and Dam does not retain water and is used primarily for salinity control, meaning there is no impounded reservoir.

Congress first authorized the construction of the project through the River and Harbor Act of October 22, 1962. The government purchased the property and construction began in 1966. At this point, the project would have been a 19,700 acre reservoir with surface elevation of four feet above mean sea level. A contract for water supply, salinity control, and recreation was signed between the U.S. Army Corps of Engineers, the Trinity River Authority, the Chambers-Liberty Counties Navigation District, and the City of Houston and was approved by the Secretary of the Army on February 2, 1968. In September 1971, a lawsuit was filed by the Sierra Club in U.S. District Court against the construction of the project. At approximately 72 percent complete, the construction was halted in 1973 by a summary judgment decision of the court. Between 1973 and 1987 the project was revised and reevaluated. And in May of 1987 the Fifth Circuit Court of Appeals dismissed the lawsuit in favor of the government and lifted the injunction against continuing construction. Then in November of 1989 a pair of nesting bald eagles was discovered near Miller Lake and the project was reevaluated again. It was this reevaluation that gave rise to the project as it stands today: a set of levees along the east and west banks of the Trinity in conjunction with the dam across the Trinity, the navigation lock and engineered navigation channel, the gated control structure on main stem of the Trinity, Structure A in the Cut-Off near Pickett’s Bayou, Structure B at the head of Lost River, and our parks and recreation areas.

3.2.2 GROUNDWATER

The primary source of groundwater in the Wallisville Lake area is the Gulf Coast aquifer. The Gulf Coast aquifer runs parallel to the Gulf of Mexico coastline from the Louisiana border to the border of Mexico. The Gulf Coast aquifer consists of multiple other aquifers including the Jasper, Evangeline, and Chicot aquifers. The Gulf Coast aquifer's waters are used for municipal, industrial, and irrigation purposes.

Water quality varies with depth and locality. It is generally good in the central and northeastern parts of the aquifer, where total dissolved solids concentrations are less than 500 milligrams per liter but is more saline to the south, where total dissolved solids are typically 1,000 to more than 10,000 milligrams per liter and where the productivity of the aquifer decreases. Areas of increased salinity along the central and eastern Gulf Coast may be associated with saltwater intrusion in response to groundwater pumping or to brine migration in response to oil field operations and natural flows from salt domes intruding into the aquifer.

3.2.3 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 (USEPA). 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 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.

Table 3 lists the acreages of various types of wetlands present at Wallisville Lake. Wetland classifications, as depicted in Figure 1, are derived from the U.S. Fish and Wildlife Service's (FWS) National Wetland Inventory (NWI) (USFWS, 2022).

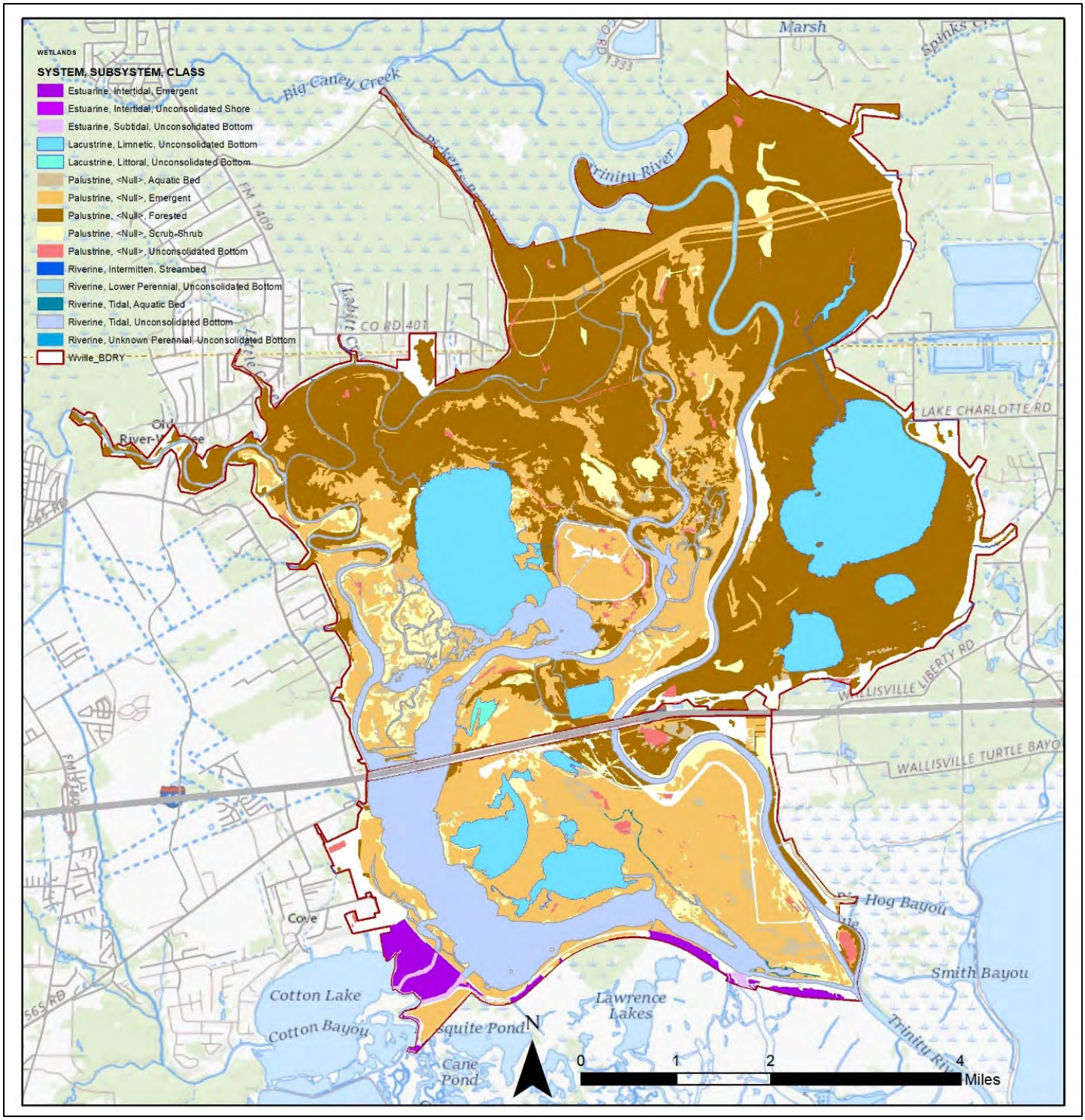

Figure 1 - NWI mapped wetlands at Wallisville Lake

Table 3 - Wetland Resources

System	Sub-system	Class	Class Acres
Estuarine	Intertidal	Emergent	1,768
Estuarine	Intertidal	Unconsolidated Shore	2
Estuarine	Subtidal	Unconsolidated Bottom	1,926
Lacustrine	Limnetic	Unconsolidated Bottom	2,618
Lacustrine	Littoral	Unconsolidated Bottom	28
Palustrine	-	Aquatic Bed	480
Palustrine	-	Emergent	5,229
Palustrine	-	Forested	9,154
Palustrine	-	Scrub-Shrub	1,127
Palustrine	-	Unconsolidated Bottom	173
Riverine	Intermittent	Streambed	21
Riverine	Lower Perennial	Unconsolidated Bottom	4,005
Riverine	Tidal	Aquatic Bed	13
Riverine	Tidal	Unconsolidated Bottom	2,574
Riverine	Unknown Perennial	Unconsolidated Bottom	4

Source: USFWS National Wetlands Inventory website

3.2.4 WATER QUALITY

Wallisville Lake is identified as part of the lower portion of Segment ID 0801 within the Trinity River Basin. According to the 2020 Texas Commission on Environmental Quality (TCEQ) Texas Integrated Report for Clean Water Act Section 305(b) and 303(d), Wallisville Lake had impairments for recreational use due to bacteria in the water, and depressed dissolved oxygen in the water (TCEQ 2020). Both impairments were listed as category 5c, meaning more data is needed to determine a management strategy or a Total Maximum Daily Load (TMDL).

Additionally, TCEQ screens bodies of water for multiple uses such as Aquatic Life Use, Recreation Use, General Use, and Domestic Water Supply Use. Wallisville Lake is listed as Fully Supporting (FS) for Aquatic Life Use, Recreation Use, and Domestic Water Use. For General Use, Wallisville Lake had one rating for Screening Level Concern (CS) for the Chlorophyll-a parameter, all other parameters for General Use were either FS or No Concern (NC).

3.2.5 ALTERNATIVE 1: NO ACTION

Operation and maintenance of USACE lands and waters at Wallisville Lake would continue as outlined in the existing 1996 Master Plan. No new resources analysis, resources management objectives, or land-use classifications would occur. There would be no direct or indirect impacts on the hydrology, groundwater or wetlands in and around Wallisville Lake.

3.2.6 ATERNATIVE 2: PROPOSED ACTION

The reclassifications included in the Proposed Action would allow land management and land uses to be compatible with the goals of good stewardship of water resources. The classification of 14,679 acres as ESA (compared to the No Action Alternative would remain unclassified) directly supports resource goals B, D, and E and several natural resource management objectives including minimizing activities that disturb the aesthetic value and protect natural habitat, all of which are further described in Chapter 3 of the revised Master Plan. The reclassification of unclassified lands to 64 acres of HDR land classification will limit future intensive development, thus reducing the potential for erosion and sedimentation. Natural vegetation communities act as buffers to trap runoff, thus potentially reducing sedimentation. The new resources objectives will provide a level of consistency in beneficial management practices that would not occur with the No Action Alternative. Land reclassifications and new resource objectives proposed as part of the Proposed Action would have moderate long-term beneficial impacts on water quality. No direct or indirect impacts to groundwater or wetlands are anticipated with implementation of the 2022 Master Plan.

3.3 CLIMATE

Wallisville Lake's proximity to the Gulf of Mexico and Galveston Bay system result in high humidity and a fairly uniform climate. The average monthly temperatures range from 52°F in January to about 82 °F in July and August. Freezing temperatures are infrequent and of very short duration. Fog can occur in the area at any time of the year but is most frequent in winter. The average growing season between frosts is about 300 days. The principal wind regimes dominating the Project Area are persistent southeasterly winds from March through November associated with marine tropical air masses. Short-lived but strong northerly winds can occur from December through February, generally in association with passage of polar fronts.

The mean annual precipitation in the Project Area is about 51 inches and the average annual lake evaporation rate is 46 to 47 inches. Precipitation in the Project Area occurs in the form of rainfall from intense local thunderstorms of short duration, general storms which extend over a period of several days, and torrential rainfall associated with tropical disturbances and hurricanes. The Wallisville area is subject to occasional periods of intense precipitation, occasionally reaching 10 to 14 inches in 24 hours. Such rains may occur at any time of the year but are commonly associated with tropical storms and hurricanes during the months of May through November.

The frequency that any point on the Texas coast may be subjected to destructive wind forces of hurricane intensity is estimated to be once every ten years. Because of the proximity of the Wallisville area to the Gulf of Mexico, it would be subject to influence by tropical storms or hurricanes. A storm surge of + 13.5 feet mean sea level (msl) near the City of Anahuac can be expected to occur about once in 100 years and a storm tide of +4 feet msl can be expected about once in 3. 7 years.

3.3.1 ALTERNATIVE 1: NO ACTION

The No Action Alternative does not involve any activities that would contribute to changes in existing conditions. There would be no direct or indirect impacts on climate as a result of implementing the No Action Alternative.

3.3.2 ATERNATIVE 2: PROPOSED ACTION

Revision of the Wallisville Lake Master Plan would have no direct or indirect impacts on the climate of the study area.

3.4 CLIMATE CHANGE AND GREENHOUSE GASES

The U.S. Global Change Research Program (USGCRP) looks at potential impacts of climate change globally, nationally, regionally, and by resource (e.g., water resources, ecosystems, human health). Wallisville Lake area lies within the Southern Great Plains region of analysis. The Southern Great Plains region has already seen evidence of climate change in the form of rising temperatures that are leading to increased demand for water and energy and impacts on agricultural practices. Over the last few decades, the Southern Great Plains have seen fewer cold days and more hot days, as well as an overall increase in total precipitation. The decrease in the cold days has resulted in an overall increase of the frost-free (growing) season. Within this region, there has been an increase in average temperatures 1.2°F for the period 1986-2016 (USGCRP 2022). In addition to more extreme rainfall, extreme heat events have also been increasing. Most of the increases of heat wave severity in the U.S. are likely due to human activity, with a detectable human influence in recent heat waves in the Southern Great Plains (USGCRP, 2022).

Texas, in general, experiences multiple climate and weather hazards including floods, droughts, severe storms, tornadoes, hurricanes and winter storms. The National Climate Assessment (Shafer et al., 2014) reports that large parts of Texas and Oklahoma are projected to see longer dry spells by mid-century (2041-2070), particularly in the western edges of the states. The projected number of heavy precipitation days is not expected to change dramatically through the remainder of the century.

According to the most recent estimating tools from the USEPA, as of 2019, there are 15 GHG contributors in Chambers County, and 0 in Liberty County (EPA 2020). Table 4 details these facilities and their emissions.

Table 4 - Greenhouse Gas Emitting Facilities in Chambers and Liberty Counties (2019)

Facility Name:	2019 Facility Emissions in Tons – Carbon Dioxide Equivalent (CO_2e):
Air Products Baytown 3 Facility	1,079,463
Baytown Energy Center	1,961,566
Cedar Bayou	1,247,075
Cedar Bayou 4	506,863
Covestro LLC	56,737
EL DORADO NITROGEN LLC	175,883
EXXONMOBIL CHEMICAL MONT BELVIEU PLASTICS PLANT	81,091
Gulf Coast Fractionators	218,191
LANXESS CORPORATION	174,257
Lone Star Frac 6 & 8	74,268
Lone Star NGL Fracs 4 & 5	95,350
MBI NGLP Mont Belvieu Plant	232,401
Mont Belvieu Complex	1,395,888
Mont Belvieu Fractionators	278,268
OHL NGLP Mont Belvieu NGL Fractionation and Storage Complex	224,28
Total CO_2e Emissions:	**7,577,553**

3.4.1 ALTERNATIVE 1: NO ACTION

The No Action Alternative does not involve any activities that would contribute to changes in existing conditions. There would be no direct or indirect impacts on climate change or contributions to GHG emissions as a result of implementing the No Action Alternative.

3.4.2 ALTERNATIVE 2: PROPOSED ACTION

Under the Proposed Action, current Wallisville Lake project management plans and monitoring programs would not be changed. There would be no direct or indirect impacts on climate change or contributions to GHG emissions as a result of implementing the 2022 Master Plan. If GHG emission issues become significant enough to impact the current operations at Wallisville Lake, the 2022 Master Plan and all associated documents would be reviewed and revised as necessary.

3.5 AIR QUALITY

The USEPA established nationwide air quality standards to protect public health and welfare in 1971. The State of Texas has adopted the National Ambient Air Quality Standards (NAAQS) as the state's air quality criteria. NAAQS standards specify maximum permissible short- and long-term and concentrations of various air contaminants including primary and secondary standards for six criteria pollutants: Ozone (O_3), Carbon Monoxide (CO), Sulfur Dioxide (SO_2), Nitrogen Oxide (NO), particulate matter (PM_{10} and $PM_{2.5}$), and Lead (Pb). Based on both Federal and state air quality standards, an area can be classified as either an "attainment," "maintenance," or "non-attainment" area for each pollutant. The Wallisville Project Area (Chambers and

Liberty Counties) is located within the Houston-Galveston-Brazoria Area as classified by the EPA. According to EPA data (EPA 2022), both Chambers and Liberty counties are nonattainment areas for the 8-hour Ozone Standard.

3.5.1 ALTERNATIVE 1: NO ACTION

The existing operation and management of Wallisville Lake is compliant with the Clean Air Act. There would be no direct or indirect impacts on air quality as a result of implementing the No Action Alternative, since there would be no change to the existing Master Plan.

3.5.2 ALTERNATIVE 2: PROPOSED ACTION

Existing operation and management of Wallisville Lake is compliant with the Clean Air Act and would not change with implementation of the 2022 Master Plan. No direct or indirect impacts on air quality would occur as a result of implementing the proposed revisions to the Wallisville Lake Master Plan. The draft 2022 Master Plan does not entail ground disturbance activities or associated GHG emissions, as such a General Conformity analysis and determination is not required.

3.6 TOPOGRAPHY, GEOLOGY, AND SOILS

3.6.1 TOPOGRAPHY

The land surface of the Project Area dips gently seaward and has elevations ranging from sea level in the Trinity River delta to about 35 feet on the Pleistocene coastal prairie uplands. Uplifted salt domes have elevated the land surface at Barbers Hill near Mont Belvieu, at Moss Bluff north of Lake Charlotte, and at Lost Lake in the immediate Project Area. The modern Trinity River floodplain lies between river-cut scarps formed in Pleistocene deposits and ranges from 2 to 6 miles in width. Topographic features in the Trinity River floodplain include abandoned channel courses, oxbow lakes, point bars, and natural levees. Abandoned channel courses reflect ancestral meandering patterns of the Trinity River and form topographic lows on the river floodplain. Some abandoned channel courses have formed oxbow lakes such as Lake Charlotte, Lake Miller, and Lost Lake. Other oxbows support swamp or freshwater vegetation. Point bars along the Trinity River are a result of deposition of bedload material on the inside of curved loops or meanders. Natural levees, which result from overflow deposition of muds and silts during flood periods, have developed along the lower reaches of the Trinity River and along channels and bayous flowing through the valley marshlands. Numerous Indian mounds and shell middens attain heights of 6 to 8 feet in the Project Area and may extend for several hundred feet along beaches or natural levees. In addition, artificial levees have been constructed around the Lost Lake Oil and Gas Field and East and West Non-Overflow Dams have been constructed, or partially constructed, as part of the original Project.

3.6.2 GEOLOGY

The stratigraphic units in the Wallisville area consist of the Beaumont and Deweyville terrace deposits and the modern alluvial-deltaic plain of the Trinity River (Bureau of Economic Geology, 1968). The Beaumont terrace was deposited during one of the last interglacial episodes of the Pleistocene. The terrace occurs in the Project

Area as high-level deposits, ranging from 20 to 30 feet above the Modern alluvial-deltaic plain, which flank the Trinity River. The Beaumont terrace deposits occur as relatively low relief surfaces with poorly preserved point bars, levees, and abandoned meander loops which reflect abandoned channel courses of the Pleistocene Trinity River. The Deweyville terrace deposits lie between the Beaumont and Modern alluvial deltaic plain. They were formed during a period of constant sea level caused by minor stillstands or temporary readvances of glaciation during the last rise in sea level which occurred 18,000 to 4,500 years ago. The Deweyville deposits occur as two to three terraces east of the Trinity River and are generally less than 10 feet above the Modern alluvial-deltaic plain. The Deweyville deposits are characterized by filled abandoned channel courses, meander scars of large radii, and well preserved point-bar ridges and swales. The Modern alluvial-deltaic plain of the Trinity River valley consists of meander belt sands and floodplain deposits flanking the present stream and a deltaic plain composed of distributary channels with associated marsh, pond, and lake environments. Pleistocene deposits underlie the delta plain at depths of about 8 feet at Lake Anahuac and depths of about 50 feet in the northern part of the delta.

3.6.3 SOILS

The most prominent soil types in the project area according to data from the United State Department of Agriculture's (USDA) Web Soil Survey Tool (WSST) are Zummo Muck and Kaman Clay, accounting for approximately 24.2% and 21.7% respectively.

There are approximately 3,980 acres of Prime Farmland soils (17.7%) and 116 acres of Farmland of Statewide Importance soils (%<1) found on USACE fee-owned lands at Wallisville Lake (USDA-NRCS 2022). Prime Farmland soils include Kaman Clay (0 to 1% slopes, occasionally flooded) and League Clay (0 to 1% slopes). Farmlands of Statewide Importance include Morey Loam (0 to 1% slopes) and Texla Silt Loam (0 to 2% slopes). (USDA 2022). Table 5 describes these soils and their acreage.

Table 5 - Soil Types found at Wallisville Lake

Soil Series Name:	Prime Farmland or State Important:	Soil Acreage (Acres):	% of Project Area:
Kaman Clay 0-1% Slopes, Occasionally Flooded (KamA)	Prime Farmland if drained and either protected from flooding or not frequently flooded during the growing season	3966.0	17.7%
League Clay 0-1% Slopes (LeaA)	All Areas Prime Farmland	13.5	0.06%

Soil Series Name:	Prime Farmland or State Important:	Soil Acreage (Acres):	% of Project Area:
Morey Loam 0-1% Slopes (MonA)	Farmland of Statewide Importance	2.8	0.01%
Texla Silt Loam 0-2% Slopes	Farmland of Statewide Importance	113.2	0.51%

3.6.4 ALTERNATIVE 1: NO ACTION

No direct or indirect impacts on topography, geology, or soils (including Prime Farmland and Farmland of Statewide Importance) would occur as a result of implementing the No Action Alternative.

3.6.5 ALTERNATIVE 2: PROPOSED ACTION

The previous Master Plan had no Land Classifications, which does not allow for specific management, targeting, or conservation of resources such as topography, geology, or soils. The proposed Land Classifications would have no effect on current or projected public use. no direct or indirect impacts on topography, geology, or soils (including Prime Farmland and Farmland of Statewide Importance) would occur as a result of implementing the 2022 Wallisville Lake Master Plan.

3.7 NATURAL RESOURCES

Operational civil works projects administered by USACE are required, with few exceptions, to prepare an inventory of natural resources. The basic inventory required is referred to within USACE regulations (ER and EP 1130-2-540) as a Level One Inventory. This inventory includes the following: vegetation in accordance with the National Vegetation Classification System through the sub-class level; assessment of the potential presence of special status species including but not limited to Federal and state listed endangered and threatened species, migratory species, and birds of conservation concern listed by the USFWS; land (soils) capability classes in accordance with NRCS soil surveys; and wetlands in accordance with the USFWS Classification of Wetlands and Deepwater Habitats of the United States, which are previously discussed in Section 3.2.

3.7.1 VEGETATION

Texas Parks and Wildlife Department (TPWD) has classified habitat ecoregions in the State of Texas. The Wallisville Lake Project is located where the South Central Plains meet the West Gulf Coastal Plains, which are the northern and southern parts of the project respectively.

Vegetation in these areas is further broken down into finer systems and are described by TPWD in their Ecological Mapping Systems (EMS). Using TPWD EMS GIS Data, 40 different Ecological Systems were identified. The 10 most prominent vegetation types, accounting for almost 70% of the land cover for Wallisville Lake, and their dominant vegetation species are described in Table 6 (TPWD 2022).

Table 6 - Ecological Systems and Dominant Vegetation Found at Wallisville Lake

Ecological System:	Area (Acre):	Dominant Vegetation:
Pineywoods: Bottomland Baldcypress Swamp	5249.8	Baldcypress *(Taxodium distichum)* Water Tupelo *(Nyssa aquatica)* Swamp Tupelo *(Nyssa biflora)* Water Hickory *(Carya aquatica)* Overcup Oak *(Quercus lyrate)* Carolina Ash *(Fraxinus caroliniana)* Green Ash *(Fraxinus pennsylvanica)* Willow Oak *(Quercus phellos)* Water Elm *(Planera aquatica)*
Chenier Plain: Fresh and Intermediate Tidal Marsh	3413.5	Maidencane (*Panicum hemitomon*) Seashore Paspalum (*Paspalum vaginatum*) Marshmillet (*Zizaniopsis milacea*) Common Cattail (*Typha latifolia*) Marshhay Cordgrass (*Spartina patens*) Bulrushes (*Schoenoplectus spp.*) Common Reed (*Phragmites australis*)
Pineywoods: Bottomland Seasonally Flooded Hardwood Forest	2178.1	Overcup Oak (*Quercus lyrata*) Water Hickory (*Carya aquatica*) Willow Oak (*Quercus phellos*) Red Maple (*Acer rubrum*) Laurel Oak (*Quercus laurifolia*) Black Willow (*Salix nigra*) Baldcypress (*Taxodium distichum*)
Pineywoods: Bottomland Temporarily Flooded Hardwood Forest	2148.1	Sweetgum (*Liquidambar styraciflua*) Water Oak (*Quercus nigra*) Green Ash (*Fraxinus pennsylvanica*)
Pineywoods: Bottomland Herbaceous Wetland	868.5	Spikerushes (*Eleocharis spp.*) Cattails (*Typha spp.*) Beaksedges (*Rhynchospora spp.*) Rushes (*Juncus spp.)* Woolgrash Bulrush (*Scirpus cyperinus*) Maidencane (*Panicum hemitomon*) Marshmillet (*Zizanopsis miliacea*) Narrow Plumegrass (*Saccharum baldwinii*)

Ecological System:	Area (Acre):	Dominant Vegetation:
		Caric Sedges (*Carex spp.*) American Waterlily (*Nymphaea odorata*) Primroses (*Ludwigia spp.*) Smartweeds (*Polygonum spp.*) Mudplantains (*Heteranthera spp.*) Heartleaf Burhead (*Echinodorus cordifolius*) Arrowheads (*Sagittaria spp.*)
Non-Native Invasive: Chinese Tallow Forest, Woodland, or Shrubland	367.1	Chinese Tallow (*Triadica sebifera*) Honey Mesquite (*Prosopis glandulosa*) Huisache (*Acacia farnesiana*) Baccharis (*Baccharis spp.*) Macartney Rose (*Rosa bracteata*) Cedar Elm (*Ulmus crassifolia*) Water Oak (*Quercus nigra*) Chinese Privet (*Ligustrum sinense*) Yaupon (*Ilex vomitoria*)
Pineywoods: Bottomland Wet Prairie	330.8	Bahia Grass (*Paspalum notatum*) Johnsongrass (*Sorghum halepense*) Bermudagrass (*Cynodon dactylon*) Little Bluestem (*Schizachyrium scoparium*) Bushy Bluestem (*Andropogon glomeratus*) Caric Sedges (*Carex spp.*) Florida Paspalum (*Paspalum floridanum*) Eastern Gamagrass (*Tripsacum dactyloides*) Switchgrass (*Panicum virgatum*)
Urban Low Intensity	302.2	Various Planted Species / Invasive Species
Gulf Coast: Near-Coast Baldcypress Swamp	265.4	Baldcypress (*Taxodium distichum*) Water Tupelo (*Nyssa aquatica*) Green Ash (*Fraxinus pennsylvanica*) Boxelder (*Acer negundo*) Chinese Tallow (*Triadica sebifera*)
Native Invasive: Common Reed	207.4	Common Reed (*Phragmites australis*)

3.7.2 FISHERIES

Wallisville Lake is known to provide habitat for a variety of sportfish such as Southern Flounder (*Paralichthys ligostoma*), Red Drum (*Sciaenops ocellatus*), Bullhead Catfish (*Ameiurus melas*), and even Bull Sharks (*Carcharhinus leucas*). The estuarine and tidal nature of the existing habitat at Wallisville Lake allows for a wide variety of species to both occupy and reproduce in this area.

3.7.3 WILDLIFE

Wallisville Lake provides habitat for an abundance of wildlife species, including game and non-game species, migratory waterfowl, resident and migratory songbirds, wading birds, reptiles, amphibians, and insects. The area offers a variety of habitat features such as riparian forest, wetlands, stream, and river habitats. The variety of habitat supports mammal species such as white-tailed deer (*Odocoileus virginianus*), Virginia Opossum (*Didelphis virginiana*), Eastern Cottontail (*Sylvilagus flordianus*), Eastern Gray Squirrel (*Sciurus carolninensis*) and bird species such as Anhinga (*Anhinga anhinga*), Northern Harrier (*Circus hudsonius*), Little Blue Heron (*Egretta caerulea*), Great Egret (*Ardea alba*), Whooping Crane (*Grus americana*) and many others. American Alligator (*Alligator mississippiensis*) are also found at Wallisville Lake.

3.7.4 ALTERNATIVE 1: NO ACTION

The No Action Alternative does not involve any activities that would contribute to changes in existing conditions. No direct or indirect impacts on natural resources would be anticipated as a result of implementing the No Action Alternative.

3.7.5 ALTERNATIVE 2: PROPOSED ACTION

The reclassifications, resource management objectives, and resource plan required for the Proposed Action would allow land management and land uses to be compatible with the goals of good stewardship of natural resources. The proposed net increase of ESA by 14,679 acres and MMRL-WMA by 787 acres would cause major long-term beneficial impacts to natural resources within these areas. The ESA classification provides the highest form of protection for natural resources. These proposed changes would protect natural resources from various types of adverse impacts such as habitat fragmentation. The Proposed Action would be compatible with conservation principles and measures to protect migratory birds as mandated by EO 13186. The Proposed Action is expected to provide moderate, direct, long-term beneficial impacts on the natural resources at Wallisville Lake.

3.8 THREATENED AND ENDANGERED SPECIES

The Endangered Species Act was enacted to provide a program for the preservation of endangered and threatened species and to provide protection for the ecosystems upon which these species depend for their survival. All Federal agencies are required to implement protective measures for designated species and to use their authorities to further the purposes of the Endangered Species Act. The Secretary of the Interior and the Secretary of Commerce (marine species) are responsible for the identification of threatened or endangered species and development of any potential recovery plan.

The USFWS is the primary agency responsible for implementing the Endangered Species Act and is responsible for birds and other terrestrial and freshwater species. USFWS responsibilities under the Endangered Species Act include (1) the identification of threatened and endangered species; (2) the identification of critical habitats for listed species; (3) implementation of research on, and recovery efforts for, these species; and (4) consultation with other Federal agencies concerning measures to avoid harm to listed species.

An endangered species is a species officially recognized by the USFWS as being in danger of extinction throughout all or a significant portion of its range. A threatened species is a species likely to become endangered within the foreseeable future throughout all or a significant portion of its range. The USFWS also identifies species that are candidates for listing as a result of identified threats to their continued existence. The Candidate designation includes those species for which USFWS has enough information to support proposals to list as endangered or threatened under the Endangered Species Act; however, proposed rules have not yet been issued because such actions are precluded at present by other listing activity. Proposed species are those candidate species that are found to warrant listing as either threatened or endangered, after completion of a scientific review including biology, ecology, abundance and population trends, and threats. Official listing occurs after considering public comments and any new data that may become available, and publication of a Final Rule in the Federal Register. Species may be considered eligible for listing as endangered or threatened when any of the five following criteria occur: (1) current/imminent destruction, modification, or curtailment of their habitat or range; (2) overuse of the species for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) inadequacy of existing regulatory mechanisms; and (5) other natural or human-induced factors affecting their continued existence. Although not afforded protection by the Endangered Species Act, candidate and proposed species may be protected under other federal or state laws.

There are 11 federally listed species and 1 candidate species that could be found at Wallisville Lake based on information from USFWS' Information for Planning and Consultation website (Consultation Code: 02ETTX00-2021-SLI-2732) (USFWS 2022B). A list of these species is presented in Table 7. No Critical Habitat has been designated within or near Wallisville Lake. The species identified as Threatened, Endangered or Candidate by TPWD, as well as all federally listed species by the USFWS are included in Section 2.2.4 of the 2022 Master Plan. The official USFWS species list is available in Appendix C of the 2022 Master Plan.

Table 7 - Federally Listed Endangered and Threatened Species with Potential to Occur at Wallisville Lake

Common Name	Scientific Name	Federal Status	Occurrence
West Indian Manatee	*Trichechus manatus*	Threatened	Migratory
Eastern Black Rail	*Laterallus jamaicensis spp. Jamaicensis*	Threatened	Resident
Piping Plover	*Charadrius melodus*	Threatened	Migratory
Red Knot	*Calidrid canutus rufa*	Threatened	Migratory
Red-Cockaded Woodpecker	*Picoides borealis*	Endangered	Migratory
Whooping Crane	*Grus americana*	Endangered	Migratory

Common Name	Scientific Name	Federal Status	Occurrence
Green Sea Turtle	*Chelonia mydas*	Threatened	Migratory
Hawksbill Sea Turtle	*Eretmochelys imbricata*	Endangered	Migratory
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*	Endangered	Migratory
Leatherback Sea Turtle	*Dermochelys coriacea*	Endangered	Migratory
Loggerhead Sea Turtle	*Caretta caretta*	Threatened	Migratory
Monarch Butterfly	*Danaus plexippus*	Candidate	Migratory

Source: USFWS 2022B

Determinations for impacts to the Piping Plover, and Red Knot are only required for wind energy projects, therefore a determination for these species is not warranted.

The West Indian Manatee is a mammal with a large, seal-shaped body with paired flippers and a round, paddle-shaped tail. These animals are known to primarily feed on seagrass. This species is also protected by the Marine Mammal Protection Act (MMPA) under the jurisdiction of the National Marine Fisheries Service (NMFS). It would be unlikely a West Indian Manatee would occur far enough North into the Wallisville Lake area to feed, especially since it would be very unlikely any seagrass would exist in the Project Area.

The Eastern Black Rail is a small gray-black bird with bright red eyes that prefers marsh habitat with vegetation cover such as *Spartina* species. It is unknown if this species occurs in the Project Area, possibly due to their cryptic nature and habitat preferences.

The Red-Cockaded Woodpecker is a small black and white woodpecker that prefers to roost in pine tree cavities. They primarily feed on insects and are an almost exclusively arboreal species. This species prefers open forested area with large, mature pine trees. It is unlikely this species would occur in the Project Area considering the most prominent habitat type are marshes, and any forested habitat in the area would be dominated by Oak, Hickory, or Tupelo species.

The Whooping Crane is a large white crane that is fairly rare in the wild due to low population count. They prefer marshes and prairie pools and ponds to fish for small fishes and crustaceans. This species prefers marsh habitat for feeding as well as breeding and rearing young. The Whooping Crane is known to overwinter in the Rockport and Matagorda areas of southern coastal Texas, but is typically a migratory visitor along the Texas coast.

All 5 turtle species listed in Table 7 would be unlikely to occur on the Wallisville Project Area considering that these turtle species are largely migratory in the State of Texas when they are nesting. The marsh shoreline habitat present in the Project Area is not representative of the habitat these species choose to nest at, such as beaches. The Project Area is also distant from where any of these species are known to nest in the State of Texas.

The Monarch Butterfly is a black, orange, and white butterfly that lays its eggs on various milkweed plants and is a key pollinator species across North America. This species is known to migrate during the spring and fall. This species is being evaluated as a candidate species by the USFWS and is not currently given protection as a Federally Listed species. *Danaus plexippus* may occur in the project area but is unlikely to be negatively affected by the MP revision.

3.8.1 TEXAS NATURAL DIVERSITY DATABASE

The Texas Natural Diversity Database (TXNDD), administered by TPWD, manages and disseminates information on occurrence of rare species, native plant communities, and animal aggregations in Texas to help guide project planning efforts. A request for information was submitted to TPWD using the Wallisville Project Boundary. USACE received the requested information from TXNDD on 5 August 2021.

Using GIS, all TXNDD records within 5 miles of the project boundary were analyzed to give a snapshot of any listed or rare species that may occur on or near project lands. All TXNDD species identified within the defined area are described in Table 8. The TXNDD species list can be found in Appendix C of the 2022 Master Plan.

Table 8 - TXNDD Species That May Occur at Wallisville Lake

Common Name:	Scientific Name:	State Listing:	Federal Listing:
Awnless Bluestem	*Bothriochloa exaristata*	S3	NA
Water Oak-Willow Oak Series	*Quercus nigra – Quercus phellos Series*	S3	NA
Texas Windmill Grass	*Chloris texensis*	S2	NA
Alligator Gar	*Atractosteus spatula*	S4	NA
Alligator Snapping Turtle	*Macrochelys temminckii*	S2	NA
Bald Eagle	*Haliaeetus lecuocephalus*	S3(B), S3(N)	Delisted – Protected by MBTA
Silverband Shiner	*Notropis shumardi*	S4	NA

Southern Crawfish Frog	*Lithobates areolatus*	S3	NA
Rookery	NA	SNRB	NA

*S (State Rank) – SNRB = Not Ranked, Status Not Yet Assessed; S2 = Imperiled in state, very rare, vulnerable to extirpation (6-20 occurrences); S3 = Rare or Uncommon in State (21 to 100 occurrences); S4 = Apparently Secure in State

3.8.1 ALTERNATIVE 1: NO ACTION

The No Action Alternative does not involve any activities that would contribute to changes in existing conditions. No direct or indirect impacts on natural resources would be anticipated as a result of implementing the No Action Alternative.

3.8.2 ALTERNATIVE 2: PROPOSED ACTION

Under the Proposed Action, the USACE would continue cooperative management plans with the USFWS, NMFS, and TPWD to preserve, enhance, and protect wildlife habitat resources. To further management opportunities and beneficially impact habitat diversity, several land parcels that were previously unclassified are proposed ESAs in order to recognize those areas having the highest ecological value and to ensure they are given the highest order of protection among possible land classifications. Any future activities that could potentially result in impacts on federally listed species will be coordinated with USFWS through Section 7 of the Endangered Species Act and NMFS through the Marine Mammal Protection Act. Direct and indirect long-term, beneficial impacts on state and federally listed threatened and endangered species would occur as a result of implementing the reclassifications outlined in the 2022 Master Plan. There would be no adverse impacts to Federally listed Threatened and Endangered species as a result of the Proposed Action, therefore USACE has determined the Proposed action would have no effect on Federally Threatened and Endangered Species.

3.9 INVASIVE SPECIES

Executive Order (EO) 13751, dated December 5, 2016, which amends EO 13112 (1999), directs federal agencies to expand and coordinate their efforts to prevent the introduction, establishment, and spread, as well as to eradicate and control populations of invasive species. Invasive species are any kind of living organism which, if uncontrolled, causes harm to the environment, economy, or human health. Invasive species generally grow and reproduce quickly and spread aggressively. Non-native, or exotic, species have been introduced, either intentionally or unintentionally, and can out-compete native species for resources or otherwise alter the ecosystem. Native invasive species are those species that spread aggressively due to an alteration in the ecosystem, such as lack of fire or the removal of a predator from the food chain. Table 9 summarizes data from the 2020 OMBIL report on invasive species occurring at Wallisville Lake.

Table 9 - Wallisville Lake Invasive Species

Common Name:	Scientific Name:
Alligatorweed	*Altermanthera philoxeroides*
Balloon Vine	*Cardiospermum halicacabum*
Bermudagrass	*Cynodon dactylon*
Chinese Tallow Tree	*Triadica sebifera*
Common Salvinia	*Salvinia minimia*
Giant Reed	*Arundo donax*
Giant Salvinia	*Salvinia molesta*
Johnson Grass	*Sorghum halepense*
Mimosa	*Albizia julibrissin*
Nutria	*Myocastor coypus*
Red Imported Fire Ant	*Solenopsis invicta*
Water Hyacinth	*Eichhornia crassipes*
Wild Boar	*Sus scrofa*
Yaupon Holly	*Ilex vomitoria*

Alligatorweed is most commonly found growing in thick, dense mats across the surface of a body of water in a sprawling fashion. It is also known to grow outside of aquatic environments if the ground is saturated enough. Alligatorweed competes with native aquatic vegetation and reduces shelter and food sources for native animals.

Ballon Vine is a vigorous, sprawling, vine-like climbing plant with hairy leaves and stems with white or yellow clustered flowers. It is often found growing near riverbanks or other damp habitats. Ballon Vine is a threat to native species due to how quickly it can spread dense growth across a habitat, which smothers other plant species from effectively performing photosynthesis.

Bermudagrass is a common commercial grass that forms dense mats of sod and can grow very quickly; it is able to survive near-freezing temperatures easily and is established throughout the State of Texas. It is mostly a nuisance in agricultural areas where it is not the desired crop being grown and can be hard to remove in an ecologically responsible manner.

Chinese Tallow Trees were a common ornamental plant that spread rapidly across the US since the 1700s, when it was imported for soap and seed oil. These trees outcompete native trees since they are able to withstand longer periods of drought due to a deep taproot. Their seeds are easily spread by birds, which make them more difficult to manage.

Common Salvinia is a rootless, aquatic fern species that grow in floating chains on the water surface and form dense mats. This species can spread rapidly by either spore reproduction or budding, as quickly as doubling every 2 weeks in the wild. Common Salvinia is often found in warm, slow-moving, freshwater habitats such as streams, lakes, ponds, ditches, and even rice fields.

Giant Reeds are a large invasive grass species that commonly grows along sandy riparian edge habitats and can grow up to 20 feet high. This species is an ecological threat due to the Giant Reed forming dense root mats and growing in thick stands. The Giant Reed can also easily spread downstream via cuttings, which can then

establish new communities. These reeds can also damage dam structures and be a fire hazard since they are highly flammable.

Giant Salvinia is in the same Genus as Common Salvinia and is similar in growth form, habitat preference, and ecological threat.

Johnson Grass is a nuisance perennial grass species to both agricultural plots and native grasses. This grass species can grow up to 7 feet tall and spreads via rhizomes. It is known to grow in monocultures which can outcompete native grass species as well as reduce forage for livestock. Johnson Grass can even produce large amounts of cyanide during frost, extreme heat, or drought conditions; it is also high in nitrates, both of which can poison livestock.

The Mimosa is a deciduous tree that can grow up to 50 feet tall and can grow in dense stands; their seeds can remain viable for up to 50 years. This species is an environmental threat due to its ability to thrive in a wide range of habitats and can therefore outcompete native species by taking up nutrients and shading out other plants.

The Nutria is a large semiaquatic rodent that are responsible for largescale damages to sugarcane and rice production, at a loss of $1 million annually. This mammal species is able to thrive in a wide variety of environmental conditions, including habitats like ponds, drainage canals, rivers, bayous, marshes, swamps, and other wetland areas. They have large incisors similar to beavers that can cause agricultural damage.

The Red Imported Fire Ant are widespread across the US and established in many states. These ants are difficult to manage effectively, and even more so to eradicate once an area is infested with them. *S.invicta* are known to displace native ants, destroy native bird nests, and kill many small species of native animals; they are also economically destructive for lawns, ranches, and agriculture due to their mound making.

The Common Water Hyacinth is a flowering, floating plant that only anchors itself via roots during flowering. This floating plant is an ecological threat due to its presence altering native vegetation and fish communities by lowering both light penetration and dissolved oxygen levels; they can also impede boat traffic and clog irrigation canals. *E.crassipes* reproduce easily via fragmentation, offshoots, or seed production in favorable conditions.

Wild/Feral hogs are an old-world species belonging to the family Suidae, and in Texas include European wild hogs, feral hogs, and European-feral crossbreeds. Feral hogs are domestic hogs that either escaped or were released for hunting purposes. With each generation, the hog’s domestic characteristics diminish, and they develop the traits needed for survival in the wild. Feral hog populations continue to expand in Texas and elsewhere. They are prolific breeders, thus rapidly expand their populations once established. While popular for recreational hunting, their destructive feeding habits and potential to spread disease are a substantial liability to agriculture and native wildlife in Texas. Feral hogs have been documented in the Wallisville Lake watershed on private property.

3.9.1 ALTERNATIVE 1: NO ACTION

Wallisville Lake would continue to be managed according to the 1975 Master Plan. With implementation of existing invasive species management programs, direct and indirect effects from Chinaberry and Willow Baccharis are anticipated to be minor.

Hydrilla is a difficult aquatic species to control. Monitoring by TPWD and USACE indicate past densities have ranged from 5 – 40 percent annually, depending on summer water levels. Direct and indirect adverse impacts from hydrilla is expected to be minor to moderate with the continued implementation of the 1975 Master Plan.

Effective control of zebra mussel populations has yet to be identified, thus this species will continue to expand in the lake and adversely impact native species and infrastructure such as gates and water supply intakes. Additional funding beyond normal maintenance will likely be necessary to maintain equipment in proper working order.

Feral hog populations are expected to expand to USACE fee-owned property, causing minor to moderate habitat damage. Population eradication is unlikely due to their prolific breeding. Recreational hunting may provide some initial control, but unlikely to provide long-term population control. As populations expand, trapping may be needed to remove large numbers.

While some invasive species could have moderate to major long-term adverse impacts to resources at Wallisville Lake, none would result due to the continued implementation of the No Action Alterative.

3.9.2 ALTERNATIVE 2: PROPOSED ACTION

The land reclassifications, resource objectives, and resource plan required to revise the Wallisville Lake Master Plan are compatible with the lake's invasive species management practices. Invasive species would continue to be monitored and eradication programs instituted to control their spread. Resource impacts from invasive species will be the same as those in Alternative 1.

3.10 CULTURAL, HISTORICAL, AND ARCHAEOLOGICAL RESOURCES

The earliest evidence of anthropogenic occupation of Wallisville Lake dates back to 4,500 BP, varying from indigenous populations to colonial Europeans and early Texans. Many artifacts have been found in the project area as well as burial grounds, and the entire project area was determined eligible for inclusion in the National Register of Historic Places (NRHP) by the Keeper of the National Register in 1984.

Section 2.3 of the 2022 Master Plan provides prehistoric and historic background discussions for the Wallisville Lake area as well as a summary regarding previous cultural resources investigations.

3.10.1 ALTERNATIVE 1: NO ACTION

Wallisville Lake would continue to be managed according to the 1996 Master Plan and cultural resource management plans. No direct or indirect impacts on cultural,

historical, or archaeological resources is anticipated as a result of implementing the No Action Alternative.

3.10.2 ALTERNATIVE 2: PROPOSED ACTION

Impacts on cultural, historical, and archaeological resources were considered during the refinement processes of land reclassifications. No ground disturbing activities are associated with the revision of the master plan; therefore, no direct impacts are expected to occur to cultural resources at Wallisville Lake. The allocation of 14,679 acres to ESA and 787 acres to Wildlife Management would provide an increased level of protection to cultural resources as ground disturbance to these areas would be limited. Implementation of the 2022 Master Plan will provide long-term direct and indirect beneficial impacts to cultural resources that exist at Wallisville Lake.

3.11 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

The Wallisville Lake Project lies near the mouth of the Trinity River in Chambers and Liberty Counties, Texas, and is situated between the metropolitan areas of Houston and Beaumont, Texas. The zone of influence for the purposes of the master plan is defined as the counties within 50 miles of the project, which includes the following eleven counties: Brazoria, Chambers, Fort Bend, Galveston, Hardin, Harris, Jefferson, Liberty, Montgomery, Orange, and San Jacinto. This area of interest includes the Houston-The Woodlands-Sugar Land and Beaumont-Port Arthur metropolitan statistical areas (MSAs). Section 2.4 of the 2022 Master Plan provides a detailed discussion on regional demographics.

3.11.1 PROTECTION OF CHILDREN

EO 13045 requires each Federal agency “to identify and assess environmental health risks and safety risks that may disproportionately affect children” and “ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks.” This EO was prompted by the recognition that children, still undergoing physiological growth and development, are more sensitive to adverse environmental health and safety risks than adults. The potential for impacts on the health and safety of children is greater where projects are located near residential areas. The 2019 U.S. Census American Community Survey estimates show that persons under 18 years of age range from 28 percent of the population in Chambers County to 26 percent of the population in Liberty County and in the State of Texas.

3.11.2 ALTERNATIVE 1: NO ACTION

Under the No Action Alternative, the USACE would continue to manage Wallisville Lake’s natural resources as set forth in the 1996 Master Plan. While camping in USACE-operated campgrounds, many visitors purchase goods such as groceries, fuel, and camping supplies locally, eat in local restaurants, stay in local hotels and resorts, and shop in local retail establishments. These activities would continue to bring revenues to local companies, provide jobs for residents, and generate local and state tax revenues. Beneficial economic impacts existing as a result of the implementation of the current Master Plan would continue. There would be no direct or indirect impacts on

minority or low-income populations or children with the implementation of the No Action Alternative.

3.11.3 ALTERNATIVE 2: PROPOSED ACTION

Under the Proposed Action, the land reclassifications, resources objectives, and resource plan reflect changes in land management and land uses that have occurred since 1996. Wallisville Lake offers a variety of free recreational opportunities for visitors. It is beneficial to the local economy through direct and indirect job creation and local spending by visitors. Beneficial economic impacts would be similar to the No Action Alternative. The classification of approximately 4,963 acres of Open Recreation and 64 acres as HDR would have no adverse effect the public as these lands will remain open for public use. There would be no direct or indirect impacts on minority or low-income populations or children as a result of the Proposed Action.

3.12 RECREATION

The primary area having a significant influence on the public use and management of Wallisville Lake includes Chambers and Liberty counties, situated in Southeast Texas. Most visitors to Wallisville Lake come from within a 25-mile radius of the lake. Wallisville Lake visitors are a diverse group ranging from hunters, fishermen, kayakers, bird watchers, trail users, and day users who picnic, boat, observe wildlife, and sightsee.

Wallisville Lake contains 4 areas/parks that are managed by the USACE (Trinity River Island Recreation Area, J.J. Mayes Wildlife Tract, Mouth of the Trinity River Waterbird Rookery, and the Trinity River Island Visitor Center), and 2 areas/parks managed by Chambers County (Cedar Hill Park and Hugo Point Park).

Section 2.5 of the 2022 Master Plan provides more details on recreation opportunities and facilities at Wallisville Lake.

3.12.1 ALTERNATIVE 1: NO ACTION

Under the No Action Alternative, there would be no direct or indirect impacts on recreational resources, as there would be no changes to the existing Master Plan.

3.12.2 ALTERNATIVE 2: PROPOSED ACTION

Wallisville is beneficial to the local visitors and offers a variety of free recreation opportunities. Approximately 64 acres of unclassified lands would be classified as HDR, 121 acres classified as LDR, and 4,963 acres classified as Open Recreation. The re-classification of previously unclassified lands would align current land management and recreation needs. Existing parks and other recreation areas would continue to be available to the public along with ESA and WM lands that would still be available to low impact activities like fishing, hiking, and wildlife viewing. The conversion of these lands would have no effect on current or projected public use as they will open for public usage. There would be direct or indirect impacts on recreational resources by implementing the Proposed Action.

3.13 AESTHETIC RESOURCES

Aesthetic resources are a subjective perception of natural beauty in a landscape. As with other resources, visual quality must be recognized and planned for and recognized for their importance.

Wallisville Lake includes many acres of unique natural beauty, water 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 Wallisville Lake is located near the large metropolitan area of Houston, people come from local urban communities to enjoy the scenic and naturalistic views offered at the lake. Most of the areas have been designated as Environmentally Sensitive Areas to preserve specific animal, plant, or environmental features that 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.

Areas of high aesthetic value are those of remarkable scenic quality which at Wallisville Lake includes the cypress swamps, bird rookeries, mature live oaks along the JJ Mayes Wildlife Trace, and the vast acres of marshlands throughout the project. In addition, area which are accessible and designated public recreation facilities, and those areas considered to be of a high sensitivity to the public.

Areas of the project that exhibit lower visual or aesthetic quality are primarily due to degree of human development or alteration. At Wallisville Lake these areas include the Lost Lake Oil Field, the water control structures and lock, and other manmade features present.

3.13.1 ALTERNATIVE 1: NO ACTION

There would be no direct or indirect impacts on visual resources as a result of implementing the No Action Alternative, as there would be no changes to the existing Master Plan.

3.13.2 ALTERNATIVE 2: PROPOSED ACTION

The reclassification of land would have no effect on current or projected public use or visual aesthetics found at Wallisville Lake. Furthermore, the reclassification of unclassified lands as ESAs and MRML – Wildlife Management would protect lands that are aesthetically pleasing at Wallisville Lake and limit future development. No direct or indirect impacts on visual resources would result from implementation of the 2022 Master Plan.

3.14 HAZARDOUS MATERIALS AND SOLID WASTE

This section describes existing conditions within the Wallisville Lake area regarding potential environmental contamination and the sources of releases to the environment. Contaminants could enter the Wallisville Lake environment via air or water pathways. The highways and roads, marinas, and private residences in the vicinity of the lake could also provide sources of contaminants. Recreation areas/parks around the

lake that could contribute small amounts of hazardous materials and waste to the watershed. Illegal trash dumping on project lands by individuals and businesses is a persistent problem. USACE and area law enforcement officials work cooperatively to apprehend those responsible for illegal trash dumping.

Several private residences and commercial facilities also surround the lake shores, and fertilizer and pesticide/herbicide use at those locations could contribute minor amounts of hazardous materials to the lake.

In order to complete a feasibility level HTRW evaluation for the Wallisville Lake Master Plan, a records search was conducted following the rules and guidance of ER 1165-2-132: *HTRW Guidance for Civil Works Projects*, and ASTM E1527-13: *Standard Practice for Environmental Site Assessment: Phase 1 Environmental Site Assessment Process*.

In the records review, files, maps and other documents that provide environmental information about the project area are obtained and reviewed. To complete the records review, USACE reviewed publicly available databases and sources using the proposed footprint of the lake along with an approximate 1-mile search distance for each of the sources shown in Table 10 below. Once the database searches were complete, USACE analyzed the results for recognized environmental conditions (RECs) that could affect the lake or need further investigation given the proposed project measures. Due to the conservative search distances and other factors, many of the record search results can be dismissed from further consideration in this study. The results of that analysis, specifics of the REC (where applicable), and justification for dismissal from further evaluation (where applicable) are discussed below. Note that only databases with issues and/or results found are discussed in detail below.

Table 10 - Standard ASTM Search Distances and Records Review Results

ASTM Source	ASTM Distance (miles)	Distance Searched (miles)	Number of Results	Source Name
Federal National Priorities List (NPL) site list	1.0	1.0	0	EPA Cleanups In My Community
Federal Delisted NPL site list	0.5	1.0	0	EPA Cleanups In My Community
Federal CERCLIS (SEMS) list	0.5	1.0	0	EPA EnviroFacts
Federal NFRAP (SEMS archive) site list	0.5	1.0	0	EPA EnviroFacts
Federal RCRA Corrective Action facilities list	1.0	1.0	0	EPA Cleanups In My Community
Federal RCRA TSD facilities list	0.5	1.0	0	EPA EnviroFacts
Federal RCRA generators list	Property and adjacent properties only	1.0	0	EPA EnviroFacts
Federal ICs/Engineering Control registry	Property only	N/A	N/A	Source not found*
Federal ERNS list	Property only	N/A	See below*	National Response Center
State and tribal equivalent NPL list	1.0	1.0	0	Texas Superfund Registry
State and tribal equivalent CERCLIS	0.5	1.0	0	TCEQ Central Registry
State and tribal landfill and/or solid waste disposal sites	0.5	1.0	0	TCEQ Central Registry
State and tribal leaking AST/UST sites	0.5	1.0	0	TCEQ Central Registry
State and tribal registered storage tank list	Property and adjacent properties only	1.0	0	TCEQ Central Registry
State and tribal ICs/Engineering Control registry	Property only	N/A	N/A	Source not found*
State and tribal voluntary cleanup sites	0.5	1.0	0	TCEQ Central Registry
Federal, State and tribal Brownfield's site list	0.5	1.0	0	EPA Cleanups In My Community

*Denotes a data failure

Federal Institutional Controls (IC)/Engineering Controls Registry – Engineering controls and ICs are both methods of preventing exposure to contaminants on a particular site, typically sites where contaminants are confined or controlled on site as part of a cleanup remedy. This database is a listing of sites where one or both of those controls are in place. USACE was unable to locate this EPA database, and this can be considered a data failure as defined by the ASTM standard. However, the ASTM standard only requires that the proposed property be searched for ICs or engineering

controls. Since these controls are typically only used at cleanup sites where contaminants are confined onsite, and the other record searches identified no existing cleanup sites within the proposed footprint, it can be assumed that no ICs or engineering controls are present within the proposed footprint.

Federal ERNS List – The Federal Emergency Response Notification System (ERNS) records and stores information on reported releases of oil and hazardous substances which are reported to the United States Coast Guard's National Response Center (NRC). Results were inconclusive as there is no detailed location information from this database, so there is no way to know if the reported incidents were near the Lake.

State and Tribal ICs/Engineering Control registry – This ASTM source refers to any listing of sites where one or both of those controls are in place and are within the State of Tribal jurisdiction. USACE was unable to locate this Texas State database, and this can be considered a data failure as defined by the ASTM standard. However, the ASTM standard only requires that the proposed property be searched for ICs or engineering controls. Since these controls are typically only used at cleanup sites where contaminants are confined onsite, and the other record searches identified no existing cleanup sites within the proposed footprint, it can be assumed that no ICs or engineering controls are present within the proposed footprint.

Although not classified as HTRW, pipelines and oil wells play an important role in determining what and how properties can be used. Often land use activities must be designed around oil and gas infrastructure, especially if the pipelines or wells cannot be relocated. In order to search for pipelines and oil wells in the proposed footprint, USACE reviewed the public GIS system maintained by the Railroad Commission of Texas (RRC), the State agency tasked with regulating this type of infrastructure.

Located along the Gulf of Mexico and surrounded by marsh lands have decreased the number of oil and gas wells in close proximity to the lake. There are 3 dry wells and 2 permitted wells within 1 mile of the lake. There is a Highly Volatile Liquid Transmission Pipeline 1.4 miles away from the lake as well. Due to the distance of the pipeline and the lack of incidents with the permitted wells, these will not be considered as RECs. Refer to Figure 2 for a map of the pipeline and wells near Wallisville Lake.

A records search was conducted following the rules and guidance of ER 1165-2-132: *HTRW Guidance for Civil Works Projects*, and ASTM E1527-13: *Standard Practice for Environmental Site Assessment: Phase 1 Environmental Site Assessment Process* for the Wallisville Lake Master Plan. No sites were found that had recognized environmental conditions (RECs). However, a few oil and gas wells and a pipeline were located near the proposed footprint of the lake and are important to note for future land use changes.

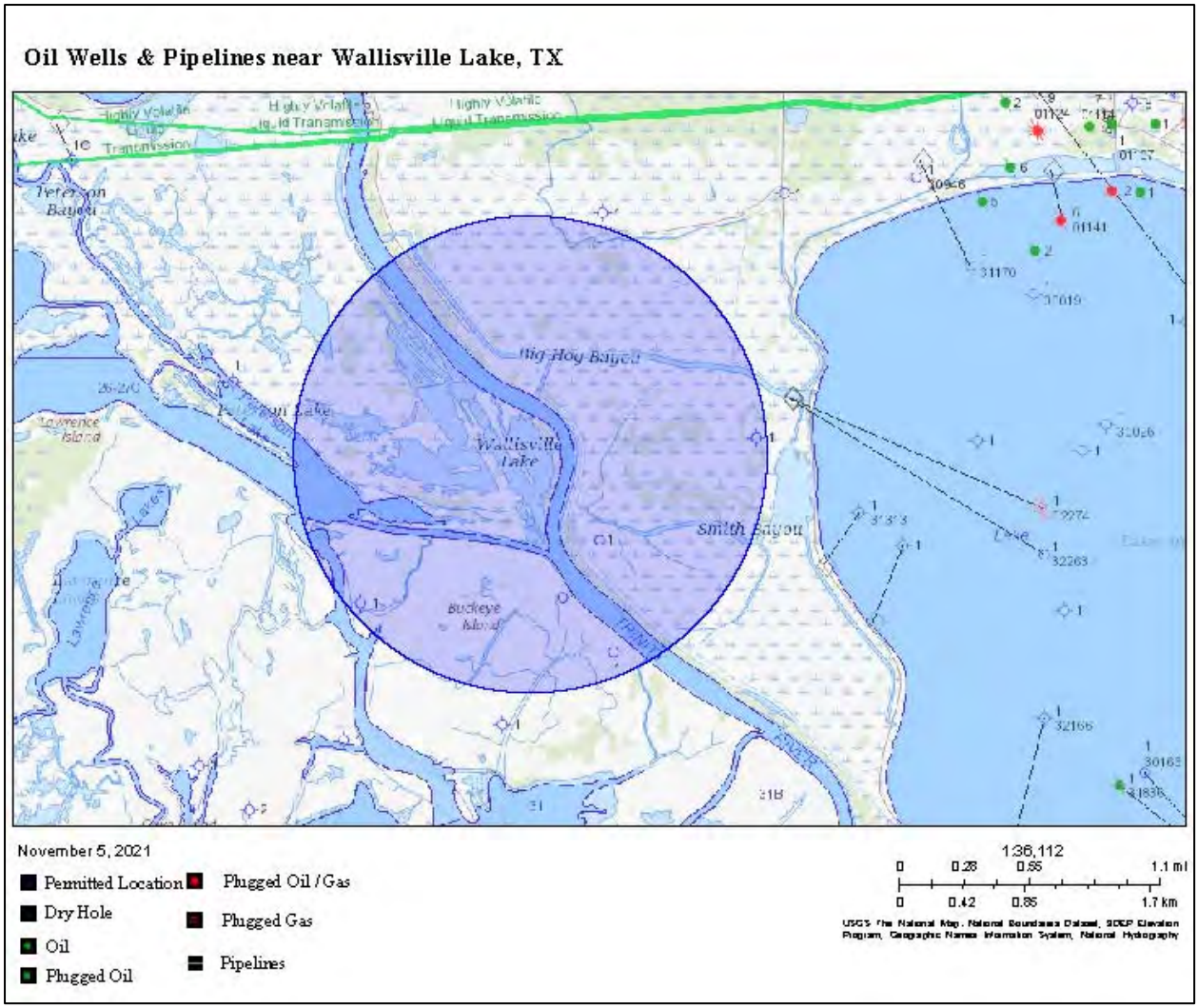

Figure 2 - Wells and Pipelines Near Wallisville Lake, TX

3.14.1 ALTERNATIVE 1: NO ACTION

There would be no direct or indirect impacts from hazardous, toxic, radioactive, or solid wastes as a result of implementing the No Action Alternative, as there would be no changes to the existing Master Plan.

3.14.2 ALTERNATIVE 2: PROPOSED ACTION

The land reclassifications required to revise the Master Plan would be compatible with Wallisville Lake hazardous and toxic waste and solid waste management practices. There would be no direct or indirect impacts from hazardous, toxic, radioactive, or solid wastes as a result of implementing the 2022 Master Plan.

3.15 HEALTH AND SAFETY

As mentioned earlier in this document, Wallisville Lake's authorized purposes include flood risk management, water conservation, and recreation. Compatible uses

incorporated in project operation management plans include conservation and fish and wildlife habitat management components. The USACE, with some assistance from the TPWD, has established public outreach programs to educate the public on water safety and conservation of natural resources. In addition to the water safety outreach programs, the project has established recreation management practices in place to protect the public. These include safe boating and swimming regulations, safe hunting regulations, and speed limit and pedestrian signs for park roads. Wallisville Lake also has solid waste management plans in place for camping and day use areas.

The Texas Department of State Health Services (TDSHS) Seafood and Aquatic Life Group protects consumers from contaminants, disease or other health hazards transmissible or found in fish and shellfish using several functions including Fish Consumption Advisories and Bans for Public Waters. Currently, there is a fish consumption advisory for the surrounding area of Wallisville Lake (TDSHS 2013,2015); these advisories include the Galveston Bay Estuary, which tidally influences the project area, and the Trinity River, which drains into the project area. These advisories are summarized in Table 11.

Table 11 - TDSHS Seafood and Aquatic Life Consumption Advisories for Wallisville Lake

Area of Concern:	Contaminant of Concern:	Species Affected:	Consumption Advisory for Women of Childbearing Age and Children <12:	Consumption Advisory for Women Past Childbearing Age and Adult Men:
Upper Galveston Bay and all contiguous waters north of a line from Red Bluff Point to Five-Mile Cut Marker to Houston Point	Dioxins and PCBs	All Species of Catfish, Spotted Seatrout, and Blue Crab	Do Not Eat	1 Meal per Month
Galveston Bay and all contiguous waters including Chocolate Bay, East Bay,	Dioxins and PCBs	All species of catfish	Do Not Eat	1 Meal per Month

Area of Concern:	Contaminant of Concern:	Species Affected:	Consumption Advisory for Women of Childbearing Age and Children <12:	Consumption Advisory for Women Past Childbearing Age and Adult Men:
Trinity Bay, and West Bay				
The Trinity River and all contiguous waters from the U.S. Highway 287 Bridge downstream to the U.S. Highway 90 Bridge including Lake Livingston	Dioxins and PCBs	Blue Catfish	Do Not Eat	1 Meal per Month
		Flathead Catfish	Do Not Eat	1 Meal per Month
		Freshwater Drum	Do Not Eat	2 Meals per Month
		Gar (all species)	Do Not Eat	Do Not Eat
		Smallmouth Buffalo	Do Not Eat	1 Meal per Month
		Striped Bass	1 Meal per Month	3 Meals per Month
		White Bass	1 Meal per Month	3 Meals per Month

3.15.1 ALTERNATIVE 1: NO ACTION

Under the No Action Alternative, the Wallisville Lake Master Plan would not be revised. No direct or indirect impacts on human health or safety would be anticipated.

3.15.2 ALTERNATIVE 2: PROPOSED ACTION

Under the Proposed Action, the proposed revisions to the Wallisville Lake Master Plan would be compatible with project safety management plans. The revised classifications of Restricted water surface (4 acres) and Designated No-Wake areas (1,498 acres) would improve boating safety near key recreational water access areas such as boat ramps. The Project would continue to have reporting guidelines in place should water quality become a threat to public health. Existing regulations and safety programs throughout the Wallisville Lake Project area would continue to be enforced to ensure public safety. There would be moderate, long-term beneficial impacts on public health and safety as a result of implementing the Proposed Action.

3.16 SUMMARY OF CONSEQUENCES AND BENEFITS

Table 12 provides a tabular summary of the consequences and benefits for the No Action and Proposed Action alternatives for each of the assessed resource categories.

Table 12 - Summary of Consequences and Benefits

Resource	Change Resulting from Revised Master Plan	Environmental Consequences		Benefits Summary
		No Action Alternative	Proposed Action	
Land Use	No effect on private lands. Emphasis is on protection of wildlife and environmental values on USACE land and maintaining current level of developed recreation facilities.	Fails to recognize recreation trends and regional natural resource priorities.	Recognizes recreation trends and regional natural resource priorities identified by TPWD and public comments.	Land classification changes and new resource objectives fully recognize passive use recreation trends and regional environmental values.
Water Resources Including Groundwater, Wetlands, and Water Quality	Minor change with benefits to recognize value of wetlands.	Fails to recognize the water quality benefits of good land stewardship and need to protect wetlands.	Promotes restoration and protection of wetlands and good land stewardship.	Specific resource objective promotes restoration and protection of wetlands.
Climate	No change.	No effect.	No effect.	No added benefit.
Climate Change and Greenhouse Gases	Minor change to recognize need for sustainable, energy efficient design.	Fails to promote sustainable, energy efficient design.	Promotes land management practices and design standards that promote sustainability.	Specific resource objectives promote national climate change mitigation goal. Leadership in Engineering and Environmental Design (LEED) standards for green design, construction, and operation activities will be employed to the extent practicable.
Air Quality	No change.	No effect.	No effect.	No added benefit.

Resource	Change Resulting from Revised Master Plan	Environmental Consequences		Benefits Summary
		No Action Alternative	Proposed Action	
Topography, Geology and Soils	Beneficial change to place emphasis on good stewardship of land and water resources.	Fails to specifically recognize known and potential soil erosion problems.	Encourages good stewardship that would reduce existing and potential erosion.	Specific resource objectives call for stopping erosion from overuse and land disturbing activities.
Natural Resources	Moderate benefits through land reclassification and resource objectives.	Fails to recognize ESAs, and regional priorities calling for protection of wildlife habitat.	Gives full recognition of sensitive resources and regional trends and priorities related to natural resources.	Reclassification of lands included 14.679 acres of ESA and a net increase in lands emphasizing wildlife management.
Threatened & Endangered Species and rare/unique communities as identified in the TXNDD Database	Moderate benefits from land reclassifications and utility corridors for recognizing both federal and state-listed species.	Fails to recognize current federal and state-listed species.	Fully recognizes federal and state-listed species as well as the TXNDD Database listed by TPWD.	The master plan sets forth the most recent listing of federal and state-listed species. The allocation of 14,679 acres of ESA and 787 acres of MRML-WM provides increased habitat for T&E and rare/unique species and communities.
Invasive Species	Minor change to recognize several recent and potentially aggressive invasive species.	Fails to recognize current invasive species and associated problems.	Recognizes current species and the need to be vigilant as new species may occur.	Specific resource objectives specify that invasive species shall be monitored and controlled as needed.
Cultural, Historical and Archaeological Resources	Minor change to recognize current status of cultural resource.	Included cursory information about cultural resources that is inadequate for future management and protection.	Recognizes the presence of cultural resources and places emphasis on protection and management.	Reclassification of lands and specific resource objectives were included for protection of cultural resources.
Socioeconomics and Environmental Justice	No change.	No effect.	No effect.	No added benefit.

Resource	Change Resulting from Revised Master Plan	Environmental Consequences		Benefits Summary
		No Action Alternative	Proposed Action	
Recreation	Negligible benefits to outdoor recreation programs.	Fails to recognize current outdoor recreation trends.	Fully recognizes current outdoor recreation trends and places special emphasis on trails.	Specific management objectives focused on outdoor recreation opportunities and trends are included.
Aesthetic Resources	Minor benefits through land reclassification, utility corridors, and resource objectives.	Fails to minimize activities that disturb the scenic beauty and aesthetics of the lake.	Promotes activities that limit disturbance to the scenic beauty and aesthetics of the lake.	Specific management objectives to minimize activities that disturb the scenic beauty and aesthetics of the lake.
Hazardous Materials and Solid Waste	No change.	No effect.	No effect.	No added benefit.
Health and Safety	Minor change to promote public safety awareness.	Fails to emphasize public safety programs.	Recognizes the need for public safety programs.	Includes specific management objectives to increase water safety outreach efforts. Also, classifies 4 acres of water surface as restricted and 1,498 acres of designated no-wake for public safety purposes.

SECTION 4: CUMULATIVE IMPACTS

NEPA regulations require that cumulative impacts of a proposed action be assessed and disclosed in an EA. Council on Environmental Quality (CEQ) regulations define a cumulative impact as "*the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time*." (40 CFR 1508.7). Impacts can be positive or negative.

By Memorandum dated June 24, 2005 from the Chairman of the CEQ to the Heads of Federal Agencies entitled "Guidance on the Consideration of Past Actions in Cumulative Effects Analysis", CEQ made clear its interpretation that "…generally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions…" and that the "…CEQ regulations do not require agencies to catalogue or exhaustively list and analyze all individual past actions." CEQ guidance also recommends narrowing the focus of cumulative impacts analysis to important issues of national, regional, or local significance.

The initial step of the cumulative impact analysis uses information from the evaluation of direct and indirect impacts in the selection of environmental resources that should be evaluated for cumulative impacts. A proposed action would not contribute to a cumulative impact if it would not have a direct or indirect effect on the resource.

USACE used NEPA guidance to identify resource topics discussed in the cumulative impact analysis (40 CFR 1508.25). Based on a review of the likely environmental impacts analyzed in Section 3 (Affected Environment and Consequences) the USACE determined that the analysis of cumulative impacts would be limited to: natural resources, threatened and endangered species, water quality, cultural resources, and safety. With respect to the remaining resource topics such as climate, environmental justice, and HTRW, both the No Action and Proposed Action alternatives would either:

1. Not result in any direct or indirect impacts and therefore would not contribute to a cumulative impact; or,
2. That the nature of the resource is such that impacts do not have the potential to cumulate. For example, impacts related to geology are site specific and do not cumulate; or,
3. That the future with or future without project condition analysis is a cumulative analysis and no further evaluation is required. For example, because climate change is global in nature, the future without project condition and future with project condition analysis is inherently a cumulative impact assessment.

For each resource topic carried forward for cumulative impact analysis, the timeframe for analysis is the time since the 1996 Master Plan was implemented (past) and thru the proposed life of the 2022 Master Plan (25 years – to 2047). The zone of influence for the purposes of the master plan is defined as the counties within 50 miles of the project, which includes the following eleven counties: Brazoria, Chambers, Fort

Bend, Galveston, Hardin, Harris, Jefferson, Liberty, Montgomery, Orange, and San Jacinto. This area of interest includes the Houston-The Woodlands-Sugar Land and Beaumont-Port Arthur metropolitan statistical areas (MSAs).

4.1 PAST IMPACTS WITHIN THE ZONE OF INTEREST

Construction of the Wallisville Lake Dam began in 1966 and due to multiple delays and project re-evaluations, the project was never constructed as intended. The project as it stands today: a set of levees along the east and west banks of the Trinity in conjunction with the dam across the Trinity, the navigation lock and engineered navigation channel, the gated control structure on main stem of the Trinity, Structure A in the Cut-Off near Pickett's Bayou, Structure B at the head of Lost River, and our parks and recreation areas. The original 39,000 feet long concrete dam structure across the marsh was abandoned after it was breached in 2001 to allow for normal water flows of the Old River and several smaller streams and bayous.

4.2 CURRENT AND REASONABLY FORESEEABLE PROJECTS WITHIN AND NEAR THE ZONE OF INTEREST

The Texas Department of Transportation (TXDOT) has multiple road projects in the vicinity of the project area, some are already underway, while others start within 4 years, and a few starting within 5 to 10 years. These projects vary from road rehabilitation, resurfacing, hazard elimination, and construction of overpasses (TXDOT 2022). These various projects are primarily focused on I-10, FM563, and SH61.

4.3 ANALYSIS OF CUMULATIVE IMPACTS

Impacts on each resource were analyzed according to how other actions and projects within the zone of interest might be affected by the No Action Alternative and Proposed Action. Impacts can vary in degree or magnitude from a slightly noticeable change to a total change in the environment. For the purpose of this analysis the intensity of impacts will be classified as negligible, minor, moderate, or major. These intensity thresholds were previously defined in Section 3.0. Minimal growth and development are expected to continue in the vicinity of Wallisville Lake and cumulative adverse impacts on resources would not be expected when added to the impacts of activities associated with the Proposed Action or No Action Alternative. A summary of the anticipated cumulative impacts on each resource is presented below.

4.3.1 HYDROLOGY AND WATER RESOURCES

Operation and maintenance of USACE lands and waters at Wallisville Lake would continue as outlined in the existing 1996 Master Plan. The No Action Alternative, when combined with other past, current, and future projects in the zone of interest, would not result in any cumulative impacts.

A major impact would occur if any action is inconsistent with adopted surface water classifications or water use plans, or if an action would substantially alter those resources required for, supporting, or benefiting the current use. Wallisville Lake is a multipurpose water resource project constructed and operated by USACE for the purposes of flood risk management, water supply, recreation, and fish and wildlife. The reclassifications and resource objectives proposed in the 2021 Wallisville Lake Master

Plan are compatible with water use plans and surface water classification; further, they were developed to help fulfill regional goals associated with good stewardship of water resources that would allow for continued use of water resources associated with Wallisville Lake. Land reclassifications and new resource objectives proposed as part of the Proposed Action would have moderate long-term beneficial impacts on water quality. Past and future projects are not anticipated to have significant impacts on the hydrology or water resources of Wallisville Lake. Any construction associated with such projects would have to meet state water quality protection standards. Cumulative impacts associated with implementation of the Proposed Action, when combined with other past, current, and proposed actions in the zone of interest, are anticipated to be beneficial for water quality.

4.3.2 NATURAL RESOURCES

The No Action Alternative does not involve any activities that would contribute to changes in existing conditions. The No Action Alternative, when combined with other past, current, and future projects in the zone of interest, would not result in any cumulative impacts.

By implementing the Proposed Action, the establishment of ESA and MRML – WM areas, as well as resource objectives and resource plans would allow land management and land uses to be compatible with the goals of good stewardship of natural resources. The Proposed Action would allow project lands to continue TPWD missions associated with wildlife conservation and implementation of operational practices that would protect and enhance wildlife and fishery populations and habitat. In addition, the Proposed Action would be compatible with conservation principles and measures to protect migratory birds as mandated by EO 13186. Past, present, and future projects are not anticipated to adversely impact the viability of any plant species or community, rare or sensitive habitats, or wildlife. The Proposed Action is expected to provide direct, long-term beneficial impacts on the natural resources at Wallisville Lake. There would be long-term beneficial cumulative impacts to natural resources resulting from implementation of the 2022 Wallisville Lake Master Plan, when combined with other past, current, and proposed actions in the zone of interest.

4.3.3 THREATENED AND ENDANGERED SPECIES

The No Action Alternative does not involve any activities that would contribute to changes in existing conditions. The No Action Alternative, when combined with other past, current, and future projects in the zone of interest, would not result in any cumulative impacts.

The Proposed Action, as well as other past, present, and future projects, are not anticipated to adversely impact threatened and endangered species. The proposed land reclassifications will allow for further protection of threatened, endangered and other unique/rare communities found within the TXNDD database. The reclassifications will also allow future land management practices that would maintain and enhance habitats for these species. The proposed utility corridors would limit further fragmentation of habitat and confine ongoing maintenance disturbances. There would be long-term beneficial cumulative impacts to threatened and endangered species resulting from

implementation of the 2021 Wallisville Lake Master Plan, when combined with other past, current, and proposed actions in the zone of interest.

4.3.4 CULTURAL, HISTORIC, AND ARCHAEOLOGICAL RESOURCES

The No Action Alternative does not involve any ground disturbing activities. Any future ground disturbing activities proposed for Wallisville Lake, as well as other past, current, and future projects would have to be coordinated with the Texas State Historic Preservation Office to minimize impacts to cultural, historic, and archaeological resources. The No Action Alternative, when combined with other past, current, and future projects in the zone of interest, would not result in any cumulative impacts.

While the Proposed Action does not involve ground disturbing activities, the allocation of 14,679 acres to ESA and 787 acres to MRML-WM would provide an increased level of protection to cultural resources, as ground disturbance to these areas would be limited. The proposed utility corridors in the 2022 Proposed Action would restrict any future pipelines, roads, or other infrastructure to already disturbed areas, further limiting impacts on cultural resources. Any future ground disturbing activities proposed for Wallisville Lake, as well as other past, current, and future projects, would have to be coordinated with the Texas State Historic Preservation Office to minimize impacts to cultural, historic, and archaeological resources. Implementation of the 2022 Master Plan would beneficially impact cultural resources.

The Proposed Action, when combined with other past, current, and future projects in the zone of interest, would provide beneficial cumulative impacts to cultural, historical, and archaeological resources present at Wallisville Lake.

4.3.5 HEALTH AND SAFETY

The No Action Alternative would continue reporting guidelines should water quality become a threat to public health. Existing regulations and safety programs throughout the Wallisville Lake Project area would continue to be enforced to ensure public safety. The No Action Alternative, when combined with other past, current, and future projects, is not expected to result in cumulative impacts to human health or safety.

The Proposed Action would have beneficial impacts on safety by revising water surface classifications that would improve boating safety near key recreational water access areas. Wallisville Lake Project Office would continue current reporting guidelines should water quality become a threat to public health. Current regulations and safety programs would continue to be implemented. Other past, current, and future projects have not, and are not expected to cause impacts to the public health and safety in the zone of interest. The Proposed Action, when combined with other past, current, and future projects, is expected to have beneficial impacts to the human health and safety in the zone of interest.

SECTION 5: COMPLIANCE WITH ENVIRONMENTAL LAWS

This EA has been prepared to satisfy the requirements of all applicable environmental laws and regulations and has been prepared in accordance with the CEQ's implementing regulations for NEPA, 40 CFR Parts 1500 – 1508, and the USACE ER 200-2-2, *Environmental Quality: Procedures for Implementing NEPA*. The revision of the 1975 Master Plan is consistent with the USACE's Environmental Operating Principles. The following is a list of applicable environmental laws and regulations that were considered in the planning of this project and the status of compliance with each:

Master Plan revision process, as well as identify reclassification proposals, and identify significant issues related to the Proposed Action. Information provided by USFWS and TPWD on fish and wildlife resources has been utilized in the development of the 2022 Master Plan.

Fish and Wildlife Coordination Act of 1958, as amended – The USACE initiated public involvement and agency scoping activities to solicit input on the 2022 Master Plan revision process, as well as identify reclassification proposals, and identify significant issues related to the Proposed Action. Information provided by USFWS and TPWD on fish and wildlife resources has been utilized in the development of the 2022 Master Plan.

Endangered Species Act of 1973, as amended – Current lists of threatened or endangered species were compiled for the revision of the 2022 Master Plan. The 2022 Master Plan revision will not result in adverse impacts on endangered species or their habitat. There would be beneficial impacts, such as habitat protection, as a result of implementation of the 2022 Master Plan.

Migratory Bird Treaty Act – The Migratory Bird Treaty Act of 1918 extends Federal protection to migratory bird species. The nonregulated "take" of migratory birds is prohibited under this act in a manner similar to the prohibition of "take" of threatened and endangered species under the Endangered Species Act. The timing of resource management activities would be coordinated to avoid impacts on migratory and nesting birds.

Executive Order 13186 (Migratory Bird Habitat Protection) – Sections 3a and 3e of EO 13186 direct Federal agencies to evaluate the impacts of their actions on migratory birds, with emphasis on species of concern, and inform the USFWS of potential negative impacts on migratory birds. The 2022 Master Plan revision will not result in adverse impacts on migratory birds or their habitat. Beneficial impacts could occur through protection of habitat as a result of implementing the 2022 Master Plan revision.

Clean Water Act (CWA) of 1972 – The Proposed Action complies with all state and federal CWA regulations and requirements and is regularly monitored by the USACE and TCEQ for water quality. A state water quality certification pursuant to Section 401 of the CWA is not required for the 2022 Master Plan revision. There will be no change in the existing management of the reservoir that would impact water quality.

National Historic Preservation Act (NHPA) of 1966, as amended – Compliance with the NHPA of 1966, as amended, requires identification of all properties in the project area listed in, or eligible for listing in, the NRHP. Known sites are mapped and avoided

by maintenance activities. Areas that have a potential for historic properties to occur will be coordinated with Tribal Nations and the Texas State Historic Preservation Officer prior natural to any earthmoving or other potentially impacting activities.

Clean Air Act of 1963 – The USEPA established nationwide air quality standards to protect public health and welfare. Existing operation and management of the reservoir is compliant with the Clean Air Act and will not change with implementation of the 2022 Master Plan.

Farmland Protection Policy Act (FPPA) – The FPPA was enacted as a subtitle of the 1981 Farm Bill. Its purpose is to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to non-agricultural uses. It assures that to the extent possible federal programs are administered to be compatible with state, local units of government, and private programs and policies to protect farmland. There are 3,980 acres of Prime Farmland and 116 acres of Farmland of Statewide Importance on Wallisville Lake Project Office Lands.

CEQ Memorandum dated August 11, 1980, Prime or Unique Farmlands – Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses. The Proposed Action would not impact Prime Farmland present on Wallisville Lake project lands.

Executive Order 11990, Protection of Wetlands – EO 11990 requires Federal agencies to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in executing Federal projects. The Proposed Action complies with EO 11990.

Executive Order 11988, Floodplain Management – This EO directs Federal agencies to evaluate the potential impacts of proposed actions in floodplains. The Proposed Action complies with EO 11988.

Executive Order 12898, Environmental Justice – This EO directs Federal agencies to achieve environmental justice to the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report on the National Performance Review. Agencies are required to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. The revision of the 1975 Master Plan will not result in a disproportionate adverse impact on minority or low-income population groups.

SECTION 6: IRRETRIEVABLE AND IRREVERSIBLE COMMITMENT OF RESOURCES

NEPA requires that Federal agencies identify “any irreversible and irretrievable commitments of resources which would be involved in the Proposed Action should it be implemented” (42 U.S.C. § 4332). An irreversible commitment of resources occurs when the primary or secondary impacts of an action result in the loss of future options for a resource. Usually, this is when the action affects the use of a nonrenewable resource or it affects a renewable resource that takes a long time to renew. Impacts from the reclassification of land would not be considered an irreversible commitment because subsequent Master Plan revisions could reclassify lands to a prior land classification.

SECTION 7: PUBLIC AND AGENCY COORDINATION

In accordance with 40 CFR §§1501.7, 1503, and 1506.6, the USACE initiated public involvement and agency scoping activities to solicit input on the 2022 Master Plan revision process, identify reclassification proposals, and identify significant issues related to the Proposed Action. The USACE began its public involvement process with a public scoping meeting to provide an avenue for public and agency stakeholders to ask questions and provide comments. The USACE, Galveston District, placed advertisements on the USACE webpage, social media, and print publications two weeks prior to the meeting. This public scoping meeting was held on 12 March 2019 from 6:00-7:30 PM at the Whites Park Community Center in Wallisville, Texas. The USACE received 68 comments from 6 individuals, spanning a wide range of topics. The comments from the Public Scoping Meeting are listed in Section 7.2 of the Master Plan.

The Second Meeting information will be added once drafts are released.

SECTION 8: REFERENCES

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SECTION 9: ACRONYMS/ABBREVIATIONS

%	Percent
°	Degrees
BMP	Best Management Practice
BP	Before Present
CAP	Climate Action Plan
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	Cubic Feet per Second
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO2e	CO2-equivalent
CWA	Clean Water Act
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EP	Engineer Pamphlet
ER	Engineer Regulation
ESA	Environmentally Sensitive Area
F	Fahrenheit
FONSI	Finding of No Significant Impact
GHG	Greenhouse Gas
GCWA	Golden-cheeked Warbler
HDR	High Density Recreation
LDR	Low Density Recreation
MP	Master Plan
MRML	Multiple Resource Management Lands
msl	Mean Sea Level
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO	Nitrogen Oxide
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRRS	National Recreation Reservation Service
O_3	Ozone
OAQPS	Office of Air Quality Planning and Standards
Pb	Lead
PCB	Polychlorinated Biphenyls
PCPI	Per Capita Personal Incomes
$PM_{2.5}$	Particulate Matter Less than 2.5 Microns
PM_{10}	Particulate Matter Less than 10 Microns
ROD	Record of Decision
RPEC	Regional Planning and Environmental Center
SGCN	Species of Greatest Conservation Need
SO_2	Sulfur Dioxide

SUPER	USACE Suite of Computer Programs
TCAP	Texas Conservation Action Plan
TCEQ	Texas Commission on Environmental Quality
TCLP	Toxicity Characteristic Leaching Procedure
TPWD	Texas Parks and Wildlife Department
U.S.	United States
U.S.C.	U.S. Code
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOC	Volatile Organic Compounds
VM	Vegetation Management
WHAP	Wildlife Habitat Appraisal Procedures
WM	Wildlife Management

SECTION 10: LIST OF PREPARERS

Blake Westmoreland – Biologist, Compliance Section, Regional Planning and Environmental Center; 3 years of USACE experience.

APPENDIX C – FEDERAL AND STATE THREATENED AND ENDANGERED SPECIES LISTS

TRUST RESOURCES REPORT – USFWS

STATE OF TEXAS – LIBERTY and CHAMBERS COUNTY THREATENED AND ENDANGERED SPECIES LIST

APPENDIX C – FEDERAL AND STATE THREATENED AND ENDANGERED SPECIES LISTS

TRUST RESOURCES REPORT – USFWS

STATE OF TEXAS – LIBERTY and CHAMBERS COUNTY THREATENED AND ENDANGERED SPECIES LIST

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Texas Coastal Ecological Services Field Office
4444 Corona Drive, Suite 215
Corpus Christi, TX 78411
Phone: (281) 286-8282 Fax: (281) 488-5882
http://www.fws.gov/southwest/es/TexasCoastal/
http://www.fws.gov/southwest/es/ES_Lists_Main2.html

In Reply Refer To: May 19, 2022
Project Code: 2022-0044761
Project Name: Wallisville Lake Master Plan 2021

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The U.S. Fish and Wildlife Service (Service) field offices in Clear Lake, Tx, and Corpus Christi, Tx, have combined administratively to form the Texas Coastal Ecological Services Field Office. A map of the Texas Coastal Ecological Services Field Office area of responsibility can be found at: http://www.fws.gov/southwest/es/TexasCoastal/Map.html. All project related correspondence should be sent to the field office responsible for the area in which your project occurs. For projects located in southeast Texas please write to: Field Supervisor; U.S. Fish and Wildlife Service; 17629 El Camino Real Ste. 211; Houston, Texas 77058. For projects located in southern Texas please write to: Field Supervisor; U.S. Fish and Wildlife Service; P.O. Box 81468; Corpus Christi, Texas 78468-1468. For projects located in six counties in southern Texas (Cameron, Hidalgo, Starr, Webb, Willacy, and Zapata) please write: Santa Ana NWR, ATTN: Ecological Services Sub Office, 3325 Green Jay Road, Alamo, Texas 78516.

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be

completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.
A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:
http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF
Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see https://www.fws.gov/birds/policies-and-regulations.php.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- Migratory Birds
- Wetlands

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Texas Coastal Ecological Services Field Office
4444 Corona Drive, Suite 215
Corpus Christi, TX 78411
(281) 286-8282

Project Summary

Project Code: 2022-0044761
Event Code: None
Project Name: Wallisville Lake Master Plan 2021
Project Type: Management Plans Land Management/Restoration
Project Description: The Master Plan is a land management document that effectively rezones the USACE fee-owned property. It will not involve construction or any ground/water disturbing activities and is effectively a zoning document.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@29.85925735,-94.75908619921452,14z

Counties: Chambers and Liberty counties, Texas

Endangered Species Act Species

There is a total of 11 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Birds

NAME	STATUS
Eastern Black Rail *Laterallus jamaicensis ssp. jamaicensis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10477	Threatened
Piping Plover *Charadrius melodus* Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered. There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/6039	Threatened
Red Knot *Calidris canutus rufa* There is **proposed** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened
Red-cockaded Woodpecker *Picoides borealis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7614	Endangered
Whooping Crane *Grus americana* Population: Wherever found, except where listed as an experimental population There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/758	Endangered

Reptiles

NAME	STATUS
Green Sea Turtle *Chelonia mydas* Population: North Atlantic DPS There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/6199	Threatened
Hawksbill Sea Turtle *Eretmochelys imbricata* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/3656	Endangered
Kemp's Ridley Sea Turtle *Lepidochelys kempii* There is **proposed** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/5523	Endangered
Leatherback Sea Turtle *Dermochelys coriacea* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/1493	Endangered
Loggerhead Sea Turtle *Caretta caretta* Population: Northwest Atlantic Ocean DPS There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/1110	Threatened

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
American Golden-plover *Pluvialis dominica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
American Oystercatcher *Haematopus palliatus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8935	Breeds Apr 15 to Aug 31

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Sep 1 to Jul 31
Black Skimmer *Rynchops niger* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/5234	Breeds May 20 to Sep 15
Gull-billed Tern *Gelochelidon nilotica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9501	Breeds May 1 to Jul 31
Hudsonian Godwit *Limosa haemastica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
King Rail *Rallus elegans* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8936	Breeds May 1 to Sep 5
Lesser Yellowlegs *Tringa flavipes* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Long-billed Curlew *Numenius americanus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/5511	Breeds elsewhere
Marbled Godwit *Limosa fedoa* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9481	Breeds elsewhere
Prothonotary Warbler *Protonotaria citrea* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 1 to Jul 31
Red-headed Woodpecker *Melanerpes erythrocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10

NAME	BREEDING SEASON
Reddish Egret *Egretta rufescens* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/7617	Breeds Mar 1 to Sep 15
Ruddy Turnstone *Arenaria interpres morinella* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Short-billed Dowitcher *Limnodromus griseus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9480	Breeds elsewhere
Sprague's Pipit *Anthus spragueii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8964	Breeds elsewhere
Swallow-tailed Kite *Elanoides forficatus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8938	Breeds Mar 10 to Jun 30
Willet *Tringa semipalmata* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 5

Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee

was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

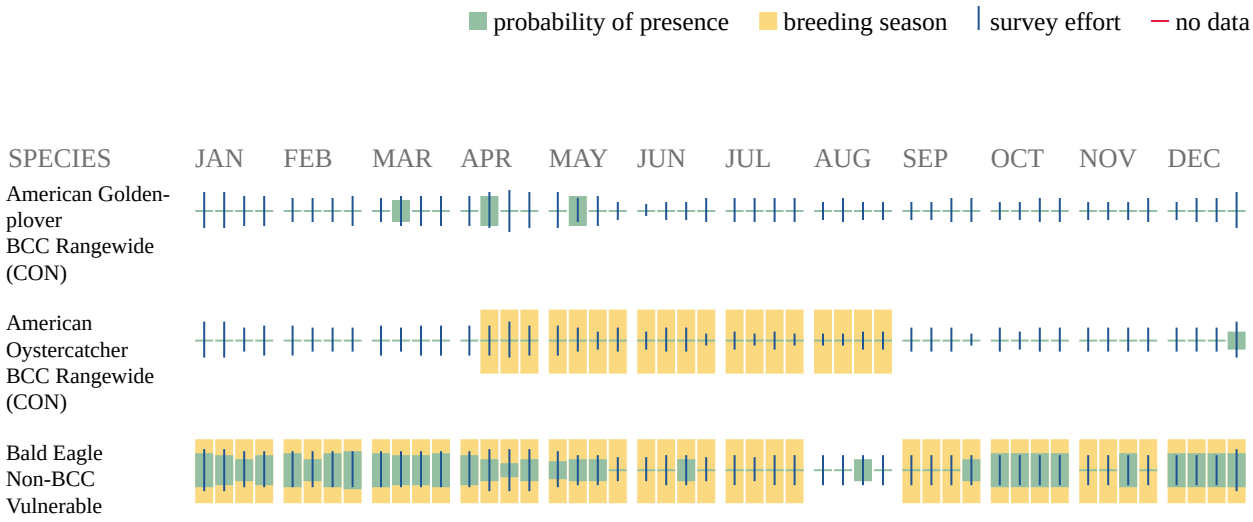
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.




Black Skimmer BCC Rangewide (CON)
Gull-billed Tern BCC Rangewide (CON)
Hudsonian Godwit BCC Rangewide (CON)
King Rail BCC Rangewide (CON)
Lesser Yellowlegs BCC Rangewide (CON)
Long-billed Curlew BCC - BCR
Marbled Godwit BCC Rangewide (CON)
Prothonotary Warbler BCC Rangewide (CON)
Red-headed Woodpecker BCC Rangewide (CON)
SPECIES
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
Reddish Egret BCC Rangewide (CON)
Ruddy Turnstone BCC - BCR
Short-billed Dowitcher BCC Rangewide (CON)
Sprague's Pipit BCC Rangewide (CON)
Swallow-tailed Kite BCC Rangewide (CON)
Willet BCC Rangewide (CON)

Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and

how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects
For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Wetlands

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

Due to your project's size, the list below may be incomplete, or the acreages reported may be inaccurate. For a full list, please contact the local U.S. Fish and Wildlife office or visit https://www.fws.gov/wetlands/data/mapper.HTML

FRESHWATER FORESTED/SHRUB WETLAND

- PFO1F
- PFO1A
- PFO1Cx
- PSS1A
- PFO1/EM1T
- PFO1/4A
- PSS1C
- PFO1/2R
- PFO1C
- PFO1/SS1A
- PFO1T
- PFO1/2F
- PFO1/SS1R
- PFO1/EM1R
- PSS1/2T
- PSS1Ah
- PFO1R
- PFO1S
- PFO2T
- PFO2F
- PFO1/2T
- PSS1/2R
- PFO1/SS1T

FRESHWATER EMERGENT WETLAND

- PEM1C
- PEM1T
- PEM1/SS1R
- PEM1S
- PEM1F
- PEM1A
- PEM1Ah
- PEM1Fh
- PEM1/SS1Cx
- PEM1Cd
- PEM1/SS1T
- PEM1Ch
- PEM1/SS1F
- PEM1Cx
- PEM1R
- PEM1Fx

FRESHWATER POND

- PAB3T
- PAB3Tx
- PAB4Fx
- PAB4F
- PAB3Fh
- PAB3V
- PAB3H
- PAB3Fx

ESTUARINE AND MARINE WETLAND

- E2EM1P
- E2USMx
- E2EM1N

LAKE

- L2UBT
- L1UBV
- L1UBVx

IPaC User Contact Information

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State: TX
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Email blake.e.westmoreland@usace.army.mil
Phone: 4097663927

Occurrence List for Quads Surrounding Request Area

Scientific Name:	Common Name:	Occurrence Number:	State Status:	Federal Status:	Eo Id:
Anaxyrus houstonensis	Houston toad	8	E	LE	3224
Atractosteus spatula	alligator gar	9			13942
Bothriochloa exaristata	awnless bluestem	3			10431
Bothriochloa exaristata	awnless bluestem	5			9991
Bothriochloa exaristata	awnless bluestem	17			10612
Bothriochloa exaristata	awnless bluestem	24			10619
Charadrius melodus	piping plover	6	T	LT	3518
Chloris texensis	Texas windmill grass	4			7849
Chloris texensis	Texas windmill grass	5			2934
Chloris texensis	Texas windmill grass	6			2166
Chloris texensis	Texas windmill grass	14			3942
Chloris texensis	Texas windmill grass	23			7136
Chloris texensis	Texas windmill grass	27			2089
Coreopsis intermedia	goldenwave tickseed	5			5406
Cuscuta attenuata	marsh-elder dodder	3			1586
Haliaeetus leucocephalus	bald eagle	59			7972
Leitneria pilosa ssp. pilosa	corkwood	1			6896

Scientific Name:	Common Name:	Occurrence Number:	State Status:	Federal Status:	Eo Id:
Leitneria pilosa ssp. pilosa	corkwood	3			6739
Liatris bracteata	coastal gay-feather	6			1464
Liochlorophis vernalis	Smooth Green Snake	4			530
Lithobates areolatus areolatus	southern crawfish frog	5			3487
Malaclemys terrapin littoralis	Texas diamondback terrapin	13			4427
Malaclemys terrapin littoralis	Texas diamondback terrapin	18			1431
Migratory Songbird Fallout Site		8			5410
Muhlenbergia capillaris Herbaceous Vegetation	Houston Coastal Prairie	5			11396
Muhlenbergia capillaris Herbaceous Vegetation	Houston Coastal Prairie	7			11488
Nerodia clarkii	salt marsh snake	6			4379
Notropis shumardi	silverband shiner	19			14035
Notropis shumardi	silverband shiner	22			14046
Quercus prinus-quercus phellos series	Swamp Chestnut Oak-willow Oak Series	2			184
Rayjacksonia aurea	Houston daisy	11	T		7313
Rayjacksonia aurea	Houston daisy	19	T		5117
Rayjacksonia aurea	Houston daisy	21	T		597
Rhynchospora indianolensis	Indianola beakrush	9			11038
Rhynchospora indianolensis	Indianola beakrush	19			11071

Scientific Name:	Common Name:	Occurrence Number:	State Status:	Federal Status:	Eo Id:
Rookery		155			5185
Rookery		156			3848
Rookery		157			5514
Rookery		158			2310
Rookery		159			8147
Rookery		160			8146
Rookery		161			1193
Rookery		162			3604
Rookery		167			6411
Rookery		168			5069
Rookery		169			1076
Rookery		179			1170
Rookery		205			5633
Rookery		206			3783
Rookery		378			7621
Rookery		379			4757
Rookery		380			4756
Rookery		407			7518

Scientific Name:	Common Name:	Occurrence Number:	State Status:	Federal Status:	Eo Id:
Rookery		549			7663
Rookery		579			5879
Schizachyrium scoparium - Paspalum plicatulum - Sorghastrum nutans - Dichanthelium oligosanthes - Paspalum setaceum - Symphyotrichum pratense Alfisol Grassland	Alfisol Coastal Prairie	30			11700
Schizachyrium scoparium - Paspalum plicatulum - Sorghastrum nutans - Dichanthelium oligosanthes - Paspalum setaceum - Symphyotrichum pratense Alfisol Grassland	Alfisol Coastal Prairie	31			11701
Schizachyrium scoparium - Paspalum plicatulum - Sorghastrum nutans - Dichanthelium oligosanthes - Paspalum setaceum - Symphyotrichum pratense Alfisol Grassland	Alfisol Coastal Prairie	34			11704
Schizachyrium scoparium - Paspalum plicatulum - Sorghastrum nutans - Dichanthelium oligosanthes - Paspalum setaceum - Symphyotrichum pratense Alfisol Grassland	Alfisol Coastal Prairie	35			11705
Schizachyrium scoparium - Paspalum plicatulum - Sorghastrum nutans - Dichanthelium oligosanthes - Paspalum setaceum - Symphyotrichum pratense Alfisol Grassland	Alfisol Coastal Prairie	36			11706
Schizachyrium scoparium-paspalum plicatulum series	Little Bluestem-brownseed Paspalum Series	13			2045
Schizachyrium scoparium-paspalum plicatulum series	Little Bluestem-brownseed Paspalum Series	16			3175
Schizachyrium scoparium-paspalum plicatulum series	Little Bluestem-brownseed Paspalum Series	17			6624
Schizachyrium scoparium-paspalum plicatulum series	Little Bluestem-brownseed Paspalum Series	18			192
Schizachyrium scoparium-paspalum plicatulum series	Little Bluestem-brownseed Paspalum Series	32			2689
Tauschia texana	Texas tauschia	8			11162
Tauschia texana	Texas tauschia	14			11159
Thurovia triflora	threeflower broomweed	11			7357
Willkommia texana var. texana	Texas willkommia	4			8304

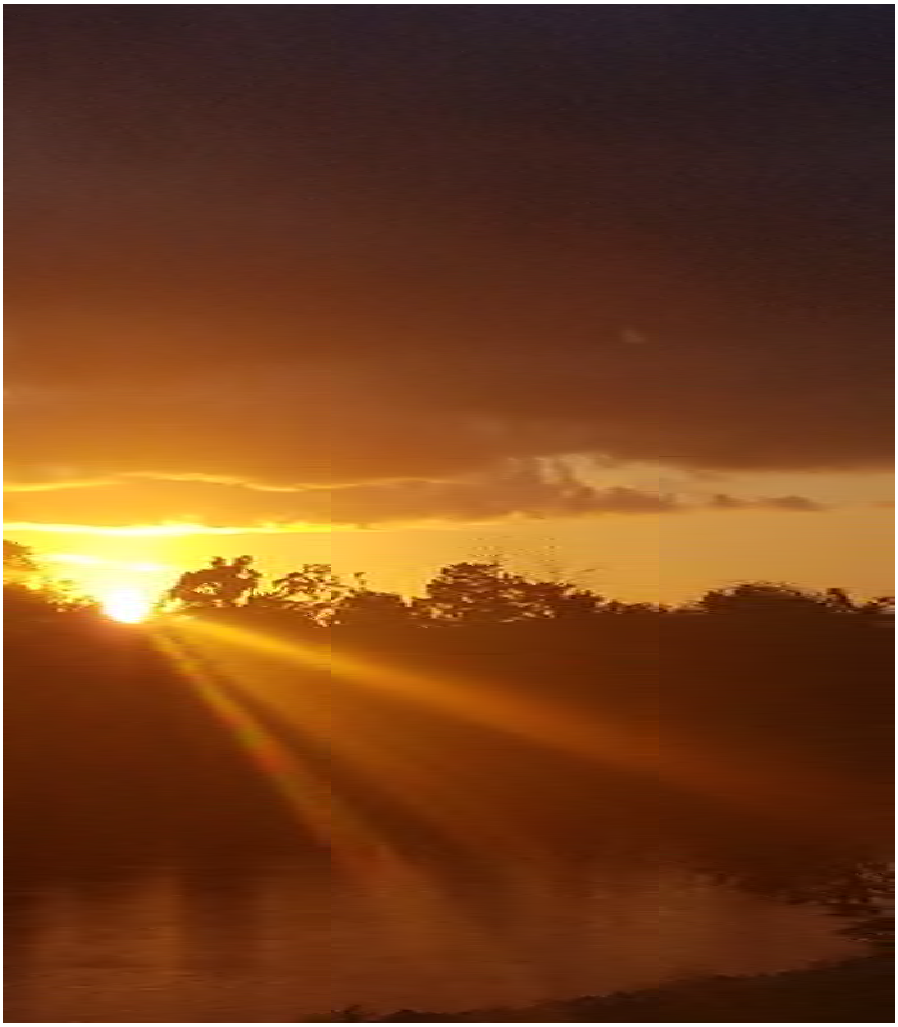
APPENDIX D – WILDLIFE HABITAT APRAISAL PROCEDURE (WHAP) REPORT

APPENDIX D

WILDLIFE HABITAT SURVEY SUMMARY REPORT

WALLISVILLE LAKE MASTER PLAN REVISION

CHAMBERS AND LIBERTY COUNTIES, TEXAS



May 2018

US Army Corps of Engineers ®
Galveston District

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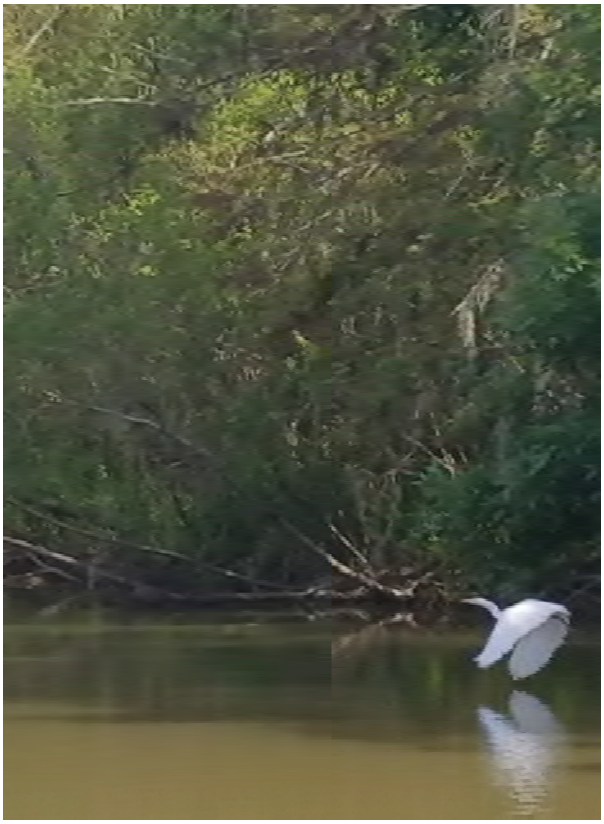
Table of Contents

Introduction

Habitat assessments were conducted within U.S. Army Corps of Engineers' (USACE) fee-owned property at Wallisville Lake on August 21-24th, 2017, using Texas Parks and Wildlife Department's (TPWD) Wildlife Habitat Appraisal Procedure (WHAP) primarily for grassland, upland forest, and bottomland hardwood forest habitats (TPWD 1995). In addition, the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) Environmental Work Group's Wetland Value Assessments (WVA) were also used primarily for marsh and swamp habitat evaluations (CWPPRA, 2010a). Three sites were also surveyed using both protocols to evaluate how similarly the resulting habitat values would be to each other. WHAP and WVA survey point locations were randomly preselected based on aerial imagery from existing Geographical Information Systems (GIS) data. A total of 14 WHAP, 12 WVA, and 3 WHAP & WVA points were surveyed, all within the U.S. Army Corps of Engineers (USACE) federal fee-owned project lands (Figures 1A and 1B).



The purpose of this report is to describe wildlife habitat quality within the USACE Wallisville Lake fee-owned property in Chambers and Liberty Counties, Texas. This report is being prepared by the USACE Regional Planning and Environmental Center (RPEC) to provide habitat quality information and inform land classifications as part of the Wallisville Lake Master Plan revision process.

Study Area

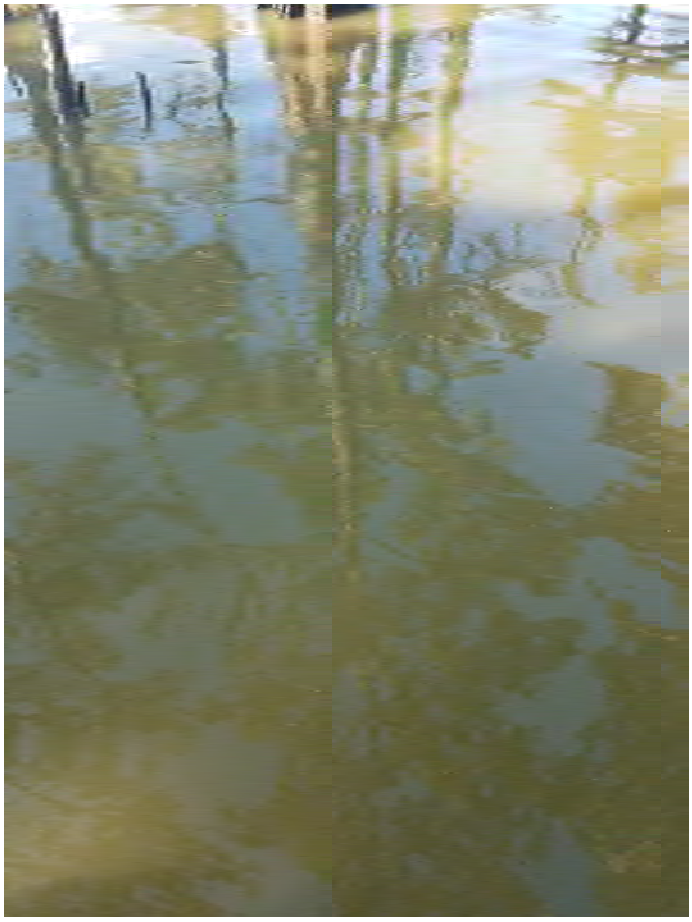
USACE fee-owned property at Wallisville Lake, totaling approximately 23,000 acres, is located east of Baytown, Texas in the Gulf Coast region of southeast Texas (Figure 1A). The Trinity River is the major contributing water source for Wallisville Lake. Downstream of the Wallisville Lake Lock and Dam, the Trinity River flows directly into Galveston Bay.

Methodology

A team of USACE Park Rangers and Biologists conducted the habitat surveys on August 21-24th, 2017. TPWD's WHAP and CWPPRA WVA protocols were used to analyze and describe existing habitats.

Wildlife Habitat Appraisal Procedures

The WHAP requires evaluating representative sites of each cover type present within an area of interest. For this project, a search area of 0.1 acre (circle with radius of 37.2 feet) was used at each WHAP site to compile a list of plant species occurring at each site and to complete the Biological Components Field Evaluation Form (https://tpwd.texas.gov/publications/pwdpubs/media/pwd_rp_w7000_0145.pdf). Field data collected on the form at each WHAP site included the following components:



1. Site Potential
2. Temporal Development of Existing Successional Stage
3. Uniqueness and Relative Abundance
4. Vegetation Species Diversity
5. Vertical Vegetation Stratification
6. Additional Structural Diversity
7. Condition of Existing Vegetation

At each site, a 0.1 acre plot was evaluated and points were assigned to all applicable components based on field conditions. A habitat quality score, where values range from 0.0 (low quality) to 1.0 (high quality), was then calculated for each site by adding together all points and dividing by 100. Photographs were taken at each site point and included in Attachment B.

TPWD did not design WHAP to evaluate habitat quality in relation to specific wildlife species. Rather, it was designed to allow a qualitative, holistic evaluation of wildlife habitat for particular tracts of land statewide without imposing significant time requirements in regard to field work and compilation of data (TPWD, 1995).

The WHAP is based on the following assumptions:

1. Vegetation structure including species composition and physiology is itself sufficient to define the habitat suitability for wildlife;
2. A positive relationship exists between vegetation diversity and wildlife species diversity;
3. Vegetation composition and primary productivity directly influence population densities of wildlife species.

As designed, the WHAP is intended to be used for the following applications:

1. Evaluating impacts upon wildlife populations from specific development project alternatives;
2. Establishing baseline data prior to anticipated or proposed changes in habitat conditions for specific areas;
3. Comparing tracts of land that are candidates for land acquisition or mitigation;
4. Evaluating general habitat quality and wildlife management potential for tracts of land over large geographical areas, including wildlife planning units.

The WHAP protocol can be used to assess a wide range of habitats, however it was originally developed to assess and develop mitigation requirements for loss of bottomland hardwoods and other aquatic habitats. Scores can trend higher for these habitats based on how the scoring is allotted to each WHAP habitat component. Upland forest and grassland habitat types cannot reach a score indicative of high quality habitat although they may exhibit high quality features. Subsequently, high quality upland habitat may not be identified or can be overlooked.

Grasslands, in particular, fall into this category of an overlooked upland habitat. For an area to receive the full 0.25 for site potential it must exhibit at least one of the following: 1) at least periodically support predominately hydrophytic vegetation; 2) contains predominately undrained hydric soils; and 3) supports or is capable of supporting hydrophytic vegetation, and/or 4) is saturated with water or covered by shallow water during 1-2 months during the growing season of each year. None of which a grassland exhibits on the maximum scale. And if it does, a successional shift from a grassland to herbaceous wetlands, swamps, or riparian forest is likely to occur because the conditions are perfect for these habitats to form. These factors are the reason why grasslands would almost always be limited to a maximum score of 0.12 points for the site potential component.

Similarly, grasslands would be limited to a maximum of 0.12 points for the temporal development of existing successional stage component, whereas other forested habitats could receive the full 0.25 points.

These two components alone regularly exclude grassland habitat from receiving 0.25 points on the WHAP scale. In order to identify the maximum score each habitat type can receive, USACE environmental staff scored each criteria given ideal conditions for riparian/bottomland hardwood forest (BHF), upland forest (includes all non-riparian/BHF forests), grassland, swamp, and marsh habitats. The maximum values scores, shown in Table 1, were then used to normalize scores for habitats that are prevented from reaching the maximum WHAP score primarily due to arbitrary low scores in the two WHAP components described above. Normalizing habitat scores may identify high quality habitat that would otherwise not be detected.

Table 1. Maximum Total Score per Habitat Type

Cover Type	Component Number								Maximum Total Score
	1	2	3	4	5	6	7	7B	
Swamp	20	20	20	20	5	5	5	5	1.00
Marsh	25	20	20	20	NA	5	10	NA	1.00
Riparian/BHF	25	20	20	15	5	5	5	5	1.00
Upland Forest	12	20	20	15	5	5	5	5	0.87

Grassland	12	12	20	6	3	5	5	5	0.68

Swamp, marsh, and riparian/BHF habitats can all achieve the maximum score, therefore, no normalization of scores were made for these habitat types. Upland forests and grasslands, however, can only reach between 0.13 and 0.32 points of the maximum WHAP score, even in ideal conditions.

To evaluate all habitat types on an even scoring basis, upland forest and grassland scores were normalized by dividing their original scores by the maximum possible score for their respective habitat types. For example, if a grassland site received an initial score of 0.42, it would be divided by the maximum total points a grassland site can receive, 0.68. The normalized total score used for further analysis for the grassland site would be 0.61.

This adjustment allows habitat type scores to be analyzed and compared to their corresponding habitat type maximum total score. Rather than, for instance, a grassland being evaluated on a bottomland hardwood scoring scale.

All WHAP scores analyzed and discussed from here forward reflect the normalized total scores. As mentioned above, swamp, marsh, and riparian/BHF habitats were not normalized as they can already achieve maximum scores. Grassland scores were normalized by dividing initial scores by 0.68, while all upland forest scores were normalized by dividing the initial score by 0.87.

Wetland Value Assessment

The WVA models are community-based models developed for several types of coastal wetlands and other coastal habitats found in Louisiana, including: 1) fresh-intermediate, brackish, saline marshes; 2) barrier islands and headlands; 3) swamp; 4) bottomland hardwood wetlands; and 5) forested coastal ridges (*e.g.*, coastal cheniers). Based on similar habit structure and species composition, Texas coastal habitats were deemed eligible to be evaluated by the WVA modeling system.

The WVA models have been developed for determining the suitability of coastal habitats for providing resting, foraging, breeding, and nursery habitat to a diverse assemblage of fish and wildlife species. The models have been designed to function at a community level and, therefore, attempt to define an optimum combination of habitat conditions for common fish and wildlife species.

The WVA operates under the assumption that optimal conditions for fish and wildlife habitat within a given coastal habitat type can be characterized, and that existing or predicted conditions can be compared to that optimum to provide an index of habitat quality. Habitat quality is estimated or expressed through the use of community models developed specifically for each habitat type. Each model consists of: 1) a list of variables that are considered important in characterizing fish and wildlife habitat; 2) a suitability index graph for each variable, which

defines the assumed relationship between habitat quality (Suitability Index) and different variable values; and 3) a mathematical formula that combines the suitability indices for each of the component variables into a single value for habitat quality, referred to as the HSI. The output of each model (the HSI) is assumed to have a linear relationship with the suitability of coastal ecosystems in providing fish and wildlife habitat.

Each WVA model contains habitat variables which are assumed to reflect habitat quality and the ability to support a diverse wildlife community.

Bottomland Hardwood Community Model
This model is limited to coastal forested wetlands of the Southeastern U.S. that have 40 percent or greater tree canopy cover, consisting of hydrophytic tree species. Tree canopy cannot be greater than 60 percent of the following tree species: Bald Cypress (*Taxodium distichum*), Water Tupelo (*Nyssa aquatica*), Red Maple (*Acer rubrum*), Buttonbush (*Cephalanthus occidentalis*), and/or American Sycamore (*Platanus occidentalis*).

The variables and associated data were collected by various methods. The team did a visual inspection for tree species composition, understory/midstory, and stand maturity. Stand maturity required the team to measure and calculate the average diameter at breast height of the trees. A USACE Biologist used satellite imagery to determine the size of contiguous forest, suitability and traversability of surrounding land uses, disturbance, and hydrology. Among all the variables and associated data mentioned, it is the hydrology variable that requires both in person visual inspection and satellite imagery methods.

Swamp Community Model
This model is limited to coastal forested wetlands of Southeastern U.S. The area must have at least 33 percent woody vegetation canopy cover. Of the cover, at least 60 percent must contain the following species: Bald Cypress (*Taxodium distichum*), Water Tupelo (*Nyssa aquatica*), Red Maple (Acer rubrum), Buttonbush (*Cephalanthus occidentalis*), and/or American Sycamore (*Platanus occidentalis*).

The variables and associated data were collected by various methods. The team did a visual inspection for stand structure, stand maturity, and water regime. For water regime, a USACE Biologist had to confirm the field data with satellite imagery of the area. The mean high salinity during the growing season variable, part of the water regime component, required a USACE Biologist to conduct online research to collect this information (USGS, 2018a).

Marsh Community Model
This model is limited to areas that are influenced by tidal waters, specifically from Galveston Bay Texas through the coastal areas of Louisiana.

The variables and associated data were collected by various methods. The team did a visual inspection for percent of wetland area covered by emergent vegetation, marsh edge and

interspersion, and aquatic organism access. For the percentage of wetland area covered by emergent vegetation and marsh edge and interspersion variables, the field data was confirmed by analyzing satellite imagery of the area. Two other variables that were collected solely by analyzing satellite imagery are percent of open water area covered by aquatic vegetation and percent of open water. In addition, the Marsh Community Model includes a salinity component, which was collected by a USACE Biologist conducting online research (USGS, 2018a).

Habitat

Using TPWD's Texas Ecological Mapping Systems (https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/), Wallisville Lake lies within the South Central and Western Gulf Coastal Plain Ecoregions (Figure 2). The most common habitat types surveyed include bottomland hardwood forest (BHF) and upland forest (Elliot, 2014). Table 2 displays all habitats surveyed and the number of points surveyed within each respective habitat type.

Table 2. WHAP Survey Points per Habitat Type

Habitat Type	Points Surveyed
BHF	6
Marsh	1
Upland Forest	6
Grassland	1
Total Points Surveyed	**15**

Elliot (2014) provided general habitat type descriptions and associated vegetation communities for the Ecological Systems' Classification and Mapping Project in support of the Comprehensive Wildlife Conservation Strategy for TPWD. These descriptions were meant to be broad and depict typical vegetative assemblages across vast areas as the observable vegetation communities can vary based on local conditions.

The Western Gulf Coastal Plains Ecoregion is characterized by habitat communities that are adapted to relative changes in flooding elevations as well as salt and freshwater influxes. These communities include those that are permanently and internment flooded by storms. The underbrush is low lying and can be sparse, especially in areas with a thick overstory. The soils in this area are diverse, but that is because of all the different areas that the Trinity River drains. The area is home to many fresh and saltwater based aquatic species and is relatively low lying with landforms that are susceptible to being changed by hurricane and heavy rain storms (Elliot, 2014).

The South Central Plains Ecoregion is similar to the Western Gulf Coastal Plains Ecoregion, in that it shares many of the same plants and animals. However, this area has no saltwater intrusion and is highly dominated by pine trees (loblolly and shortleaf). The topography is predominately rolling hills with loamy, sandy and clayey soils.

Figure 2 displays the distribution of habitat types within the USACE federal fee-owned projects lands at Wallisville Lake. For analysis purposes, habitat types were pooled into one of four yycategories: BHF, Marsh, Upland Forest, and Grassland.

Results and Discussion

Hurricane Harvey approached the Middle Texas Coast as a category 4 Hurricane on August 25, 2017. At landfall it had 130 mile per hour winds, with some areas experiencing as much as 40 inches of rain within less than a 48 hour period (NWS, 2018).

The field data for this report, which was collected on August 21-24th, 2017, concluded the day before Hurricane Harvey made landfall. As mentioned earlier, the habitats within the USACE Wallisville federal fee-owned project lands are incredibly well adapted to such events. Therefore, this reports assumes that the habitats surveyed remained intact or will quickly rebound from damage sustained from the hurricane.

For this habitat assessment there were three points that were surveyed by both the WHAP and WVA protocols to evaluate how similarly the resulting habitat values would be to each other. The difference in the range of values for the three points: 4, 11 and 31 was no more than 0.08. Based on the comparison of these three points, it can be assumed that WHAP and WVA scores would be similar when used interchangeably.

WHAP Results and Discussion

The total habitat score for each point surveyed is a representation of multiple habitat attributes including vegetative diversity and structure, site soil potential, successional stage, and uniqueness of that habitat across the landscape. Data analysis highlights are discussed below, while detailed data for each point surveyed can be found in Attachment A: Wallisville Lake WHAP and WVA Summary Results of this report.

Bottomland hardwood forest (BHF) and upland forests were the most abundant habitat types surveyed. BHF scores ranged from 0.56 to 0.71, while upland forest scores ranged from 0.54 to 0.86. These ranges are indicative of the diversity of habitats within USACE Wallisville federal fee-owned project lands.

The average, maximum, and minimum total score observed for each habitat type surveyed is shown in Table 3.

Table 3. WHAP Average, Maximum, and Minimum Total Scores per Habitat Type

Habitat Type	Average Total Score	Maximum Total Score	Minimum Total Score
BHF	0.65	0.71	0.56
Marsh	0.64	0.64	0.64
Upland Forest	0.69	0.86	0.54
Grassland	0.65	0.65	0.65

Figures 3A-3J show the range of total scores for all fourteen points surveyed as well as the five additional points that were skipped due to inaccessibility or multiple points occurring in the same

area. Skipped points show a total score of 0 in Figures 3A-3J. Overall, upland forest habitat exhibited the highest average total score (0.6

9). In general, this habitat type exhibited more woody and herbaceous vegetative species diversity.

Beyond vegetative diversity, there are three other major metrics within the WHAP scoring criteria that allocate points. These are site potential, successional stage, and uniqueness and relative abundance. Table 4 shows these metrics' average score per habitat type.

Table 4. WHAP Average Site Potential, Successional Stage, and Uniqueness and Relative Abundance Scores per Habitat Type

Habitat Type	$\bar{x}$ Site Potential (Max = 0.25)	$\bar{x}$ Successional Stage (Max= 0.20)	$\bar{x}$ Uniqueness and Relative Abundance (Max= 0.20)
BHF	0.20	0.10	0.14
Marsh	0.25	0.10	0.10
Upland Forest	0.14	0.12	0.14
Grassland	0.12	0.12	0.10

Site potential allocates points based on soil substrates characteristics and hydrologic connectivity that can support hydrophytic habitats, such as marshes, swamps, and bottomland hardwood forests. This allows areas to score higher even though a recent disturbance, such as fire or flood, may have removed most of the vegetation. Areas scoring high in site potential but low in other metrics can be targeted for management efforts as the vegetation community response in these areas should be favorable, thus increasing habitat value. As shown in Table 4, BHF and marsh habitats score high in this component due to their hydrophytic vegetative species.

Successional stage refers to the age of the vegetative community. Because they provide more diverse forage, cover, and niche habitats, older, more mature forests would score higher than earlier succession pole stands. Similarly, climax prairies would score higher than disturbed grasslands. Successional stage scores are expected to increase across all habitats except in areas around the lake that are frequently disturbed or flooded for long periods during the growing season. These disturbances and long duration flooding events reset the vegetation associations back to early successional stages.

Uniqueness and relative abundance takes into consideration the rarity of a habitat or vegetative community and its abundance in the region. Ongoing urban development and expansion, increase in oil and gas exploration and production activities, sea level rise, reduction of freshwater and sediment flow, as well as land subsidence has significantly influenced the region's remaining habitat composition. Few large, contiguous tracts of protected habitat remain within the Southeast Texas region. Wallisville Lake and the surrounding terrestrial habitats represent one of these remaining tracts. As ongoing habitat loss continues, the remaining habitat at Wallisville Lake will likely increase in overall wildlife value and uniqueness.

Only one WHAP point surveyed, Point 29, received a score over 0.80 indicating very high quality habitat. This area supports upland habitats featuring high site potential and woody vegetation diversity.

WVA Results and Discussion

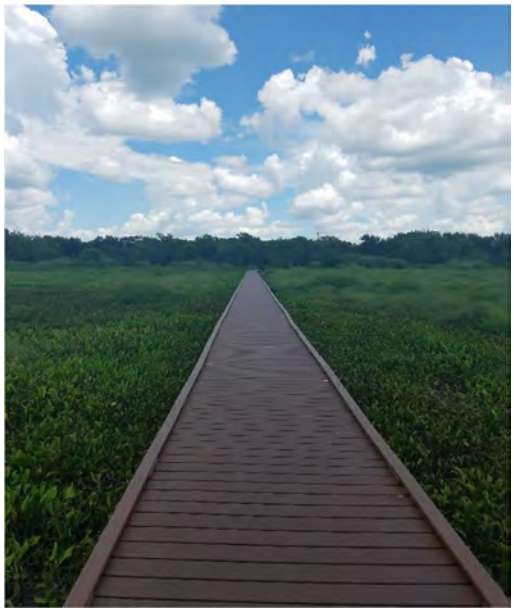
The total habitat and open water score for each point surveyed is a representation of multiple habitat attributes across the landscape. Data analysis highlights are discussed below, while detailed data for each point surveyed can be found in Attachment A: Wallisville Lake WHAP and WVA Summary Results of this report.

Marsh and swamps were the most abundant habitat types surveyed. Marsh habitat value scores ranged from 0.77 to 1.00, indicating the marshes within USACE Wallisville federal fee-owned projects lands all have high habitat quality and the ability to support a diverse wildlife community.

Swamp habitat value scores ranged between 0.17 and 0.81. Among these, some points were unreachable by survey teams because of access and safety reasons Because of this, scores for these points were collected on the outer fringe and then readjusted to reflect a more realistic score. The readjustments are based on the assumption that interior areas of the swamp would be expected to contain denser mid- and overstory canopy coverage as well as a more diverse herbaceous component. ; and 2) with access to interior swamp habitat being limited, exterior swamp sites surveyed with overstory canopy cover being greater than or equal to 33 percent, were assumed to contain the herbaceous and midstory canopy layers at the greater than or equal to 33 percent level although these layers may have been present to a lesser degree during field surveys. Therefore points -- received an increase of –.

Only four WVA points surveyed (0, 3, 15 and 20) received scores over 0.80 indicating very high quality habitat. These areas support swamp and marsh habitats featuring large contiguous permanently flooded areas, with an established dense vegetative community.

One point, Point 15, received the highest possible score of 1.00. This area exhibited nearly 100 percent emergent vegetation cover with tidal channels and ponds running throughout.



The marsh community model also contains an open water value scoring system. This allows emergent (marsh habitat value) and open water components to be assessed for fish and wildlife communities. Variable 2, percent of open water area covered by aquatic vegetation, largely determines the open water value. Due to varying water depths and associated aquatic plant growth at Wallisville Lake, it is not surprising to see a low (0.32) open water average score. Reduced water clarity may be influencing aquatic vegetation distribution due to the lack of sunlight.

The average, maximum, and minimum total WVA habitat values observed for each habitat type surveyed are shown in Table 5.

Table 5. WVA Average, Maximum, and Minimum Total Scores per Habitat Type

Habitat Type	Average Total Score	Maximum Total Score	Minimum Total Score
BHF Habitat Value	0.71	0.71	0.71
Swamp Habitat Value	0.53	0.81	0.17
Marsh Habitat Value	0.77	1.00	0.60
Marsh Open Water Value	0.32	0.61	0.19

The average, maximum, and minimum total WVA habitat and open water value observed for each type of marsh is shown in Table 6.

Table 6. WVA Marsh Type Habitat & Open Value for Average, Maximum, and Minimum Total Scores

Habitat Type	Average Total Score	Maximum Total Score	Minimum Total Score
Brackish Habitat Value	0.72	0.75	0.70

Brackish Open Water Value	0.39	0.54	0.28
Fresh Habitat Value	0.80	1.00	0.60
Fresh Open Water Value	0.29	0.61	0.19

The marsh community model is divided into 3 different habitat types, bottomland hardwood, swamp and marsh. All three use the same variables, however, the habitat scoring formulas are different. Among the three habitat types, 7 fresh and 3 brackish marshes were surveyed for this report. Freshwater marsh had the highest average score at 0.80. However, for open water habitat value, brackish marsh has the highest average score at 0.39.

Summary

In summary, using both the WHAP and WVA analyses, survey teams were able to sample random habitats throughout USACE Wallisville federal fee-owned project lands. This resulted in an overall habitat evaluation that has revealed that the habitats at Wallisville Lake are of relatively good to high quality.

Recommendations

Even with planned and unplanned disturbances, there are numerous areas of valuable fish and wildlife habitat remaining within Wallisville Lake project lands.

Based on the results of the WHAP and WVA survey efforts, areas to consider for Wildlife Management or Environmentally Sensitive Areas land classifications include those areas having the highest scores. The planning team for the Wallisville Lake Master Plan revision will take into account the WHAP scores when making land classification decisions.

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Elliott, Lee F., David D. Diamond, C. Diane True, Clayton F. Blodgett, Dyan Pursell, Duane German, and Amie Treuer-Kuehn. 2014. Ecological Mapping Systems of Texas: Summary Report. Texas Parks & Wildlife Department, Austin, Texas.

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Texas Parks and Wildlife Department (TPWD). 1995. Wildlife Habitat Appraisal Procedure (WHAP). Last revised January 12, 1995.

U.S. Geological Survey (USGS). 2018a. National Water Information System: Web Interface: USGS 08067252 Trinity Rv at Wallisville, TX: Salinity, Water, Unfiltered, Parts Per Thousand, Upstream of Barrier: 2015-05-11 to 2018-03-20 https://nwis.waterdata.usgs.gov/tx/nwis/uv?cb_00480=on&cb_00480=on&cb_00480=on&format=rdb&site_no=08067252&period=&begin_date=2015-03-21&end_date=2018-03-20

Wallisville Lake WHAP Results Summary Figures

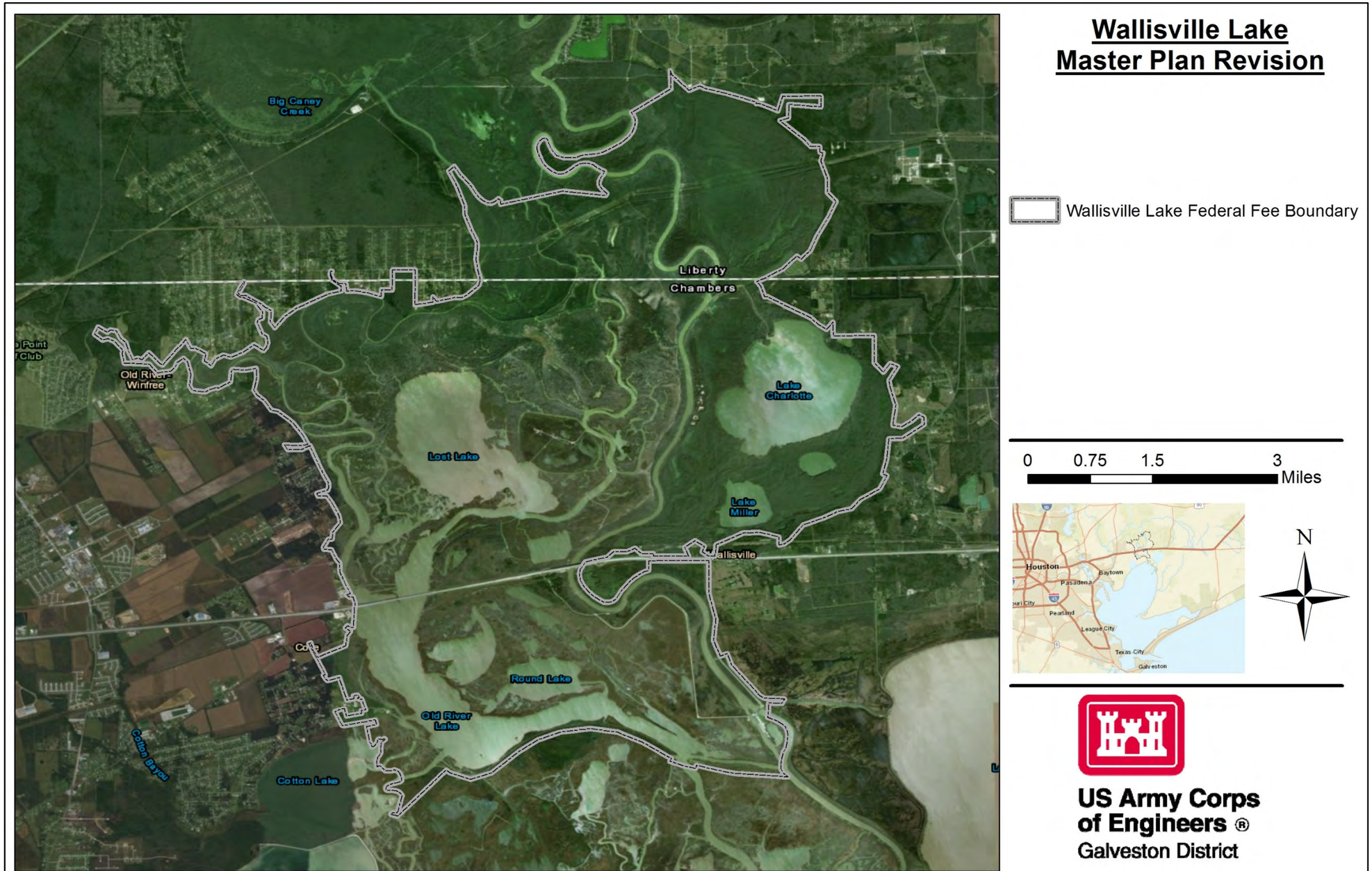

Figure 1A. Display of USACE Wallisville Federal Fee-Owned Boundary.

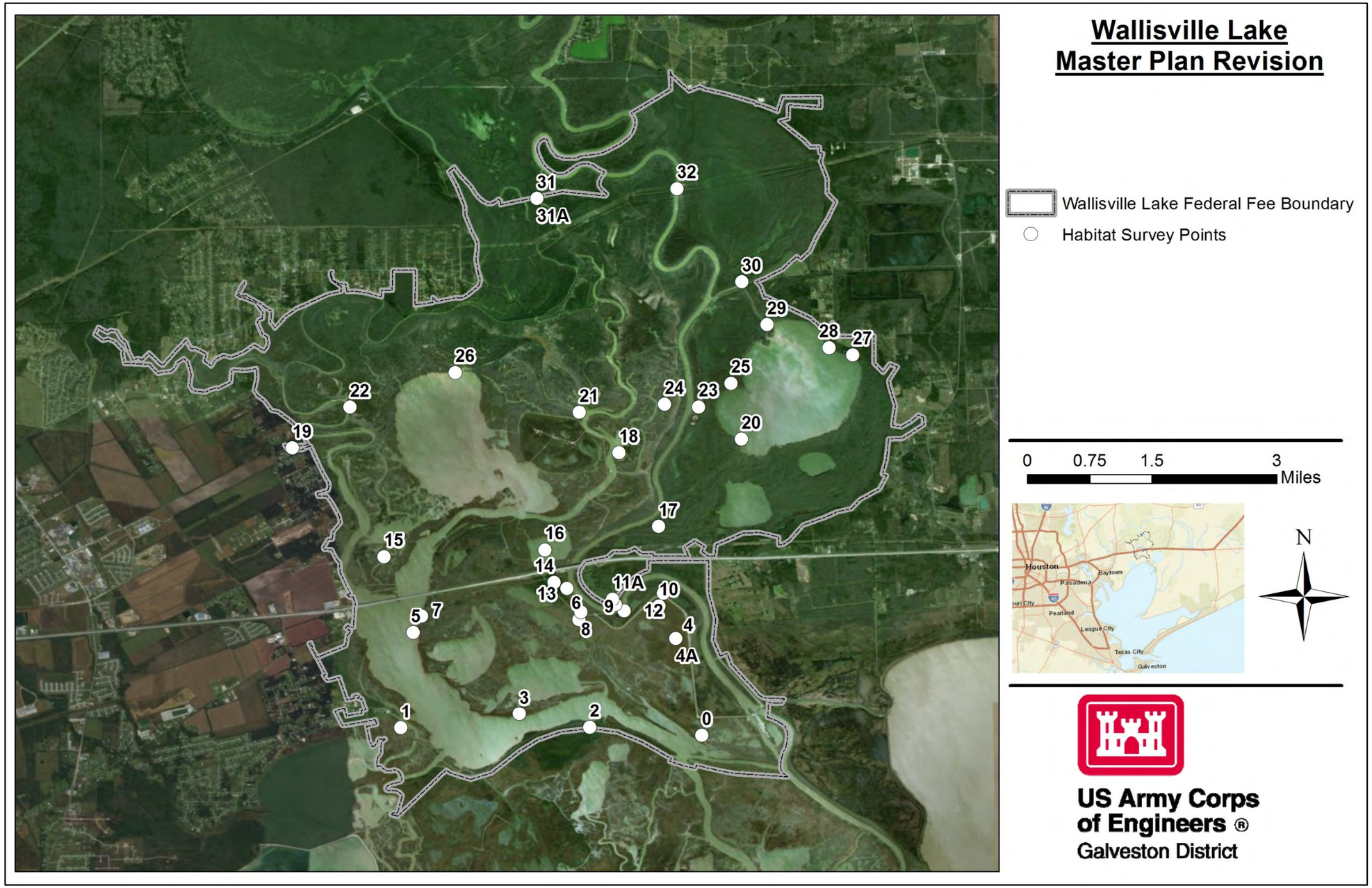

Figure 1B: Distribution of WHAP Points within the USACE Wallisville Federal Fee-Owned Project Lands.

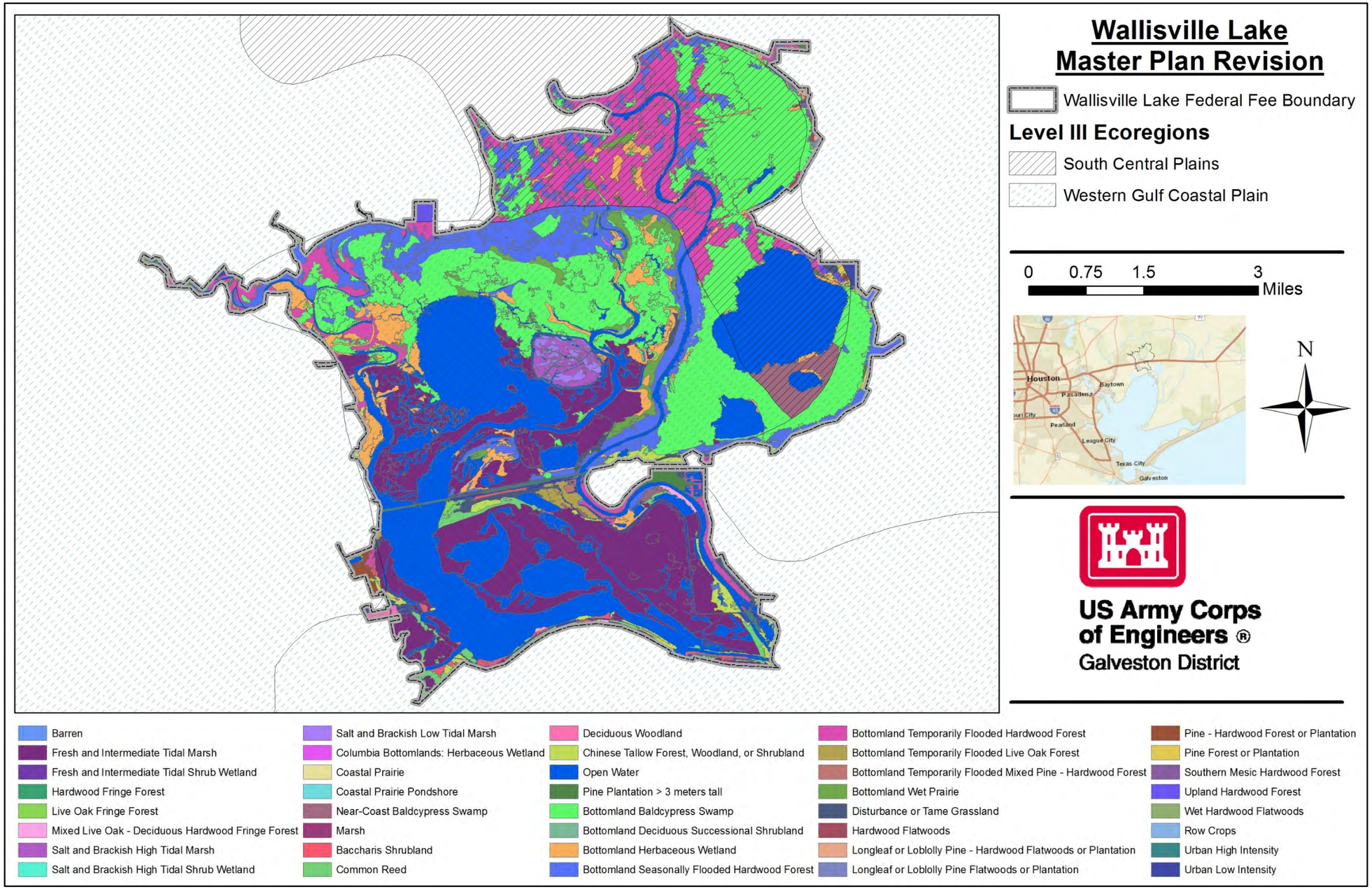

Figure 2. Distribution of Habitat Types within the USACE Wallisville Federal Fee-Owned Project Lands.

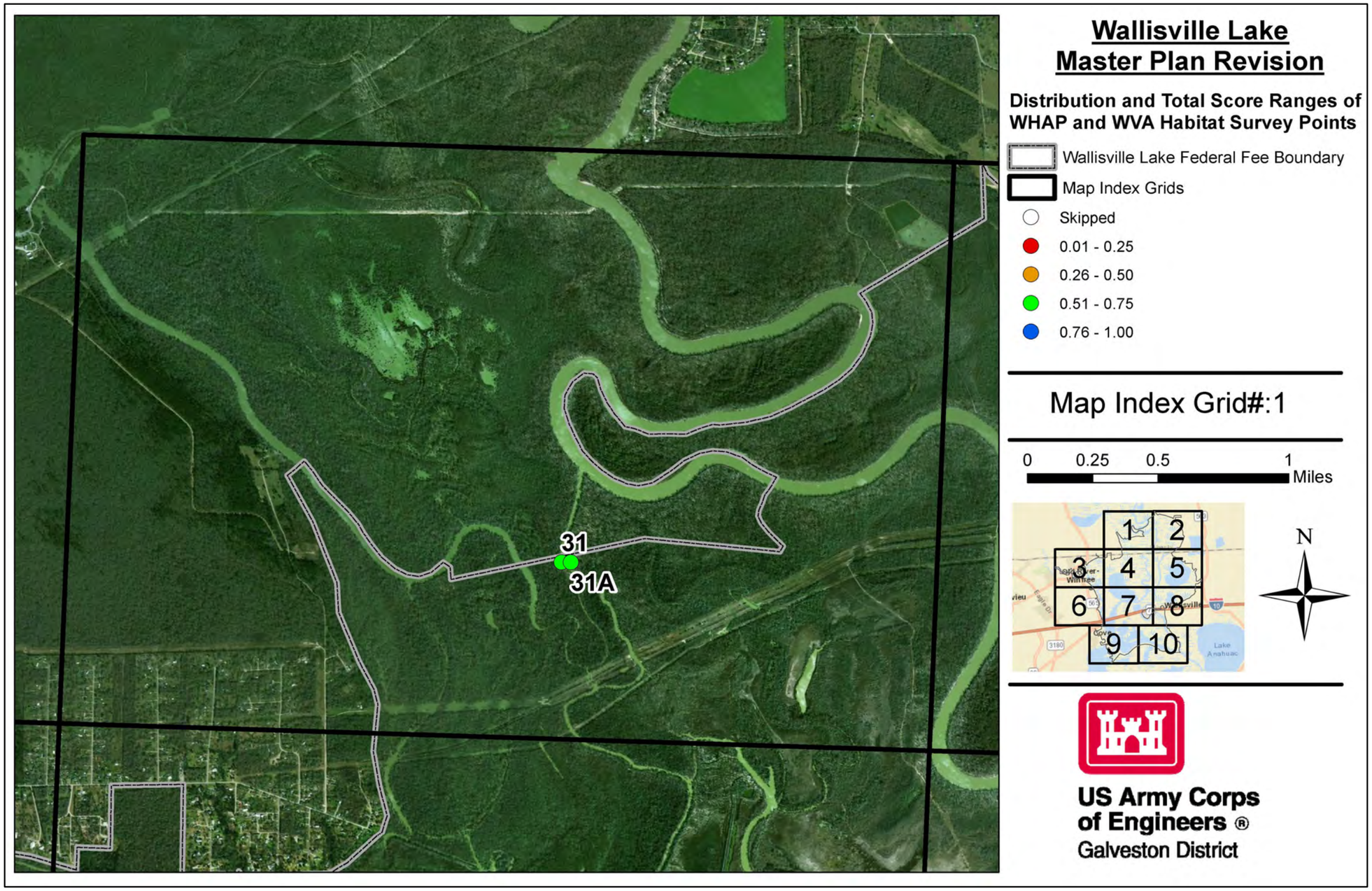

Figure 3A. Total Score Range for All Points Surveyed.

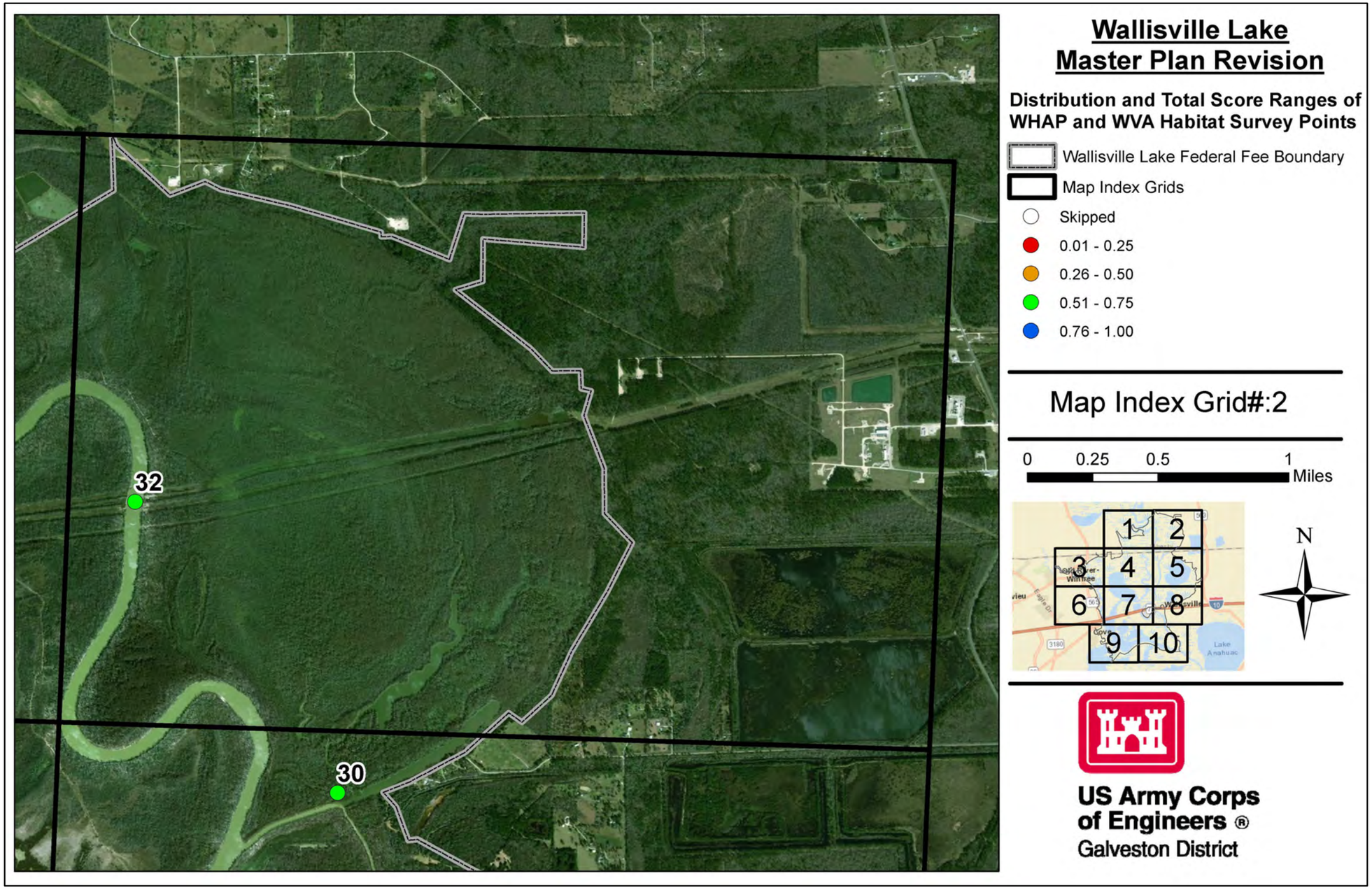

Figure 3B. Total Score Range for All Points Surveyed.

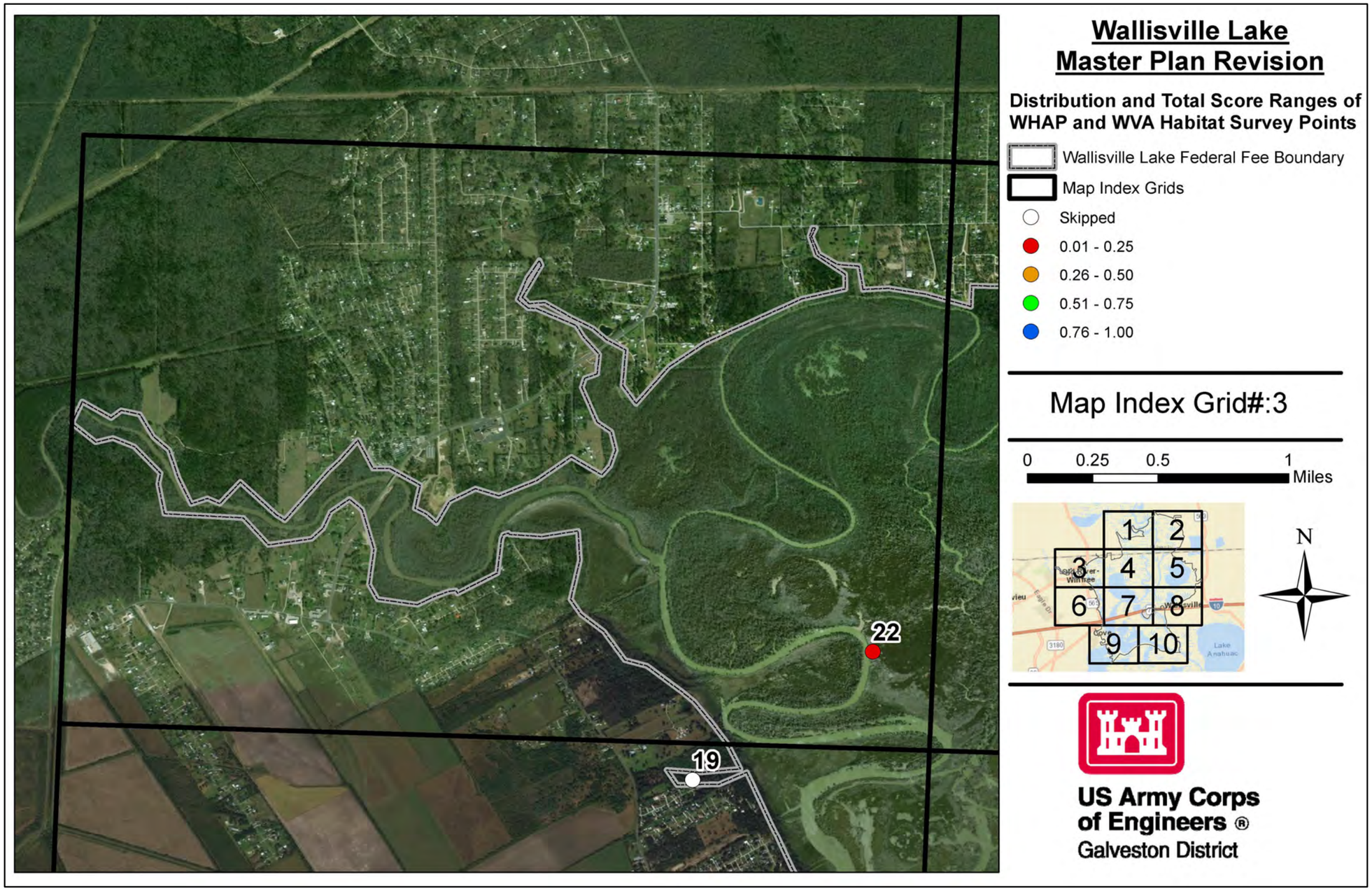

Figure 3C. Total Score Range for All Points Surveyed.

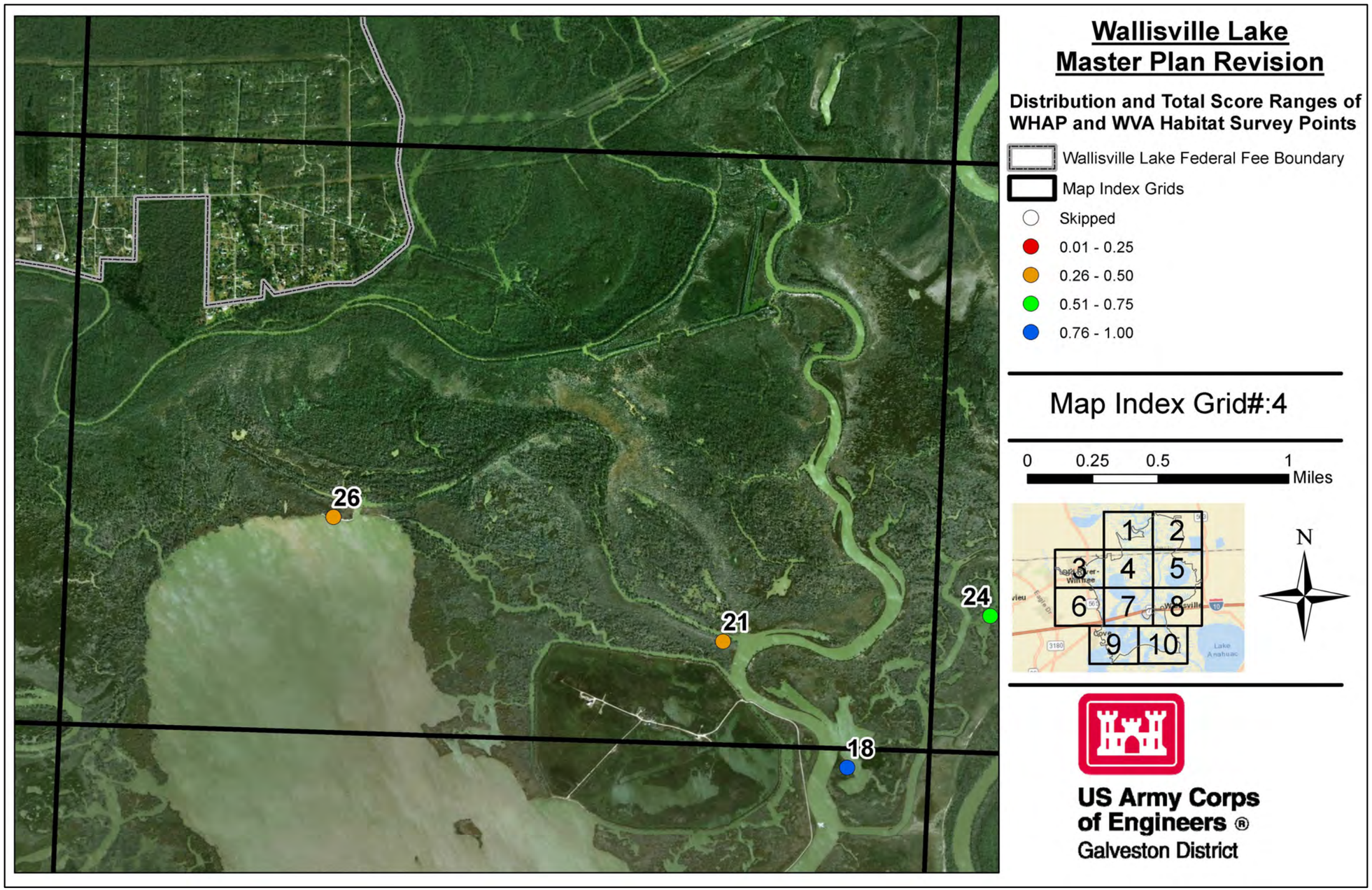

Figure 3D. Total Score Range for All Points Surveyed.

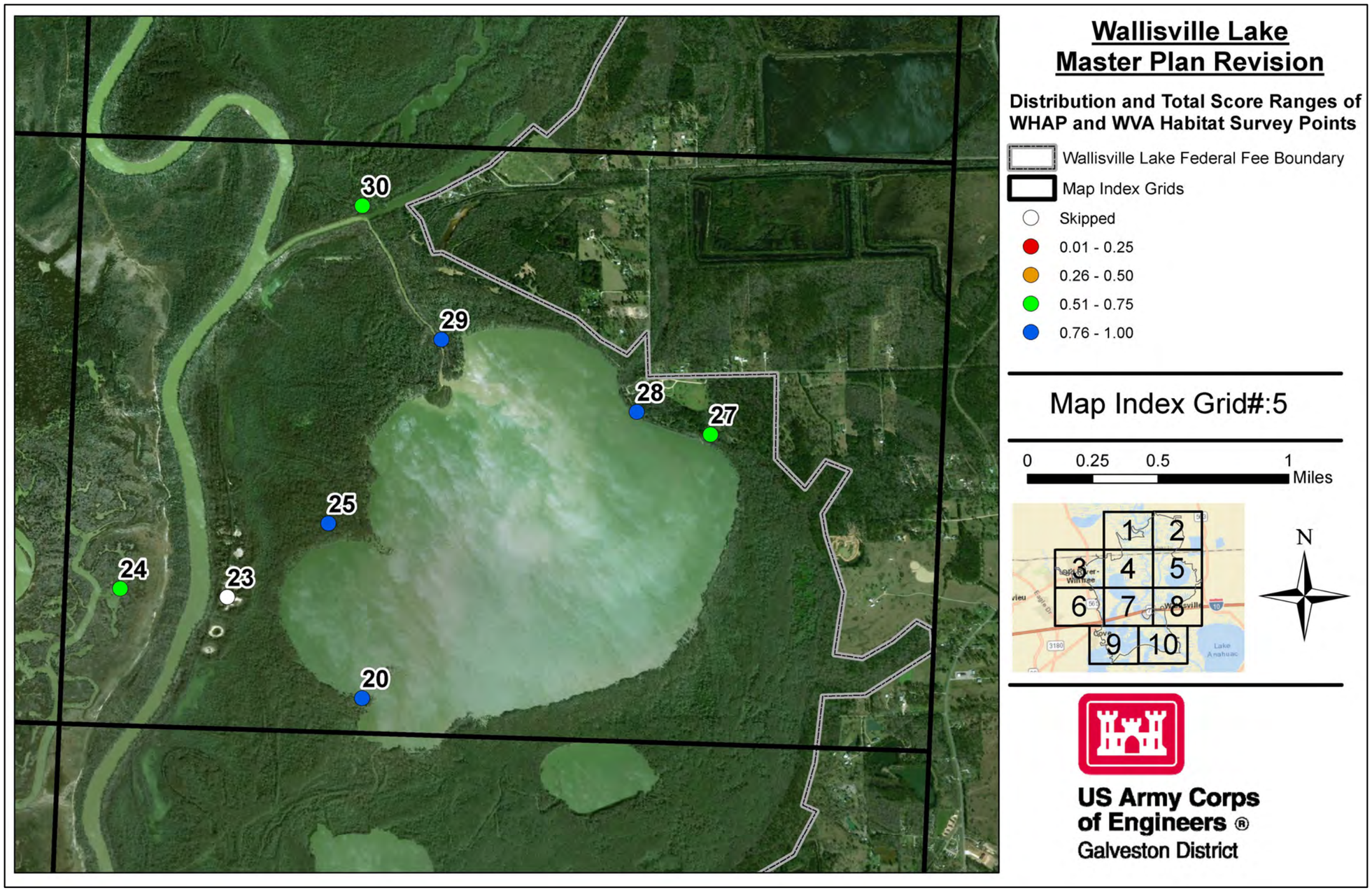

Figure 3E. Total Score Range for All Points Surveyed.

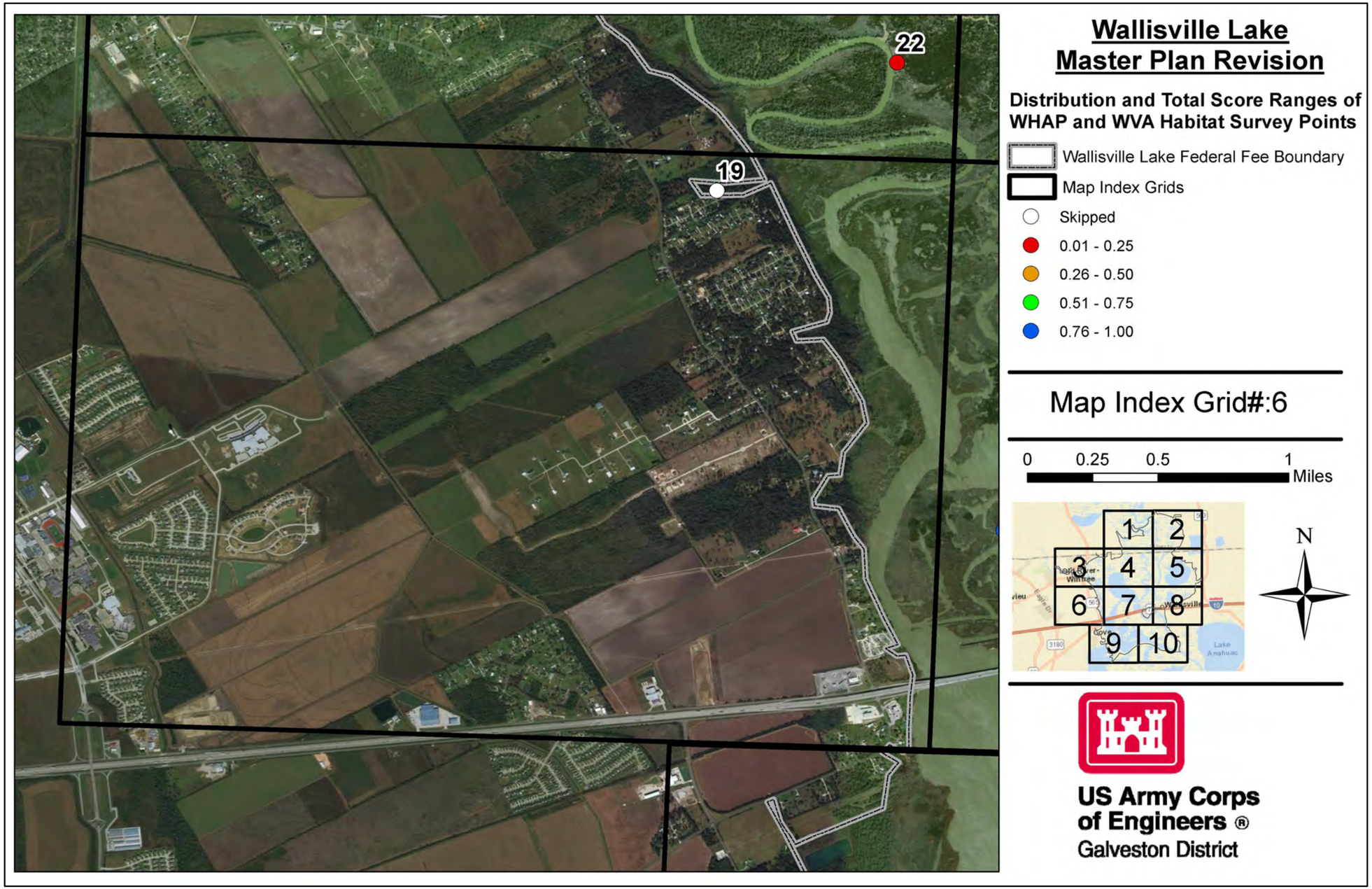

Figure 3F. Total Score Range for All Points Surveyed.

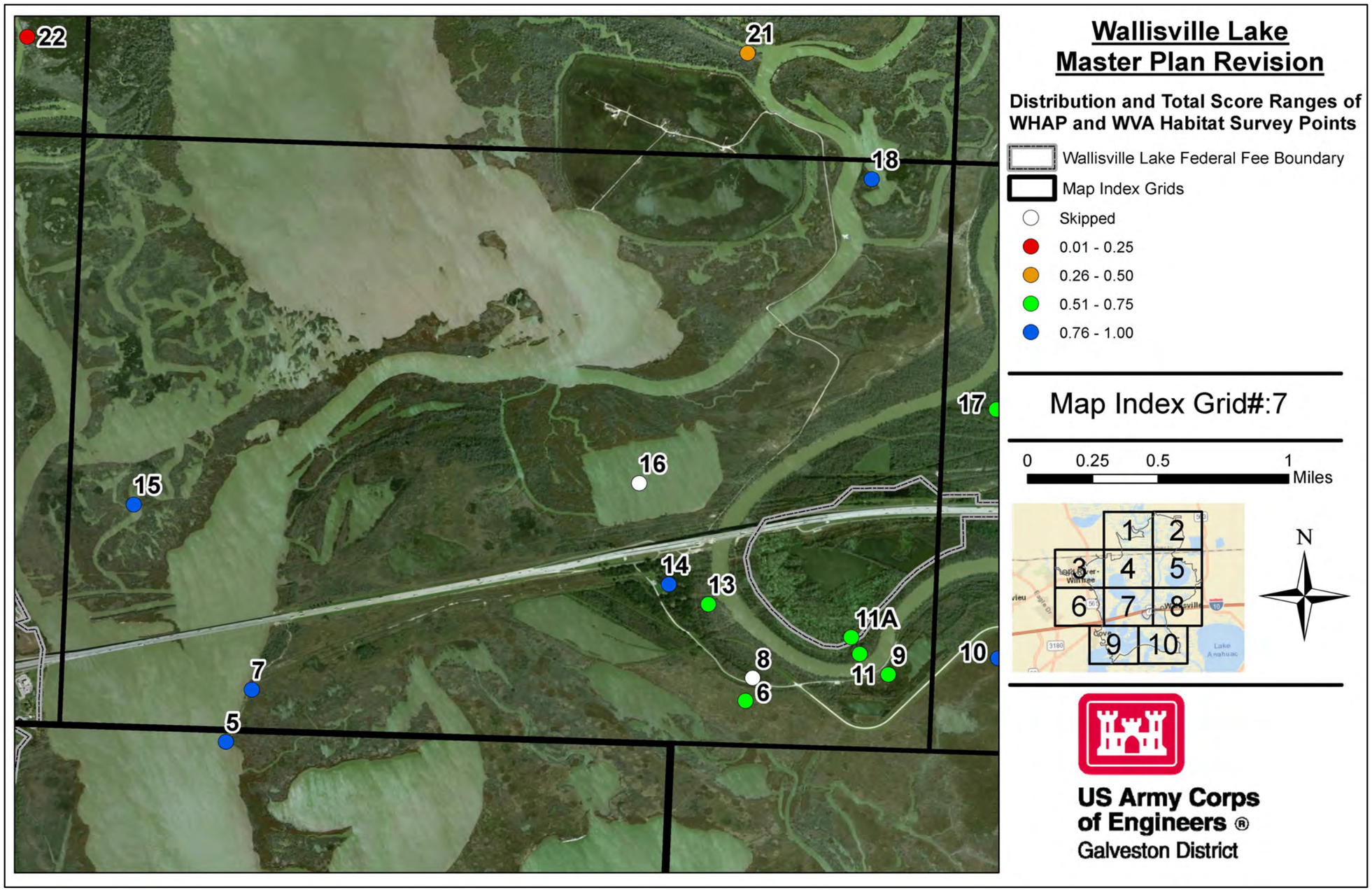

Figure 3G. Total Score Range for All Points Surveyed.

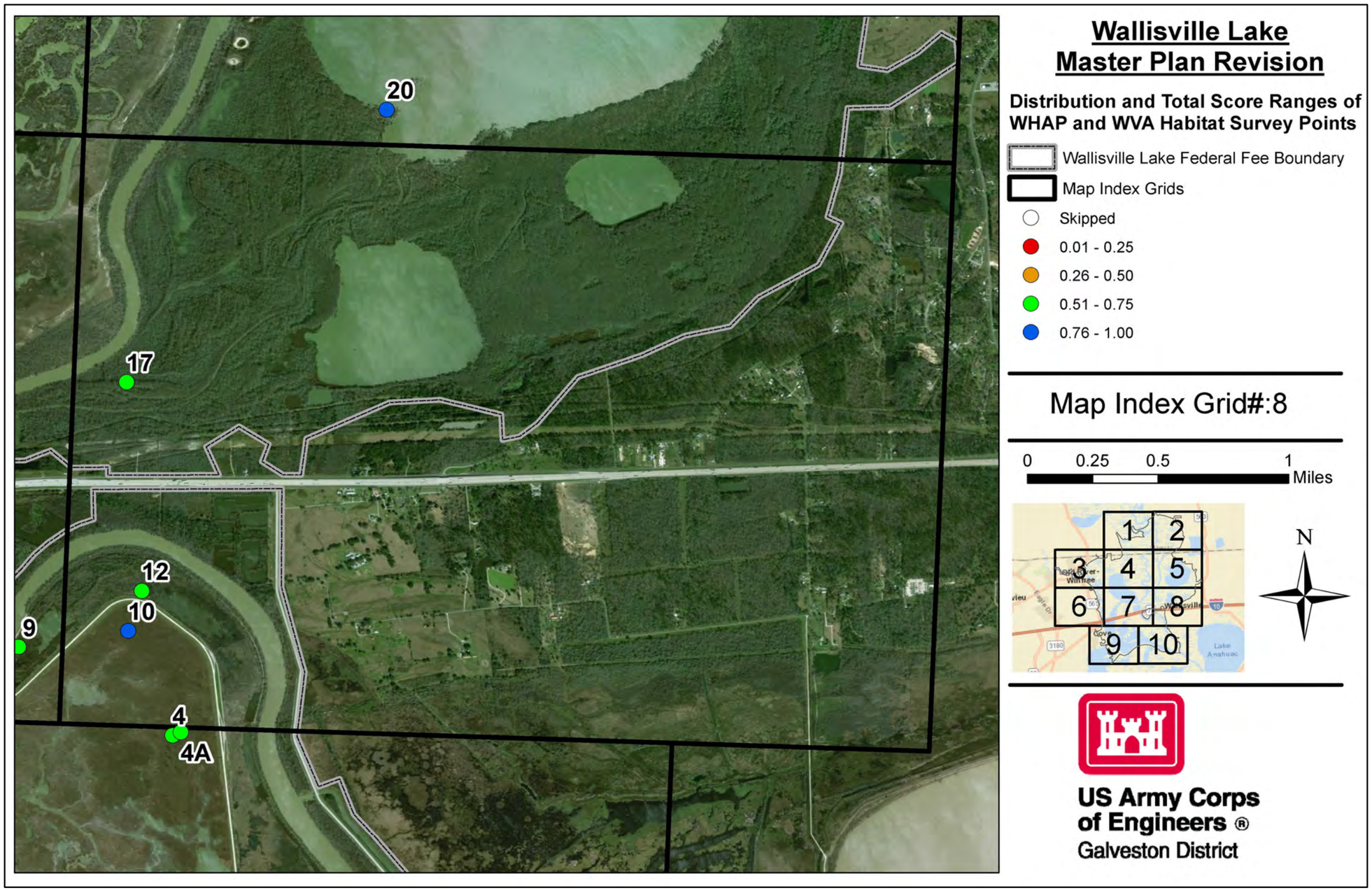

Figure 3H. Total Score Range for All Points Surveyed.

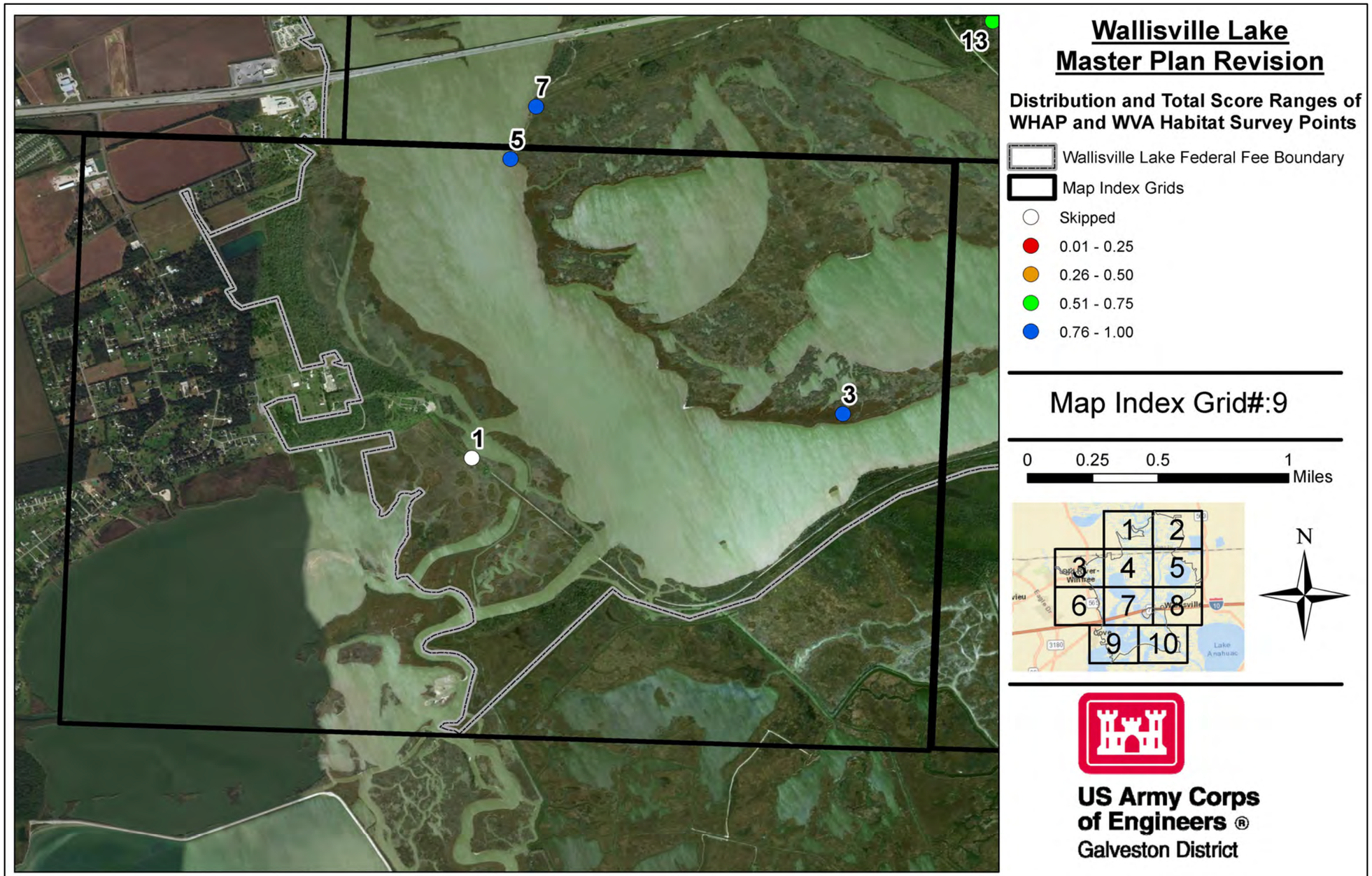

Figure 3I. Total Score Range for All Points Surveyed.

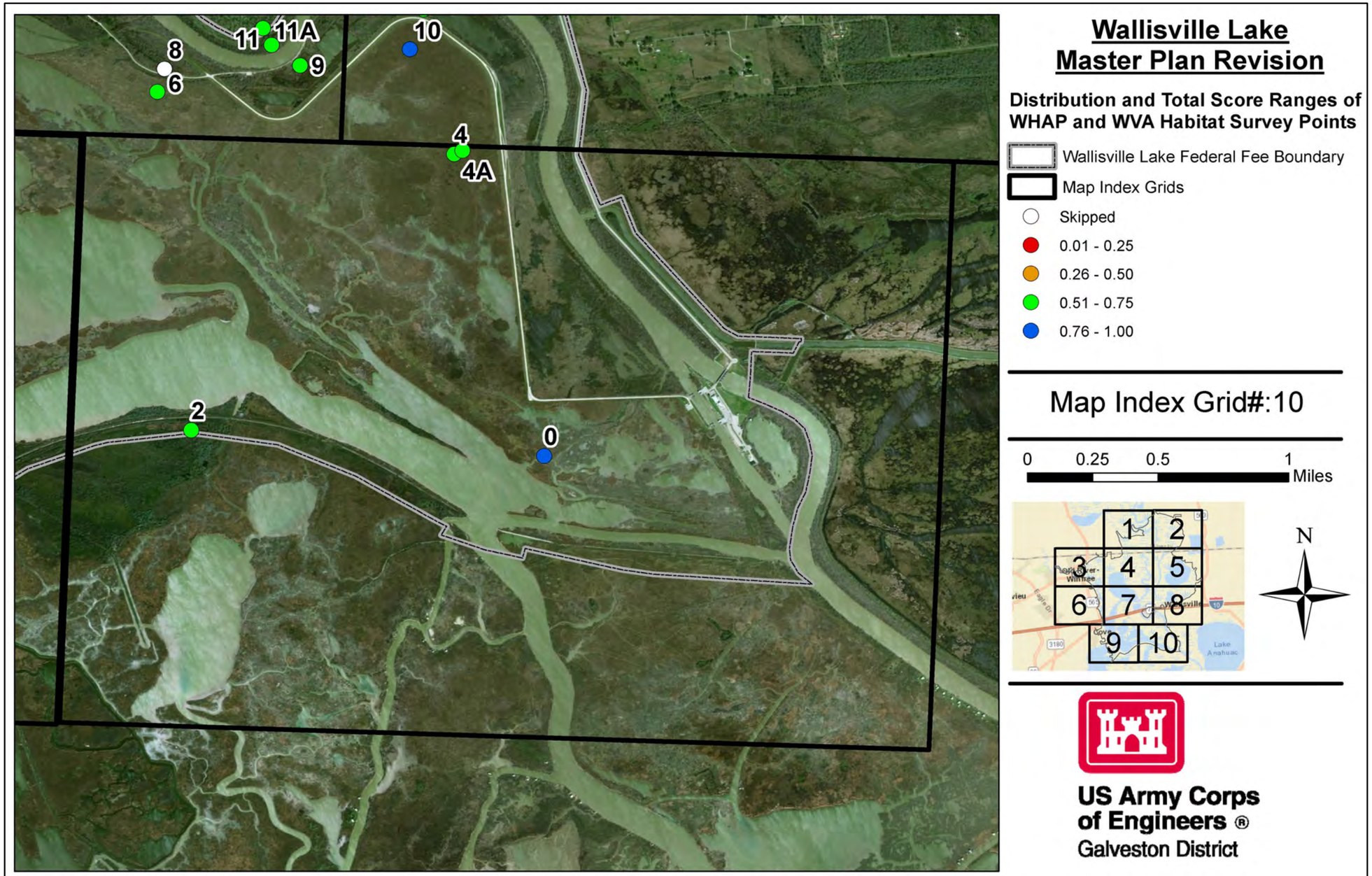

Figure 3J. Total Score Range for All Points Surveyed.

Attachment A: Wallisville Lake WHAP & WVA Results Summary

Wallisville Habitat Survey: WHAP and WVA Point Data

Point Number	Habitat Group	Total Score	Berry Drupe	Legume Pod	Acorn	Nut Nutlike	Samara	Cone	Achene	All Others	Herbaceous Species	Method Used
0	Fresh Water Marsh	0.87	None	Joint Vetch	None	None	None	None	None	None	Deer Pea, Spartina, Smartweed, Sedge, Common Reed, Morning Glory, Cattail, Stinkweed, Iris, 1 unknown	WVA
1	Skipped	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	Upland Forest	0.59	Hackberry, Black Hawthorn, Poison Ivy, Pepperberry, Dewberry, Privet spp, grape, Chinese Tallow	Legume Spp	none	none	American Elm, Cedar Elm, Winged Elm	None	Baccharis	None	unknown grass, Wildrye, Ragweed, 2 Carex spp, Ironweed, 1 unknown Forb	WHAP
3	Fresh Water Marsh	0.8	Unknown Vine	Vetch	None	None	None	None	None	Duckweed	Smartweed, Giant Reed	WVA
4	Marsh	0.64	None	None	None	None	None	None	None	None	Spartina sp, Deer Pea, Salt Marsh, Morning Glory	WHAP
4A	Brackish Water Marsh	0.7	None	None	None	None	None	None	None	None	Spartina sp, Deer Pea, Salt Marsh, Morning Glory	WVA
5	Skipped	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6	Brackish Water Marsh	0.72	None	Locust	None	None	None	None	None	None	Hyacinth, unknonw yellow flower, Phragmites, unknown grass, Spartina sp, Deer Pea, Salt Marsh, Morning Glory	WVA
7	Fresh Water Marsh	0.78	None	Vetch, Sesbania	None	None	None	None	None	None	Cattail, Bullrush, Smartweed, Sedges, Ironweed, Juncus, Reed, Stinkweed	WVA
8	Skipped	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9	BHF	0.57	Chinese Tallow	Locust	None	None	None	Bald Cypress	None	Willow	Giant Ragweed, Juncus species, Wildrye, Morning Glory, Stinkweed, unknown yellow flower, unknown purple flower, Western Ragweed, Hyacinth	WHAP
10	Brackish Water Marsh	0.75	None	None	None	None	None	None	None	None	Spartina sp, Deer Pea, Salt Marsh, Morning Glory	WVA
11	BHF	0.7	None	None	None	None	Green Ash	Bald Cypress	None	None	Duckweed, Hyacinth	WHAP
11A	Swamp	0.72	None	None	None	None	Green Ash	Bald Cypress	None	None	Duckweed, Hyacinth	WVA
12	Fresh Water Marsh	0.6	None	Locust	None	None	None	None	None	Duckweed, Gooseweed	Hyacinth, Sedge, cord like grass, Iva frutescens,Typha, Sedge	WVA
13	BHF	0.56	Tallow, Unknown Vine	Locust	Live Oak	None	None	None	None	None	Horsetail, Juncus, 2 species of Sedge, Yellow Flower, Ragweed, Acanthus	WHAP
14	Upland Forest	0.78	1 unknown, Muscadine, Pepperweed, Hackberry	Live Oak	None	None	None	None	None	None	Plametto, Ragweed	WHAP
15	Fresh Water Marsh	1.00	Chinese Tallow	Sesbania, Acacia	None	None	None	None	None	Duck Potato	Morning Glory, Deer Pea, Common Reed, Panicum Species	WVA
16	Skipped	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
17	BHF	0.7	Peppervine, unknown vine, Legume vine, Greenbrier	None	Water Oak, Willow Oak	Hickory	None	Bald Cypress	None	None	Ragweed, 2 species of Panicum	WHAP
18	Fresh Water Marsh	0.77	None	Sesbania	None	None	None	None	None	None	Bulrush, Smartweed, Waterhemp, Deer Pea, Spartina, Sedges, Morning Glory, Stinkbush, Smartweed, 2 species of Sawgrass, Common Reed, Sumpweed	WVA
19	Skipped	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
20	Swamp	0.81	None	None	None	None	None	Bald Cypress	None	Spanish Moss	None	WVA
21	Swamp	0.4	Chinese Tallow	Locust, Sesbania	None	None	Cedar Elm, Ash	Bald Cypress	None	Willow	Spider Lily, Deer Pea, Waterhemp, Cattail, Sawgrass, Smartweed, Sedge, Ragweed, Sumpweed, Morning Glory, Stinkbush, Rose Mallow	WVA
22	Swamp	0.17	Chinese Tallow	Sesbania, Locust	None	None	Cedar Elm	Bald Cypress	None	Willow	Frog Fruit, Deer Pea, Sawgrass, Brazilian Verbena, Waterhemp, Sumpweed, Licustris	WVA
23	Skipped	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Wallisville Habitat Survey: WHAP and WVA Point Data

Point Number	Habitat Group	Total Score	Berry Drupe	Legume Pod	Acorn	Nut Nutlike	Samara	Cone	Achene	All Others	Herbaceous Species	Method Used
24	Grassland	0.65	None	None	None	None	None	None	None	None	Texas Sedge, 1 unknown, Thistle	WHAP
25	Swamp	0.76	None	None	None	None	None	Bald Cypress	None	Spanish Moss	None	WVA
26	Swamp	0.29	Peppervine, Trumpet Creeper, Chinese Tallow, Dewberry, unknown vine, Balsamapple	Locust, Sesbania, unknown Paloverde, Acacia	None	None	Cedar Elm, Green Ash	Bald Cypress	None	Buttonbush	Deer Pea, Morning Glory, Sedges, Sawgrass, Stinkbush, Marshmallow, Ragweed, unknown daisy, Bulrush, two unknowns, Smartweed, Juncus, Alligatorweed, Common Reed, Balloon Vine, Creeping Spot-flower	WVA
27	Upland Forest	0.63	Greenbrier, Chinese Tallow, Yaupon, Peppervine	Locust	None	Pecan	None	None	None	None	Palmetto, Bunchgrass, Saltgrass, 1 unknown	WHAP
28	Upland Forest	0.75	Yaupon, Greenbrier, Smilax spp, American Beautyberry, American Persimmon, Peppervine	None	Live Oak	Wax Myrtle, Hickory	None	Loblolly Pine	None	Sweetgum	Ragweed, Western Ragweed, 1 unknown, Cutgrass, 2 unknown woodies	WHAP
29	Upland Forest	0.86	Peppervine, Poison Ivy	None	None	Hickory	None	Bald Cypress	Sycamore	Willow	Hyacinth, Morning Glory, Stinkweed, Western Ragweed, Cordgrass, 1 unknown, Deer Pea	WHAP
30	BHF	0.71	Poison Ivy, Mustang Grape, Chinese Tallow, Peppervine	Locust	None	None	Elm	Bald Cypress	Sycamore	Willow	Snailseed, Stinkweed, Panicum, Ragweed, 1 unknown	WHAP
31	BHF	0.63	Yaupon, Peppervine, Crossvine	None	Water Oak, Willow Oak	Pecan, Hickory	Elm	None	Sycamore	None	Sedge x3, Ragweed, Bunchgrass, Wildrye, Panicum x2, Sensitive Brier, moss, Sabal Palmetto	WHAP
31A	BHF	0.71	Yaupon, Peppervine, Crossvine	None	Water Oak, Willow Oak	Pecan, Hickory	Elm	None	Sycamore	None	Sedge x3, Ragweed, Bunchgrass, Wildrye, Panicum x2, Sensitive Brier, moss, Sabal Palmetto	WVA
32	Upland Forest	0.54	Yaupon, Peppervine, Hackberry	None	None	None	Elm	None	None	None	Wildrye, Bunchgrass, 2 unknown	WHAP

APPENDIX E – CULTURAL RESOURCES

American Recovery and Reinvestment Act 2009 Section 110 Compliance Report for the U.S. Army Corps of Engineers, Galveston District

NHPA, Cultural Resources Investigations
Technical Report No. 6, Part 1

Section 110 Survey and Evaluation of 193 Previously Recorded Archaeological Sites at Wallisville Reservoir, Chambers and Liberty Counties, Texas

Mandatory Center of Expertise for the Curation and Management of Archaeological Collections

US Army Corps of Engineers ®
St. Louis District

REPORT DOCUMENTATION PAGE

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1. REPORT DATE *(DD-MM-YYYY)*	2. REPORT TYPE	3. DATES COVERED *(From - To)*
04-05-2011	Final Report	Nov 2009 - May 2011

4. TITLE AND SUBTITLE
American Recovery and Reinvestment Act 2009 Section 110 Compliance Report for the U.S. Army Corps of Engineers, Galveston District, NHPA, Cultural Resources Investigations, Technical Report No. 6: Section 110 Survey and Evaluation of 193 Previously Recorded Archaeological Sites at Wallisville Reservoir, Chambers and Liberty Counties, Texas

5a. CONTRACT NUMBER
W912P9-09-D-0537

5b. GRANT NUMBER
N/A

5c. PROGRAM ELEMENT NUMBER
N/A

6. AUTHOR(S)
Shannon Dunn, Chris Hunt, and Scott Butler

5d. PROJECT NUMBER
N/A

5e. TASK NUMBER
0006

5f. WORK UNIT NUMBER
N/A

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
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8. PERFORMING ORGANIZATION REPORT NUMBER
#3702

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US Army Corps of Engineers, St. Louis
Mandatory Center of Expertise for the Curation and Management of Archaeological Collections
1222 Spruce Street
Saint Louis, MO 63103

10. SPONSOR/MONITOR'S ACRONYM(S)
CEMVS-EC-Z

11. SPONSOR/MONITOR'S REPORT NUMBER(S)
Technical Report #6

12. DISTRIBUTION/AVAILABILITY STATEMENT
Restricted - not for public disclosure

13. SUPPLEMENTARY NOTES

14. ABSTRACT
Between November 2, 2009 and May 20, 2010, Brockington and Associates reevaluated 193 previously recorded archaeological sites in the Wallisville Reservoir area. The project area includes 9,966 acres within the federally owned (U.S. Army Corps of Engineers, Galveston District) Wallisville Reservoir, which includes 6,875 acres in Chambers County and 3,091 acres in Liberty County, Texas. This project was conducted under Contract No. W912P9-09-D-0537 with the St. Louis District, Corps of Engineers (Corps) as part of an American Recovery and Reinvestment Act (ARRA) program enacted by Congress in 2009. This archaeological study included site revisits and delineation, assessment of disturbance and site integrity, preliminary assessment of the National Register of Historic Places (NRHP) eligibility, and management recommendations. In all, this project resulted in the revisit of 157 previously recorded archaeological sites and identification of five previously unrecorded sites. Twenty-three of these are listed or eligible for the NRHP, 23 are recommended potentially eligible, 8 sites are unknown eligibility, and 108 are recommended ineligible. This ARRA-funded task order employed 25 specialists for a period of 18 months.

15. SUBJECT TERMS
NHPA, Section 110, Cultural Resources Survey, US Army Corps of Engineers, Galveston District
36 CFR Part 800; SWG; Archaeology

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			Thomas G. Whitley
U	U	U	UU	1662	19b. TELEPHONE NUMBER *(Include area code)* 678-638-4113

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American Recovery and Reinvestment Act 2009
Section 110 Compliance
Report for the U.S. Army Corps of Engineers, Galveston District

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Technical Report No. 6, Part 1

Section 110 Survey and Evaluation of 193 Previously Recorded Archaeological Sites at Wallisville Reservoir, Chambers and Liberty Counties, Texas

by Shannon Dunn, Chris Hunt, and Scott Butler

US Army Corps of Engineers ®
St. Louis District

Mandatory Center of Expertise for the Curation and Management of Archaeological Collections

Brockington
Cultural Resources Consulting

EXECUTIVE SUMMARY

Between November 2, 2009 and May 20, 2010, Brockington and Associates reevaluated 193 previously recorded archaeological sites in the Wallisville Reservoir area. The project area includes 9,966 acres within the federally owned (US Army Corps of Engineers, Galveston District) Wallisville Reservoir, which includes 6,875 acres in Chambers County and 3,091 acres in Liberty County, Texas. This project was conducted under Contract No. W912P9-09-D-0537 with the St. Louis District, Corps of Engineers (Corps) as part of an American Recovery and Reinvestment Act (ARRA) program enacted by Congress in 2009. The primary goals of this investigation are to identify and document the status of all previously recorded archaeological and historical resources within the project boundaries, and assess eligibility for inclusion of encountered resources on the National Register of Historic Places (NRHP) according to the criteria set forth by 36 CFR Part 60. The focus of all work under this contract was Section 110 Compliance on Corps fee-title land, and was therefore not subject to State Historic Preservation Office (SHPO) review. Accordingly, standardized report guidelines that meet the Secretary of the Interior's "Professional Qualifications Standards" (48 FR 44738-9) were developed and followed in the preparation of this report. Wherever possible, specific guidelines issued by the Texas SHPO and the direction of the Galveston District Corps were also followed. Methods for recording and delineating sites adhered to the Texas Historical Commission's (THC) standards. Courtesy copies of the report were provided to the THC.

This archaeological study included site revisits and delineation, assessment of disturbance and site integrity, preliminary assessment of the National Register of Historic Places (NRHP) eligibility, and management recommendations. Prior to undertaking fieldwork, Brockington and Associates met with the District Archaeologist, Mr. Jerry Androy, to determine the focus of the Section 110 investigation. Mr. Androy identified 193 previously identified archaeological sites within the Wallisville study area for revaluation. Most of these sites were recorded in the 1960s and 1970s as shell middens, but little was known regarding their current condition. Prior to fieldwork, archival research was undertaken at the Texas Archaeological Research Laboratory (TARL), at the University of Texas at Austin. There, we obtained information for previous investigations and previously recorded sites. Several of the sites are located at the borders of the project area; field visits were required to determine whether these sites were actually within or outside of Corps property. One hundred and eighty-six of these sites are located within Chambers County, and six are within Liberty County.

Field survey showed, however, that 33 sites (of the 193) are currently inundated and therefore inaccessible to pedestrian or boat access. Field crews were thus unable to assess the condition/eligibility of these 33 sites. As originally recorded, five of these sites had previously been listed on the NRHP, 15 had been recommended ineligible for the NRHP or had been recorded as destroyed, and the NRHP eligibility of the remaining 13 sites is unknown. Besides these 33, two other sites (41CH006 and 41LB093) were never re-located and appear to be outside of Corps of Engineers property. Also, one mapped site location did not correlate with any previously recorded site. Additionally, five previously unrecorded archaeological sites were identified (sites 41CH381, 41CH382, 41CH383, 41CH384, and 41CH385); these sites were also fully recorded and assessed.

In all, this project resulted in the revisit of 157 previouslyrecordedarchaeologicalsitesandidentification of five previously unrecorded sites (sites 41CH381, 41CH382, 41CH383, 41CH384, and 41CH385). Of these 162 total sites, 22 have been previously listed on the National Register of Historic Places (NRHP), one is previously determined eligible for the NRHP, 23 are recommended potentially eligible for inclusion on the NRHP, and the research potential/eligibility of eight sites are unknown. These latter eight sites were buried at over one meter in depth or are submerged; their location was revisited and confirmed when possible, but no information regarding the condition of cultural

deposits was recovered. The remaining 108 sites are recommended NRHP-ineligible.

Archaeological sites within the Wallisville region tend to be prehistoric rather than historic, and represent a long occupation span from the Archaic through the Protohistoric and historic occupations. There are 171 prehistoric shell middens of varying sizes or sites containing or shell scatter components; they account for approximately 89 percent of all sites identified during this study. It is clear that subsidence has affected the majority of the shell midden sites. Many shell middens have suffered from wave erosion or are now entirely inundated. Other sites have been subjected to severe looting, some recently. The removal of shell midden for road fill and construction appears to have been a common practice through recent decades, and this practice has destroyed many substantial midden deposits, some with recorded human burials.

Though site types do not evidence a great deal of diversity, the occupations represented within these types vary widely. They indicate intensive occupation of the Wallisville region and utilization of its marine and terrestrial resources throughout prehistoric and, to a lesser extent, historic periods. The active stewardship of such sites and their associated activity zones by the Galveston Corps will allow future scholars to provide continual, more detailed interpretations of prehistoric lifeways.

The authors wish to thank Ruth Millsaps (Park Ranger, Wallisville Lake Project) and Jerry Androy (Galveston District, Cultural Resources Manager). All fieldwork and reporting aspects of this project were conducted by Shannon Dunn, Chris Hunt, Patrick Severts, and Jimmy LeFebvre, under the direction of Scott Butler. Field technicians included Kong Cheong, Lara Duncan, Melissa Garcia, Lesley Nash, and Stacey Whitacre. GIS and spatial analysis was carried out by Gitisha Goel, Cameron Sexton, and Ambrose Hoilman, under the direction of Thomas G. Whitley.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION

1.1 PROJECT OVERVIEW

Between November 2, 2009 and May 20, 2010, Brockington and Associates reevaluated 193 previously recorded sites and identified five newly recorded sites in the Wallisville Reservoir region of the upper Texas coast. The fieldwork was completed during four field visits (November 2 through November 12, 2009, February 8 through February 25, 2010, March 29 through April 15, 2010, and May 4 through May 20, 2010). The project area comprises 9,966 acres within the Wallisville Reservoir area that were prioritized for Section 110 investigation; this project area includes 6,875 acres in Chambers County and 3,091 acres in Liberty County, Texas (Figures 1.1 and 1.2). This project was conducted under Contract No. W912P9-09-D-0537 with the St. Louis District, Corps of Engineers (Corps) as part of an American Recovery and Reinvestment Act (ARRA) program enacted by Congress in 2009. The primary goals of this investigation are to identify and document the status of all previously recorded archaeological and historical resources within the project boundaries, and assess eligibility for inclusion of encountered resources on the National Register of Historic Places (NRHP) according to the criteria set forth by 36 CFR Part 60. The focus of all work under this contract was Section 110 Compliance on Corps fee-title land, and was therefore not subject to State Historic Preservation Office (SHPO) review. Accordingly, standardized report guidelines that meet the Secretary of the Interior's "Professional Qualifications Standards" (48 FR 44738-9) were developed and followed in the preparation of this report. Wherever possible, specific guidelines issued by the Texas SHPO and the direction of the Galveston District Corps were also followed. Methods for recording and delineating sites adhered to the Texas Historical Commission's (THC) standards. Courtesy copies of the report were provided to the THC.

The District Archaeologist originally identified 193 archaeological sites for reevaluation. However, of these 193 sites, 33 were inaccessible to either pedestrian or boat access, two (41CH006 and 41LB093) were not located and appear to be outside of Corps of Engineers property, and the recorded location of one site did not correlate with any previously recorded site number and was determined not to be a location of an archaeological site. Brockington and Associates revisited 157 previously recorded sites in the Wallisville Reservoir area; revisits included site delineation, assessment of disturbance and site integrity, preliminary assessment of the National Register of Historic Places (NRHP) eligibility, and management recommendations for these 157 sites. Additionally, five previously unrecorded archaeological sites were encountered (sites 41CH381, 41CH382, 41CH383, 41CH384, and 41CH385); these sites were also fully recorded and assessed. The project area includes 9,966 acres within the Wallisville Reservoir area that have been prioritized for Section 110 investigation, which includes 6,875 acres in Chambers County and 3,091 acres in Liberty County, Texas.

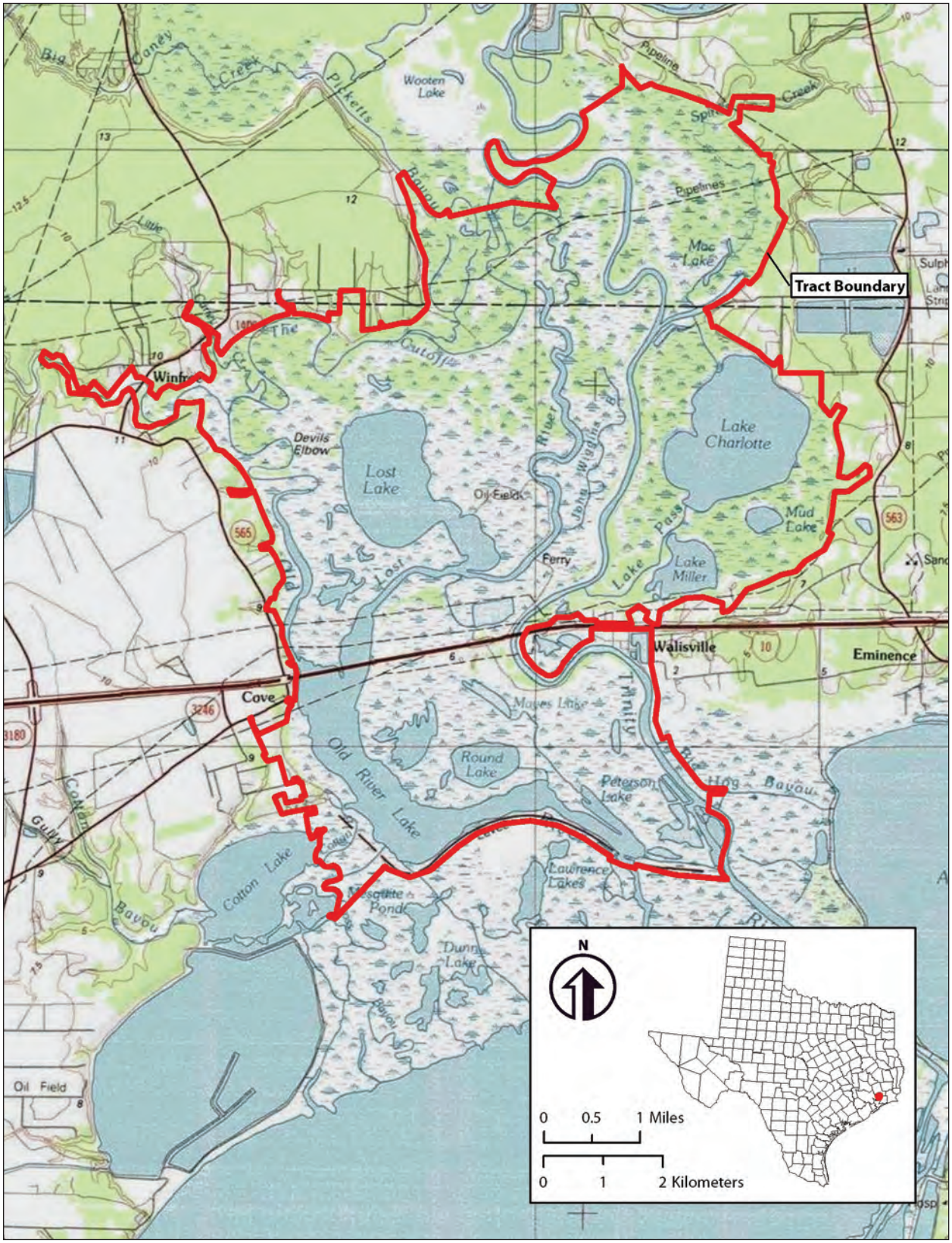

Figure 1.1 Project tract location (7.5 minute USGS quadrangle maps: Anahuac, Texas [1993], Cove, Texas [1995], Moss Bluff, Texas [1993], and Shiloh, Texas [1993]).

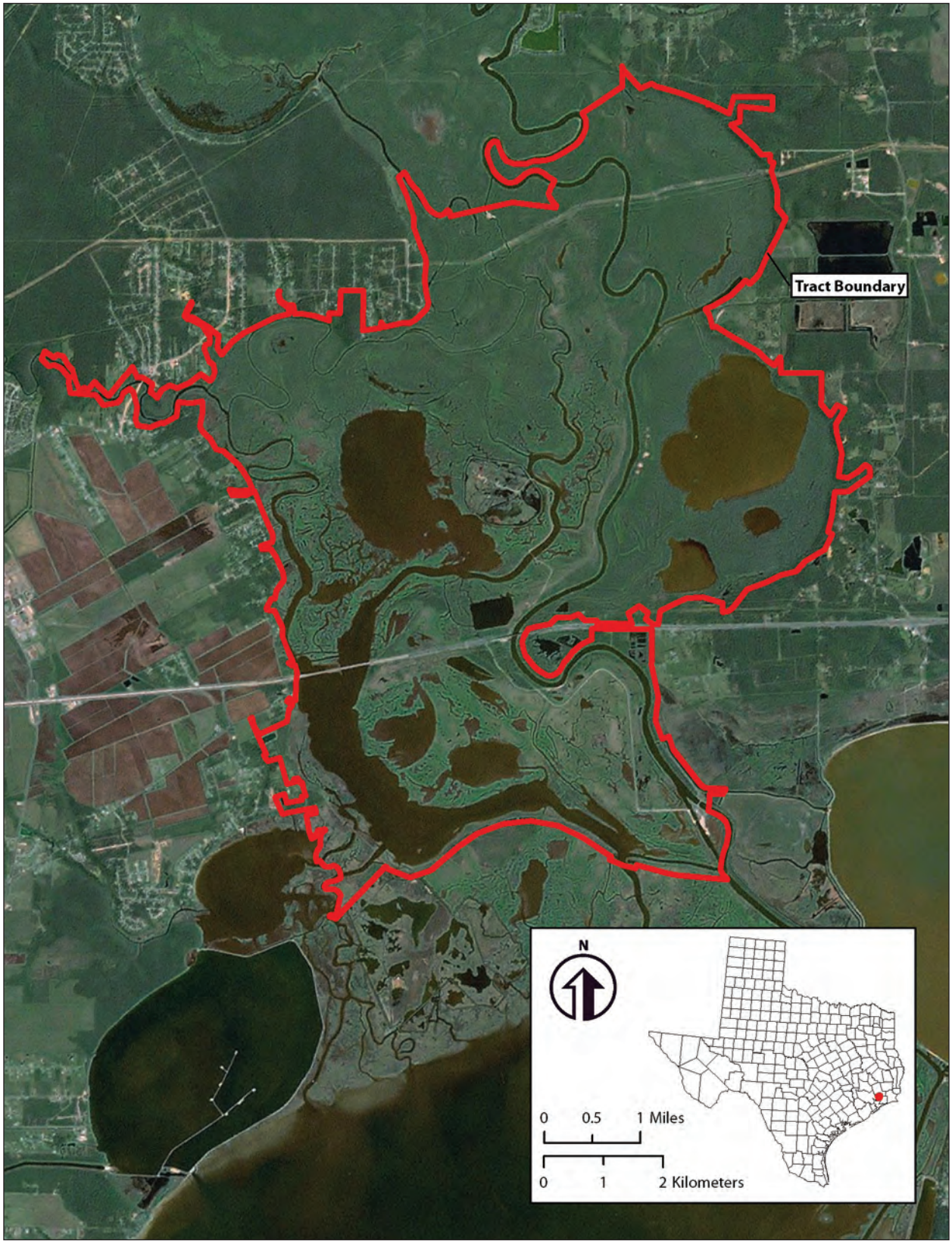

Figure 1.2 Project tract location, aerial view.

2.0 METHODS

2.1 BACKGROUND RESEARCH

Prior to undertaking fieldwork, Brockington and Associates conducted archival research at the Texas Archaeological Research Laboratory (TARL), at the University of Texas at Austin. Additionally, the THC's online Atlas sites database was employed. All databases, maps, and previous reports containing information regarding previously recorded sites within the project boundaries were copied and studied prior to the start of fieldwork. USGS quadrangles with previously recorded site locations within the project areas were extensively reviewed at TARL, where copies of each site form were obtained. The Atlas-plotted site locations were crosschecked with the TARL information, and UTMs of previously recorded sites were pre-loaded into handheld Global Positioning System (GPS) units. Libraries at the THC, TARL, and the University of Texas at Austin were also utilized for relevant background literature concerning previous investigations in the region. Geologic Atlas of Texas sheets for the survey tracts were obtained from the Bureau of Economic Geology at the University of Texas at Austin and were used to identify the geology of the project areas, prior to initiating fieldwork.

2.2 PRE-FIELD PLANNING

For reevaluation and revisits of the Wallisville Reservoir sites, a logistical plan was prepared in advance of each field investigation. USACE archaeologists provided a Geographic Information Systems (GIS) shapefile (ArcGIS format) to Brockington, which was used in conjunction with USGS topographic maps and Geologic Atlas of Texas sheets to identify site locations prior to commencement of field activities. All sites identified for revisits were sorted according to accessibility by land or by water. In addition, site locations were loaded as .kml files in Google Earth, and were examined both prior to fieldwork and while in the field. These maps were utilized by the project archaeologist and crew chiefs to determine proximity of sites, accessibility, and to direct daily field tasks. Fieldwork began with pedestrian revisits and pedestrian attempts to access sites for which accessibility was uncertain; fieldwork concluded with revisits via boat. All field personnel participating in boat-aided site revisits completed the Georgia Department of Natural Resources boating safety course and exam (identical to the Texas DNR course), and were trained in the operation specifics of the vessel utilized as well as safety and emergency procedures. All Texas state boating laws and regulations were followed during these boat-aided investigations.

2.3 SITE LOCATION, DELINEATION, AND RECORDATION

Sites were located according to the previously recorded information, which may have included a mapped location, UTMs, or other general descriptive data provided by previous investigators. In the event that sites were not identified at the previously reported locations, surrounding locales were searched for evidence of the sites. Narrative descriptions were scrutinized for clues, and original location maps, when available, were utilized to identify similar landforms and geographic locations near the recorded site location to determine if the originally recorded location may have been affected by some degree of error.

Once identified, initial work at each site included surface inspection, collection of GPS location data, and site photographs. A datum was established near what appeared to be the center of the site. Shovel tests were excavated at each site in a uniform grid of radial tests conducted at 15-meter intervals in grid cardinal directions until two negative tests were excavated in a row. At small sites, usually 30 meters in diameter or less, reduced intervals of ten or five meters were utilized to ascertain site boundaries.

Site boundaries were defined using surface features and subsurface artifact distributions at recorded positive shovel test locations. These positive test boundary definitions were augmented with additional data such as surface distributions of artifacts and/or features, shell

midden piles, and close observations of exposed soils and cultural deposits in bluff edges, road cuts, borrow pits, and animal burrows. Sites were field sketched to scale and those field sketches were used to refine details on the final site maps created using GIS software. Sites were photographed for general setting, surface conditions, and observed surface and subsurface features. All site data were recorded onto field site forms that were transferred to electronic State of Texas site data forms and submitted to TARL using the TexSite database. In the case of previously recorded sites, a site revisit form was submitted to TARL.

All shovel tests were between 30 and 35 centimeters in diameter and were excavated to 100 cm deep or until restrictive clay subsoil (hardpan) was encountered. All sediments excavated through shovel tests were screened through ¼-inch mesh hardware cloth; where heavy clays were encountered, sediments were often trowel sorted in the screens. Along wetlands and stream margins, individual shovel tests were terminated when water appeared in the test unit.

Each test was individually recorded and described by field technicians for depth, sediment texture, stratigraphy, and cultural material present by stratum. Additionally, the field director or crew chiefs recorded details of soil type, Munsell color, texture, structure, and clast content for each site identified. Cultural material recovered from positive shovel tests was recorded according to type (prehistoric ceramics, prehistoric lithics, and historic artifacts) and returned to the positive shovel test pit during backfilling. Diagnostic artifacts were photographed in the field before being returned to the positive shovel test. Recent rubbish was sometimes encountered within project areas, especially along shorelines, at boat launches and parks, and within bodies of water. Large quantities of jetsam (sometimes including large uprooted trees and heavy brush) resulting from multiple flood events was frequently encountered. Only material obviously predating 50 years in age was recorded as part of a site.

2.4 EVALUATION OF NRHP ELIGIBILITY

Cultural resources (i.e., districts, buildings, structures, sites, and objects) are generally evaluated based on the criteria for eligibility to the National Register of Historic Places (NRHP), as specified in the Department of Interior Regulations 36 CFR Part 60: National Register of Historic Places. According to 36 CFR Part 60.4 (Criteria for Evaluation), cultural resources (referred to properties in the regulations) can be defined as significant (i.e., eligible for NRHP listing) if they "possess integrity of location, design, setting, materials, workmanship, feeling, and association." In addition, to be considered eligible for the NRHP, a property must be shown to be significant under one or more of four basic criteria for evaluation; referred to as Criteria A through D.

Archaeological sites are generally evaluated relative to Criterion D, however, some sites, particularly those representing historic period occupation or use, can be considered eligible if they can be shown to be "associated with events that have made a significant contribution to the broad patterns of [American] history" (Criterion A), or are found to be "associated with the lives of persons significant in [America's] past" (Criterion B), or "embody the distinctive characteristics of a type, period, or method of construction" (Criterion C) (Savage and Pope 1988). According to the US Department of the Interior's guidelines for applying the NRHP criteria, the key to applying Criterion D to archaeological sites is in determining the "information potential" of the cultural property. In order for an archaeological site to be considered eligible for the NRHP under Criterion D, that site (1) must have, or have had, information to contribute to our understanding of human history or prehistory, and (2) the information must be considered important.

The first of these requirements can be defined as research potential. The National Park Service provides clarification for this statement by adding that a site should be considered eligible for the NRHP if that site "has been used as a source for data and contains more, as yet unretrieved data" (Savage and Pope 1998:21). It is extremely difficult to develop a completely objective set of attributes that allow definition of NRHP eligible or ineligible archaeological sites. Recent interpretation

of published guidelines indicates that sites should be evaluated based on their ability to contribute to our "theoretical and substantive knowledge" (Butler 1985:821-826). Regardless of exact terminology, there is consensus among cultural resource managers that each site type must be evaluated with full awareness of regional research needs, and relative to similar sites in the region.

Archaeological resources located are evaluated within local and regional prehistoric and historic contexts. A site's potential to provide data was evaluated explicitly as research potential beyond the present survey project. For example, every site with culturally or temporally diagnostic material has the potential to contribute to the reconstruction of settlement patterns through time. In many cases, however, this potential can be realized through recognition and detailed documentation at the survey level of investigation. It was within this context that the identified archaeological sites were evaluated and summarized in the results section of this report. Specifically, the focus was on providing locational information, environmental characteristics, temporal assignation, as well as summaries of the soils, stratigraphic profiles, and artifact counts, descriptions, and density. This is accompanied by interpretations of the site function(s), the nature of the occupation(s), the conditions, and integrity of the site, the potential for intact subsurface features, the observed threats, and the potential research themes that might be addressed with future research. The final interpretive evaluations are the treatment options. These are our recommendations with regard to the NRHP-eligibility of the site, management actions, and research potential under Criterion D (or any of the other criteria).

2.5 ARTIFACT ANALYSIS

The USACE District Archaeologist requested that we not collect artifacts during this investigation. Artifacts were identified during field investigations and returned, as best as possible, to their original contexts. Field technicians identified and recorded artifacts during shovel test excavations and surface collection, yielding data regarding artifact types and density at each site. When possible, lithic artifacts were identified by raw material type among those known throughout Texas (e.g., chert, chalcedony, quartz, quartzite, orthoquartzite, metavolcanics, etc.). Generally, the lithics recovered represent two distinct classes of flaked lithic artifacts: tools and debitage. Tools represent items shaped through knapping or use for implementation during a specific task, while debitage represents the byproducts of lithic tool manufacture. For prehistoric ceramic sherds, field analysis efforts included decoration and morphological traits (e.g. body, rim, or base sherds). Other prehistoric artifacts included shell, which was identified as to density and distribution as well as type (usually Rangia), and faunal bone, which was identified by type (turtle, fish, mammal, etc.) and any alteration (burned, butchered, etc.) when possible. Historic artifact analysis was based on observable stylistic and technological attributes. For this process, artifacts were identified by material, color, type, and form as well as could be identified in the field.

2.6 GIS/SPATIAL ANALYSIS

All GIS layers were processed and analyzed in ArcGIS 9.3 (ESRI 1999-2008). The ArcGIS program options included ArcView (ArcMap, ArcCatalog, ArcScene, and ArcGlobe) with the Spatial Analyst and 3D Analysts Extensions loaded. Site maps were drawn using 2009-2010 aerial imagery acquired through the ArcGIS GIS Servers online (services.arcgisonline.com); specifically the World Imagery, ESRI Imagery World 2D, and USA Topo Maps map services. The National Elevation Dataset (NED) for the region encompassing the survey tracts was downloaded from the USGS National Map Seamless Server (seamless.usgs.gov/index.php) and five m contours were extracted. All data was stored, analyzed, and manipulated in Zone 14 of the Universal Transverse Mercator (UTM) coordinate system, keyed to the North American 1983 (NAD83) datum, and using meters as the distance units.

The GIS was used to calculate site centroids (in both NAD83 and NAD27 datums), area (in square meters), elevation (at centroid using the NED), lengths and widths (using minimum bounding rectangles), linear distance to nearest permanent water sources, and the number of both positive and negative shovel tests within

each site's boundaries. Artifact density was calculated in two ways; where subsurface artifacts occurred, the number of artifacts per excavated square meter was calculated for the entire site, and surface artifacts were included only as part of their shovel test location. Where surface collections were made, the number of artifacts per square meter was based on a collection area of 10 meters diameter around the collection point, unless a larger area was specifically identified. In no case does the artifact density represent a calculation based on the area of the site as a whole–since the entire site was never sampled as a complete collection unit.

2.7 CURATION

All project maps, field notes, analysis forms, photographs, and other information generated by this project will be prepared for storage at a federally approved repository for curation, based on standards outlined in 36 CFR 79 (Curation of Federally-Owned and Administered Archaeological Collections; Final Rule. Long-term curation of these field documents will be at the Galveston District US Army Corps of Engineers Office.

3.0 ENVIRONMENTAL OVERVIEW

3.1 INTRODUCTION

The project area comprises 9,966 acres within the Wallisville Reservoir area, which includes 6,875 acres in Chambers County and 3,091 acres in Liberty County, Texas. This chapter provides an environmental overview of the project area, which is located across three Level IV ecoregions as defined by the US Environmental Protection Agency (EPA). Ecoregions are defined as "areas within which there is spatial coincidence in characteristics of geographical phenomena associated with differences in the quality, health, and integrity of ecosystems" (Omernik 2004:28). With respect to this project, the EPA Level IV ecoregions (those defined at the highest resolution; on the local level) provide a framework for understanding the ecosystems within which archaeological sites investigated for this project are located, including components such as climate, vegetation, and fauna.

Texas consists of 12 Level III and 56 Level IV ecoregions (Griffith et al. 2004:1), indicating a wide diversity of climatic and environmental conditions across the state. The upper coast of Texas falls within the Western Gulf Coastal Plain, and the project area falls within a subset of the Gulf Coastal Plain and a small portion of the South Central Plains Level III ecoregion (Figure 3.1), within three Level IV ecoregions: Northern Humid Gulf Coastal Prairies and Texas-Louisiana Coastal Marshes within the Gulf Coastal Plain to the south, west, and east, and the Floodplains and Low Terraces within the South Central Plains in the northern portion of the project area (Figure 3.2; Griffith et al. 2004:1, 2).

3.2 ECOREGIONS AND ENVIRONMENT

The project area has extensive waterways throughout the Wallisville Lake area, including the Trinity River, Trinity Bay, Round Lake, Lake Miller, Lake Charlotte, John Wiggins Bayou, Lost Lake, Old River Lake, Peterson Bayou, and the many human-made boat cuts and canals in the area, as well as much of the land adjacent to these bodies of water. Marshes and coastal environments in the majority of this area fall into the Northern Humid Gulf Coastal Prairies and Texas-Louisiana Coastal Marshes ecoregions, characterized by flat topography and extensive grasslands. North of Lake Charlotte, a small portion of the project area, primarily within Liberty County, lies within the Floodplains and Low Terraces ecoregions, characterized by coniferous forest along irregular plains (Griffith et al. 2004:1, 2; Griffith et al. 2007:73-74, 82, 88).

3.2.1 Climate

Climate within the three ecoregions of the project is comparable, and all can be classified as humid subtropical, typified by hot summers and moderate to mild winters, and a dominant southeasterly wind (Fisher et al. 1972:17; Griffith et al. 2007:73-74, 82, 88). This southeasterly wind dominates March to November, with a strong northerly wind present December through February. Temperatures at the project area average from a minimum of 42° F in winter to an average daily maximum of 93° F in summer. Precipitation in the region averages 53 inches per year, with the highest rates of precipitation in the summer. Flooding is common, as rainfall exceeds rates of evapotranspiration, and may occur year round (Stokes 1985:31-32; Corps of Engineers 1981:154). Freezing temperatures and frosts are rare, and short in duration, in part due to high humidity; relative humidity is 75 percent (Stokes 1985:31). The project area is subject to changes in sea level accompanying storms, with storm tides of 1.3 m above mean sea level (amsl) occurring approximately every four years, on average, and an increase of 60 cm to one meter occurring regularly with a strong southeasterly wind. Hurricanes affect the project area with some regularity, with a strong hurricane and an associated high tide up to five meters amsl occurring approximately once every five years. Lower water levels of up to 1.3 meters below mean sea level can occur during winter fronts with strong northerly winds (Corps of Engineers 1981:68, 75).

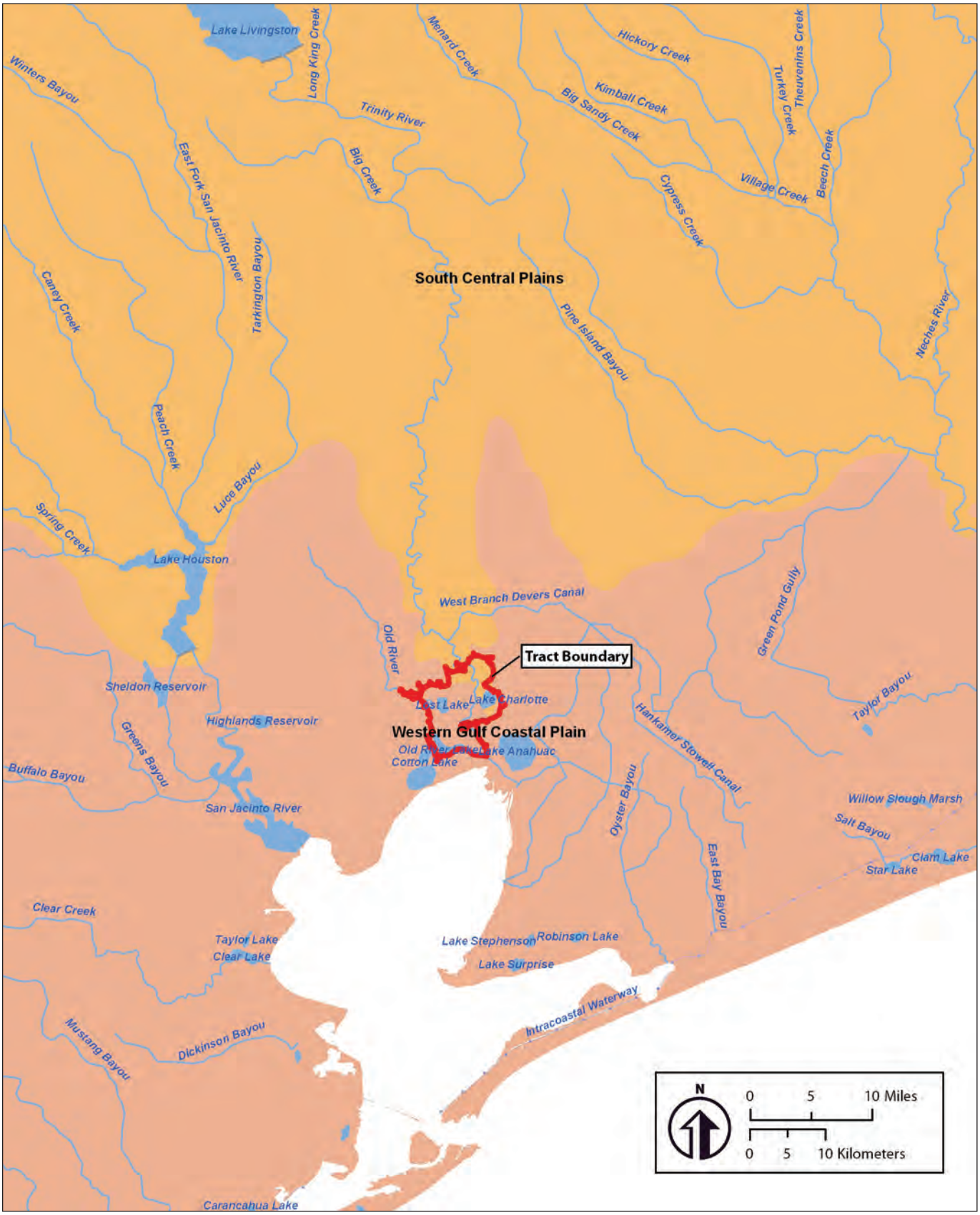

Figure 3.1 Project location over the US EPA Level III ecoregions (Griffith et al. 2004).

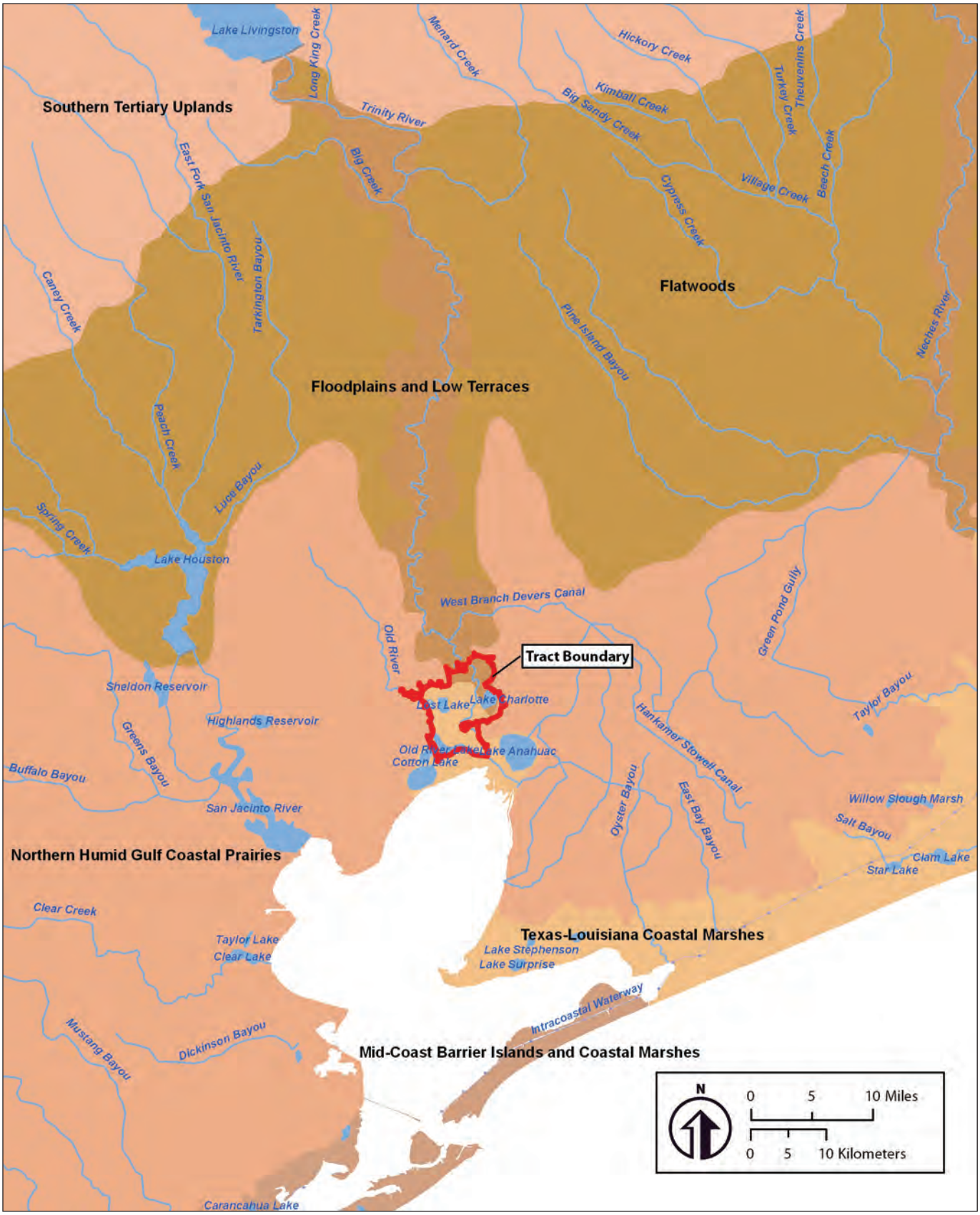

Figure 3.2 Project location over the US EPA Level IV ecoregions (Griffith et al. 2004).

3.2.2 Hydrology

The entirety of the project area is closely associated with hydrologic features. This is reflected in the descriptions of Level IV ecoregions: extensive freshwater and saltwater coastal marshes typify the Texas-Louisiana Coastal Marshes, with rivers, lakes, bayous, tidal channels, canals, streams and rivers; the Floodplains and Low Terraces ecoregion is defined along major waterways, such as the Trinity River, in the eastern portion of the state; and the Northern Humid Gulf Coastal Prairies are comprised of low-relief coastal plain that is commonly flooded (Griffith et al. 2007:73-74, 82, 88). All of these ecoregions are present across the Wallisville Lake area, which is located across the delta of the Trinity River, with associated bodies of water including Trinity Bay, Round Lake, Lake Miller, Lake Charlotte, Lost Lake, and Old River Lake. The expanse of the Trinity River basin drains nearly 18,000 square miles of watershed, and flows through coastal prairies and marsh before emptying into Trinity Bay, one of four bays of the Galveston Bay system. This group represents the largest estuary on the Texas coast. Trinity Bay is fed by three other major waterways, Old River, Lost River, and the Cutoff; the bay is shallow, with maximum depths of eight to ten feet (Corps of Engineers 1981:65).

3.2.3 Geology and Soils

Geology of the project area is defined by its location within the Trinity River, which drains the Floodplains and Low Terraces ecoregion at the north of the project area through generally well-drained inland coastal plain, characterized by low hills. Nearer the coast, the river flows through the Northern Humid Gulf Coastal Prairies, characterized by a mostly flat coastal plain. Finally, the Trinity River flows through the Texas-Louisiana Coastal Marshes are comprised by flat plains covered by standing water, usually in tidal marshes adjacent to lakes, canals, and bayous. The project area is primarily situated within the Trinity River delta, formed during the Holocene and late Pleistocene, with the current coastal marsh and estuaries formed between 18,000 and 3,500 BP as sea levels stabilized (Stokes 1985:29). Specifically, sea level fluctuations and eventual stabilization during this period caused flooding and alluvial deposits (Fisher et al. 1972:13), which created the present Trinity River delta's marshes, estuaries, and barrier islands (Stokes 1985:29-30).

The more recent deposits represent the coastal plain, with elevations near sea level; these are categorized among the Texas-Louisiana Coastal Marshes, comprised of Holocene deposits of clay and silt forming flat plains covered by standing water, usually in tidal marshes adjacent to lakes, canals, and bayous. Somewhat further inland, the Northern Humid Gulf Coastal Prairies, are characterized by a mostly flat coastal plain, located along the fluvial terraces of Holocene and late Pleistocene deposits of silts, sands, and clays. Drainage is nearly consistently poor in this ecoregion due to the prevalence of clay subsoil and low relief. Within this region, two Pleistocene-age soil formations are present: the upper Lissie Formation, with light colored soils including sandy clay loam, silt loam, and sandy loam, and lower Beaumont Formation, with darker clayey soils. At the northernmost extent of the project area, primarily within Liberty County, the Floodplains and Low Terraces ecoregion is comprised of Holocene deposits of alluvial sand, silt, clay, and gravel along low stream and river terraces and level floodplains, with low gradient streams with silty and sandy substrates (Griffith et al. 2004:1-2; Griffith et al. 2007:73-74, 82, 88).

All of the geologic formations along the Trinity River delta result from active coastal geologic processes, including "longshore drift, beach swash, wind deflation and deposition, tidal currents, wind-generated waves and currents, river-point bar and flood deposition, [and] delta out-building" (Fisher et al. 1972:11). As noted by Aten (1983a:124) and Stokes (1985:29-30), these processes actively created many of the present Trinity River delta landforms as the region became more highly populated, and human activity, most often in the form of shell midden creation, likely had an impact on geologic formations within the delta.

Soils in the project area, and throughout the Trinity and Galveston Bays, primarily result from underlying parent material and alluvial deposits. Sandy soils are prevalent along the course of present and former river beds and meanders, while clay soils are present in most other areas, formed from mud and silt deposits (Stokes 1985:32-33; Fisher et al. 1972:9). Eleven soils are listed by

the USDA within the project area. These can be grouped into two broad categories: soils that are moderately well drained, located on floodplains, flats, and terraces, and soils that are somewhat poorly to very poorly drained, located on depressions, flats, floodplains, terraces, oxbows, and marshes (Table 3.1).

No sources of chert exist near the project area; the nearest source is approximately 100 km from the upper Texas coast, with chert gravels located in the Brazos River valley (Aten 1983a:20).

3.2.4 Subsidence and Sea Level Fluctuation

Fluctuation in sea level and land subsidence are significant environmental factors along the upper Texas coast, and are dramatic within the project area. The National Ocean Service and National Geodetic Survey indicate that the project area, and the Texas coast between Sabine Pass and Freeport, experience very high rates of regional relative sea level rise (RSL) each year. This RSL is calculated as eustatic sea-level rise plus subsidence, and along the upper Texas coast this amount is up to 20 millimeters per year (Sharp et al. 1991:397). Sharp et al. (1991:397) have suggested that this is a substantially higher rate than natural RSL, and is expedited in the region by the extraction of groundwater and hydrocarbons (crude oil). The upper Texas coast contains up to 15 kilometers of sediments including uranium, lignite, petroleum, and base metals (Sharp et al. 1991:398). Also contributing to the rising RSL are the development of the coastal region for industrial, recreational, municipal, and habitation purposes (Sharp et al. 1991:397); saltwater intrusion (White and Tremblay 1995:794); lessened or altered deposits of sediments in the gulf by coastal waterways, especially by upstream dams, reservoirs, and the dredging of canals (White and Tremblay 1995:788, 794); climatic changes (White and Tremblay 1995:794); and continued resource extraction from coastal areas (Sharp et al. 1991:397). It is important to note that these artificial and natural impacts work in tandem to create impacts to RSL, subsidence, and wetland loss (White and Tremblay 1995:794).

Geology is an important factor in the region's subsidence and sea level rise. The upper Texas coast is characterized by its two largest estuaries, Galveston Bay and Sabine Lake, which are comprised of Holocene and Pleistocene deposits (White and Tremblay 1995:789). Brackish and salt marshes are prevalent along the coast, between and beyond Sabine Lake and Galveston Bay, and fresh marshes, swamps, and woodlands are present along the Neches, Sabine, San Jacinto, and Trinity Rivers. Nearly 60 percent of the salt and brackish marshes in the US are located along the Gulf coast of Louisiana and Texas (White and Tremblay 1995:788). The Galveston Bay region is the seventh largest estuary in the US, with 163,000 ha of open water and 52,800 ha of marsh; approximately 83 percent of this area is

Table 3.1 Soils within the project tract (USDA 2010).

Soil type	Drainage	Landform
Acadia silt loam	Somewhat poorly drained	Terraces
Beaumont clay	Poorly drained	Depressions on flats
Estes clay	Somewhat poorly drained	Floodplains
Fausse clay	Very poorly drained	Oxbows
Harris clay	Very poorly drained	Marshes
Kaman clay	Poorly drained	Floodplains
Lake Charles clay	Moderately well drained	Flats
Morey silt loam	Somewhat poorly drained	Meander scrolls
Owentown fine sandy loam	Moderately well drained	Floodplains
Spurger fine sandy loam	Moderately well drained	Terraces
Vamont clay	Somewhat poorly drained	Flats

salt and brackish marsh, and 17 percent is fresh marsh (White and Tremblay 1995:790). Wetlands in these areas are situated on Holocene and Pleistocene landforms; the thickness of Holocene landforms varies from more than 40 m at the Bolivar Peninsula to less than 10 m near Galveston Bay (White and Tremblay 1995:790). The upper sediments present along the upper Texas coast contain clays that are highly compressible; these clays are located within and between coastal aquifers (Sharp et al. 1991: 399).

As groundwater, oil, and gas are pumped from subsurface deposits, usually for petroleum production, these clays and shales become depressurized and consolidate. Sharp et al. (1991) argued that the depressurization of oil and gas reservoirs is a primary factor in the dramatic subsidence along this region of the Gulf coast, while White and Tremblay (1995) argued that subsidence in the Houston-Galveston area appears to have been a result more of groundwater withdrawal than of oil and gas (Ratzlaff 1982:12). This result of Ratzlaff's study, however, may be the result of the localized nature of oil and gas withdrawal and the larger reaching effects of groundwater withdrawal, which are visible over a much larger area (Ratzlaff 1982:12). Localized subsidence of a dramatic nature has also been reported, such as that at the Moss Bluff Salt Dome on the Liberty-Chambers County line, in which subsidence of over 4.6 m was caused by sulfur production (Ratzlaff 1982:12).

Whatever the cause, this depressurization appears to contribute the most significantly to rates of increasing RSL, which were reported as "11.4 mm/yr with components as follows: 2-2.4 mm/yr in undifferentiated eustatic sea-level rise; 0.1-2.4 mm/yr of natural subsidence; 0-4.1 mm/yr of subsidence caused by ground-water withdrawal; and 2.5 to 9.2 mm/yr of subsidence induced by petroleum reservoir depressurization" (Sharp et al. 1991:402). This analysis of contributing factors to the change in RSL indicates that subsidence is the predominant factor, while changes in sea level are less substantial. Natural rates of subsidence are not definitively known, but estimates from Florida's more static coastal shelf range from two to 2.4 mm per year, and global estimates range from one to 1.5 mm per year (Sharp et al. 1991:401). Large and numerous deposits of oil and gas are located within these clay deposits, at both shallow and greater (up to 6,000 m) depths (Sharp et al. 1991:399). When water or other liquids are withdrawn from underground deposits, pore pressure decreases, which causes an increase on the pressure of the "skeleton" of the aquifer (Ratzlaff 1982:5). Different soils adjust to changes in pressure at different speeds, with coarse-grained, usually sand, deposits adjusting more rapidly than fine grained, clay and silt, deposits, which adjust slowly (Ratzlaff 1982:5). This difference in pressure and adjustment time allows water to flow from clays to sands, compacting clays and causing a decrease in elevation, or subsidence (Ratzlaff 1982:5). Generally, the withdrawal of oil and gas occurs in more pressurized areas, resulting in up to 20 times the fluid pressure of that involved in the withdrawal of groundwater (Ratzlaff 1982:5).

Tidal gauge data from the Galveston area indicate that the rate of RSL rise is increasing, and a change of between 0.9 and 3.5 m was predicted by the year 2100 CE, with an increase of 0.3 and 1.5 m by 2050 CE (Sharp et al. 1991:397, 403). Early evidence for subsidence resulted in a shift from underground water supplies to surface resources (Sharp et al. 1991:398); from 1906 to 1978, four mm per year of subsidence was noted as attributable to groundwater withdrawal (Sharp et al. 1991:401), and in the Houston and Galveston areas, up to three m of subsidence has occurred due to groundwater withdrawal in the area since 1906 (White and Tremblay 1995:795). Since the 1930s, underground fluid production, including both groundwater and oil and gas withdrawal, have contributed to the rise in RSL (Ratzlaff 1982:5), which has resulted in the change of thousands of hectares (ha) of vegetated coastal wetlands to shallow underwater flats or open water (White and Tremblay 1995:788). Changes in RSL in the region around Trinity Bay are particularly evident, as approximately half of the area lies below 1.5 m elevation, with approximately three quarters of the area under three m elevation; most of this area is coastal and inland marsh interspersed with a large number of waterways (Sharp et al. 1991:401). The rates of RSL rise are important for predicting inundation and coastal retreat, particularly for the management of natural and cultural coastal resources, human habitation, and impacts on infrastructure. Shoreline retreat is predicted to progress at rates between 9.2 m/yr and 28.5 m/yr, depending

on rates of RSL rise (Sharp 1991:404). There is some indication that rates of human-induced subsidence have decelerated (White and Tremblay 1995:788). These changes have occurred in salt, brackish, and freshwater marshes and associated forested areas near Sabine Lake and Galveston Bay, with the permanent inundation of nearly 11,000 ha of wetland habitat in the Galveston Bay area alone.

In the Trinity River delta and alluvial valley, nearly 40 percent of wetland inundation was the result of a power plant cooling reservoir over 1,010 ha in size, which is located in the southwestern portion of the Trinity River delta. The remaining 60 percent of submersion appears to relate to subsidence and lower rates sediment deposits (White and Tremblay 1995:798). Lower sediment deposits have meant that vertical accretion can not keep up with sea level rise, but subsidence appears to be the primary factor of submersion and wetland loss (White and Tremblay 1995:798-799). In other regions of Galveston Bay, including Clear Lake, subsidence has been the most dramatic factor in wetland loss, as wetlands are commonly converted to water and submerged flats. The region around Clear Lake subsided between 1.5 and two m from 1906 to 1987, with rates varying from three mm/yr to 60 mm/yr (White and Tremblay 1995:799).

Additionally, active faults intersect with wetlands in many of the Galveston and Sabine areas. The primary fault zone along the upper Texas coast is in the Houston-Galveston region, with 150 km of linear faulting, much of which appears to extend from subsurface faults (White and Tremblay 1995:795). This faulting, too, can be primarily attributed to the withdrawal of liquids in the region (White and Tremblay 1995:795). In marsh contexts, vertical displacement of land along the fault often leads not only to subsidence but to inundation, loss of vegetation, and eventual loss of wetland habitat. Over 25 active faults were identified by White and Tremblay (1995:797) in wetland contexts along the upper Texas coast, most of which are located in the Galveston Bay region. Much of the fault movement in the Galveston Bay area appears to be related to hydrocarbon production (White and Tremblay 1995:804).

Subsidence of land on which archaeological sites are located increases the potential for inundation and heavy erosion from wave action, especially in the Wallisville Reservoir project area, where most previously identified sites are situated within marshes or waterways or along their peripheries. Stokes (1985:127-177) mentioned subsidence, rising water levels, and the increasing impacts of subsidence and erosion, particularly due to water movement and wave action, in passing, but is one of the only archaeologists to have addressed the topic in any way. It is clear from the data presented in this report that subsidence has had, and is likely to continue to have, a dramatic impact on the archaeological sites within the Wallisville Reservoir, as well as those within the surrounding area.

3.2.5 Flora and Fauna

Vegetation within the Northern Humid Gulf Coastal Prairies is typically grassland with maritime woodlands typically containing oaks, though some riparian forests include water oak, live oak, pecan, elm, and hackberry are also present, particularly along the northern portion of this ecoregion. Grasses often include switchgrass, little bluestem, yellow Indiangrass, gulf muhly, and brownseed paspalum. Invasive species include Chinese tallow and Chinese privet, which are prevalent in some portions of the project area and elsewhere in the region. Throughout the Texas-Louisiana Coastal Marshes, cordgrass marshes of freshwater, brackish, and saltwater contain grasses, sedges, and rushes, with few or no trees. Saltwater marshes contain bulrush, cordgrass, and needlerush, brackish marshes contain cordgrass, saltgrass, bulrush, and paspalum, and freshwater marshes contain bulrushes, maidencain, cutgrass, cattails, and spikesedges. In the Floodplains and Low Terraces ecoregion, vegetation is typical of southern floodplain forests, with loblolly pine, elm, blackgum, sweetgum, maple, and oaks such as water oak, southern red oak, and swamp chestnut oak, with green ash, sycamore, black willow, and eastern cottonwood present along river banks. In frequently flooded areas, water tupelo and bald cypress are common, and in seasonally flooded areas, swamp privet, sweetgum, green ash, red maple, and water hickory are common (Griffith et al. 2004:1-2; Griffith et al. 2007:73-74, 82, 88; Corps of Engineers 1981:147-181).

Fauna in the project area historically included bison, the remains of which have been recovered from shell middens in the Trinity River delta (Dillehay 1975:138-144), though these are no longer present

near the project area. Records of native groups hunting both bison and bear were recorded by early European explorers within the low Trinity River region (Foster 2008:251-254). Terrestrial fauna still prevalent today include red and gray fox, white-tailed dear, cottontail rabbit, swamp rabbit, mink, weasel, fox squirrel, gray squirrel, skunk, armadillo, opossum, cotton rat, rice rat, beaver, raccoon, and river otter, with ringtail, black bear, cougar, and bobcat present but not as common as other terrestrial fauna (Stokes 1985:34-35, 37-38). Reptiles include the American alligator, many venomous snakes (copperheads, coral snakes, diamond-back and black rattlers, and moccasins) and non-venomous snakes (rat, hog-nosed, king, green, rainbow, water, garter, and eastern racer varieties) (Stokes 1985:37-38; Corps of Engineers 1981:154-181). Cane and narrow mouth toads are common, as are tree frogs and cricket frogs, chameleons, and skinks (Stokes 1985:38). Turtles are prevalent, and types present in the project area include snapping turtles, mud turtles, painted turtles, chicken turtles, soft shell turtles, and terrapin turtles (Stokes 1985:38).

Fish and shellfish of both freshwater and saltwater varieties are present. Freshwater fish include bass, carp, channel catfish, crappie, blue catfish, drum, and sunfish; saltwater fish include Atlantic croaker, bluefish, black drum, red drum, Gulf flounder, striped mullet, sea trout, and sheephead (Corps of Engineers 1981:104-128). Shellfish include brown shrimp, white shrimp, oysters, and blue crab, though the Rangia clam represents the most common mollusk within the Trinity River delta area; according to Hopkins et al. (1973; Stokes 1985:40), up to 99 percent of benthic biomass in this type of low-salinity brackish water is represented by the Rangia clam.

Nearly 400 species of birds have been recorded from the historic period along the upper Texas coast and in the Trinity River area. Waterfowl comprise a large portion of the bird population, with geese, many species of duck, cormorants, herons, egrets, ibises, bitterns, spoonbills, pelicans, and storks among the most common (Stokes 1985:40-41). Other birds include quail, dove, gull, loon, coot, avocet, skimmer, sandpiper, and tern, as well as birds of prey such as owl, osprey, hawk, and vulture (Stokes 1985:40-41, Corps of Engineers 1981:160-177).

4.0 CULTURAL OVERVIEW

4.1 CULTURAL FRAMEWORK

Humans have occupied Texas for at least the past 12,000 years. Stokes (1985), Perttula (2004), Ricklis (2004), and Aten (1979) provide syntheses of the prehistory of the region. Cultural chronologies for Texas (Aten 1979; 1983a; Collins 2004; 1995; Foster 2008; Johnson 1995; Pertulla 2004; Prikryl 1990; Ricklis 2004; Ricklis and Collins 1995; Stokes 1985) largely consist of four broad subdivisions: Paleoindian (ca. 12,000-8800 BP), Archaic (8800-1200 BP), Late Prehistoric (1200 BP-AD 1600), and Historic (AD 1600 to the present). These generalized divisions are often based on changes in the subsistence strategy as seen through plant and animal remains in archaeological assemblages, technological responses such as morphological changes in lithic technology, and rarely, recovery of perishable technologies such as projectile delivery systems (e.g., thrusting spear, atlatl, bow and arrow), wooden implements, and fiber technologies that rarely persist in the archaeological record outside of dry cave environments. Because there are far more comprehensive sources that provide excellent overviews of the prehistory and history of central Texas, the following sections will only briefly outline the pertinent periods in the area of the survey tracts. For more detail refer to the references cited in the text.

4.2 THE PALEOINDIAN PERIOD (12,000-8800 BP)

The Paleoindian Period marks the initial human occupation in North America and is characterized by an array of distinctive, finely-made, fluted and non-fluted spear points. By 12,000 BP, Paleoindian peoples are believed to have migrated across the Bering Strait, possibly following herds of Pleistocene megafauna and other migratory species into the central part of the continent. The period corresponds with the terminal Pleistocene, when the climate was generally much colder than today, and when sea levels were much lower than they are at present. During the terminal Pleistocene, an array of now extinct large-bodied herbivores such as mammoths, mastodons, ground sloths, and archaic bison roamed North America. These "megafauna" were preyed upon (or more often scavenged) by Paleoindians. The bulk of the evidence suggests that the sparse populations of Paleoindians and the megafauna were tied together across North America in a series of predator-prey migratory cycles that may have been keyed to wide-ranging physiographic environments.

Paleoindian sites along the Texas coast were inundated with the rise in sea level by 10,000 BP, during which Galveston Bay was formed; later sea level fluctuations occurred until approximately 4,000 to 3,000 BP, when modern sea levels were reached. These later fluctuations and general rise in sea level submerged then-coastal Paleoindian sites, with few sites of this period identified along the modern Texas coast (Hester 1995; Ricklis and Weinstein 2005). No Paleoindian sites have been excavated in southeast Texas, though diagnostic tools from the period have been recovered from surface and subsurface contexts (Perttula 2004); when recovered from excavations, Paleoindian artifacts within southeast Texas have been mixed with later Archaic deposits (Perttula 2004). Much of our understanding of Paleoindian lifeways in southeast Texas is inferred from evidence from sites located further inland.

The Paleoindian period is the oldest substantiated cultural period in Texas. Typically, the Paleoindian is further subdivided into Early and Late subperiods (Collins 1995:380-383). Early Paleoindian sites are identified by the Clovis and Folsom type fluted lanceolate projectile points. The Early Paleoindian is well represented in central Texas at Wilson-Leonard (41WM235) and Gault (41BL323). The Gault site Clovis assemblage is so large that Collins suggests it represents more than 60 percent of all Clovis-aged artifacts excavated in North America to date (Black 2001). Isolated Paleoindian tools of this period have been recovered in southeast Texas: Clovis and Folsom points were recovered from McFaddin Beach, and isolated Folsom points have been recovered from Wharton County and Harris County (Perttula 2004).

Our interpretations of the patterns of settlement for the Paleoindian have been reconstructed primarily from the distribution of diagnostic fluted projectile points and quarry sites, along with inferences drawn from contemporaneous domestic or special purpose sites (such as rockshelters or kill sites). The typical Paleoindian settlement/subsistence model appears to have been one of broad-range, high-mobility hunting and gathering with a focus on megafauna exploitation. This implies a "prey-based" nomadism, where seasonal patterns of human migration are keyed to the migratory patterns of the principal prey species. The exploitation of other small animals, and a wide range of plant species would have occurred, but they would not have been scheduled. Instead they would have been taken opportunistically along the megafaunal migration routes as their presence could be taken for granted; or at least the presence of suitable resource alternatives was to be expected. Extensive population movements and possible exchange are also evident in the high quality of lithic materials of which the Paleoindian points recovered in southeast Texas were made; sources for these materials are scarce in that region (Ricklis 2004:184-185).

Late Paleoindian sites in central Texas are commonly identified by the diagnostic types Plainview, Midland, St. Mary's Hall, Golondrina, Wilson, Angostura, and Thrall, among others (Bousman 2004). One site, 41HI68, had 10 different Paleoindian components recorded, more than any other site with the exception of Wilson-Leonard (Bousman et al. 2004:65). Subsistence studies conducted on the Wilson-Leonard Late Paleoindian components suggest a broad spectrum diet exploiting the diverse plant and animal species available at the site (Bousman et al. 2004: 83). In southeast Texas, diagnostic late Paleoindian point types include San Patrice, Scottsbluff, Plainview, and Angostura (Ricklis 2004:183-185). East of the project area, on McFaddin Beach in Jefferson County, the 32 km stretch of beach as been acknowledged as a site (41JF050) not because of intact deposits but because of the extensive and continuously redeposited prehistoric cultural materials present. Paleoindian and Early Archaic tools, especially, are prevalent, with over 100 Clovis points recovered; this is more than any other county in Texas (Stright et al. 1999). These early materials are redeposited from disturbed primary deposits in the Gulf of Mexico, and include Clovis, Folsom, and other lanceolate points (Stright et al. 1999). Late Paleoindian points have also been recovered elsewhere in southeast Texas in isolated contexts, usually along major streams (Ricklis 2004:184).

4.3 THE ARCHAIC PERIOD (8800-1200 BP)

The Archaic in Texas is a period when forager lifeways first noted in the Paleoindian seem to have intensified. Aten (1983a:141-153) noted that populations intensified occupations and resource extraction along the shore line, especially along the upper Texas coast, as the modern sea level was reached after 4000 BP, and Ricklis (2004:182-189) reported evidence that such intensification began earlier, while sea levels and ecosystems were still in flux. The Archaic in southeast Texas is broadly defined by prehorticultural adaptations such as hunting and gathering, and by hunting technologies and tool kits that do not include the bow and arrow (Ricklis 2004:184). Tool kit complexity also increases with the introduction of ground stone technology (manos and metates), grooved stones (net sinkers, bola stones, Waco sinkers), and specialized chipped stone woodworking tools (Clear Fork tools, Guadalupe bifaces - Collins 2004: 119). These technological changes, combined with an increase in site types and numbers, point to a rise in population (Prewitt 1981:73), using a diverse tool kit to exploit a wide variety of plants and animals, while "settling in" within increasingly distinct territories (Prikryl 1990: 65). Point types indicative of the period in southeast Texas include Pedernales, which is found later in central Texas, as well as Kent and Gary points, which are most popular in the region during the Late Archaic (Ricklis 2004:186-187).

Early Archaic sites are generally rare in the project area, though shell from nearby 41GV053, near Clear Lake on the western shore of Galveston Bay, has yielded radiocarbon dates indicating occupation during this period (Hines 1992). The Eagle Ridge site (41CH252), revisited during the present investigation, provides a rare example of a stratified site with intact Archaic components including small hearth features; at Eagle Ridge, intensive shellfish exploitation is evident by

4500 BP (Ensor et al. 1995:119-133; see also Ensor 1998a; Ensor and Ricklis 1998). However, most evidence of Early Archaic coastal occupation is now submerged along stream margins and buried under alluvial sediment (Aten 1983a: 144; Gagliano 1977; Stright 1986). Projectile points typical for this interval include early stemmed and side-notched points of the Trinity, Neches River, and Keithville types, Bell/Calf Creek barbed points, stemmed Wells and unstemmed Tortugas points (Ricklis 2004:186-189; Ensor 1998b). Outside of lithic technology, Early Archaic subsistence and settlement patterns are often indistinguishable from the Late Paleoindian, though the changing sea level and fluctuations in ecosystems required geographical shifts in locations of particular resource extraction strategies.

Sites with isolable single components remain rare during the Middle Archaic. Again, the Eagle Ridge site (41CH252) provides the best example of a stratified site containing an identifiable Middle Archaic component in the project area. Projectile points typical for this interval include Yarbrough, Bulverde, Carrollton, Morhiss, Palmillas, Pedernales, and Travis, with the first two being the most common. Other components of the Middle Archaic tool kit recovered from Eagle Ridge and considered typical of the period include utilized flakes, small bifacial drills or perforators, and unifacial microliths, usually of Edwards chert. Additionally, cut and grooved bone were recovered from Eagle Ridge, with identifiable artifacts including projectile points, awls, beads, and a possible gaming piece (Ensor and White 1998).

Some research indicates several periods of population abandonment of shore line occupation (Ricklis 2004:187-189). These periods of abandonment appear to correlate with periods of rapid sea level rise after 7000 BP and 4000 BP, when saltwater inundation of brackish and freshwater estuaries and marshes would have dramatically affected entire ecosystems, reducing available subsistence resources during periods of transition. Continuous occupation coincided with the stabilization of sea level at near modern level, thriving estuaries, and high biotic production in the region between 4000 and 3000 BP (Ricklis 2004:187-189). This also marks the beginning of the Late Archaic, during which sites increase in number and size, and are more broadly distributed across the landscape. Story (1980) suggested that territories were established during this period, as populations increased and people developed adaptive strategies to habitats and ecosystems no longer in flux; extensive trade is also implied, as igneous stone from Arkansas was the parent material of some artifacts recovered from the upper Texas coast (Hall 1981). Shell middens dating to circa 3000 BP are common along the Galveston and Trinity Bay areas, as indicated by the present study as well as those by Ambler (1967, 1970), Aten (1979, 1983a), Dillehay (1975), Stokes (1981, 1985), and Ricklis (2004), among others. Most of these sites are located within deltas or along the shore of river mouths and secondary bays (Ricklis 2004:186). Similarly, in his upper Trinity study, Prikryl (1990:74-76) reports Late Archaic sites are 3.5 times more common than Middle Archaic sites. Prewitt (1981) suggests this is due to increased population pressure during the period. Patterson (1987, 1995) and Aten (1983a) proposed similar evidence for population growth in the upper coastal region of Texas, evidenced by the much larger number of sites with Late Archaic components and potentially supported, according to Aten (1983a), by the application of efficient technologies such as fish weirs.

Within the project area, a noted distinction of the Late Archaic and earlier lithic assemblages at Eagle's Ridge was noted; specifically, worked material was primarily silicified wood, with little diversity among tool types (Ensor et al. 1995:119-133; Ensor and White 1998). These types were predominantly Kent, though Palmillas and Gary points were also recovered. Worked bone artifacts are comparable to those from the Middle Archaic component of the site, with cut and grooved bone and antler in the form of points, awls, and beads (Ricklis 2004:192). Eagle's Ridge is likely unique, however, as Dillehay (1975:84-86) noted the increasing differences between sites beginning in the Late Archaic in regards to thickness of midden deposits and site size, indicating variations in duration of occupation, intensity of occupation, and the group size of occupying populations. Sites within the Wallisville area with Late Archaic components include 41CH013, 41CH016, 41CH032, 41CH047, and 41CH172.

Projectile points typical for the Late Archaic include Kent, Gary, Ensor, and Godley; these points

are often formed from poorer quality, closer lithics, indicating a potential for less mobility and potentially for defined territories (Ricklis 2004:192-193). Though marine resources were obviously a large part of the Late Archaic subsistence strategy, terrestrial resources were also utilized including reptiles and mammals (Dillehay 1975; Ricklis 2004). At Eagle's Point, for instance, analysis of faunal remains indicated that white-tailed deer represented the largest portion of the remains (approximately 80 percent), with fish such as black drum, mullet, croaker, sheepshead, and redfish (10 percent) and other reptiles and mammals (10 percent). These analyses did not include the shellfish, most prevalent at the midden, so their representation among subsistence resources represented in the assemblage is unknown (Ensor 1998b). In addition to the obvious importance of these resources given their density at midden sites, shellfish and other marine and estuarine resources represent an "abundant, concentrated, and predictable" set of subsistence resources around which population movements could be planned(Ricklis 2004:188).

The final stage of the Archaic period along the coast of Texas is signaled by the production of ceramics. Attributable to the Late Archaic, this period is sometimes separated and labeled the Early Ceramic Period (c.f. Ricklis 2004). Ceramics along the upper Texas coast appeared approximately 2000 BP, and arrived via diffusion from the east (Aten 1983a:141-142; Story 1990:42-43). The earliest ceramics along the coast are vessels with thick walls, are often contorted, and have untempered paste; by the time ceramics disseminated to inland populations, coastal ceramics had developed into the Goose Creek series of vessels with sand paste (Aten 1983a:285). The Early Ceramic Period corresponds to the Clear Lake, Mayes Island, and Turtle Bay ceramic periods defined by Aten (1979:390; see also Aten 1983a:285) on the basis of ceramic types, seriation, and radiocarbon dates, though these have elsewhere been questioned (see Ricklis 2004). Other indicates of Late Archaic and Early Ceramic occupation include Gary dart points, which replaced Kent dart points in the Galveston region between 2400 BP and 2200 BP.

The dissemination of this technology, either during its reception or during its proliferation into inland populations, does not appear to indicate changes in population movements or subsistence patterns from those established during the Late Archaic. Cultural deposits from this Early Ceramic Period often overlie earlier Archaic components within sites, indicating continuities instead of dramatic changes in subsistence of habitation practices (Amber 1967; Aten 1983a; Hines 1992). Several unique cultural practices have been identified in the archaeological record as originating during this period however, including the development of the bow and arrow, tidal fish weirs, and the establishment of cemeteries. The use of the bow and arrow and fish weirs indicates a shift from large game hunting to exploitation of smaller game and marine resources. Stokes (1985:73-74) and Aten (1983a:322) interpreted the establishment of cemeteries adjacent to habitations as indications of increased definition of territories and ritual practice. Many sites within the Trinity River delta contain identifiable Early Ceramic Period components, including 41CH013, 41CH014, 41CH016, 41CH017, 41CH024, 41CH033, 41CH036, 41CH047, 41CH052, 41CH080, 41CH087, 41CH098, 41CH106, 41CH165, and 41CH172.

4.4 THE LATE PREHISTORIC (1200 BP-AD 1600)

The Late Prehistoric is identifiable in archaeological contexts along the upper Texas coast with the introduction of grog tempering in ceramics, an expansion of ceramic decoration styles, a trend toward smaller groups for habitation, and an increase in the use of the bow and arrow, possibly indicating increased hunting (Stokes 1985:74). In other parts of Texas, particularly north and central regions of the state, the beginning of the Late Prehistoric is signaled by the bow and arrow and the production of ceramics. These technologies were already in use along the upper Texas coast by the beginning of this period, though the prevalence of both increased during the period and both of these technological innovations would have had great impact upon the peoples of the region. The bow and arrow offers improved hunting accuracy and efficiency over atlatl thrown darts, and pottery is a great improvement over perishable storage and cooking implements. In other parts of the country, a third innovation appears

during roughly the same timeframe, the introduction of tropical cultigens and agricultural practices. However, for coastal as well as north central and central Texas, evidence of agriculture is largely absent.

During the early phase of the Late Prehistoric, the bow and arrow was of increasing use, an interpretation predicated on the recovery of increasingly smaller, lighter, straight- and expanded-stem lithic points such as Alba, Catahoula, and Scallorn (Ricklis 2004:194-195). These points, and the expanding use of the bow and arrow during this period, appear to have become prevalent due to the increased presence of bison in the region (Dillehay 1974:163-180). Grog-tempering, as mentioned above, is a key characteristic of Late Prehistoric ceramic technology, as is bone-tempering, though this latter temper appears never to have been particularly common (Ricklis 2004:195; Stokes 1985:73). Vessel shapes were comparable to earlier periods, with bowls, jars, and constricted-neck ollas. Decorations became significantly more complex, with wider, parallel incised bands under rims and incised lines in vertical, cross-hatched, and oblique patterns on bodies. Ricklis (2004:195-197) noted that these decorative patterns and their development and seriation correspond to those present in coastal Louisiana and the Lower Mississippi Valley, indicating trade and other interaction between these populations. Aten's (1979:390) ceramic seriation of Late Prehistoric sites include Round Lake and Old River ceramic periods.

Subsistence patterns during this phase seem to be an extension of the generalized hunter-gatherer strategies used throughout the Archaic. In coastal Texas, shell middens continue to be used. Clear evidence of introduced tropical cultigens such as maize, beans, and squash is not found at sites in the region at this time. Aten (1983a) suggested population aggregation during winter seasons in larger inland villages, with population dispersal through small, mobile bands in the spring and summer, with limited archaeological evidence indicating a primarily warm-weather exploitation of marine resources along the coast (Ricklis 2004:197).

By approximately 700 BP, Perdiz points were common, and one of a complex lithic tool kit including "unifacial end scrapers, blade-core lithic technology, thin bifacial knives (often alternately beveled) and expanded base drills/perforators made on flakes and prismatic blades" (Ricklis 2004:194; see also Black 1986; Ricklis and Cox 1993). Though these Perdiz points were commonly used to hunt buffalo north of the region, these points were likely utilized along the coast for smaller game.

Mitchell Ridge (41GV66), located on Galveston Island, southwest of the project area, provides a stratified example of a site occupied during both the early and late portions of the Late Prehistoric. The site included early deposits with a human burial associated with Scallorn points, and a later deposit with Perdiz points, thin bifacial knives, expanded-base drills, and prismatic blades (Black 1986; Prewitt 1985; Ricklis 1996). Bison bone fragments are present, but less common than sites slightly further inland; deer and fish were the primary protein source represented among remains (Ricklis 2004). Interestingly, seasonality analysis of Mitchell Ridge suggest a fall-winter occupation, indicating that populations may have aggregated on that island and their spring-summer movements to the coastal environment may actually have been inland, to marshes and estuaries around bays and river deltas (Ricklis 2004). This is supported by the sixteenth-century notes of Cabeza de Vaca, who reported that populations along the upper Texas coast wintered on Galveston Island.

Indication for increasing populations and increasingly complex social structures is also present at archaeological sites of the period. Four cemetery areas identified at the Mitchell Ridge site reflect increasing sociopolitical complexity. Three of the four Late Prehistoric cemeteries reflect common traits within the Galveston Bay area, with flexed or semi-flexed single interments, red ochre, and personal items (Aten 1976a, 1976b). The remaining cemetery, however, yielded "dramatically higher" quantities of artifacts in the form of grave offerings, indicating a spatial segregation of the deceased after death. Specifically, in this latter cemetery, 91 percent of the burials contained grave goods, while only approximately 20 percent of burials contained grave goods within the other three cemeteries (Ricklis 2004:197-198). Further, the grave goods recovered from the more artifact-dense cemetery were also more diverse: this cemetery yielded 24 classes of grave goods, while the other three cemeteries yielded between one

and three classes. Higher-status individuals appear to have been interred within an area designated for the burial of socially distinct individuals, indicating differences in status. Several other sites with Late Prehistoric components have been previously recorded within the project area, including 41CH17, 41CH020, 41CH022, 41CH024, 41CH031, 41CH032, 41CH036, 41CH062, 41CH098, 41CH106, 41CH110, 41CH169, and 41LB048.

4.5 THE HISTORIC PERIOD (AD 1600 TO PRESENT)

The arrival of European explorers and colonists brought drastic changes to the indigenous populations of the Americas from the late fifteenth century onward. Disease and warfare brought about large-scale extinctions of aboriginal populations, and European expansion dislocated and disrupted the lifeways of countless surviving aboriginal groups and their descendants. For a discussion of historic period indigenous groups in the upper coast of Texas, Foster (2008: 219-232) provides a short synthesis. Newcomb (1961; 1993) provides comprehensive discussions of specific aboriginal peoples across Texas from the prehistoric through to the present.

The earliest Europeans on the upper coast arrived with Cabeza de Vaca's landing on Galveston Island in 1528. Subsequently, de Vaca lived and traded with local native populations along the upper and central Texas coast, covering an area as much as 130 miles in diameter. In 1543, Luis de Moscoso Alvarado, successor to Hernando de Soto after his death in 1539, led the survivors of de Soto's expedition along the Texas coast and reported both trade and violent skirmishes with native populations on the return to Mexico (Foster 2008). Interestingly, though no evidence of agriculture or horticulture has been reported in the archaeological record of the region, members of Moscoso's group traded Spanish goods for "ears of Indian corn" over the course of an eight-day encampment near Galveston Bay (Foster 2008:222). These represented some of the last European interactions with native populations along the upper Texas coast for over a century, as the Spanish government learned of little exploitable resources, especially gold, in the region.

In 1682, French explorer René-Robert Cavelier, Sieur de La Salle, claimed the western drainage of the Mississippi River for France. La Salle was unable to relocate the region during a subsequent visit, during which he was intended to establish a fort and colony; La Salle missed the Mississippi and sailed west of even the present project area, to Matagorda Bay. Further French forces were destined for the area, however, and the account of the shipwrecked Simars de Bellisle provides one of the earliest detailed descriptions of the Akokisa, the Native American group present along this region during the early historic period (Foster 2008:219-232; Fox et al. 1980:39-52; Stokes 1985:75). De Bellisle spent 15 months among the Akokisa as the sole survivor of a group of French officers abandoned by their ship when the small group ventured ashore. De Bellisle reported poor treatment, including physical abuse and little food or other provisions, and claimed to have witnessed cannibalism. These latter claims may not be substantiated by the archaeological record, and de Bellisle's assertions certainly may be categorized among the sometimes exaggerated reports common among colonial travel accounts. However, de Bellisle's description of mundane activities illustrates a population of hunter-gatherers with little material culture inhabiting a territory from the Neches River to the Trinity and Brazos Rivers; populations relied on foraged wild plants, deer, and bison for subsistence, and utilized canoes and horses for transportation (Folmer 1940; Foster 2008; Stokes 1985).

The settlement patterns of native groups described in historic accounts echo those inferred by archaeologists for the Late Prehistoric, with population aggregations and dispersal according to seasons. Akokisa aggregated at inland villages of up to 500 people during the winter months, with more social stratification evident during these periods (Aten 1983a; Stokes 1985), and dispersed in bands of approximately 25 persons during the summer for hunting and foraging along coastal environments (Aten 1983a; Bolton 1913; Folmer 1940). This is evidenced at Mitchell Ridge (41GV66), which also contains a protohistoric component comprised of overlapping pits filled with occupational rubbish. Fishing and hunting provided a substantial portion of subsistence and dietary needs, with evidence of white-

tailed deer, bison, and cotton rats recovered (Ricklis 2004; Ricklis 1994). Mortuary practice appears to have continued with little, if any, change from the Late Prehistoric patterns into the Protohistoric period, but by the eighteenth century, more indication of mortality is evident. An average of 3.5 individuals appears interred in the burials of this period, compared to the average of 1.2 during the Late Prehistoric. Perhaps more telling, demographics of these later burials include 50 percent sub-adults, double the percentage of the earlier period (Ricklis 2004).

De Bellisle's experience among the Akokisa, though not entirely pleasant (Foster 2008), helped the French gather important information and establish relationships for French trading efforts in the region (Stokes 1985:75-77). In response to the increase in French activity in the region, between 1682 and 1793, Spanish authorities and Franciscan missionaries founded twenty-six different missions within Texas as part of an effort to establish small communities supervised by missionaries and insulated from other aboriginal groups and more secular Spanish (Weddle 2010), and substantial impacts to coastal populations were not recorded until the early eighteenth century (Aten 1983a).

Among the escalated Spanish settlement activities were Presidio San Agustin de Ahumada and Mission Nuestra Senora de la Luz at El Orcoquisac in 1756. The location was formerly the site of a French trading post, situated on the south shore of Lake Miller (Fox et al. 1980:39-50, 82-103; Stokes 198575-77; Tunnell and Ambler 1967), and was intended to strengthen Spanish control with increased military, commerce, and missionary presence. The mission and presidio were moved to nearby higher ground after repeated flooding of the original location, and the posts were abandoned by 1772 when France ceded nearby territories to Spain (Stokes 1985:76). These locations are identifiable in the archaeological record and include sites with both colonial European and Native American components within the project area, including 41CH022, 41CH053, 41CH054, and 41CH057; these sites represent portions of a Spanish and Akokisa settlement complex referred to as El Orcoquisac by contemporary Spanish sources. These sites, along with 41CH110 and 41LB004, were listed on the National Register of Historic Places as contributing resources of the Orcoquisac Archaeological District. Site 41CH110 is comprised of a large Rangia and oyster shell midden occupied between approximately 800 and 200 BP (Gilmore 1974; Stokes 1985:156), and 41LB004 is comprised of an inland shell midden representing a single occupation between 500 and 200 BP (Aten 1983a:195; Stokes 1985:177).

European interaction with native populations continued, especially through the fur trade, through the early nineteenth century. European and American settlers moved into the Trinity River delta region, first illegally between 1810 and 1820 (Pool 1975:35-37), and later legally, after the 1824 Mexican Colonization Law allowing land acquisition through empresarios (Fox et al. 1980:51; Stokes 1985:77).

More recent historic occupation of the project area is most identifiable in both the archaeological and archival records through the settlement of Wallisville, originally known as Wallis Hill, in 1824-1825. The town was settled by the Wallis family, who moved from Louisiana under the family head of Elisha Henry Robert Wallis, under the legal sponsorship of empresario Joseph Vehlein (Stokes 1985:78-79). At this time, keel boats were used to transport goods in the region, but were unable to navigate Galveston Bay. Cargo was transferred to larger vessels for transport to Galveston harbor. With a location well-suited to accommodate the needs of these boats, Wallisville was officially established in 1845, and served the Trinity River bay and valley region as a center for trade. Steam ships became an important means of river transport as well, with over 100 steam ships operating on the Trinity between 1838 and 1893 (Block 1977; Stokes 1985:79-80).

Early settlers in the region either farmed or were employed by farmers; further north, cotton and sugar plantations were plentiful. Steamships were utilized to transport goods down the Trinity River until the Civil War, when rail lines were considered less likely to be impacted by the conflict. Eventually, rail lines were established nearer these plantations, and steamship cargo traffic on the Trinity River nearly ceased. Wallisville, however, was still dependent on steamships, and eventually relied on the mail steamer from Galveston to transport cargo and passengers between Liberty and Galveston, with no rail facilities near Wallisville (Stokes

1985:80-81). By the end of the twentieth century, most of the steamships operating on the Trinity River were associated with lumber mills located near Wallisville and Liberty.

Wallisville was nearly completely destroyed by a hurricane in 1915, though several of the town's structures were continuously inhabited until their destruction through razing in the mid-twentieth century. Seven sites (41CH228, 41CH237, 41CH238, 41CH239, 41CH240, 41CH241, and 41CH243) near or within the project area have been listed on the NRHP as the Old Wallisville Townsite Archaeological District, and are associated with the town or its early settlers and trade. An additional eleven sites (41CH001, 41CH023, 41CH062, 41CH231, 41CH232, 41CH233, 41CH234, 31CH235, 41CH242, 41CH244, and 41LB049) have been identified with components relating to the occupation of the town or the region's early settlement within or near the project area. Site types include boat landings, brick yards, domestic sites, farmsteads, and cemeteries.

The Rivers and Harbors Act of 1962 authorized the Wallisville Lake Project, originally designed to help control water supply and salinity as well as enhance navigation, fish and wildlife populations, and recreation. As proposed, the project would have entailed creation of a nearly 20,000-acre reservoir lake. The project began in 1966, but was halted in 1973 with nearly three quarters of the project complete after a lawsuit was filed claiming deficiencies in the Environmental Impact Statement (EIS) for the project. A new EIS completed in 1981 recommended a modified project with a smaller footprint (Stokes 1985:6). In 1987, a court decision gave clearance to the government and the US Army Corps of Engineers (Corps) for continuance of the project. In 1989, a pair of nesting bald eagles within the project area caused another delay and project re-evaluation. This reassessment resulted in the project's present status and design: parks and recreation areas (including JJ Mayes Wildlife Tract, Hugo Point Park, and Cedar Hill Park), levees along the east and west banks of the Trinity River, a dam across the Trinity River, a navigation lock and navigation channel, a gated control structure on the Trinity River, Structure A near Pickett's Bayou, and Structure B at the head of Lost River (Corps of Engineers 2010).

5.0 PREVIOUS RESEARCH

5.1 REGIONAL SITE TYPES

Prehistoric sites in the upper Texas coast region are typically located along the coast of rivers, streams, bayous, and within marshes. Open sites, especially shell middens, are often situated on alluvial terraces alongside the mainstem of rivers or near their confluence with smaller streams. Frequently open sites are re-occupied repeatedly, and due to their proximity to rivers, are susceptible to burial by overbank flood sediments. These sites are commonly well stratified and offer the opportunity to develop local or regional cultural sequences from their diagnostic artifacts. Few upland areas were encountered in the project area; these were usually slopes or blufftops, and were often the location of open occupation sites or lithic scatters less susceptible to burial by fluvial sediments. Upland occupation sites often have less discrete stratigraphic separation, and are commonly susceptible to deflation by wind and overland flow from storm runoff; upland occupation sites within the project area were especially susceptible to erosion from wave action and fluctuating water levels.

Lithic scatters may only have chipping debris associated with the manufacture or maintenance of chipped stone tools, and generally lack other evidence of longer term habitation, perishable materials, or diagnostic artifacts used to date the sites. Historic sites were usually identified through a scatter of architectural debris and historic artifacts, though no intact historic structures were encountered and few historic features were identified. Historic sites related either to the early European settlement of the upper Texas coast or to the later nineteenth- and twentieth-century American occupation of the area, both of which had substantial impacts on native populations.

5.2 PREVIOUS RESEARCH

Records of archaeological investigations along the upper Texas coast indicate that these were limited in scope and rare in occurrence before the 1960s. The only known archaeological excavations in the Wallisville area before the Wallisville Reservoir survey projects of the 1960s were at the Stubbs Farm site (41CH006) and the Lawrence Island site (41CH001), each substantial shell middens. Both sites were excavated in 1932 by A.M. Woolsey (Woolsey 1932), though records of the investigations include only the field log with no detailed descriptions of excavations; the field notes described the general location of excavations, burials, and cursory artifact inventories.

In the surrounding region, archaeological investigations were somewhat more common and their results more widely disseminated. The University of Texas, for instance, completed excavations in 1932 at the Caplen Site (41GV001), a primarily Galveston Bay Focus site with ephemeral Rockport Focus and Alto Focus occupations. Prehistoric burials and at least one historic burial were identified at the site (Campbell 1957), indicating an extensive and complex multicomponent site with significant research potential. Approximately 50 miles west of Wallisville, the project areas of the Addicks and Barker Dams were surveyed in the 1950s (Wheat 1953), with sites dating to the La Harpe Aspect (Johnson 1962) and the Galveston Bay Focus (Suhm et al. 1954).

Beginning in the 1960s, the Wallisville area was the focus of several substantial site surveys between 1960 and 1985, usually in conjunction with the research associated with the Wallisville Lake Project and its 19,700 acres in the lower Trinity River delta (Ambler 1970, 1973; Aten 1966, 1979, 1983a, 1983b; Dillehay 1975; Fox et al. 1980; Gilmore 1974; Mercado-Allinger 1982; Shafer 1966a, 1966b; Tunnell and Ambler 1967). Much work was completed by or with volunteers from the Houston Archaeological Society and included excavations at the Jamaica Beach Site (41CH005) (Ring 1963, Aten 1965b) and the Galena Site (41HR061) (Ring 1960). The Texas Archaeological Salvage Project undertook surveys and excavations at the Livingston Reservoir (Nunley 1963) and the Honea Reservoir (Shafer 1966b). In 1966, the Texas Archaeological Society excavated the Gaulding Site, a shell midden approximately 30 miles east of Wallisville, as the location of their summer field

school (Shafer 1966a). This excavation represented the easternmost site excavated on the Texas coast to that date.

Surveys of the Wallisville area conducted during the 1960s were primarily undertaken by boat, which provided better access to the predominantly marshy areas; most of these early surveys, such as those by Shafer (1966a) and Ambler (1970), were not systematic, and the location of survey areas was not included but has to be inferred from site locations identified under each study (Stokes 1985:45). The first of these surveys was undertaken by Aten, who identified seven shell middens south of Wallisville and west of the Trinity River. Aten's project focused on the relationship of these shell middens to the Trinity River's channel stages, with much emphasis in the study applied to geology as opposed to archaeological interpretations of sites (Aten 1983a). However, Aten's research provided radiocarbon dates from Rangia shell middens, which provided valuable information to later developments of cultural chronologies (e.g. Shafer 1966a).

In 1965, archaeological survey of the Wallisville Reservoir was conducted by the Texas Archaeological Salvage Project (TASP) under the guidelines established in a Memorandum of Agreement (MOA) between the National Park Service and the University of Texas (Shafer 1966a). The project was undertaken in advance of planned inundation associated with the contemporary plans for the Wallisville Dam and Reservoir project, and was intended to assess the archaeological potential of the project area. Harry Shafer conducted much of the survey and prepared the report, but acknowledged additional work conducted by Lawrence Aten and the Houston Archaeological Society in previously identifying sites in the area. Most of the investigation was undertaken from a boat, which also aided in the quick identification of sites eroding from shore lines. The survey was not intensive and did not examine the entire proposed Wallisville Reservoir area, but Shafer indicated that a majority of sites was likely identified and provided a sufficient overview of the prehistoric occupation of the area as well as a plan for excavation at significant sites. Forty-seven sites were identified, 44 of which are shell middens. The remaining three sites, located at higher elevations, also contain large amounts of shell with a more prevalent soil matrix. Shafer noted that the region in which these sites were identified "is the fastest growing industrial area of Texas and sites are being destroyed at an alarming rate by dredging, construction, and pipelines" (1966a:4), with destruction of entire sites due to commercial shell removal among the most frequent causes of negative impacts to sites. This damage became particularly prevalent during the planning and preparation period for the implementation of the Wallisville Dam, as landowners and shell companies sought to utilize these resources for commerce before the area was inundated. Natural erosion due to wave action was also noted as a substantial source of disturbance at many sites: "wave erosion has been responsible for either completely destroying or damaging practically every site that is now, or has at one time been, situated along a lake shore" (Shafer 1966a:6), with undisturbed sites noted as a rare occurrence.

During this period, no cultural chronologies existed for the upper Texas coast; when cultural affiliations were assigned, they usually borrowed from the Addicks Dam studies by Wheat (1953), with preceramic sites attributed to the La Harpe Aspect and ceramic sites to the Galveston Bay Focus (Johnson 1962; Suhm et al. 1954). Shafer's 1960s investigations provided general ceramic seriation data relating to temper; Aten later refined this ceramic chronology and defined the San Jacinto (grog-tempered) and Goose Creek (sand-tempered) ceramic types (Aten 1967).

Shafer's survey of the Wallisville region illustrated that archaeological sites were prolific and that many likely offered substantive research potential. A subsequent survey was undertaken in 1968 for the Texas Archaeological Salvage Project (TASP) under contract with the National Park Service (Ambler 1970). The boundaries of this project are not known, however, many inland sites were also identified during this survey, indicating that both pedestrian and boat survey were utilized. Ninety-one newly recorded sites were identified in this 1968 survey, 71 of which were located within the Wallisville Lake Project area. The twenty sites not included in the project area were recorded by Houston Archaeological Society (HAS) members and incorporated into Ambler's (1970) report. Though, like Shafer's previous survey, most sites

were comprised of prehistoric shell middens, historic components were noted at several sites (Gilmore 1974; Fox et al. 1980), including evidence of Spanish and French colonial occupations.

Aten continued research in the region between 1969 and 1971, and began emphasizing the cultural diversity over time and between regions as indicated through ethnohistoric and archaeological research in the area. Aten suggested, for instance, at least seven different statuses and distinct shifts in mortuary ritual over time in the region, and associated these with shifts in social structures, the movement of information, and population size (Aten et al. 1976, Aten 1983a). During Aten's 1969 survey, fourteen newly identified sites were recorded, and Aten also recorded eleven sites recorded by HAS. All of these sites are shell middens except two, which are earth middens.

The Center for Archaeological Research (CAR) at the University of Texas at San Antonio conducted further investigations in the Wallisville area (Fox et al. 1980). Though prehistoric occupations were noted in the study, it was among the first to explicitly also include a search for historic sites. The CAR study included archival research and literature reviews to locate potential historic sites and shipwrecks within the Corps property of the Wallisville area. Seventeen newly identified sites were located during this 1979 investigation; two are prehistoric, and the remaining 15 sites are historic, with most occupational components dating to the nineteenth and twentieth century. Six of these sites (41CH228, 41CH237, 41CH238, 41CH240, 41CH241, and 41CH243) were identified adjacent to or within the boundaries of historic Wallisville and have been listed on the National Register of Historic Places as the Old Wallisville Townsite Archaeological District. Some testing investigations were also carried out under the CAR project.

Stokes (1985) conducted limited survey of the Wallisville project area in 1981, and 61 previously recorded sites within the project area were revisited to determine condition, accessibility, and anticipated impacts of the proposed reconfigured Wallisville Reservoir. Stokes conducted auger tests and collected artifacts and faunal remains at revisited sites. Systematic survey of the western and eastern terrace margins south of the Chambers/Liberty County line was also conducted; this included survey of the eastern terrace east of Lake Charlotte and Lake Miller, and partial survey of the western margin south of Interstate 10 and north of Cotton Lake. Stokes recorded six previously unrecorded sites during this survey, all of which are shell middens.

Investigations until this point had focused primarily on the easily accessible regions within the Wallisville Reservoir project area. Large portions of inaccessible interior marshland in the project area, particularly in the northern project area, had received limited, if any, attention. These areas began to come under study with the development of mineral and pipeline easements in the area, and in 1982, Prewitt and Associates, Inc. conducted an archaeological reconnaissance of the proposed Lost Lake Oil Field Mineral Lease tract (Mercado-Allinger 1982). The project was intended to identify all cultural resources within the project tract, approximately 300 acres. The location and horizontal extent of resources were identified; the vertical extent and resource potential of sites were not assessed. Field survey was conducted utilizing a helicopter to identify areas with sufficient elevation and topography to warrant investigation. Distinct survey areas were defined by easily recognizable landforms, and the helicopter was maneuvered in closely-spaced transects running east-west and west-east until each survey area was fully inspected. Any increases in elevation or locations where Rangia shell or other midden materials were found were noted for further investigation. Areas investigated under previous surveys in the region, especially those conducted in relation to the development of the Wallisville Reservoir (Shafer 1966a, Ambler 1970), were not included in the Prewitt investigation. Once areas of interest were identified, the helicopter landed and survey crews conducted systematic walkover survey to identify archaeological deposits. Auger probes were drilled to determine site depth. No artifacts were collected, and no diagnostic artifacts were observed in the investigations. In total, the Prewitt reconnaissance survey identified nine archaeological sites in addition to the 11 previously recorded sites located within the project area. All twenty sites are prehistoric, with no historic components recorded or identified in any sites encountered during the project.

In 1985, Stokes utilized the results of her own survey and the data collected during other investigations to create a cultural resource management plan for the Wallisville Lake Project region, intended to assist the US Army Corps of Engineers with the identification, assessment, and management of archaeological sites within the proposed project area. In 1984, utilizing Stokes' research, the Corps received a determination of eligibility for the Wallisville Archaeological District, which is considered significant because the majority of cultural resources in the project area consist of prehistoric sites that range in age from the Middle Archaic through initial European contact. When considered as a group, these sites present a unique opportunity for the study of long-term adaptation in response to a dynamic natural environment. Few areas in Texas present a more ideal situation for the investigation of changing settlement and resource utilization patterns through time. In no other area on the Texas coast can we be assured of such a thorough inventory of existing sites. Relatively few disturbances usually associated with urban and industrial development have occurred and numerous surveys have intensively explored the majority of the project area. For these reasons, studies of subsistence and settlement patterns in the lower Trinity delta can yield more reliable data than is generally possible in other areas (Stokes 1985:84-85).

6.1 SITE REVISIT RESULTS

Revisit of sites in the Wallisville Reservoir included pedestrian and boat-aided efforts to revisit 193 previously recorded sites in the Wallisville Reservoir area. The primary goals of the investigation included revisits to recorded site locations, identification of cultural components, delineation, assessment of types and extent of disturbance, assessment of integrity of cultural deposits, and preliminary evaluations of significance, research potential, and National Register of Historic Places (NRHP) eligibility. Management recommendations were formulated according to the outcome of the revisits. Of the 193 previously recorded sites within the project area, two (41CH006 and 41LB093) were not located and appear to be outside of Corps of Engineers property, and one mapped location did not correlate with any previously recorded site. Of the remaining 190 previously recorded sites within the project area, 33 were inaccessible to either pedestrian or boat access. Additionally, five previously unrecorded archaeological sites were encountered (sites 41CH381, 41CH382, 41CH383, 41CH384, and 41CH385); these sites were also fully recorded and assessed.

The project area includes 9,966 acres within the Wallisville Reservoir area that have been prioritized for Section 110 investigation, which includes 6,875 acres in Chambers County and 3,091 acres in Liberty County, Texas (see Figures 1.1 and 1.2). Figures 6.1 through 6.10 show the location of archaeological sites within the project area. Figures 6.11 through 6.31 show the location of archaeological sites in modern and historic aerials, showing the relationship of sites to changing shore lines and water levels. Table 6.1 lists all of the sites by type, affiliation, and eligibility recommendation.

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Table 6.1 Sites revisited and identified within the project area.

Site	Site Type	Cultural Period	NRHP Rec.
41CH001	Shell midden	Unk. prehistoric	Potentially eligible
41CH003	Shell midden	Unk. prehistoric	Recommended ineligible
41CH005	Shell midden	Unk. prehistoric	Recommended ineligible
41CH007	Shell midden	Late Prehistoric	Recommended ineligible
41CH008	Shell midden	Late Prehistoric	Recommended ineligible
41CH010	Shell midden	Unk. prehistoric	Recommended ineligible
41CH011	Shell midden	Late Prehistoric	Recommended ineligible
41CH012	Shell midden	Late Prehistoric	Recommended ineligible
41CH013	Shell midden	Archaic, Late Prehistoric	Unknown
41CH014	Shell midden	Unk. prehistoric	Recommended ineligible
41CH015	Shell midden	Late Prehistoric	Unknown
41CH016	Shell midden	Archaic, Late Prehistoric	Recommended ineligible
41CH017	Shell midden	Late Prehistoric, Protohistoric	Unknown
41CH018	Lithic scatter	Unk. prehistoric	Recommended ineligible
41CH019	Shell midden	Unk. prehistoric	Recommended ineligible
41CH020	Shell midden	Late Prehistoric	Listed
41CH021	Shell midden	Unk. prehistoric	Recommended ineligible
41CH022	Shell midden	Late Prehistoric	Listed
41CH023	Shell midden, homestead	Late Prehistoric, Hist. European	Potentially eligible
41CH024	Shell midden	Late Prehistoric	Recommended ineligible
41CH025	Shell midden	Late Prehistoric	Potentially eligible
41CH026	Shell midden	Late Prehistoric	Recommended ineligible
41CH027	Shell midden	Late Prehistoric	Recommended ineligible
41CH028	Shell midden	Late Prehistoric	Potentially eligible
41CH029	Shell midden	Late Prehistoric	Recommended ineligible
41CH030	Shell midden	Archaic, Late Prehistoric	Recommended ineligible
41CH031	Shell midden	Late Prehistoric	Listed
41CH032	Shell midden	Archaic, Late Prehistoric	Listed
41CH033	Shell midden	Late Prehistoric	Recommended ineligible
41CH034	Shell midden	Late Prehistoric	Potentially eligible
41CH035	Shell midden	Late Prehistoric	Recommended ineligible
41CH036	Shell midden	Late Prehistoric	Listed
41CH037	Shell midden	Late Prehistoric	Recommended ineligible
41CH038	Shell midden	Late Prehistoric	Recommended ineligible
41CH039	Shell midden	Late Prehistoric	Recommended ineligible
41CH040	Shell midden	Late Prehistoric	Potentially eligible
41CH041	Shell midden	Late Prehistoric	Recommended ineligible

Table 6.1 Sites revisited and identified within the project area (continued).

Site	Site Type	Cultural Period	NRHP Rec.
41CH042	Shell midden, dock	Late Prehistoric, Hist. European	Potentially eligible
41CH043	Shell midden	Late Prehistoric	Recommended ineligible
41CH044	Shell midden	Late Prehistoric	Recommended ineligible
41CH045	Shell midden, historic artifact scatter	Late Prehistoric, Twentieth century	Recommended ineligible
41CH046	Shell midden	Late Prehistoric	Listed
41CH047	Shell midden	Archaic, Late Prehistoric	Unknown
41CH048	Shell midden	Unk. prehistoric	Recommended ineligible
41CH049	Shell midden	Late Prehistoric	Unknown
41CH050	Shell midden	Late Prehistoric	Recommended ineligible
41CH051	Shell midden	Late Prehistoric	Recommended ineligible
41CH052	Shell midden	Late Prehistoric	Recommended ineligible
41CH053	Artifact scatter, presidio	Unk. prehistoric, Hist. European	Listed
41CH054	Artifact scatter	Hist. European, Protohistoric	Listed
41CH055	Shell midden	Unk. prehistoric	Unknown
41CH056	Shell midden	Unk. prehistoric	Unknown
41CH057	Shell midden	Archaic, Late Prehistoric	Listed
41CH060	Shell midden	Late Prehistoric	Unknown
41CH061	Shell midden	Late Prehistoric	Recommended ineligible
41CH062	Shell midden	Late Prehistoric	Listed
41CH063	Artifact scatter, shell midden	Hist. European, Unk. Prehistoric	Potentially eligible
41CH064	Shell midden	Unk. prehistoric	Recommended ineligible
41CH065	Shell midden	Late Prehistoric	Potentially eligible
41CH066	Shell midden	Late Prehistoric	Potentially eligible
41CH067	Shell midden	Unk. prehistoric	Recommended ineligible
41CH068	Shell midden	Late Prehistoric	Potentially eligible
41CH069	Shell midden	Late Prehistoric	Recommended ineligible
41CH070	Shell midden	Late Prehistoric	Potentially eligible
41CH071	Shell midden	Unk. prehistoric	Potentially eligible
41CH072	Shell midden, artifact scatter	Late Prehistoric, Hist. European	Recommended ineligible
41CH073	Shell midden	Late Prehistoric	Recommended ineligible
41CH074	Shell midden	Late Prehistoric	Recommended ineligible
41CH075	Shell midden, dock	Late Prehistoric, Twentieth century	Recommended ineligible
41CH076	Shell midden	Unk. prehistoric	Recommended ineligible
41CH077	Shell midden	Unk. prehistoric	Recommended ineligible
41CH078	Shell midden	Unk. prehistoric	Recommended ineligible
41CH079	Shell midden	Unk. prehistoric	Recommended ineligible

Table 6.1 Sites revisited and identified within the project area (continued).

Site	Site Type	Cultural Period	NRHP Rec.
41CH080	Shell midden	Late Prehistoric	Listed
41CH081	Shell midden	Unk. prehistoric	Recommended ineligible
41CH082	Shell midden	Late Prehistoric	Recommended ineligible
41CH083	Shell midden	Late Prehistoric	Recommended ineligible
41CH084	Shell midden	Unk. prehistoric	Recommended ineligible
41CH085	Shell midden	Unk. prehistoric	Recommended ineligible
41CH086	Shell midden	Unk. prehistoric	Recommended ineligible
41CH087	Shell midden	Late Prehistoric	Listed
41CH088	Shell midden	Late Prehistoric	Potentially eligible
41CH089	Shell midden	Late Prehistoric	Potentially eligible
41CH090	Shell midden	Unk. prehistoric	Recommended ineligible
41CH091	Shell midden	Unk. prehistoric	Recommended ineligible
41CH092	Shell midden	Unk. prehistoric	Unknown
41CH093	Shell midden	Unk. prehistoric	Unknown
41CH094	Shell midden	Unk. prehistoric	Recommended ineligible
41CH095	Shell midden	Unk. prehistoric	Recommended ineligible
41CH096	Shell midden	Unk. prehistoric	Recommended ineligible
41CH097	Shell midden	Unk. prehistoric	Recommended ineligible
41CH098	Shell midden	Unk. prehistoric	Recommended ineligible
41CH099	Shell midden	Late Prehistoric	Recommended ineligible
41CH100	Shell midden	Unk. prehistoric	Recommended ineligible
41CH103	Shell midden	Late Prehistoric, Protohistoric	Unknown
41CH104	Shell midden	Unk. prehistoric	Recommended ineligible
41CH105	Shell midden	Unk. prehistoric	Recommended ineligible
41CH106	Shell midden	Late Prehistoric	Listed
41CH107	Shell midden	Late Prehistoric	Recommended ineligible
41CH108	Shell midden	Late Prehistoric	Potentially eligible
41CH109	Shell midden	Late Prehistoric	Potentially eligible
41CH110	Shell midden	Late Prehistoric, Protohistoric	Listed
41CH111	Shell midden	Unk. prehistoric	Recommended ineligible
41CH112	Shell midden	Late Prehistoric	Recommended ineligible
41CH113	Shell midden	Unk. prehistoric	Recommended ineligible
41CH114	Shell midden	Unk. prehistoric	Recommended ineligible
41CH115	Shell midden	Unk. prehistoric	Recommended ineligible
41CH116	Shell midden	Unk. prehistoric	Recommended ineligible
41CH117	Shell scatter	Late Prehistoric	Recommended ineligible
41CH118	Shell scatter	Late Prehistoric	Recommended ineligible

Table 6.1 Sites revisited and identified within the project area (continued).

Site	Site Type	Cultural Period	NRHP Rec.
41CH119	Shell midden	Late Prehistoric	Recommended ineligible
41CH120	Shell midden	Unk. prehistoric	Recommended ineligible
41CH121	Shell midden	Late Prehistoric	Recommended ineligible
41CH122	Shell midden	Unk. prehistoric	Unknown
41CH124	Shell midden	Unk. prehistoric	Recommended ineligible
41CH125	Shell midden	Late Prehistoric	Recommended ineligible
41CH131	Shell midden	Late Prehistoric	Recommended ineligible
41CH145	Shell scatter	Unk. prehistoric	Recommended ineligible
41CH146	Artifact scatter	Unk. prehistoric	Recommended ineligible
41CH150	Shell midden	Unk. prehistoric	Recommended ineligible
41CH153	Shell midden	Late Prehistoric	Unknown
41CH154	Shell midden	Late Prehistoric	Recommended ineligible
41CH155	Shell midden	Late Prehistoric	Recommended ineligible
41CH158	Shell midden	Late Prehistoric	Recommended ineligible
41CH165	Shell midden	Late Prehistoric	Recommended ineligible
41CH168	Shell midden	Unk. prehistoric	Recommended ineligible
41CH169	Shell midden	Late Prehistoric	Listed
41CH170	Shell midden	Late Prehistoric	Listed
41CH171	Shell midden	Unk. prehistoric	Unknown
41CH172	Shell midden	Archaic, Late Prehistoric	Recommended ineligible
41CH173	Shell midden	Late Prehistoric	Recommended ineligible
41CH174	Shell midden	Late Prehistoric	Unknown
41CH175	Shell midden	Late Prehistoric	Recommended ineligible
41CH176	Shell midden	Unk. prehistoric	Recommended ineligible
41CH180	Shell midden	Late Prehistoric	Recommended ineligible
41CH181	Shell midden	Unk. prehistoric	Recommended ineligible
41CH182	(see 41CH047)	(see 41CH047)	(see 41CH047)
41CH183	Shell midden	Unk. prehistoric	Recommended ineligible
41CH184	Shell midden	Late Prehistoric	Recommended ineligible
41CH185	Shell midden	Unk. prehistoric	Recommended ineligible
41CH186	Shell midden	Unk. prehistoric	Recommended ineligible
41CH199	Shell midden	Unk. prehistoric	Recommended ineligible
41CH200	Shell midden	Unk. prehistoric	Recommended ineligible
41CH201	Shell midden	Unk. prehistoric	Recommended ineligible
41CH219	Shell midden	Unk. prehistoric	Recommended ineligible
41CH228	Courthouse, jail	Nineteenth century, Twentieth century	Listed
41CH230	Shell midden, artifact scatter	Late Prehistoric, Twentieth century	Unknown

Table 6.1 Sites revisited and identified within the project area (continued).

Site	Site Type	Cultural Period	NRHP Rec.
41CH231	Brick yard	Nineteenth century, Twentieth century	Listed
41CH232	Brick kiln	Nineteenth century, Twentieth century	Listed
41CH233	Homestead	Nineteenth century, Twentieth century	Potentially eligible
41CH234	Artifact scatter	Hist. European	Recommended ineligible
41CH235	Shell midden, homestead	Unk. prehistoric, Hist. European	Recommended ineligible
41CH236	Shell midden	Late Prehistoric	Recommended ineligible
41CH237	Homestead	Nineteenth century, Twentieth century	Listed
41CH238	Homestead	Nineteenth century, Twentieth century	Listed
41CH239	Boarding house	Nineteenth century, Twentieth century	Listed
41CH240	Homestead	Nineteenth century, Twentieth century	Listed
41CH241	Homestead	Nineteenth century, Twentieth century	Listed
41CH242	Homestead	Nineteenth century, Twentieth century	Recommended ineligible
41CH243	Saw mill	Nineteenth century, Twentieth century	Listed
41CH244	Boat yard	Nineteenth century, Twentieth century	Recommended ineligible
41CH245	Shell midden	Unk. prehistoric	Recommended ineligible
41CH247	Shell midden	Unk. prehistoric	Recommended ineligible
41CH248	Shell midden	Unk. prehistoric	Recommended ineligible
41CH249	Shell midden	Late Prehistoric	Potentially eligible
41CH250	Shell midden	Late Prehistoric	Potentially eligible
41CH251	Shell midden	Late Prehistoric	Potentially eligible
41CH252	Shell midden	Late Prehistoric	Potentially eligible
41CH253	Shell midden	Unk. prehistoric	Unknown
41CH254	Shell midden	Unk. prehistoric	Unknown
41CH255	Shell midden	Unk. prehistoric	Unknown
41CH256	Shell midden	Unk. prehistoric	Recommended ineligible
41CH257	Shell midden	Unk. prehistoric	Recommended ineligible
41CH258	Shell midden	Unk. prehistoric	Recommended ineligible
41CH259	Shell midden	Unk. prehistoric	Recommended ineligible
41CH260	Shell midden	Unk. prehistoric	Recommended ineligible
41CH261	Shell midden	Unk. prehistoric	Recommended ineligible
41CH263	Shell midden	Unk. prehistoric	Recommended ineligible
41CH271	Shell midden	Unk. prehistoric	Recommended ineligible
41CH273	Shell midden	Unk. prehistoric	Recommended ineligible
41CH274	Shell midden	Unk. prehistoric	Recommended ineligible
41CH356	Shell midden	Late Prehistoric	Listed
41CH357	Shell midden	Late Prehistoric	Unknown
41CH358	Homestead	Nineteenth century, Twentieth century	Recommended ineligible

Table 6.1 Sites revisited and identified within the project area (continued).

Site	Site Type	Cultural Period	NRHP Rec.
41CH359	Homestead	Nineteenth century, Twentieth century	Recommended ineligible
41CH381	Shell scatter	Unk. prehistoric	Recommended ineligible
41CH382	Shell midden	Late Prehistoric	Potentially eligible
41CH383	Shell midden	Unk. prehistoric	Recommended ineligible
41CH384	Brick scatter	Unk. Historic	Recommended ineligible
41CH385	Farmstead	Hist. European	Recommended ineligible
41LB004	Shell midden	Protohistoric	Listed
41LB010	Artifact scatter	Late Prehistoric	Recommended ineligible
41LB011	Artifact scatter	Late Prehistoric	Recommended ineligible
41LB048	Shell midden	Late Prehistoric	Determined eligible
41LB049	Boat landing, homestead	Twentieth century	Recommended ineligible
41LB093	Cemetery	Hist. European	Potentially eligible

6.2 ARCHAEOLOGICAL SITE DESCRIPTIONS

The following section describes in more detail the locations, environment, characteristics, affiliations, and interpretations for each of the 190 reevaluated, previously recorded archaeological sites and the five newly recorded sites. The treatment options presented summarize the NRHP recommendations, the observed integrity, and the potential threats to the property. A brief summary of the artifacts is presented by stratum and material type. Site 41CH182 is not described below, as this site number was mistakenly assigned to previously identified 41CH047 (state site form; Stokes 1985); see description of 41CH047 for site description.

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American Recovery and Reinvestment Act 2009 Section 110 Compliance Report for the U.S. Army Corps of Engineers, Galveston District

NHPA, Cultural Resources Investigations
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by Shannon Dunn, Chris Hunt, and Scott Butler

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7.0 SUMMARY AND CONCLUSIONS

7.1 PROJECT SUMMARY

Through archival research at TARL, we re-identified 192 archaeological sites within the project area, encompassing an area of 9,966 acres within the Wallisville Reservoir; this included 6,875 acres in Chambers County and 3,091 acres in Liberty County, Texas. Archaeologists were unable to reach 33 of these sites by pedestrian or boat-aided access, and two sites (41CH006 and 41LB093) were not re-located and appear to be outside of Corps of Engineers property. All of the remaining 157 sites were revisited; at each, archaeologists conducted surface and subsurface (shovel testing) investigations, recorded site size, type and extent of disturbance, cultural components, artifact densities, vegetation, and potential threats to archaeological deposits. Sites were evaluated according to these criteria for eligibility for inclusion on the NRHP, according to the criteria set forth by 36 CFR Part 60.

In addition to the revisit of 157 previously recorded archaeological sites, five previously unrecorded sites (sites 41CH381, 41CH382, 41CH383, 41CH384, and 41CH385) were recorded. Of these 162 archaeological sites identified or revisited, 22 have been previously listed on the National Register of Historic Places (NRHP), one has been determined eligible for the NRHP, 23 are recommended potentially eligible for inclusion on the NRHP, and the eligibility of eight sites is unknown. These latter eight sites were buried at over one meter in depth or are submerged; their location was revisited and confirmed when possible, but no information regarding the condition of subsurface cultural deposits could be recovered. The remaining 108 sites are recommended NRHP-ineligible.

The recorded locations of 33 sites were inaccessible to field crews by both pedestrian and boat-aided access. Of these, five had previously been listed on the NRHP, 15 had been recommended ineligible for the NRHP or had been recorded as destroyed, and the NRHP eligibility of the remaining 13 sites is unknown. The previously recorded sites that could not be relocated are likely to have been destroyed by a number of different actions. First, inundation has occurred at several sites that were originally recorded near lake or river shorelines. Second, erosion of the shore of lakes, rivers, and bayous, especially along bluff edges, has probably eradicated others. Third, Corps and private activities, including dredging, shell removal, boat cuts, levee and dam construction, and the construction and maintenance of Interstate 10 and Wallisville Reservoir recreational facilities, appear to have destroyed some sites. Finally, because the original UTM locations were calculated by hand (some many decades ago), it is also possible that the reported locations are considerably inaccurate, and some of these sites may fall outside of the Corps property (and were therefore not investigated), or they were subsequently recorded as new sites in the intervening period.

7.2 NRHP RECOMMENDATIONS AND TREATMENT OPTIONS

Brockington and Associates reevaluated 190 previously recorded sites in the Wallisville Reservoir area during the present study. Reevaluation included site revisits and delineation, assessment of disturbance and site integrity, preliminary assessment of the National Register of Historic Places (NRHP) eligibility, and management recommendations. Of these 190 sites, 157 previously recorded archaeological sites were revisited, five previously unrecorded sites were newly investigated; additionally, 33 previously recorded sites were noted as inaccessible, primarily due to inundation and submersion under water, and two were noted as outside of the project area. Twenty-two of the previously recorded sites have been previously listed on the National Register of Historic Places, and one has been determined eligible for the NRHP (see Table 7.1). Of the remaining 139 sites, 23 are recommended potentially eligible for inclusion on the NRHP, based on their potential to yield significant data through further archaeological research under Criterion D (41CH001, 41CH023, 41CH025, 41CH028, 41CH034, 41CH040, 41CH042, 41CH063, 41CH065, 41CH066, 41H068, 41CH070, 41CH071, 41CH088, 41CH089, 41CH108, 41CH109,

Table 7.1 Previously recorded archaeological sites listed on the NRHP revisited during the current investigation.

Site	NRHP status	District
41CH022	Listed	Orcoquisac Archaeological District
41CH054	Listed	Orcoquisac Archaeological District
41CH057	Listed	Orcoquisac Archaeological District
41CH110	Listed	Orcoquisac Archaeological District
41CH228	Listed	Old Wallisville Townsite Archaeological District
41CH237	Listed	Old Wallisville Townsite Archaeological District
41CH238	Listed	Old Wallisville Townsite Archaeological District
41CH239	Listed	Old Wallisville Townsite Archaeological District
41CH240	Listed	Old Wallisville Townsite Archaeological District
41CH241	Listed	Old Wallisville Townsite Archaeological District
41CH020	Listed	Wallisville Archaeological District
41CH031	Listed	Wallisville Archaeological District
41CH032	Listed	Wallisville Archaeological District
41CH036	Listed	Wallisville Archaeological District
41CH046	Listed	Wallisville Archaeological District
41CH062	Listed	Wallisville Archaeological District
41CH080	Listed	Wallisville Archaeological District
41CH087	Listed	Wallisville Archaeological District
41CH106	Listed	Wallisville Archaeological District
41CH169	Listed	Wallisville Archaeological District
41CH231	Listed	Wallisville Archaeological District
41CH232	Listed	Wallisville Archaeological District
41CH356	Eligible	Wallisville Archaeological District

41CH233, 41CH249, 41CH250, 41CH251, 41CH252, and 41CH382). We recommend preservation of sites previously listed or determined eligible for the NRHP, along with those recommended potentially eligible.

A number of sites had evidence of looting or vandalism, particularly shell middens and brick kilns. Much of the severe disturbance at shell middens is attributable to looting, recorded during interviews with informants up to five decades ago (e.g., Ambler 1970, 1973; Aten 1965a, 1979, 1983a; Stokes 1985), as well as the common historic and modern practice of removing large portions of shell middens for road construction. Many of the shell middens revisited during the present investigation yielded burials during private or amateur investigation (as reported on site forms and by Ambler 1970; Aten 1979; Stokes 1985) and during site testing (Aten 1979; Dillehay 1975; Ensor et al. 1995; Fox et al. 1980; Ricklis 2004; Stokes 1985). Disturbance at brick kilns appears primarily attributable to the removal of brick for private use, though at the Old River Brick Yard (41CH231), which is listed on the NRHP as a contributing resource of the Wallisville Archaeological

District, extensive disturbance was caused by the construction of a drainage ditch through one of the beehive kilns, apparently by the adjacent landowner.

Most other disturbance at sites appears natural, and is primarily attributable to wave action, erosion, and fluctuating water levels/ground subsidence. The most dramatic natural impacts on archaeological sites within the Wallisville Reservoir project area appear to be the direct and indirect results of subsidence. As noted by Ratzlaff (1982), Sharp et al. (1991), and White and Tremblay (1995), subsidence along the upper Texas coast has been substantial since first recorded in 1906, and appears to be primarily attributable to the recent pumping of groundwater, oil, and gas from buried deposits. This leads to depressurization and results in compression of clays and shales, which has led to rates of combined sea level rise and subsidence of up to 20 millimeters per year (Sharp et al. 1991:397). This "sinking" of the earth not only leads to the deterioration and destruction of marsh and wetland habitats, but to increased erosion and inundation of the many archaeological sites located within these ecological regions and along their borders. Many of the sites revisited during the present investigation that were previously above the water table and safe from water erosion are now heavily wave eroded and/or submerged.

In general, the number of well-preserved archaeological resources, especially stratified shell middens, around the Wallisville Reservoir area is such that a comprehensive analysis of the distribution of these sites, along with data regarding periods and duration of occupation and seasonality, would help illuminate prehistoric settlement practices along the upper coast of Texas. There is also a potential to further investigate early Spanish, and to a lesser extent French, colonial and missionary activities in the region, and the impacts of this early European interaction with native populations. The active stewardship of such sites and their associated activity zones by the USACE will allow future scholars to provide ever more detailed interpretations of prehistoric lifeways and early European activities in the region.

We recommend that the sites identified as listed on, eligible, or potentially eligible for listing on the NRHP be monitored on an on-going basis for potential threats, particularly looting and severe erosion. Since no federal action or undertaking is proposed for any of these locales, we do not recommend additional testing or evaluation of potentially eligible sites at this time. If future undertakings are to occur in these areas, we recommend following the procedures of NHPA-Section 106, to update and determine the NRHP eligibility sites and evaluate their integrity. Since no standing historic structures were defined within any of these tracts, we suggest no further architectural or historic resources survey are necessary for Section 110 purposes.

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APPENDIX F – ACRONYMS

ac-ft..... Acre-Feet
AQI..... Air Quality Index
B.P. ..... Before Present
BMP ..... Best Management Practices
CAP ..... Climate Action Plan
CHSP..... Cedar Hill State Park
CRMP ..... Cultural Resources Management Plan
CWA ..... Clean Water Act
DC..... District Commander
DF ..... Deciduous Forest
DQC..... District Quality Control
DQCB ..... District Quality Control Board
DM ..... Design Memorandum
EA..... Environmental Assessment, NEPA Document
EMS..... Ecological Mapping System
EOP ..... Environmental Operating Principles
EP..... Engineering Pamphlet
EPA ..... United States Environmental Protection Agency
ER..... Engineering Regulation
ESA..... Environmentally Sensitive Area
°F ..... Degrees Fahrenheit
FONSI..... Finding of No Significant Impact
FWCA ..... Fish and Wildlife Coordination Act of 1958
GIS ..... Geographical Information Systems
HDR..... High Density Recreation
HQ ..... USACE Headquarters (also HQUSACE)
IH ..... Interstate Highway
IPaC..... Information for Planning and Consultation
LDR..... Low Density Recreation
LEED ..... Leadership in Energy and Environmental Design
MP ..... Master Plan or Master Planning
MRML ..... Multiple Resource Management Lands
NAAQS ..... National Ambient Air Quality Standards
NCTCOG ..... North Central Texas Council of Governments
NEPA..... National Environmental Policy Act, 1970
NGVD29 ..... National Geodetic Vertical Datum (1929)
NHPA..... National Historic Prevention Act
NRHP ..... National Register of Historic Places
NOA..... Notice of Availability
NRCS..... Natural Resource Conservation Service
NRHP..... National Registry of Historic Places
NVCS..... National Vegetation Classification System
NWI ..... National Wetland Inventory

O&M..... Operations and Maintenance
OMB..... Office of Management and Budget
OMBIL..... Operations and Maintenance Business Information
OMP..... Operations Management Plan for a specific lake Project
OPM..... Operations Project Manager
PDT..... Project Development Team
PII ..... Personally Identifiable Information
PL ..... Public Law
PM ..... Project Management or Project Manager
PMP ..... Project Management Plan
PO..... Project Operations
RBLH ..... Riparian Bottomland Hardwoods
RBS ..... Recreational Boating Survey
RIFA..... Red Imported Fire Ant
RPEC..... Regional Planning and Environmental Center
RTEST ..... Rare, Threatened, and Endangered Species of Texas
SGCN ..... Species of Greatest Conservation Need
SH..... State Highway
SHPO..... State Historical Preservation Office
SMPS..... Shoreline Management Policy Statement
SIP ..... State Implementation Plan
SWA..... State Wildlife Area
TCAP ..... Texas Conservation Action Plan
TCEQ..... Texas Commission on Environmental Quality
TPWD ..... Texas Parks and Wildlife Department
TORP..... Texas Outdoor Recreation Plan
TRA..... Trinity River Authority
TX ..... Texas
TXDOT..... Texas Department of Transportation
TXNDD ..... Texas Natural Diversity Database
US..... United States (U.S.)
USACE ..... United States Army Corps of Engineers
USFWS..... U. S. Fish and Wildlife Service
USGS..... U.S. Geological Survey
VM ..... Vegetative Management Area (VMA)
WDA ..... Workforce Development Area
WHAP ..... Wildlife Habitat Appraisal Procedure
WM ..... Wildlife Management Area (WMA)