

**DRAFT  
ENVIRONMENTAL ASSESSMENT  
FOR  
MASTER PLAN REVISION  
ADDICKS AND BARKER RESERVOIRS  
BUFFALO BAYOU AND TRIBUTARIES  
FORT BEND AND HARRIS COUNTIES, TEXAS**



**U.S. ARMY CORPS OF ENGINEERS, GALVESTON DISTRICT  
GALVESTON, TEXAS  
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## **EXECUTIVE SUMMARY**

This Environmental Assessment (EA) is prepared in accordance with provisions of the National Environmental Policy Act (NEPA) of 1969. The EA addresses the potential impacts of the Galveston District, U.S. Army Corps of Engineers proposed Master Plan Revision for Addicks and Barker Reservoirs. The proposed revision would incorporate current land use classification standards, include contemporary requirements mandated by Federal environmental laws, and better reflect the USACE Environmental Operating Principles and Natural Resources Management Mission.

This EA examines seven alternatives (including the No Action alternative) that would implement the Master Plan Revision using various land classification scenarios. Under the No Action Alternative, no changes would be made to the current (1986) Master Plan. Implementation of the Master Plan Revision would entail permanent changes to the land use classifications of the majority of reservoir lands exclusive of existing operational and recreational/multi-purpose use facilities. This EA examines the effects the reclassification of reservoir land uses would have on the reservoirs.

The current Addicks and Barker Master Plan was last updated in 1986. Land use classifications in the 1986 document reflect two categories only: 1) Operations; and 2) Intensive Recreational Development. The proposed Master Plan Revision incorporates current standards set forth in EP 1130-2-550, and proposes the following land use classifications: 1) Operations (Ops); 2) Existing High Impact Recreation (HIRec); 3) Proposed High Impact Recreation (PHIRec); 4) Environmentally Sensitive (ES); and 5) Multiple Resource Management (MRM).

There would be no significant adverse effects to the natural environment associated with the proposed land re-classification. The proposed Federal action would not significantly impact the human environment, biological or cultural resources within the project area and is not likely to adversely affect any Federal species listed or proposed for listing as threatened or endangered in accordance with the Endangered Species Act. The analysis of the proposed action and potential impacts to the natural and human environment presented in this EA resulted in the conclusion that preparation of an environmental impact statement (EIS) is not required.

**Draft Environmental Assessment  
 Master Plan Revision  
 Addicks and Barker Reservoirs  
 Buffalo Bayou and Tributaries  
 Fort Bend and Harris Counties, Texas**

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## **1.0 PURPOSE AND NEED**

### *1.1 PROJECT DESCRIPTION*

Addicks and Barker Reservoirs are an integral part of the Buffalo Bayou, Texas, Project. The Buffalo Bayou Project reduces potential flood damages through a combination of reservoirs, channel improvements, and detention basins. The two reservoirs serve as detention basins and are designed and located to collect excessive amounts of rainfall, then release the accumulated rainfall down Buffalo Bayou at a controlled rate. Completed in 1948, the reservoirs are located in Harris and Fort Bend Counties west of the City of Houston. The reservoirs are normally “dry”, in the sense that they normally impound water only during rainfall or flood events, and do not store water year-round as is typical of most reservoirs. This “dry” condition of the reservoirs has presented the USACE with several natural resource management opportunities, including quality public outdoor recreational experiences.

### *1.2 PURPOSE AND NEED FOR PROJECT*

The U.S. Army Corps of Engineers (USACE), Galveston District is proposing to revise the 1986 Master Plan for Addicks and Barker Reservoirs. The Master Plan provides direction for decisions made at various times and at all levels regarding the management of the Addicks and Barker Reservoirs. The original Master Plan for Addicks and Barker Reservoirs was prepared in 1963 and subsequently revised in 1973, 1977, and 1986. The current (1986) Master Plan reflects values and policies concerning recreation, wildlife, and vegetation management that have since changed, necessitating a revision of the Master Plan.

When the Master Plan was last updated in 1986, only two land use classifications were identified: 1) Project Operations - lands needed for the safe and efficient operation and maintenance of the reservoirs for flood risk management; and 2) Intensive Use Recreation – lands available for development as intensive recreational use (multi-use facilities, sports fields, dog parks, etc.). These two classifications are insufficient to achieve long-term sustainable management of reservoir resources. The rapid rate of urban development and the widespread loss of habitat in the project area necessitate the revision of land use classifications. The proposed Master Plan Revision incorporates current USACE land use classification standards, includes contemporary requirements mandated by Federal environmental laws, and better reflects the USACE Environmental Operating Principles, natural resource management mission and environmental

stewardship and ecosystem management principles, while providing quality outdoor recreation experiences for current and future generations. The proposed land use classification changes will provide for the continued safe and efficient operation of the reservoirs and will enable USACE to manage the reservoir resources more effectively.

### *1.3 STUDY AUTHORITY*

Addicks and Barker Reservoirs are part of the Buffalo Bayou, Texas Project authorized by the Rivers and Harbors Act approved June 30, 1938 and modified by the Flood Control Act of August 11, 1939 and September 3, 1954. All lands within the reservoirs were acquired for flood risk management purposes. Although flood risk management remains the primary function of the reservoirs, Section 209 of the Flood Control Act of 1954 allows for the development and use of flood-control reservoir areas for recreational and related purposes. This EA is being prepared pursuant to the National Environmental Policy Act (NEPA) of 1969 to address the potential impacts of recreation and vegetation management changes to Addicks and Barker Reservoirs project lands. The lead agency for this change in policy is the Galveston District, U.S. Army Corps of Engineers. NEPA coordination was not conducted for the Buffalo Bayou, Texas, Project or the construction of Addicks and Barker Reservoirs as their authorization and construction occurred prior to 1969 and the implementation of NEPA. Actions within the reservoirs subsequent to NEPA implementation have been coordinated to meet the requirements put forth under NEPA.

## 2.0 ALTERNATIVES

The proposed Master Plan Revision presents an updated inventory and assessment of the reservoirs' land and water resources as well as recreational resources, an analysis of resource use, and a reevaluation of existing and future needs required to protect and improve the natural and recreational resource base. The proposed Master Plan Revision also reclassifies project lands in accordance with current USACE regulations, guidance and land stewardship principles. As proposed, the new land classifications would: 1) substantially reduce the amount of reservoir project lands available for new high impact recreational use; 2) increase the amount of project lands classified as Operations; 3) add a land use classification for Proposed High Impact Recreation; 4) add an Environmentally Sensitive land use classification; and 4) add a Multiple Resource Management land use classification. The reclassification of project lands constitutes a major Federal action and requires the preparation of an EA to examine potential beneficial and negative consequences to natural and human resources related to the implementation of proposed land use classifications. During the development of the proposed land use classifications and preparation of the EA, different alternatives were analyzed to determine a preferred alternative that best meets the need for sustainable development of natural resources and providing quality outdoor recreation experiences for current and future generations while maintaining the reservoirs' primary purpose of flood risk management.

### 2.1 ALTERNATIVE DEVELOPMENT CRITERIA

The primary constraint in the development of land classification alternatives is the need to avoid negatively affecting the flood risk management function of the reservoirs. All project lands of Addicks and Barker Reservoirs are allocated (designated) for the sole purpose of flood risk management. All other uses of reservoir lands such as recreation, vegetative management, and wildlife management are subordinate to this purpose. However, allocated project lands may be further classified to provide for recreational development and natural resources management as long as the classification is consistent with the authorized project purpose and the provisions of NEPA and other Federal laws (ER 1130-2-550 and EP 1130-2-550).<sup>85</sup>

For the Master Plan Revision, the District examined several criteria for the development of land use classifications. Criteria considered included maintaining reservoir flood pool capacity; compliance with laws, regulations, and guidance pertaining to the management of resources on Federal lands; consideration of existing natural resources within the

reservoirs project area; improving natural resource conservation and restoration; minimizing habitat fragmentation; providing additional outdoor recreational opportunities within the reservoirs to meet the increasing demand for natural and man-made outdoor recreational opportunities.

## 2.2 ALTERNATIVE 1 – NO ACTION

The National Environmental Policy Act requires that not implementing a project (taking no action) be considered as an alternative. Under Alternative 1 - No Action, the 1986 Master Plan would continue to guide the management of both recreation and natural resources on the Addicks and Barker Reservoir lands. The 1986 Master Plan identifies the following two land use classifications (Table 1 and Figure 1):

### Project Operations

Lands in this category are allocated to provide for the safe, efficient operation of the project for authorized purposes other than recreation and natural resource management activities for the benefit of fish and wildlife and natural habitats. These lands include the lands on which the operational structures, maintenance facilities, and administrative offices are located.

### Intensive Recreation

These lands are allocated for intensive recreation development. The 1986 Master Plan identifies all areas not specifically set aside for project operations as allocated for intensive recreational development. The term intensive recreational development means high impact or high density development that generally results in higher impacts to the natural environment than low impact / low density recreation. Examples of intensive recreation include sports fields, buildings, dog parks, and associated infrastructure (roads, parking lots, etc.).

**Table 1. Alternative 1 - No Action Land Use Classifications and Approximate Acres**

Land Use Classification	Addicks	Barker	Total
Operations	1,200	1,000	2,200
Intensive Recreational Development*	12,400	11,500	23,900
Total	13,600	12,500	26,100
* Includes existing recreational development at Addicks (1,700 ac) and Barker (1,400 ac) Reservoirs			

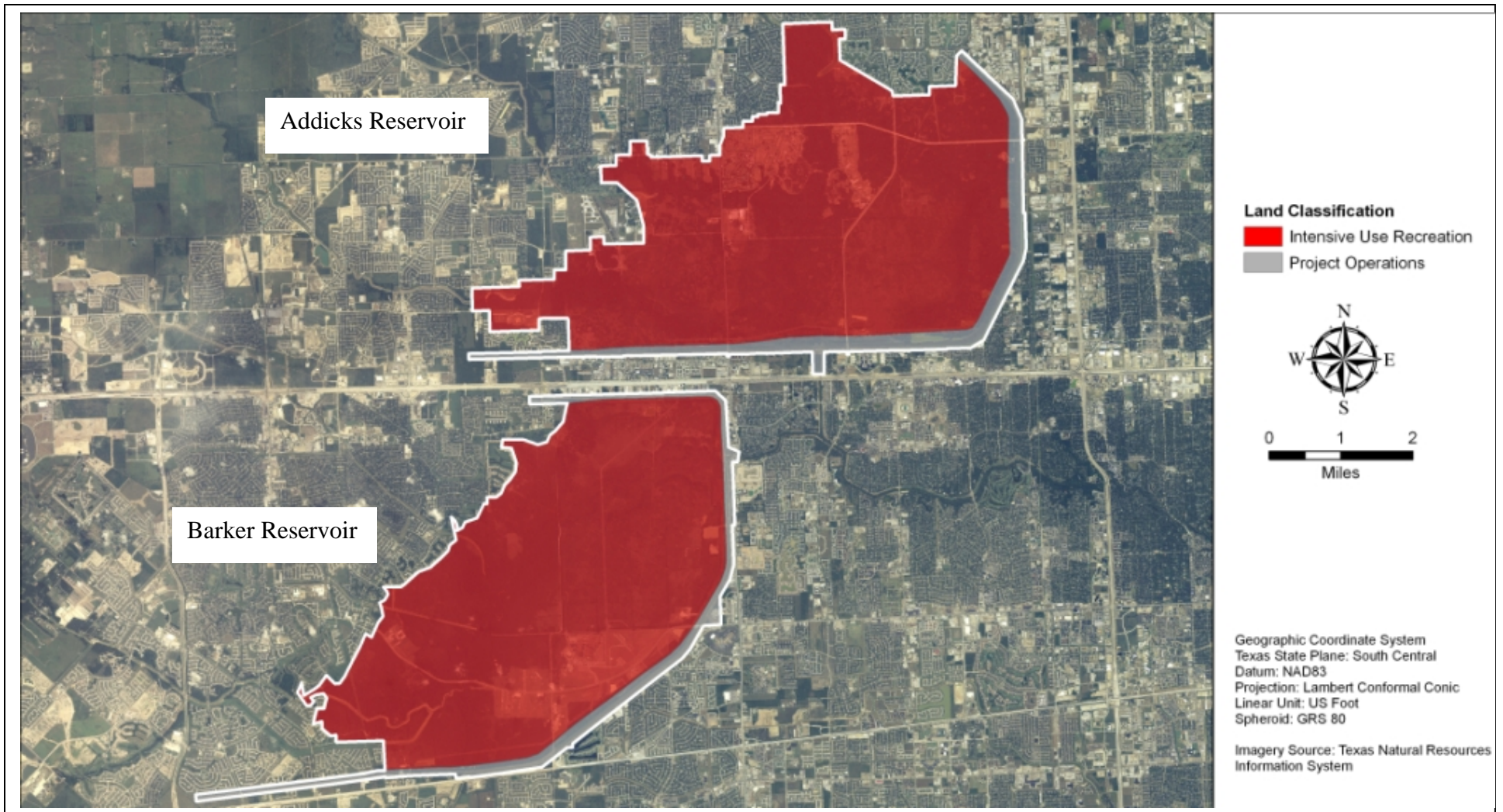


Figure 0-1. 1986 Master Plan Land Use Classifications



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Additionally, the 1986 Master Plan lists four objectives for forest, fish, and wildlife management: 1) Minimize susceptibility of project lands to overuse; 2) Develop interpretive programs for visitor education; 3) Provide for management and enhancement of native game and non-game species; and 4) Provide protection for the natural resources while maximizing practical use of project lands for recreation.

For Project Operations, the 1986 Master Plan identifies five goals: 1) To support and encourage non-Federal entities in the development, operation, and maintenance of recreation, fish and wildlife, and other natural resource activities; 2) To ensure that all development in Addicks and Barker Reservoirs is in accordance with the 1986 Master Plan; 3) To ensure that the resource is protected from overuse; 4) To preserve, protect, and interpret the archeological and historical resources which occur on the projects; and 5) To provide for the distribution of information about Addicks and Barker Reservoirs as well as the Galveston District and the USACE of Engineers.

Apart from Project Operations and Intensive Use Recreation, Alternative 1 (No Action) does not identify Multiple Resource Management or Environmentally Sensitive land use classifications as identified in ER 1130-2-550, does not facilitate compliance with current USACE mandates for environmental sustainability, and does not achieve compliance with other current land management regulations and policies.

### 2.3 *ALTERNATIVES 2 THROUGH 7 – PROPOSED LAND USE CLASSIFICATIONS*

Alternatives 2 through 7 propose changes to land use classifications in accordance with USACE guidance and the long term sustainable management strategies for recreation and natural resources as identified in the proposed Master Plan Revision. A desktop analysis was performed using a geographical information system (GIS) computer program to analyze reservoir data including: National Wetland Inventory data; aerial imagery; land use/land cover data; reservoir flood pool levels; cultural resources data; and data pertaining to the endangered plant species, *Hymenoxys texana*. In addition to the desktop analysis, operational knowledge of the reservoirs, and field verification and coordination with state and Federal resource agencies were used to determine the limits and characterization of the proposed land use classifications in the development of project alternatives. The process of alternatives development established the base areas and acreages for the Operations (Ops), existing High Impact Recreation (HIRec), and Environmentally Sensitive (ES) land use classifications which were consistently applied to each alternative developed (Alternatives 2 – 7), with the exception of Alternative 1.

After the Ops, HIRec, and ES land use classifications were identified, the development of alternatives focused on the amount and location of project lands to be classified as Proposed High Impact Recreation (PHIRec) and Multiple Resource Management (MRM). Addicks and Barker Reservoirs represent some of the last remaining large open natural habitat spaces in the region. In recognition of their importance as natural resources, the growing need for natural and man-made outdoor recreational resources, and in keeping with the USACE Natural Resource Management Mission and Environmental Operating Principles, the recommended PHIRec land use classification was developed to minimize the potential environmental consequences (impacts) associated with the anticipated requests for additional high impact recreational opportunities.

The location and amount of the Ops, HIRec, and ES land use classifications are the same for all alternatives (Figures 12 – 17, Appendix A). The Ops land classification includes the dams and maintenance areas necessary for the efficient operation of the reservoirs, and does not vary between alternatives. The existing high impact recreation (HIRec) land use classification is based on existing recreational facilities and as such, is also the same for all alternatives. To develop the ES land use classification, the USACE used a geographical information system (GIS), National Wetlands Inventory (NWI) data, stream data, known populations of the endangered plant species *Hymenoxys texana* data, cultural resource survey data, and field surveys conducted in coordination with the USFWS. For all alternatives, the proposed ES land use classification is the same as the environmental and cultural data used to develop the land classification do not vary between alternatives. Alternatives 2 – 7 differ only in the amount and location of the PHIRec and MRM land classification areas. The amount of project land classified as MRM changes depending on the amount of land classified as PHIRec under each alternative. The following descriptions of land use classifications apply to Alternatives 2 – 7:

#### Operations (Ops)

This classification includes lands required for the dams, outfall structures, operations center, office, maintenance compound and other areas that are used solely for Addicks and Barker Reservoirs project operations. This land use classification is expanded under Alternatives 2 – 7, from 2,200 acres (1986 Master Plan) to 4,100 acres. The proposed Ops areas include lands currently classified as Operations lands and additional areas that consist largely of the borrow ditches from the construction of the dams. The proposed

Ops areas will provide a buffer for the more managed sections of Ops lands while allowing conservation of the established wetlands.

#### Existing High Impact Recreation (HIRec)

This classification includes existing recreational areas developed as high impact recreation. Lands already developed for intensive outdoor recreational activities by the visiting public including developed recreation areas and areas for concession. Examples of high impact recreation within the reservoirs include golf courses, sports/ball fields, picnic areas, dog parks, building and multi-use facilities (e.g. velodrome, community center, animal exhibits, etc.) and associated infrastructure. The HIRec combined total for both reservoirs is approximately 3,100 acres.

#### Proposed High Impact Recreation (PHIRec)

This classification includes areas designated as potential locations for additional high impact (high density) recreation facilities (examples in HIRec section above). Under the 1986 Master Plan, all lands outside of the Operations classification are identified as available for intense recreational development. The alternatives examined in this EA identify between zero and nine hundred acres for additional High Impact Recreational development, depending on the number and size of PHIRec sites in each alternative. The location of existing high impact recreation, existing infrastructure (e.g. roads), proximity to ES areas, existing natural resources, and minimization of habitat fragmentation were key criteria considered when selecting potential locations for PHIRec areas. To minimize the impact to natural resources and fragmentation of habitat, PHIRec areas were located adjacent or close to existing high impact recreation areas where possible. Similarly, locating PHIRec areas away from ES areas was also preferable. When developing the amount of PHIRec land use classification, it was assumed that about 20 sports fields (mix of soccer and baseball fields and associated infrastructure) could be developed on 125 acres of land (Figure 2). Figure 2 shows more than 20 sports fields but as sufficient parking has been identified as an issue with existing facilities, 20 was chosen as a conservative value to allow for more parking.



**Figure 0-2. 125 acres equals approximately 20 fields with access roads and parking**

The discussion of Alternatives 2-7 (sections 2.3.1 – 2.3.6) provides an evaluation of the proposed locations for PHIRec areas and the amount of PHIRec acres for each alternative.

### Environmentally Sensitive (ES)

This land use classification identifies areas of scientific, ecological, cultural, or aesthetic features and areas that contain resources protected by Federal law (e.g. threatened and endangered species, cultural resources). These sensitive areas must be identified and managed to ensure that they are not adversely impacted. Limited or no development for public use (excludes any existing development) would be contemplated on lands in this classification, including agricultural or grazing uses. The scientific and ecologically important areas of Addicks and Barker Reservoirs generally include stream corridors and associated riparian/bottomland hardwood forest, upland forest, and remnant prairie characterized as the best representative prairie habitat currently identified within the reservoirs. Alternatives 2 – 7 establish approximately 7,200 acres under the ES land use classification for Addicks and Barker Reservoirs.

Several populations of the endangered plant species *Hymenoxys texana* (prairie dawn-flower) are located within an existing high impact recreation area (picnic areas in Bear Creek Pioneer Park). These populations (11 known sites) were identified after the park was established and are further discussed in Sections 3.7 and 4.5.

### Multiple Resource Management (MRM)

This classification includes areas identified as multiple use areas that could provide the public with an unstructured natural setting for low impact outdoor recreational activities (e.g. hike and bike trails, nature viewing, photography, education), vegetative management (e.g. prairie restoration and control of invasive species), and wildlife management activities (e.g. creation of waterfowl habitat). Lands can be managed for one or more of these activities concurrently, to the extent that they are compatible with the primary allocation (flood risk management) and each other. Under Alternatives 2 – 7, MRM lands are generally lands not included in one of the previously discussed land use classifications (Ops, HIRec, PHIRec, ES). The amount of area classified as MRM for Alternatives 2-7 ranges from 10,800 acres to 11,700 acres.

The proposed Master Plan Revision would also establish the following goals for reservoir management: 1) Ensure consistent and thorough management of all project lands and other associated constructed and natural resources; 2) Provide responsible stewardship by the conservation, maintenance and restoration of diverse habitats for the benefit of various ecosystems; 3) Maintain, protect, and restore wetlands to support wildlife diversity and provide habitat for wetland dependent species; 4) Manage public lands to encourage optimal use by the greatest number of wildlife species through inventorying, manipulating, and protecting their habitats; 5) Provide a safe and healthy environment for project visitors by monitoring, maintaining, and improving the environmental quality and natural aesthetics of the area; 6) Encourage outdoor recreation opportunities for the elderly, disabled, and other disadvantaged groups by providing barrier-free access; and 7) Expand upon the distribution of information detailing the importance of natural habitats within the reservoirs including their conservation and restoration and the importance of public safety.

#### 2.3.1 Alternative 2

Alternative 2 would establish the Ops, ES, HIRec, and MRM land use classifications but would remove all acres currently identified as Intensive Use Recreation (excluding existing recreational development) and would not identify any areas for future high

impact recreational opportunities (PHIRec) (Table 2 and Appendix A, Figure 2). By eliminating PHIRec as a land use classification, Alternative 2 conserves the greatest amount of undeveloped areas of the reservoirs. Although this alternative does not identify additional high impact recreation, it would allow for additional low impact recreation facilities (e.g. hike and bike trails) that would be constructed in the MRM land classification.

**Table 2. Alternative 2 – Proposed Land Use Classifications and Approximate Acres**

<b>Land Use Classification</b>	<b>Addicks</b>	<b>Barker</b>	<b>Total</b>
Operations	1,900	2,200	4,100
HIRec	1,700	1,400	3,100
PHIRec	0	0	0
ES	4,300	2,900	7,200
MRM	5,700	6,000	11,700
Total	13,600	12,500	26,100

### 2.3.2 Alternative 3

Alternative 3 would add two PHIRec areas in Barker Reservoir totaling 340 acres (Appendix A, Figure 3). The first site is located in Cinco Ranch Park off of Westheimer Parkway across from an existing soccer field complex and consists of severely degraded prairie. The second site is in George Bush Park, north of the model airplane facility, and is comprised of severely degraded prairie. Both areas were selected as PHIRec development areas due to their access to an existing major roadway (Westheimer Parkway), proximity to existing recreational development, and quality of habitat. The proposed land use classification acres are shown in Table 3.

**Table 3. Alternative 3 – Proposed Land Use Classifications and Approximate Acres**

<b>Land Use Classification</b>	<b>Addicks</b>	<b>Barker</b>	<b>Total</b>
Operations	1,900	2,200	4,100
HIRec	1,700	1,400	3,100
PHIRec	0	340	340
ES	4,300	2,900	7,200
MRM	5,700	5,660	11,360
Total	13,600	12,500	26,100



### 2.3.3 Alternative 4

Alternative 4 would add a third PHIRec area (110 acres) in Addicks Reservoir, in addition to the two in Barker Reservoir identified in Alternative 3. The additional PHIRec area is located in Cullen Park, Addicks Reservoir, just east of the intersection of War Memorial and Eldridge Parkway, close to the existing sports field complex located to the west of the same intersection in Bear Creek Pioneers Park (Appendix A, Figure 4). This area would be accessible using Eldridge Parkway, is located next to existing park facilities, and is comprised of severely degraded prairie infested with deep-rooted sedge (*Cyperus entrerianus*), a highly invasive exotic plant. The proposed land use classification acres are shown in Table 4.

**Table 4. Alternative 4 – Proposed Land Use Classifications and Approximate Acres**

Land Use Classification	Addicks	Barker	Total
Operations	1,900	2,200	4,100
HIRec	1,700	1,400	3,100
PHIRec	110	340	450
ES	4,300	2,900	7,200
MRM	5,590	5,660	11,250
Total	13,600	12,500	26,100

### 2.3.4 Alternative 5

Alternative 5 would add a third PHIRec area (190 acres) in addition to the areas identified in Alternative 3 (Appendix A, Figure 5). The additional area is in Bear Creek Pioneers Park, Addicks Reservoir, on Pine Forest (potential access road), west of Highway 6. This area is currently used for grazing livestock, contains an historic cemetery, and is comprised of degraded prairie habitat dominated by exotic and native invasive woody vegetation. The area immediately to the south is a riparian forested area associated with Bear Creek and is classified as ES, which could present potential encroachment issues (e.g. expansion of mowed/maintained areas; impact to habitat associated with increased human activities) if the area south of Pine Forest is identified as PHIRec. The proposed land use classification acres are shown in Table 5.

**Table 5. Alternative 5 – Proposed Land Use Classifications and Approximate Acres**

Land Use Classification	Addicks	Barker	Total
Operations	1,900	2,200	4,100
HIRec	1,700	1,400	3,100
PHIRec	190	340	530
ES	4,300	2,900	7,200
MRM	5,510	5,660	11,170
Total	13,600	12,500	26,100

### 2.3.5 Alternative 6

Alternative 6 includes all PHIRec areas in Addicks Reservoir described in Alternatives 4 and 5, and the two areas in Barker Reservoir described in Alternative 3 (Appendix A, Figure 6). The proposed land use classification acres are shown in Table 6.

**Table 6. Alternative 6 – Proposed Land Use Classifications and Approximate Acres**

Land Use Classification	Addicks	Barker	Total
Operations	1,900	2,200	4,100
HIRec	1,700	1,400	3,100
PHIRec	300	340	640
ES	4,300	2,900	7,200
MRM	5,400	5,660	11,060
Total	13,600	12,500	26,100

### 2.3.6 Alternative 7

Alternative 7 includes all of the PHIRec areas identified in Alternatives 3 through 6 and adds an additional 260 acre PHIRec area in Cullen Park, Addicks Reservoir. The additional area is located north of Clay Road and east of Eldridge Parkway (Appendix A, Figure 7). This area was considered for the PHIRec land use classification based on its location. It is comprised of degraded prairie habitat and would be accessible using Clay Road. The area to the west of the additional PHIRec area is an ES area containing several populations of the endangered plant species *Hymenoxys texana*. The area south

of the area (across Clay Road) also contains *Hymenoxys texana* sites. The acres for the proposed land use classifications are shown in Table 7.

**Table 7. Alternative 7. – Proposed Land Use Classifications and Approximate Acres**

Land Use Classification	Addicks	Barker	Total
Operations	1,900	2,200	4,100
HIRec	1,700	1,400	3,100
PHIRec	560	340	900
ES	4,300	2,900	7,200
MRM	5,140	5,660	10,800
Total	13,600	12,500	26,100

#### 2.4 COMPARISON AND EVALUATION OF ALTERNATIVES

The information in this section presents a side-by-side comparison of the Alternatives presented previously and focuses on proposed changes to land management strategies and land use classifications of Federal lands at Addicks and Barker Reservoirs (Table 8). This section also presents an alternative screening matrix for the comparison and ranking of alternatives based on the previously established criteria (Table 9). This comparison and ranking process provides the basis for the selection of the preferred alternative for land use classifications under the proposed Master Plan Revision for Addicks and Barker Reservoirs.

**Table 8. Comparison of Land Use Classification Acres by Alternative (Alt)**

	Alt 1 No Action	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Operations	2,200	4,100	4,100	4,100	4,100	4,100	4,100
Existing High Impact (intensive) Recreation	3,100	3,100	3,100	3,100	3,100	3,100	3,100
Proposed High Impact (intensive) Recreation	20,800	0	340	450	530	640	900
Environmentally Sensitive	0	7,200	7,200	7,200	7,200	7,200	7,200
Multiple Resource Management	0	11,700	11,360	11,250	11,170	11,060	10,800
Total Acres	26,100	26,100	26,100	26,100	26,100	26,100	26,100

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**Table 9. Alternative Screening Matrix**

Alternative Screening Criteria for Proposed High Impact Recreation Areas as Proposed in the Master Plan Revision for Addicks and Barker Reservoirs (1 = Bad, 5 = Good)	Alternative 1 No Action	Alternative 2 No PHIRec	Alternative 3 340 acres PHIRec	Alternative 4 450 acres PHIRec	Alternative 5 530 acres PHIRec	Alternative 6 630 acres PHIRec	Alternative 7 900 acres PHIRec
Provides buffer area between dams and recreational areas.	2	5	5	5	5	5	5
Minimizes potential habitat fragmentation.	3	5	4	3	2	2	2
PHIRec located adjacent to existing High Impact Recreation facilities.	3	5	4	3	2	2	1
Minimizes construction of additional roadways (located adjacent to existing infrastructure).	3	5	4	4	3	3	2
Avoid locating PHIRec areas close to Environmentally Sensitive Areas.	3	5	4	4	3	3	2
Contributes to the sustainable development of natural resources within the reservoirs.	2	5	5	4	4	4	4
Provides PHIRec areas in the three major park outgrant areas.	5	1	3	5	5	5	5
Allows for additional development of High Impact Recreational and multi-use facilities.	5	1	2	3	4	5	5
<b>Total Score</b>	<b>26</b>	<b>32</b>	<b>31</b>	<b>31</b>	<b>28</b>	<b>29</b>	<b>26</b>

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The evaluation and selection process compared the alternatives against each other based on the criteria listed in Table 9. Apart from Alternative 1, the proposed Ops, ES, MRM, and existing HIRec land use classifications for the alternatives are essentially the same. The differences between the alternatives are the amount of PHIRec identified in each alternative and the amount of proposed MRM lands (more PHIRec, less MRM and vice versa). All proposed alternatives, minus the No Action Alternative (Alternative 1), would provide a buffer between the more managed Ops lands and potential conservation, restoration and recreational lands and received the maximum score of five (5). Alternative 1 received a score of two (2) since the current Operations land use classification includes the operational facilities and structures only, and lacks an additional buffer. For minimization of habitat fragmentation, the alternatives that scored the best were those that had no, or little, amounts of land identified as PHIRec (all alternatives would include low impact recreation opportunities within the MRM lands). Alternative 2 would not identify any PHIRec and therefore received the highest score of five (5). The lowest scoring alternative was Alternative 7 (900 acres of PHIRec), which scored a one (1). The additional infrastructure (e.g. roads, parking lots) that would accompany PHIRec areas was considered a negative environmental consequence, and an alternative's score was reduced as the amount of infrastructure needed increased. Some of the alternatives has PHIRec lands situated adjacent or near ES lands (e.g. Alternatives 5 through 7). High impact recreational areas would have unintended negative consequences for adjacent ES lands and thus reduced an alternative's score. Providing PHIRec opportunities within the three park outgrants would be met by Alternatives 4 through 7 but not by Alternatives 1 through 3. The amount of high impact outdoor recreational opportunities was related to the amount of PHIRec lands identified by each alternative, with higher scores given to alternatives with more overall PHIRec acres (Alternatives 6 and 7 both received scores of five; Alternative 2 received a score of one). As Alternatives 2 through 7 present land use classifications that consider ES and cultural areas while providing conservation, restoration and outdoor recreational opportunities, they scored well for contributing to the sustainable development of the reservoirs. Alternative 1 (No Action) does not take into account a sustainable approach to development of reservoir lands and therefore scored the lowest of all alternatives.

## *2.5 PREFERRED ALTERNATIVE – ALTERNATIVE 4*

Alternative 4 was selected as the Preferred Alternative as it would best meet the need for sustainable management and conservation of natural resources within the reservoirs while providing for current and future quality outdoor recreational needs of the public. The



selection process included consideration for minimizing fragmentation of remaining natural habitat areas, avoidance of wetland areas and scientifically important and regionally scarce natural resources, and providing opportunities for quality outdoor recreational experiences. The three highest scoring alternatives were Alternative 2 (32 points); Alternative 3 (31 points); and Alternative 4 (31 points). Alternative 2 ranked the highest for overall consideration for natural resource conservation, but provided no additional high impact recreational (PHIRec) opportunities and was dropped from consideration as the Preferred Alternative. Alternatives 5 through 7 would have provided for sufficient outdoor recreational opportunities, but the increased potential for associated negative environmental consequences dropped them from further consideration as the preferred alternative. Alternatives 3 and 4 scored equally well, varying slightly in overall natural resource conservation and recreational opportunities. Alternative 4 would provide an additional 110 acres of PHIRec over Alternative 3. As the natural resource conservation and sustainable development aspects of Alternative 3 were only slightly better than Alternative 4, the increase in outdoor recreational opportunities led to the selection of Alternative 4 as the Preferred Alternative.

### 3.0 AFFECTED ENVIRONMENT

#### 3.1 PROJECT AREA

The Addicks and Barker Reservoirs are located in the San Jacinto River Basin. Addicks and Barker watersheds (both watersheds drain into the Buffalo Bayou watershed) are located approximately 17 miles west of downtown Houston (Figure 4). Addicks and Barker Reservoirs are in the Gulf Coast Prairies and Marshes Ecoregion (Gould, 1975), which is a nearly level plain in a narrow band about 60 miles wide along the Texas coast bordering the Gulf of Mexico from the Sabine River to the Rio Grande (Figure 3).

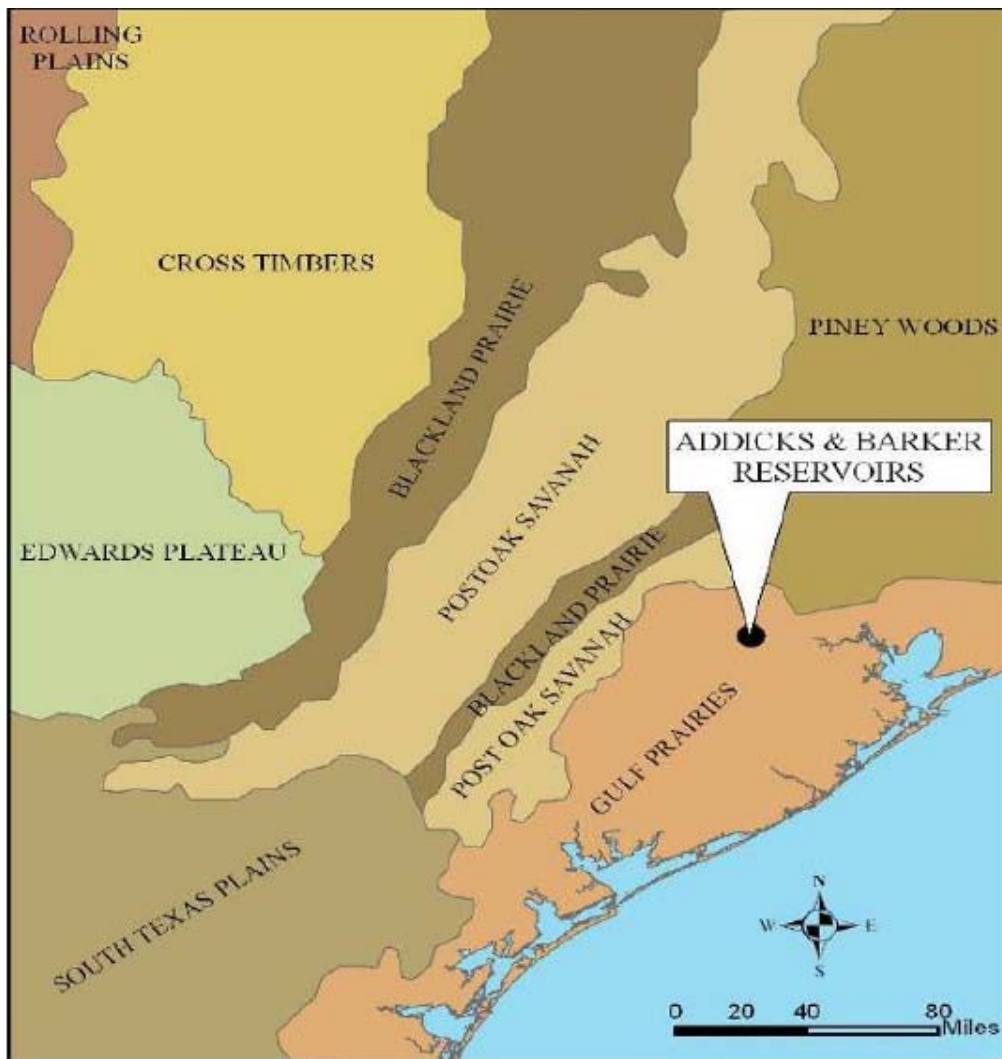


Figure 0-1. Ecoregions and location of reservoirs. Modified from Gould (1975) Ecoregions.

The region is flat and gradually slopes coastward from an elevation of approximately 245 ft (Diamond and Smeins, 1984). It is comprised of shallow bays, estuaries, salt marshes,

dunes, and tidal flats as well as tallgrass prairie, forested riparian corridors, mottes and coastal woodlots, and dense brush habitats. Soils in the marshy areas include acid sands, sandy loams, and clay, while the prairies contain more clay and are very rich in nutrients (TPWD, 2007). The reservoirs are located close to two other ecoregions, the Post Oak Savannah (north and west), and the Piney Woods (north and east) (Gould, 1975).

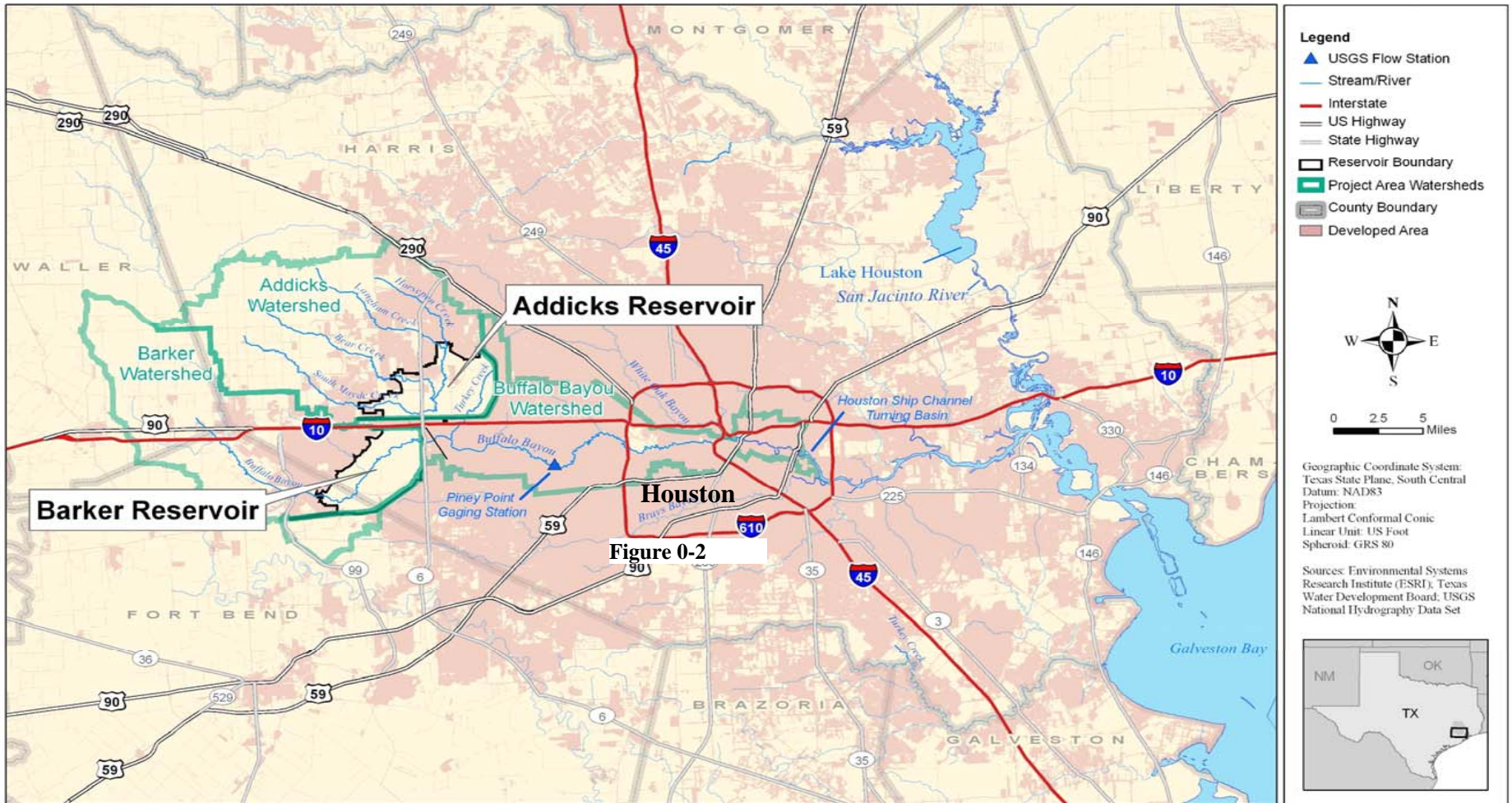


Figure 0-3. Location of Addicks and Barker Reservoirs in relation to Houston, Texas metropolitan area.

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### 3.2 CLIMATE

Houston's climate is classified as humid subtropical. Spring thunderstorms sometimes bring tornadoes to the area. Prevailing winds are from the south and southwest during most of the year, bringing heat across the continent from the deserts of Mexico and moisture from the Gulf of Mexico.

During the summer months, it is common for the temperature to reach over 90°F (32°C), with an average of 99 days per year above 90°F (32°C). Winters in Houston are fairly temperate. The average high in January, the coldest month, is 63°F (17°C), while the average low is 45°F (7°C).

#### Precipitation and Past Flooding Events

Harris County receives an average of 47.8 inches of precipitation each year as measured at Bush International Airport. Normal monthly rainfall in the Houston area varies from about three inches to over five inches, with the heaviest rainfall occurring during May and June. The reservoirs were built in response to the Houston area being subject to periodic flooding associated with high rainfall events including tropical storms (TS) and hurricanes throughout its history. Harris County has experienced at least 12 major storm events since 1853 (USGS, 2003). In June, 2001, over a period of five days, TS Allison dumped record amounts of rainfall throughout the Houston area, causing widespread flooding and resulted in 22 deaths and in Harris county alone, over \$4.88 billion in damages.

### 3.3 GEOLOGY AND SOILS

The soils on which Addicks and Barker Reservoirs lie are of the Lissie Formation and consist of thick beds of sand, containing lentils of gravel, interbedded with clay and silt (Smeins et al., 1991). Beds of marine clays occur between thick strata of fine sand as a result of the advance and retreat of the Gulf of Mexico. The formation is generally composed of about 60 percent sands or silty sands, 20 percent sandy clay, 10 percent gravel and 10 percent clay. Table 10 provides a breakdown and short description of the soils occurring in the reservoirs. Both the Lissie Formation and Beaumont Formation soils found at Addicks and Barker Reservoirs generally drain poorly due to their low relief and dense subsoils (Smeins et al., 1991). The soils are nearly level and clayey, suggesting the majority of this area supported a native prairie plant community (Wheeler, 1976) outside of the forested riparian corridors.

**Table 10. Soil Types in Addicks and Barker Reservoirs adapted from NRCS GIS soil coverages (NRCS, 2007)**

Soil Series	Short Description
Addicks	Loamy, slightly acid through moderately alkaline, poorly drained, moderately permeable, nearly level, upland prairie soil.
Aris	Loamy, strongly acid through neutral, poorly drained, very slowly permeable, nearly level, upland prairie soils.
Aris-Urban	Same as Aris, but extensive built-up area where works, structures, and soil disturbance comprise 75 to 100 percent of the area.
Beaumont	Clayey, very strongly acid through mildly alkaline, poorly drained, very slowly permeable, nearly level, upland prairie soils.
Bernard	Loamy, slightly acid through moderately alkaline, somewhat poorly drained, very slowly permeable, nearly level through gently sloping, upland prairie soils.
Bernard-Urban	Same as Bernard, but extensive built-up area where works, structures, and soil disturbance comprise 75 to 100 percent of the area.
Clodine	Loamy, slightly acid through moderately alkaline, poorly drained, moderately permeable, nearly level, upland prairie soils.
Clodine-Urban	Same as Charles, but extensive built-up area where works, structures, and soil disturbance comprise 75 to 100 percent of the area.
Edna	Loamy, medium acid through moderately alkaline, poorly drained, very slowly permeable, nearly level through gently sloping, upland prairie soils.
Gessner	Loamy, slightly acid through moderately alkaline, poorly drained, moderately permeable, nearly level, upland prairie soils.
Katy	Loamy, strongly acid through mildly acid, somewhat poorly drained, very slowly permeable, nearly level, upland prairie soils.
Lake Charles	Clayey, slightly acid through moderately alkaline, somewhat poorly drained, very slowly permeable, nearly level to gently sloping, upland prairie soils.
Midland	Loamy, strongly acid through moderately alkaline, poorly drained, very slowly permeable, nearly level, upland prairie soils.
Nahatche	Loamy, strongly acid through mildly alkaline, somewhat poorly drained moderately permeable, nearly level, forested bottomland soils.

Since the topography of the reservoirs is nearly flat, with little relief, remnant microtopographic features play an important role in plant diversity. Where remaining, these features consist of floodplain mounds, pimple mounds, and series of microridges and microdepressions called gilgai (Fields, R.C. et al, 1983; Fields, R.C. et al, 1986). Pimple mounds are small (usually 18 to 60 feet in diameter), low (usually less than 12 inches high) mounds of sandier soil than the surrounding flat areas (Carty et al., 1988). The origin of these pimple mounds is unclear, but some theories include: products of past coastal environments and associated drainage patterns, wind and wave action (Smeins et al., 1991); wind driven accumulation of sediments around clumps of vegetation; and the actions of burrowing animals (Aronow, 1992; Cox, 1984; Price, 1949). The mounds also have an influence on patterns of plant distribution and abundance and are associated with



the Federally listed endangered Texas prairie dawn-flower. The introduction of agricultural practices such as leveling for rice farming and disking for row cropping, leveled many of the microtopographic features historically prevalent in both reservoirs.

### *3.4 ECOLOGICAL BACKGROUND AND TRENDS*

Addicks and Barker Reservoirs are located in the Texas Coastal Prairie which contains an assemblage of grasslands, wooded stream bottoms and upland wooded areas (Diamond and Smeins, 1984). Prior to European settlement and twentieth-century development, the region included woodlands of sugarberry, pecan, elms, and live oaks, interspersed with open prairies with native grasses dominated by little bluestem and other typical prairie species (Gould, 1975; Diamond and Smeins, 1984). Of the approximately 8 million acres of the native Coastal Prairie grasslands once found in Texas, it is estimated that less than one percent remains in a relatively pristine state following its conversion to cropland, rangeland, pasture, or urban land uses (Diamond and Smeins, 1984; Grafe et al, 1999).

Coastal forests of the Gulf Coast Prairies and Marshes Ecoregion typically occur along river and bayou drainages and on ridges, barrier islands, and delta splays (Barrow et al, 2005). Forested wetlands are perhaps the most rapidly disappearing wetland type in the United States. Most swamp and riparian forests underwent severe deforestation and over-harvesting in the early part of this century. Construction of dams and reservoirs along the rivers that supply water to these wetlands, agriculture and silviculture represent the major continuing threats. In addition to the clearing or drowning of forested wetlands within reservoir floodpools, there is a long-term threat from the flood-control function of most dams. Once annual flooding is removed, the wetlands begin to dry out and become more susceptible to development pressures and invasion by exotic species.

Although long-term historical data for losses of bottomland hardwoods in eastern Texas are not well documented (USFWS, 1985), collaborative studies conducted by U.S. Fish and Wildlife Service, Texas Parks and Wildlife Department and U.S. Department of the Interior examining the status and trends of Texas coastal wetlands from the mid-1950s to early 1990s, identify the net loss of 96,477 acres of palustrine forested wetlands (swamps, bottomland hardwoods, etc.) from 886,285 acres in 1955 to 789,808 acres in 1992, a percent loss of 11% (USFWS, 1997; Moulton and Jacob, 2000). Between 1992 and 2000, forest declined by approximately 17% percent within the Houston region, primarily from urban expansion (U.S. Forest Service, 2005).

Land-use prior to construction of the dams and reservoirs was primarily ranching and rice farming (Barker) and dairying (Addicks), which resulted in the alteration of the native prairie and woodland habitats. Woody vegetation became established with the decline of agricultural and ranching practices and with the continued suppression of a natural fire regime. Returning vegetation often includes the exotic invasive species Chinese tallow (*Triadica sebifera* syn. *Sapium sebiferum*), and more recently, deep-rooted sedge (*Cyperus ennerianus*) among others (USACE, 1986). Examples of this conversion occur throughout the reservoirs.

Outside the reservoirs, urban development in the surrounding area and region has also increased with the decline of rice farming and the resulting conversion of extensive open space to urban land-use, marking westward expansion of the City of Houston (Katy Prairie Conservancy, 2007). Minimal grazing (under grazing leases) still takes place within the reservoirs and farming has stopped altogether since acquisition of the reservoir lands by the USACE. Despite the extensive impacts, native vegetation assemblages are identifiable in Addicks and Barker (Fields, R.C. et al 1983; Fields, R.C. et al 1986).

Existing land cover classifications within the reservoirs are divided into three general categories: Degraded Prairie (coastal prairie invaded by native and non-native vegetation); Riparian/Bottomland Hardwood Forest; and Developed Land. The most prevalent land cover, Degraded Prairie, includes areas that were historically coastal prairie but now consist mostly of a mix of prairie and old field habitat (mix of non-native and native plants). The Degraded Prairie classification also includes areas of native prairie vegetation (may contain exotic or invasive species) considered to be the best examples of remaining prairie habitat in the reservoirs identified to date. Riparian/Bottomland Hardwood Forest includes areas along the streams and bayous of remnant forest that were not cleared for agricultural use and areas of regenerating forest. Other forested areas in the reservoirs outside of the riparian corridors may include upland and floodplain forest, containing various evergreen and deciduous woodland species and may occur intermixed with prairie. The Developed Land land cover classification includes areas of recreational and multi-use development. As more detailed vegetation surveys become available, land classifications will be further defined and documented in subsequent updates to the Master Plan.

### 3.5 VEGETATION

#### 3.5.1 Prairie

For remnant prairie sites of the Upper Coastal Prairie, the dominant prairie community is characterized as little bluestem-brownseed paspalum-indiangrass (*Schizachyrium scoparium-Paspalum plicatulum-Sorghastrum nutans*) (Figure 5) (Diamond, and Smeins, 1985; TPWD, 2008). Commonly associated plants are: bushy bluestem, slender bluestem, little bluestem, silver bluestem, three-awn, buffalograss, bermudagrass, brownseed paspalum, single-spike paspalum, smutgrass, sacahuista, windmillgrass, southern dewberry, live oak, mesquite, huisache, baccharis, and Macartney rose. Representative plant species are listed in Table 11.

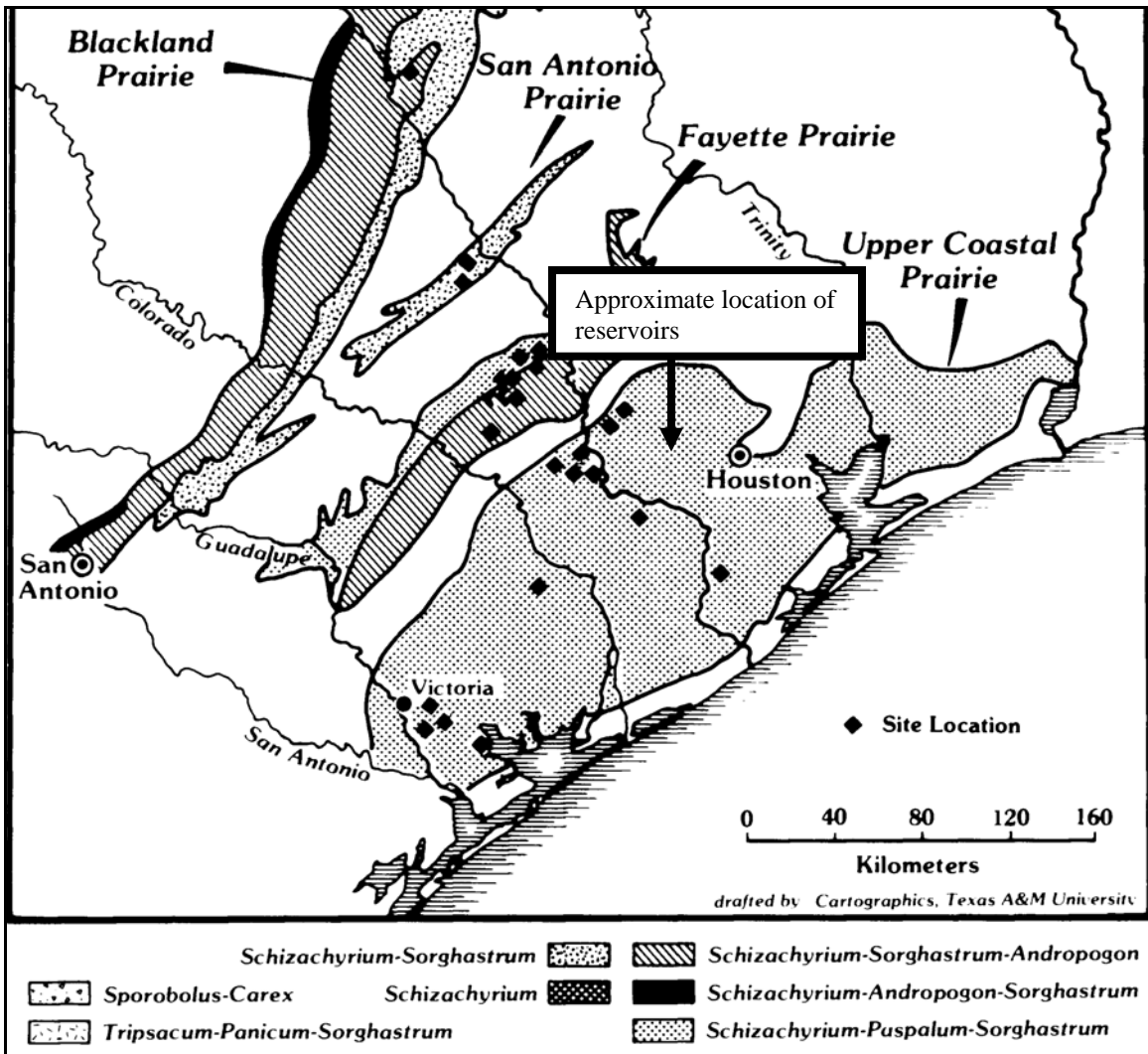


Figure 0-4. Grassland community types of east-central Texas. Adapted from Diamond and Smeins, 1985.

**Table 11. Characteristic Prairie Community and Species List - Upper Texas Coastal Prairie.  
(Adapted from Diamond and Smeins, 1985)**

Upper Texas Coastal Prairie Community Schizachyrium scoparium-Paspalum plicatulum-Sorghastrum nutans (littlebluestem-brownseed paspalum-indiangrass)		
Graminoids (herbaceous flowering grasses, sedges and rushes)		
	Andropogon gerardii	big bluestem
	Bouteloua curtipendula	sideoats grama
	Carex microdonta	small-toothed caric sedge
	Coelorachis cylindrica	cylinder jointtail grass
	Dichanthelium oligosanthes	rosette grass
	Fimbristylis puberula	hairy fimbry
	Panicum virgatum	switchgrass
	Paspalum floridanum	Florida paspalum
	Paspalum plicatulum	brownseed paspalum
	Paspalum setaceum	thin paspalum
	Rhynchospora spp.	beakrush
	Schizachyrium scoparium	little bluestem
	Scleria ciliata	fringed nutrush
	Sorghastrum nutans,	Indiangrass
	Sporobolus asper	scratchgrass
	Stipa leucotricha, Nassella	Texas wintergrass, Texas
	leucotricha	tussockgrass
Forbs (herbaceous flowering plants that are not grasses, sedges, or rushes)		
	Acacia hirta	prairie acacia
	Aster ericoides	white aster
	A. pratensis	aster
	Bifora americana	prairie bishop
	Gnaphalium spp.	cudweed
	Hedyotis nigricans	diamondflowers
	Hymenopappus scabiosaeus	Carolina woollywhite
	Liatris spp.	blazing stars
	Linum medium	stiff yellow flax
	Neptunia lutea	puff
	Physostegia intermedia	slender false dragonhead
	Ratibida columnaris	upright prairie coneflower
	Rudbeckia hirta	blackeyed Susan
	R. nudiflora	violet wild petunia
	Schrankia uncinata	little leaf sensitive-briar
	Sisyrinchium pruinosum	roadside blue-eyed grass

In addition to the general plant community descriptions for the Upper Coastal Prairie, vegetation characteristic of the Houston Coastal Prairie community, Muhlenbergia capillaries Herbaceous Vegetation (Natureserve, 2007), is representative of prairie found at Addicks and Barker Reservoirs (Rosen, D. USFWS per comm.). The dominant species of this association is Gulf coast muhly (*Muhlenbergia capillaris*) with Gulf cordgrass (*Spartina spartinae*) prevalent. Eastern baccharis (*Baccharis halimifolia*) occurs as scattered individuals up to moderately dense patches as an invader of disturbed

or overgrazed sites. Other potential species include the Federally endangered Texas prairie dawn-flower (*Hymenoxys texana*) and the rare endemic species Houston camphor daisy (*Rayjacksonia aurea*), Texas windmill grass (*Chloris texensis*), and three-flower snakeweed (*Thurovia triflora*), all of which may occur in small grass-free openings in the community. Very few occurrences of this community are known, with nearly all degraded by grazing, fire exclusion, or hydrologic alteration. The few remaining examples are known from private lands and Addicks and Barker Reservoirs, in Harris and Fort Bend counties (Natureserve, 2007).

Typical native and non-native invasive plants commonly found in old field and pastureland are vasey grass (*Paspalum urvillei*), deep-rooted sedge (*Cyperus entrerianus*), little barley (*Hordeum pusillum*), and Johnson grass (*Sorghum halepense*). Native prairie plant species can also be found among the mix of plants commonly found in abandoned agricultural fields throughout the reservoirs. Native and non-native encroaching woody vegetation typically found in these sites include wax myrtle (*Morella cerifera*), sensitive briar (*Mimosa nuttallii*), rattle bush (*Sesbania drummondii*), McCartney rose (*Rosa bracteata*), yaupon (*Ilex vomitoria*), Chinese privet (*Ligustrum sinense*) and Chinese tallow (*Sapium sebiferum*) (USACE, 1986). Historically, prairie fires occurred frequently throughout the Gulf Coast Prairies and Marshes Ecoregion, preventing woody plants from establishing, stimulating seed germination, replenishing nutrients, and allowing light to reach herbaceous growth. Fire suppression in remnant prairies allows both native shrubs and invasive species to become established (Grafe et al, 1999). Prior to, and continuing after extensive European settlement, human-induced fires were an integral part of the coastal prairie landscape, suggesting that the most dramatic change to the region's fire regime was the suppression of fire associated with the introduction of heavy grazing (Grace, J.B. et al, 2005).

### 3.5.2 Riparian/Bottomland Hardwood Forest.

Bottomland hardwoods perform numerous ecological functions including acting as sources of aquifer recharge, capturing and dispersing sedimentation, filtering runoff and providing important bird habitat (Guilfoyle, 2001). This is of particular importance at Addicks and Barker Reservoirs, as urbanization and agriculture have reduced the amount and quality of riparian and bottomland forests in the region. The reservoirs are situated just east of the Columbia Bottomlands (Austin's Woods) which, at the beginning of the last century, covered approximately 700,000 acres among the floodplains of the Brazos,

San Bernard, and Colorado Rivers, but now exists only as scattered patches totaling approximately 175,000 acres (USFWS, 2008a).

Typical species found within riparian forests of the Upper Texas Coast include oaks (*Quercus spp.*), hickories (*Carya spp.*), American elm (*Ulmus americana*), winged elm (*Ulmus alata*), cedar elm (*Ulmus crassifolia*), green ash (*Fraxinus pennsylvanica*), yaupon (*Ilex vomitoria*), deciduous holly (*Ilex decidua*), box elder (*Acer negundo*), dwarf palmetto (*Sabal minor*), hackberry (*Celtis laevigata*), red maple (*Acer rubrum*), soapberry (*Sapindus drummondi*) (Barrow et al. 2005) and in wetter areas water tupelo (*Nyssa aquatica*) and bald cypress (*Taxodium distichum*). .

Other patches of forested or wooded areas outside of the riparian corridors and floodplains may contain a mix of evergreen-deciduous communities including Live Oak Woodland and Coastal Live Oak-Pecan (TOES, 1998). Typical species found in the Live Oak Woodland community include live oak (*Quercus virginiana*), water oak (*Quercus nigra*), loblolly pine (*Pinus taeda*), American elm (*Ulmus americana*), hackberry (*Celtis laevigata*), yaupon (*Ilex vomitoria*), red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), and dwarf palmetto (*Sabal minor*) (Barrow et al. 2005). Typical species found in the Coastal Live Oak-Pecan (*Quercus virginiana-Carya illinoensis*) community include post oak, black jack oak, water oak, yaupon, hawthorn (*Crataegus spp.*). These communities grade to or are intermixed with Live Oak-Post Oak communities or prairies (TOES, 1998). Other hardwood species include slippery elm (*Ulmus rubra*), white ash (*Fraxinus americana*), red mulberry (*Morus rubra*), and American sycamore (*Platanus occidentalis*). The shrub and understory layer is composed of native and non-native species including yaupon and loblolly pine saplings, southern arrow-wood (*Viburnum dentatum*), rattlebush (*Baptisia australis*), baccharis (*Baccharis halimifolia*), American beautyberry (*Callicarpa americana*), vines, rattan-vine Alabama supplejack (*Berchemia scandens*), grape, greenbriar, dewberry (*Rubus flagellaris*), honeysuckle (*Lonicera japonica*), peppervine (*Ampelopsis arborea*), Chinese tallow, Japanese honeysuckle (*Lonicera japonica*) and McCartney rose (*Rosa bracteata*).

### 3.5.3 Wetlands

Based on the U.S Fish and Wildlife National Wetland Inventory (NWI) data, Addicks and Barker Reservoirs contain approximately 3,400 acres and 4,100 acres of wetlands respectively, the majority of which are riparian (riverine) and depressional wetlands (e.g. prairie potholes). Wetlands are subject to periodic and constant inundation of water

which saturates the soil and supports vegetation which can tolerate these soils. Wetlands like those found within the reservoirs and nearby Katy Prairie provide habitat for aquatic species and are vital for the wildlife directly supported by wetlands. In the water cycle, wetlands are crucial in restoring ground-water levels by collecting runoff and precipitation and allowing it to infiltrate slowly into the soil. This characteristic of water collection also serves to buffer floods, reducing storm surges and river flows (Tacha, 1994). Wetlands assist with filtering suspended sediment, capturing bed load, and stabilizing banks against erosion.

Prairie pothole and marsh wetlands are inundated by direct precipitation and by runoff. They are remnants of the rivers that laid down the great floodplain and delta deposits that make up most of the coastal plain, where the original morphology has been greatly modified by wind and other agents. The Katy Prairie west of the project area is one of the more well known prairies with abundant pothole wetlands. Prairie potholes once covered vast expanses of prairie in the region before urbanization. Historically, agriculture was the greatest cause of the loss of prairie potholes and marshes. Urbanization is probably the greatest cause of loss today.

Prairie potholes occur throughout the reservoirs and are important to wildlife, particularly birds that migrate across the western Gulf of Mexico. These habitats are sources of freshwater for migrants and are heavily used by songbirds, shorebirds and waterfowl, and others. Wetland herbaceous vegetation can include Carolina caric-sedge (*Carex caroliniana*), flat-fruit caric-sedge (*Carex complanata*), various other sedges (*Carex spp.*), common spikerush (*Eleocharis palustris*), soft rush (*Juncus effuses*), round-head rush (*Juncus validus*), duckweed (*Lemna obscura*), pickerelweed (*Pontederia cordata*), gulf swampweed (*hygrophila lacustris*) spring spider lily (*Hymenocallis liriosme*), cut-leaf water milfoil (*Myriophyllum pinnatum*), savannah panic grass (*Panicum gymnocarpon*) and Missouri ironweed (*Vernonia missurica*).

#### 3.5.4 Invasive Plant Species

Several exotic invasive plant species, primarily Chinese tallow (*Sapium sebiferum*), Macartney rose (*Rosa bracteata*), deep-rooted sedge (*Cyperus entrerianus*), Chinese privet (*Ligustrum sinense*), and Japanese honeysuckle (*Lonicera japonica*), are prevalent at Addicks and Barker Reservoirs. Invasive species readily invade disturbed soils and outcompete native vegetation resulting in impacts to habitat quality in the reservoirs.

Restoration management measures such as chemical, mechanical, and applied burning treatments are necessary to control the spread of these species.

### 3.6 WILDLIFE

Addicks and Barker Reservoirs contain large expanses (relative to the surrounding urban development) of undeveloped land, providing forest, grassland, wetland and riparian habitat that support a variety of animal species. Typical animal species found in the reservoirs are discussed in the following sections.

#### 3.6.1 Fish

Typical fish species found in waters within the reservoirs include: bowfin (*Amia calva*), spotted gar (*Lepisosteus oculatus*), longnose gar (*Lepisosteus osseus*), gizzard shad (*Dorosoma cepedianum*), bullhead minnow (*Pimephales vigilax*), common carp (*Cyprinus carpio*), smallmouth buffalo (*Ictiobus bubalus*), yellow bullhead (*Ameiurus natalis*), channel catfish (*Ictalurus punctatus*), bluegill (*Lepomis macrochirus*), longear sunfish (*Lepomis megalotis*), warmouth (*lepomis gulosus*), and white crappie (*Pomoxis annularis*).

#### 3.6.2 Amphibians and Reptiles

The typical amphibians within the area are green tree frogs (*Hyla cinerea*), southern leopard frog (*Rana utricularia*), and Gulf Coast toad (*Bufo valliceps*). Typical reptiles include common snapping turtle (*Chelydra serpentine*), red-eared slider (*Trachemys scripta elegans*), three-toed box turtle (*Terrapene carolina*), ornate box turtle (*Terrapene ornate ornata*), green anole lizard (*Anolis carolinensis*), and five-lined skink (*Eumeces fasciatus*). The reservoirs also support a number of snake species such as racer, prairie king snake (*Lampropeltis calligaster*), cottonmouth (*Agkistrodon piscivorus*), southern copperhead (*Agkistrodon contortrix*) and a number of water snakes (*Nerodia spp.*) (University of Texas, 2000).

#### 3.6.3 Birds

Forest and grassland habitats of Addicks and Barker Reservoirs provide for many bird species, including savannah sparrow (*Passerculus sandwichensis*), Henslow's sparrow (*Ammodramus henslowii*), white-throated sparrow (*Zonotrichia albicollis*), red-tailed hawk (*Buteo jamaicensis*), northern harrier (*Circus cyaneus*), peregrine falcon (*Falco peregrinus*), sandhill crane (*Grus canadensis*), least sandpiper (*Calidris minutilla*), rock



dove (*Columba livia*), mourning dove (*Zenaida macroura*), great horned owl (*Bubo virginianus*), eastern screech-owl (*Megascops asio*), rufous hummingbird (*Selasphorus rufus*), downy woodpecker (*Picoides pubescens*), and pileated woodpecker (*Dryocopus pileatus*). Typical species utilizing wetland areas of the reservoirs include the sharp-shinned hawk (*Accipiter striatus*), white ibis (*Eudocimus albus*), and white-faced ibis (*Plegadis chihi*) great blue heron (*Ardea herodias*), snowy egret (*Egretta thula*) and waterfowl such as the black-bellied whistling-duck (*Dendrocygna autumnalis*), northern shoveler (*Anas clypeata*), mallard (*Anas platyrhynchos*), pintail (*Anas acuta*), blue-winged teal (*Anas discors*), gadwall (*Anas strepera*), American wigeon (*Anas Americana*), and mottled duck (*Anas fulvigula*).

The riparian/bottomland hardwood forests within the reservoirs provide habitat for migrating birds, wintering birds, and year-round residents. During the spring and fall migration, migratory species observed in the project area include American redstarts (*Setophaga ruticilla*), Baltimore orioles (*Icterus galbula*), black-throated green warbler (*Dendroica virens*), orange-crowned warbler (*Vermivora celata*) (Nashville warbler *Vermivora ruficapilla*), yellow-rumped warbler (*Dendroica coronata*), ruby-crowned kinglet (*Regulus calendula*), black and white warbler (*Mniotilta varia*), and Wilson's warbler (*Wilsonia pusilla*), and yellow-bellied sapsucker (*Sphyrapicus varius*). Year round residents of bottomland hardwood forests within the reservoirs include tufted titmouse (*Baeolophus bicolor*), Carolina wren (*Thryothorus ludovicianus*), Carolina chickadee (*Poecile carolinensis*), downy woodpecker (*Picoides pubescens*), and red-bellied woodpecker (*Melanerpes carolinus*).

#### 3.6.4 Mammals

Although development surrounding the reservoirs is likely to isolate the habitat within Addicks and Barker Reservoirs for many mammals, typical species include coyote (*Canis latrans*), white-tailed deer (*Odocoileus virginianus*), feral hog (*Sus scrofa*), bobcat (*Lynx rufus*), raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), beaver (*Castor canadensis*), otter (*Lutra canadensis*), eastern fox squirrel (*Sciurus niger*), eastern gray squirrel (*Sciurus carolinensis*), cottontail rabbit (*Sylvilagus sp.*), striped skunk (*Mephitis mephitis*), nine-banded armadillo (*Dasypus novemcinctus*), and rodents including hispid cotton rat (*Sigmodon hispidus*), whitefooted mouse (*Peromyscus leucopus*), deer mouse (*Peromyscus maniculatus*), house mouse (*Mus musculus*), and feral cats and dogs.

3.7 *THREATENED AND ENDANGERED SPECIES*

The U.S. Fish and Wildlife Service (USFWS) consider the threatened or endangered species contained in Table 1 as possibly occurring in Fort Bend or Harris Counties. No designated or proposed critical habitat, or other species under the jurisdiction of the USFWS were identified as possibly occurring in either of the two counties.

The bald eagle (*Haliaeetus leucocephalus*), which was delisted from the Federal endangered species list is known to occur on the eastern side of Lake Houston, at Warren Lake west of Houston, and also nests in Fort Bend and Brazoria Counties.

**Table 12. Federally Listed Threatened and Endangered Species – Addicks and Barker Reservoirs**

<b>Common Name</b>	<b>Scientific Name</b>	<b>Listing Status</b>
<b>Birds</b>		
bald eagle	<i>Haliaeetus leucocephalus</i>	Delisted, Being Monitored
whooping crane	<i>Grus americana</i>	Endangered, Experimental Population, Non-essential
<b>Fish</b>		
sharpnose Shiner	<i>Notropis oxyrhynchus</i>	Candidate, Ready for Proposal
<b>Plants</b>		
Texas prairie dawn-flower	<i>Hymenoxys texana</i>	Endangered

The TPWD also maintains county lists of state-listed threatened, endangered and rare species potentially found in Fort Bend and Harris Counties. Unless also listed Federally, the state listed species are not afforded protection under Federal law. The state listed species can be found in Appendix D, State Species Lists – Addicks and Barker Reservoirs.

3.8 *CULTURAL RESOURCES*

This section provides a brief overview of the current status of management practices, inventories, cultural resources, and development policy for both Addicks and Barker Reservoirs in Harris and Fort Bend Counties, Texas.

## Management

The USACE developed regulation ER 1130-2-540, amended November 2002, to establish land management policy for USACE administered project lands. Chapter 6 – Cultural Resources Management provides guidance on artifact collection use and management, historic preservation, inventory and site evaluation priorities at Operations Projects, and enforcement actions. ER 1130-2-540 incorporates the following Federal laws governing cultural resource management: the National Historic Preservation Act, the Archeological and Historic Preservation Act, Archeological Resources Protection Act, and the Native American Grave Protection and Repatriation Act. Refer to Section 1.05 E Cultural and Historical Considerations for a brief description of these laws.

## Cultural Resource Inventories

As of the preparation of this document, approximately 11,900 acres (45%) of Addicks and Barker Reservoirs have been inventoried for cultural resources. Approximately 5,750 acres (40%) of Addicks Reservoir has been inventoried and 6,150 acres (47%) of Barker Reservoir has been inventoried. Overall, these inventories provide a strong representative sampling of the distribution, component, and type of cultural resources located on both reservoirs.

## Resources

A total of 179 cultural resources have been recorded in the reservoirs, 96 in Addicks and 83 in Barker. One hundred twenty-six of the cultural resources are prehistoric and 53 of are historic. Currently there are no identified Traditional Cultural Properties on either reservoir.

Ninety-nine of the prehistoric resources are identified as pimple mounds. The other 27 prehistoric resources appear to be primarily small lithic scatters with some tools present. Lithics, the most common artifact type, occur on most (111) of the prehistoric resources and ceramic sherds, the second most common artifact type, occur on only 39 of the prehistoric resources. The historic resources primarily date between 1900 and 1930. The majority (23) of the resources are related to early 20<sup>th</sup> century home sites. There are also 12 historic trash dumps/artifact scatters, nine resources related to ranching and agriculture, four cemeteries, two historic bridges, one historic recreational facility, and one historic railroad feature.

### 3.9 AESTHETIC RESOURCES

Natural and cultural features that give the project area landscape its character include topographic features, existing structures, and vegetation. The topography within the reservoirs is generally flat with a slight decrease in elevation from west to east. The landscape within the dry reservoirs is not typical of the surrounding area, which is primarily residential and commercial development. The aesthetic natural quality of the reservoirs serves as contrast to the visual character of the adjacent developed areas. The forested aesthetic is periodically broken by buildings and recreational developments. The visual resources near the streams include mature trees and an established understory of dense brush along the riparian corridor areas. Upland areas are generally dominated by patchworks of open views across prairie-type grasses and views obstructed by woody vegetation.

### 3.10 RECREATIONAL RESOURCES

Presently, there are numerous and varied outdoor recreation opportunities available in Addicks and Barker Reservoirs (Table 13, Figures 5 and 6). Priority rankings for park amenities as listed in the Harris County report titled *Master Plan for Parks, Recreation and Open Space, Phase Two* (Harris County, 2003) identify trails (natural and hard surface) as the amenity that consistently received the highest priority ranking among all four Harris County precincts. Land acquisition, park expansion, soccer fields, playgrounds, community buildings, football fields, ballfields (baseball and softball), and pavilions were also ranked high or medium for all precincts. Additionally, Precincts One, Two, and Four, ranked nature conservation areas and basketball courts as high or medium priority amenities (Harris County, 2003).

**Table 13. Summary of Public Recreational Development**

Recreation Area	Picnic Shelters/Pavilions	Picnic Sites	Visitor Center	Group Camp	Playground Areas	Baseball/Little League Fields	Soccer Fields	Jog, Hike, Bike, Trails (Miles)	Equestrian Trails (Miles)	Horseshoe Pits	Restrooms	Community Center	Golf Courses	Tennis Courts	Pond	Dog Park	Animal Exhibits
<b>Addicks Reservoir</b>																	
Bear Ck. Pioneers Park	8	729	1	1	2	19	36	2.0	3.5	16	18	1	3	4		1	22
Cullen Park	7	390			7		8	3.5			12						
Subtotal	15	1,119	1	1	9	19	42	5.5	3.5	16	30	1	3	4		1	22
<b>Barker Reservoir</b>																	
George Bush Park	3	30			2	6	47	10.8	1		5				3	1	
Subtotal	3	30			2	6	47	10.8	1		5				3	1	
<b>TOTALS</b>	<b>18</b>	<b>1,149</b>	<b>1</b>	<b>1</b>	<b>11</b>	<b>25</b>	<b>89</b>	<b>16.2</b>	<b>4.5</b>	<b>16</b>	<b>35</b>	<b>1</b>	<b>3</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>22</b>

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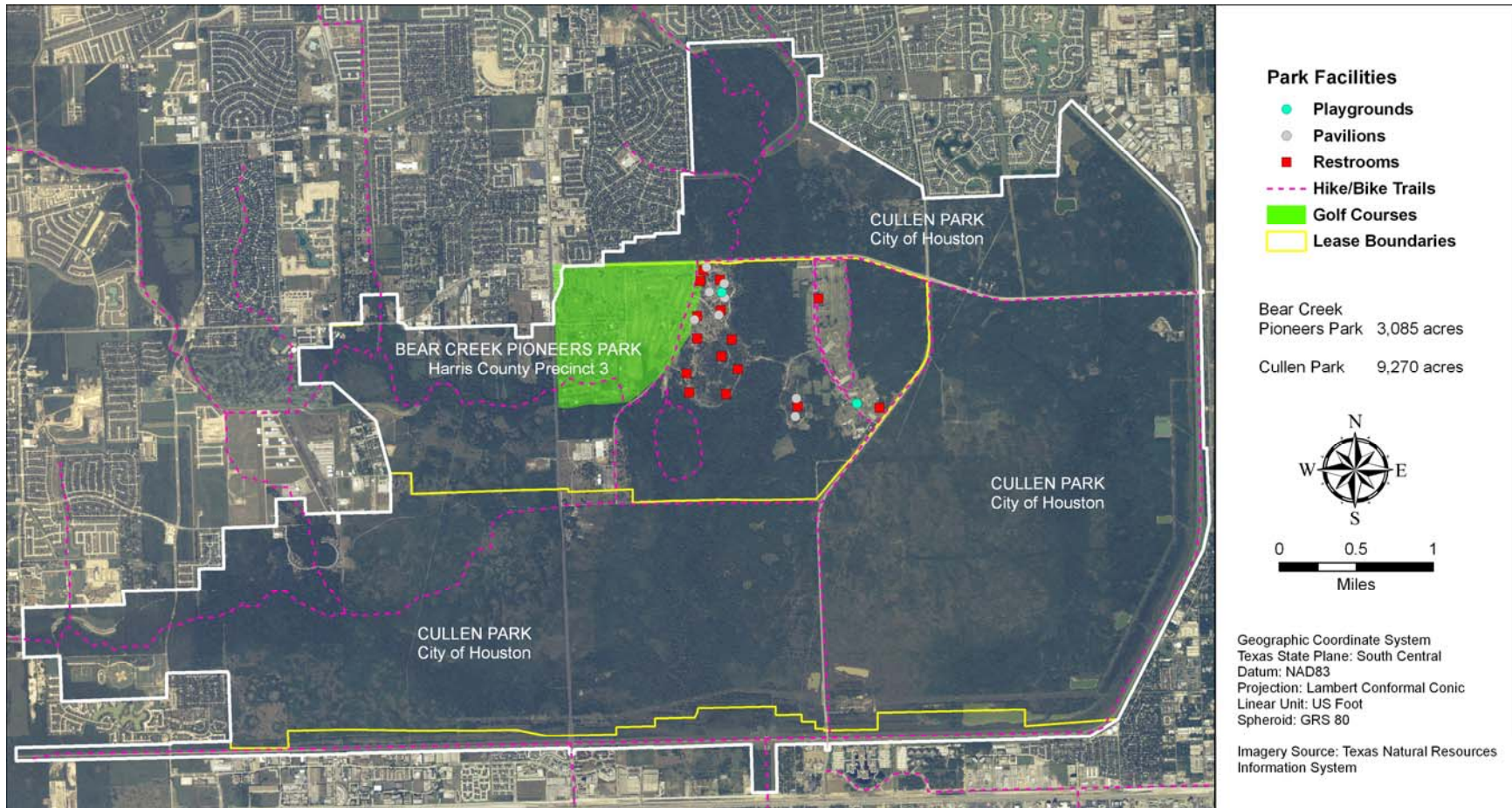


Figure 0-5. Addicks Reservoir park outgrants and facilities.

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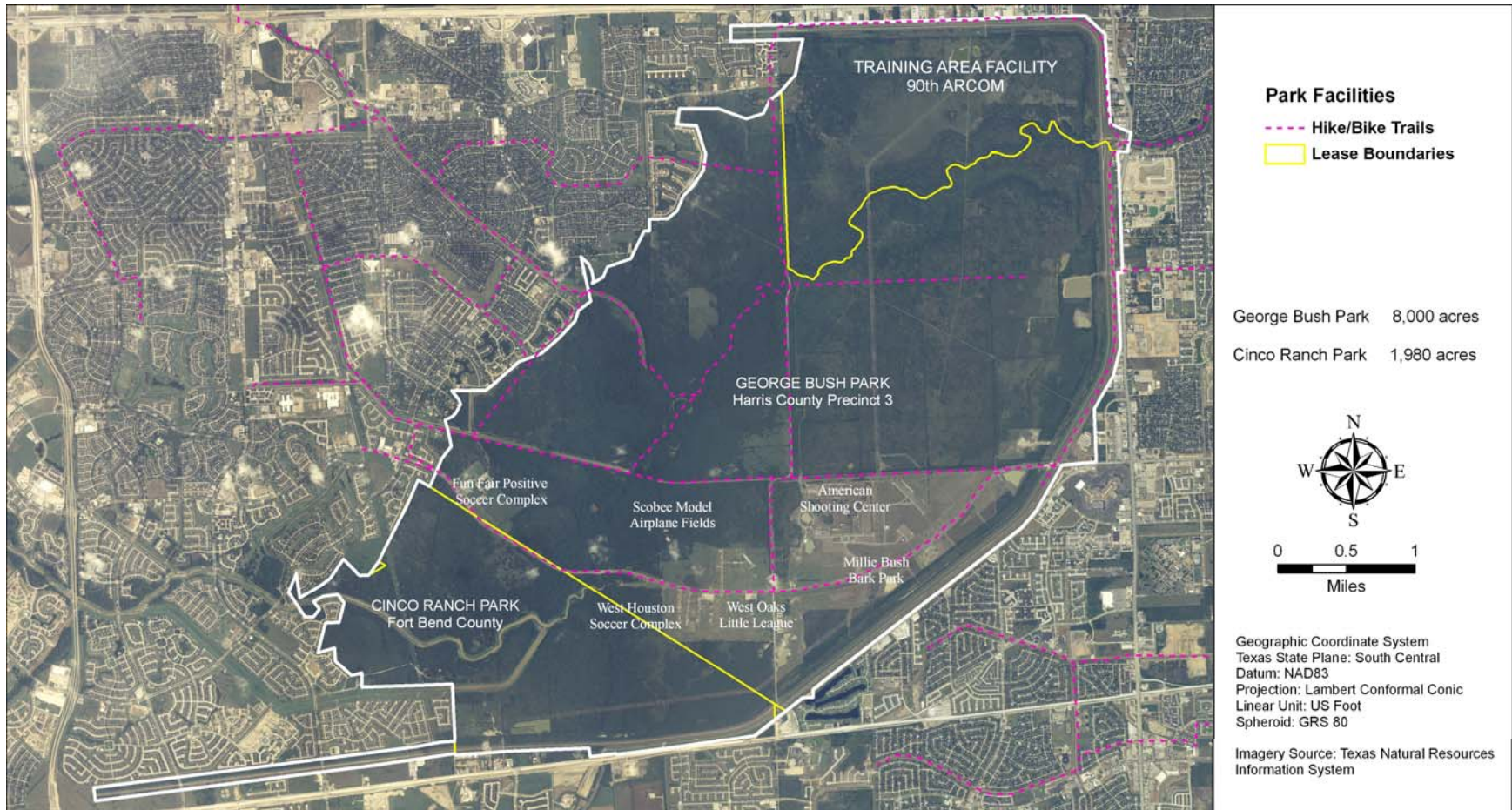


Figure 0-6. Barker Reservoir park outgrants and facilities.

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As population in the project area increases, it is expected that there will be an increase in demand for additional outdoor recreational opportunities, with the highest demand being for hike and bike trails and sports fields and conservation areas.

### *3.11 AIR QUALITY AND NOISE*

#### 3.11.1 Air Quality

To comply with the 1970 Clean Air Act (CAA) and the 1990 Amendments, the U.S. Environmental Protection Agency (EPA) has promulgated National Ambient Air Quality Standards (NAAQS) for the protection of the public health and welfare with the allowance of an adequate margin of safety. The EPA has set NAAQS for six criteria pollutants: lead; sulfur dioxide; nitrogen dioxide; carbon monoxide; ozone; and particulates. The project area is located within the Houston-Galveston-Brazoria (HGB) area which holds nonattainment status for ground-level ozone under the eight-hour standard. All eight counties of the HGB (Harris, Montgomery, Chambers, Brazoria, Liberty, Galveston, Fort Bend and Waller Counties) exceeded the standards for ozone. The TCEQ has submitted a State Implementation Plan (SIP) to the EPA, which describes how air quality standards for ozone will be attained in the HGB. The subsequent approval of the SIP by the EPA, initiated increased restrictions on construction project air emissions in the HGB. In accordance with regulatory requirements, Section 176 of the CAA, known as the General Conformity Rule and Texas Rule, 30 TAC 101.30, respectively, criteria were established for air quality preservation that apply to Federal actions in areas that are designated as being in non-attainment for any of the criteria pollutants.

#### 3.11.2 Noise

Pursuant to the Noise Control Act of 1972 as amended by the Quiet Communities Act of 1978, the EPA has developed appropriate noise-level guidelines. The Federal Interagency Committee on Urban Noise developed land-use compatibility guidelines for noise in terms of day-night average sound level (DNL) (USDOT, 1980). It is recommended that no residential uses, such as single and multifamily dwellings, dormitories, hotels, and mobile home parks, be located where the noise is expected to exceed a DNL of 65 decibels (dBA). The DNL is the energy average A-weighted acoustical level for a 24-hour period with a 10-decibel upward industrial uses considered acceptable where the noise level exceeds DNL of 65 dBA. For outdoor activities, the Environmental Protection Agency (EPA) recommends DNL of 55 dBA as the sound level

below which there is no reason to suspect that the general population will be at risk from any of the effects of noise (USEPA, 1974). Several factors affect response to noise levels, including background level, noise composition, level fluctuation, time of year, time of day, history of exposure, community tolerance, and individual emotional factors. In general, people are more tolerant of a given noise if the background level is closer to the level of the new noise source. Also, people are more tolerant of noises during daytime than at night when background noise normally diminishes, increasing sound awareness. Residents are more tolerant of an activity if it is considered to benefit the economic or social wellbeing of the community or them individually. Noise levels also have a much greater affect on outdoor than indoor activities. The Houston-Galveston vicinity is highly urbanized and has high ambient noise levels from concentrations of residential areas, industry, and traffic (highway, railroad, and shipping). Addicks and Barker Reservoirs contain large areas that are undeveloped, but are subjected to noise from vehicular traffic along roads that surround and pass through the reservoirs.

### *3.12 WATER QUALITY*

Water quality for the general project area is under continual study by the Buffalo & White Oak Bayous Indicator Bacteria Total Maximum Daily Load (TMDL) Stakeholders Group. The Stakeholder Group is a voluntary committee formed by TCEQ and represented by government (including USACE - Galveston District), permitted facilities, agriculture, business, environmental, and community interests in the White Oak Bayou and Buffalo Bayou watersheds. The group provides advice to the TMDL Program regarding the development of three TMDLs for fecal coliform bacteria in Buffalo Bayou Tidal (Segment 1013), Buffalo Bayou Above Tidal (Segment 1014), and Whiteoak Bayou Above Tidal (Segment 1017) segments.

The Federal Clean Water Act and Texas Law define a water body as impaired if it does not meet the criteria for support of its beneficial uses, as defined in the Texas Surface Water Quality Standards. Currently, all main segments and tributaries of Buffalo Bayou that run through either Addicks or Barker Reservoir have been identified as impaired (Table 14), which is typical for all of the segments for both Buffalo and White Oak Bayous. The majority of sources for the contamination are located upstream of the reservoirs and include numerous waste water treatment plants (WWTP) and residential sources of stormwater runoff that are discharged directly into the reservoirs and the streams and tributaries that feed into the reservoirs. In addition to upstream sources,

there are three WWTPs operating within the reservoirs; one in Addicks and two in Barker.

**Table 14. Impaired Segments of Buffalo Bayou and tributaries within Addicks and Barker Reservoir Boundaries.**

Segment Name	Reservoir	Year Listed
Buffalo Bayou	Barker	2006
Mason Creek	Barker	2006
South Mayde Creek	Addicks	2002
Bear Creek	Addicks	2006
Langham Creek	Addicks	2006
Turkey Creek	Addicks	2002

Texas requires water quality in Buffalo Bayou be suitable for swimming, wading, fishing, and aquatic life. Swimming and wading are referred to as Contact Recreation, while fishing is referred to as Non-Contact Recreation. Texas has established TMDL standards for both contact and non-contact recreation (Table 15).

**Table 15. Indicator Bacteria Standards in Texas**

Indicator	Freshwater Contact Recreation		Freshwater Recreation	Non-Contact
	30-day geometric mean	Single Sample should not exceed	30-day geometric mean	Single sample should not exceed
Fecal Coliform	200 per 100 mL	400 per 100 mL	2,000 per 100 mL	4,000 per 100 mL
<i>E. coli</i>	126 per 100 mL	394 per 100mL	605 per 100mL	No standard

The Buffalo & White Oak Bayous Indicator Bacteria TMDL Stakeholders Group is currently developing a Watershed Plan to reduce the contaminants in the impaired streams. The USACE promotes the implementation of projects such as outfall wetlands to improve water quality.

### 3.13 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE (HTRW)

A Phase I HTRW preliminary site assessment was conducted for Addicks and Barker Reservoirs in 1995 (Hazardous, Toxic and Radioactive Waste Preliminary Assessment, Buffalo Bayou and Tributaries, Texas, Addicks and Barker 216, September 1995). This

investigation indicated there are no known HTRW problems on reservoir lands. Since the 1995 site assessment, no new HTRW sites have been permitted in Addicks and Barker Reservoirs. This baseline information was supplemented and updated with available on-line information (Figures 7 and 8; USEPA EnviroMapper®). Figures 7 and 8 indicate numerous permitted hazardous waste sources, water discharge sources (waste water treatment plants) upstream and surrounding the boundaries of the reservoirs, that could affect the water quality of the reservoirs in case of an accidental spill or release.



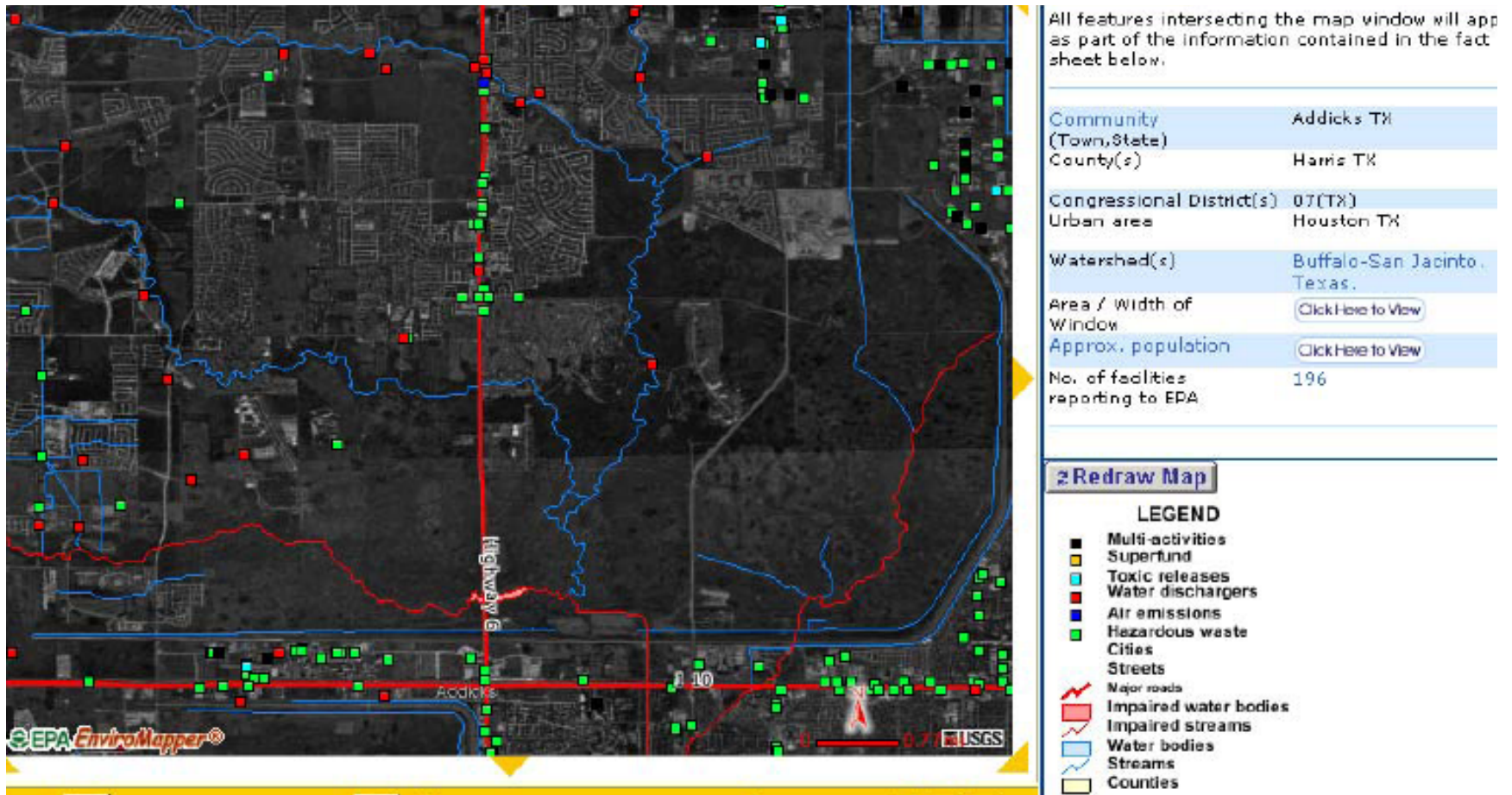


Figure 0-7. HTRW on-line survey for Addicks Reservoir.

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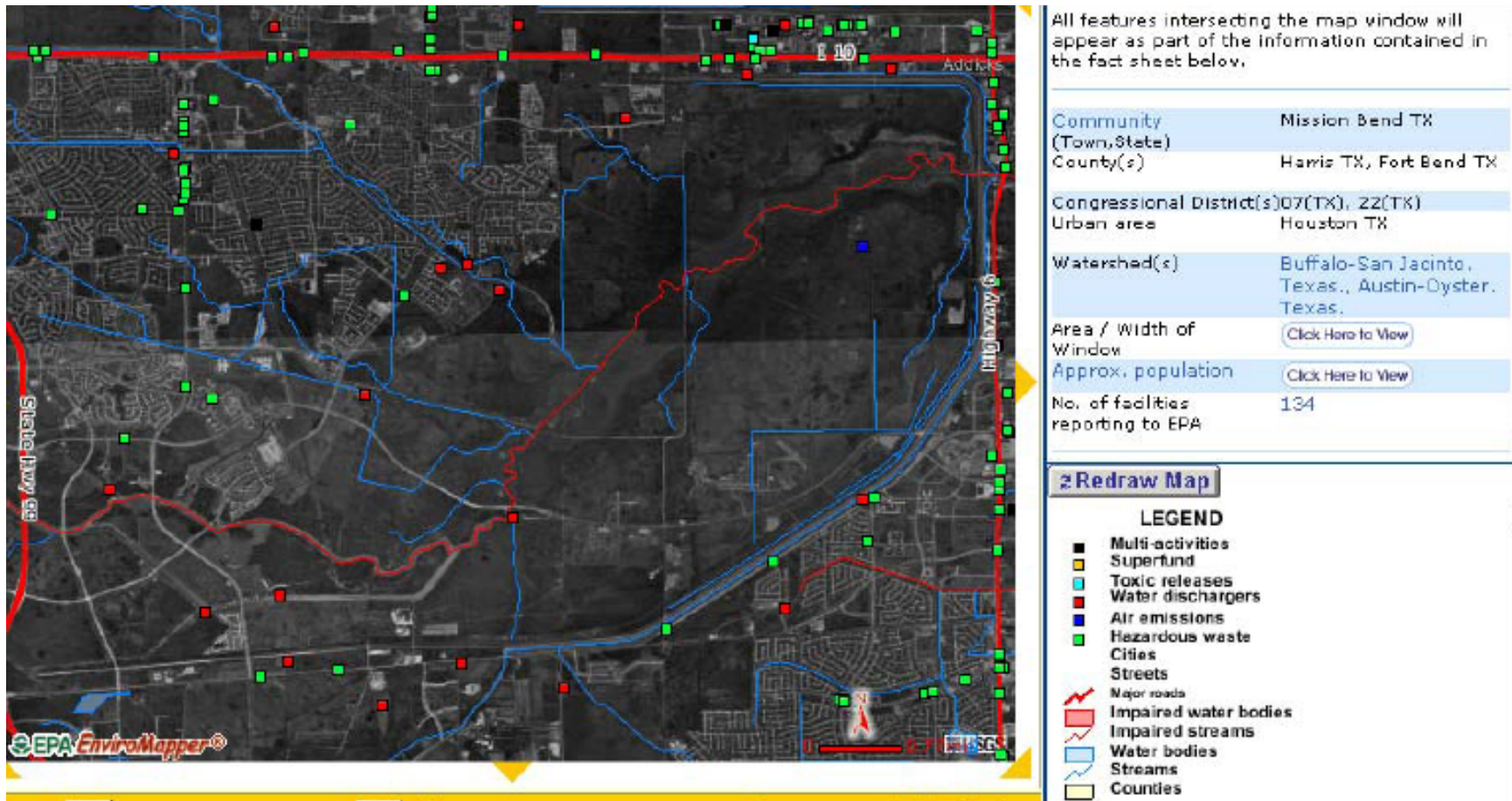


Figure 0-8. HTRW on-line survey for Barker Reservoir.

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### 3.14 SOCIOECONOMICS

Addicks and Barker Reservoirs are located in Fort Bend and Harris Counties. Harris County contains the largest population of all surrounding counties and consists primarily of urban development, containing almost all of the City of Houston. Fort Bend County has a much smaller population and includes urban development and agricultural/rural areas.

Executive Order 12898 of February 1994 “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” provides that each U.S. Federal Action shall identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations in the United States. The 2000 Census data and The Department of Health and Human Services (HHS) 2000 weighted average poverty threshold for a family of four (\$17,603) were used to examine the project area population. The zip codes surrounding Addicks and Barker Reservoirs are shown in Figure 10.

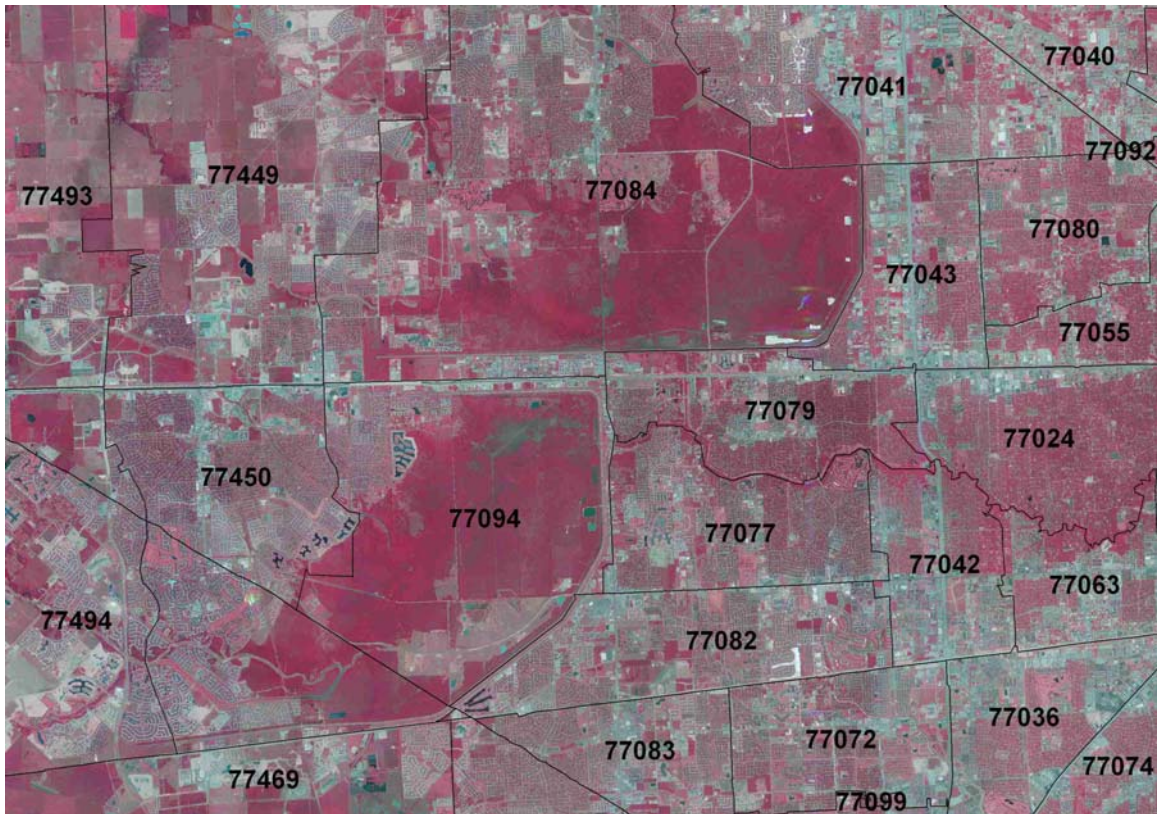


Figure 0-9. Zip codes - Vicinity of Addicks and Barker Reservoirs

The percent of individuals in the state of Texas living below the poverty level in 1999 was 15.4%. Of the zip codes in the vicinity of Addicks and Barker Reservoirs, six were identified as having a percentage higher than 15.4%. These zip codes are: 77043 (16.4%), 77080 (19.6%), 77055 (21.4%), 77072 (18.1%), 77092 (17.6%), and 77036 (25.5%) (Zipskinny, 2008). With the exception of an additional zip code (77041), these same zip codes also had higher percentages of minority populations than other zip codes in the area (Table 16).

**Table 16. Zip codes in vicinity of reservoirs and ethnicity group percentages.**

<b>Percent Race by Zip Code 2000 Census Data</b>	<b>77041</b>	<b>77043</b>	<b>77080</b>	<b>77055</b>	<b>77072</b>	<b>77092</b>	<b>77036</b>
Hispanic/Latino	36.2	38.9	56.3	56.8	35.8	45.7	44.7
White *	39.0	45.7	32.6	34.9	16.0	32.9	14.2
Black *	9.6	5.6	5.0	3.7	27.4	18.6	24.4
Native American *	---	---	---	---	---	---	---
Asian *	13.4	7.9	5.0	3.4	18.6	1.5	14.8
Hawaiian/Pacific Islands *	---	---	---	---	---	---	---
Other *	0.1	0.3	0.1	0.1	0.2	0.2	0.2
Multiple Races *	1.5	1.3	0.9	0.9	1.9	1.0	1.6

\* does not include individuals in this racial group who identify as Hispanic/Latino

U.S. Census Bureau estimates for 2006 list the median household income for Fort Bend County as \$56,488, Harris County as \$41,922 for, and the State of Texas as \$41,645. According to the U.S. Census Bureau, the population of Harris County increased from 3.4 million people in year 2000 to 3.9 in year 2007. The population for Fort Bend County increased from 350,000 to 510,000 over the same time period.

### *3.15 PUBLIC SAFETY*

Current operations and maintenance regulations, policies, and procedures are conducted to insure the safety of the visiting public. The recreational facilities within Addicks and Barker Reservoirs are highly visible and utilized extensively by the visiting public; in particular, those living in the surrounding region. As development increases in the surrounding residential communities, the opportunity for vandalism, illegal vehicle access, camping, theft, and destruction of public property within the reservoirs increases. Illegal trespassing, off-road vehicle use, poaching, camping, and vandalism are potential safety issues that can occur on reservoir project lands. When left unabated these issues would adversely affect both ecological and recreational uses of the reservoirs. Numerous law enforcement agencies have some form of jurisdiction that covers all or portions of Addicks and Barker Reservoirs. The primary agencies are the City of Houston Police Department, the Fort Bend County Sheriff Department, the Harris County Sheriff Department, and the Harris County Precinct 5 Constables. Project Operations staff are able to call on any of these agencies should assistance be needed. The Houston Police Department handles major investigations into major criminal acts and incidents.

The Houston Fire Department is responsible for all fires and medical emergency responses occurring within Addicks and Barker Reservoirs. As the back boundaries of Addicks and Barker Reservoirs also form the city limit for the City of Houston, various volunteer fire departments and emergency rescue services will respond to fires and other emergencies along and within the back boundaries of the reservoirs. The Texas Forest Service (TFS) also serves as a resource for the fire departments in the area. Should a wild fire become large and appear to threaten private property adjacent to the reservoirs, or facilities within the reservoirs, the Texas Forest Service will respond with heavy wild fire fighting equipment such as bulldozers. However, since bulldozers can cause an extensive amount of damage if used improperly, their use is limited in the reservoirs.

### *3.16 PRIME AND UNIQUE FARMLANDS*

The Farmland Protection Policy Act was passed in 1981 requiring the consideration of those soils which the U.S. Department of Agriculture defines as best suited to producing food, feed, forage, fiber, and oilseed crops with the highest yield relative to the lowest expenditure of energy and economic resources. A Form AD-1006 was submitted to NRCS for their evaluation (Appendix E). NRCS determined that since Addicks and

Barker Reservoirs were already part of an authorized flood risk management project, the reservoir project lands are not considered prime or unique farmlands.

## **4.0 ENVIRONMENTAL CONSEQUENCES OF PREFERRED ALTERNATIVE**

The purpose of this section is to provide a description of the environmental effects of the proposed action.

Alternative 4 was selected as the preferred alternative for land use classifications and is the alternative used in subsequent references to the Master Plan Revision. The approach used in evaluating these consequences was to assume that over time the maximum use allowable under each land use classification would occur. The purpose of Section 4 is to examine foreseeable negative and beneficial environmental consequences on resources within the reservoirs, and to discuss irretrievable commitments of resources should the proposed activities under the Master Plan Revision be implemented.

The primary environmental consequence expected from the adoption of the proposed Master Plan Revision is the reclassification of approximately 20,800 acres (currently Intensive Use Recreation) into five categories of use including Operations (Ops), Existing High Impact Recreation (HIRec); Proposed High Impact Recreation (PHIRec), Environmentally Sensitive (ES), and Multiple Resource Management areas (MRM). The land use classifications proposed in the Master Plan Revision reduce the footprint of lands available for development as High Impact Recreation (Intense Recreation), expands the overall area for operations and maintenance, establishes an Environmentally Sensitive land classification for protection of sensitive resources, and establishes a Multiple Resource Management land classification.

The following assumptions were made to assess the environmental consequences to project lands related to the adoption of the Master Plan Revision and the land use classifications contained therein: 1) identified PHIRec areas would be fully developed as sports fields or similar amenities; 2) hike and bike trails and wildlife viewing platforms or similar amenities could be constructed in areas classified as MRM; 3) habitat restoration, invasive species control, and wildlife management activities would be conducted in MRM areas; 4) existing operations and maintenance activities would continue; and 5) current activities and use in existing High Impact Recreation areas would continue.

### *4.1 ADDITIONAL FUTURE NEPA COORDINATION*

The intention of the Master Plan Revision is to develop land use classifications that will guide the sustainable development of resources within Addicks and Barker Reservoirs.



Although the placement of future High Impact Recreational amenities is expected to correspond to the PHIRec areas identified in the Master Plan Revision, it is not feasible to define the exact nature of potential impacts prior to receiving specific project proposals. The same constraint applies to the potential construction of trails and low impact recreation opportunities in MRM areas, future operations and maintenance needs, and vegetation/wildlife management activities. Environmental consequences may be less than or may, in fact, exceed what is described in this EA for land use classification. To insure that future environmental consequences are captured and coordinated as accurately as possible, additional NEPA coordination will be conducted, as appropriate for construction projects proposed within Addicks and Barker Reservoirs.

#### 4.2 *ENVIRONMENTAL CONSEQUENCES - GENERAL*

Under Alternative 4, the following potential negative and beneficial impacts are anticipated within the land use classification areas.

##### Operations

The Operations land use classification would increase by 1,900 acres from the existing 2,200 acres to 4,100 acres. These additional acres are located along the inner perimeter of both dams and provide a buffer between the operational structures of the dams and the areas available for recreational facilities and natural resource management activities. Maintenance activities are expected to remain similar to what they currently are. Mowing of the dams (2 to 3 times a year) would continue but would not be expanded into the additional proposed Operations Areas.

Approximately 940 acres (total for both reservoirs) of wetlands, consisting primarily of ditches running along the inside toes of both dams and existing borrow pits, are included within the proposed Operations land use classification. Although this number represents a significant amount of wetlands, operations and maintenance activities are expected to continue as presently conducted. No significant adverse impact to wetlands within this land classification is expected to occur. However, possible future actions, such as the mining of new borrow areas for material to repair operational structures, could be proposed within the Operations areas. As it is not feasible to predict the location and extent of such projects in this EA, future impacts and mitigation requirements will be assessed under additional NEPA coordination conducted specifically for each proposed future action. No negative impacts to natural resources are expected to occur in the expanded areas as a result of the reclassification of project lands.



### Existing High Impact Recreation (HIRec)

Alternative 4 would reduce the amount of project lands classified as HIRec (Intensive Recreational Development under the 1986 Master Plan) from a total of approximately 20,800 acres for both reservoirs to a combined total of approximately 3,100 acres. The lands surrounding wetlands within HIRec areas have already been developed and no further impact to these wetlands from development of recreational facilities or other actions is expected. Although the reclassification of project lands under the Alternative 4 land use classification is not expected to have any direct effect on wetlands or other sensitive resources in the HIRec areas, it is possible that future proposed actions could result in impacts. Additional NEPA coordination will be conducted to assess potential environmental impacts of proposed HIRec development or modifications within existing HIRec areas as they are submitted to the District for review and approval.

### Proposed High Impact Recreation (PHIRec)

Under Alternative 4, approximately 450 acres of native and non-native vegetation currently would be classified as Proposed High Impact Recreation (PHIRec) land use. If the PHIRec areas are fully developed, the 450 acres would become recreational facilities with accompanying infrastructure (access roads, parking, restrooms). The PHIRec areas were sited in areas of severe degradation with low habitat values (USFWS, 2008b) in coordination with resource agencies. Proposed high-impact recreational (PHIRec) areas were situated close to existing high impact recreation facilities to reduce potential environmental impacts by minimizing habitat fragmentation. Further, PHIRec were located next to existing roadways to avoid additional impacts associated with roadway construction.

### Environmentally Sensitive (ES)

Under the proposed Alternative 4 land use classification, approximately 7,200 acres of riparian/bottomland hardwood forests; other forests; prairie areas that, although degraded, are the best remaining prairie remnants within the reservoirs; threatened and endangered species habitat, and cultural resource sites are included in the ES areas. Development would not normally be allowed in the ES land classification. Any limited development that may be allowed (e.g. educational trails in riparian forest habitat) would be very carefully planned to avoid impacts to sensitive resources. In addition, ecosystem restoration of sensitive habitats may be pursued as funding permits. Of particular interest

is restoration of native prairie and wetlands, and eradication of non-native invasives, which would be beneficial to the reservoirs.

#### Multiple Resource Management (MRM)

Alternative 4 would classify approximately 11,250 acres as MRM lands. It is anticipated that limited, low-impact recreational development, including hike and bike trails, educational facilities, wildlife viewing opportunities or similar low impact recreational opportunities, would be constructed in the MRM land use classification areas. All MRM lands would also be available for restoration management opportunities, apart or in combination with low impact recreation, where compatible. The construction of trails or similar low impact facilities may result in temporary adverse impacts that will be subjected to NEPA review and coordination prior to approval of construction. Additional short-term adverse impacts may occur from restoration and resource management activities. Long-term impacts may include the avoidance of trail areas by animal species sensitive to the presence of human activity, and maintenance activities. Potential beneficial impacts include the control of invasive species, restoration of native plant communities, and improved species diversity. The overall impact to the human environment from management of MRM lands is anticipated to be beneficial.

### *4.3 ENVIRONMENTAL CONSEQUENCES - VEGETATION*

Foreseeable consequences to reservoir lands resulting in the adoption of Alternative 4 under the proposed Master Plan Revision are examined by land use classification category. Actions potentially occurring within the different land use classifications are assumed for the purposes of assessing potential environmental consequences. This EA does not address specific recreation or restoration projects and as such, mitigation requirements for potential impacts to project area wetlands or other sensitive resources can not be determined here. Additional NEPA coordination and compliance will be achieved, as appropriate, for future proposed development or restoration activities in the reservoirs. Project specific mitigation requirements will be determined at that time.

#### 4.3.1 Prairie

It is expected that Alternative 4 would have both negative and beneficial consequences on prairie habitat within the reservoirs. The anticipated negative consequences may include the direct loss of 450 acres of mixed native and nonnative grass and woody vegetation if PHIRec areas are fully developed as high density recreation, and the loss of

habitat area associated with the construction of hike and bike trails within the MRM land use classification. The anticipated long-term beneficial consequences may include the conservation of prairie within ES classified lands and the potential restoration of the degraded prairie and wetlands within the MRM land use classification. Vegetative management measures undertaken to restore natural habitat areas may have initial negative short-term impacts (chemical or mechanical treatment of invasive species, short-term displacement of animal species). Management and restoration measures would be coordinated to avoid nesting/reproductive seasons of animal species utilizing the reservoirs, and to minimize other potential impacts. As such, the long-term benefits associated with these measures are expected to outweigh the immediate negative impacts.

#### 4.3.2 Riparian/Bottomland Hardwood Forest

Riparian/bottomland hardwood forests identified within the reservoirs are included in the ES land use classification. Limited or no development would be permitted in ES areas. The potential for impacts from a limited number of carefully sited trails constructed to provide educational and wildlife viewing opportunities does exist. Proposals for construction of trails in ES areas would be closely coordinated with and approved by USACE. As such, no significant impacts are expected to occur to riparian/bottomland hardwood forests. It is anticipated that the ES classification will have an overall beneficial impact on the resource.

#### 4.3.3 Upland Forest

No forest/woodland areas are identified within the PHIREC land use classification. The potential for trails constructed in MRM areas that may impact desirable forest/woodland resources does exist. Construction of trails in MRM areas will be closely coordinated in order to avoid or minimize negative impacts to these resources. Although not expected, there also exists the potential for operations and maintenance activities in the Ops land use classification to impact this resource. To the extent practicable, efforts will be made to avoid or minimize negative impacts to forest/woodland resources, considering the need to maintain the safe and efficient operation of the reservoirs in the event that potential adverse impacts are identified.

#### 4.3.4 Wetlands

The Operations land use classification area is expanded under Alternative 4. The purpose of the expansion is largely to provide a buffer between the dams and other reservoir

lands. Approximately 940 acres of wetlands are included under the proposed Operations Area land use classification (total for both reservoirs). Although this number represents a significant amount of wetlands, no wetland impacts from operations and maintenance activities are expected.

Approximately 4,000 acres of wetlands are contained in the proposed ES area land use classification. Actions permitted in ES areas are restricted to limited or no development. As such, no significant impact to wetlands in ES areas are expected.

The areas surrounding wetlands in the existing HIRec areas have already been developed and limited or no further development is expected. Additional NEPA coordination would be required to assess potential environmental consequences of future development in these areas, if proposed.

There are approximately 30 acres of wetlands in the proposed Alternative 4 PHIREC areas. Almost the entire 30 acres occurs in the PHIREC area located in Bear Creek Pioneers Park, Addicks Reservoir, at the intersection of War Memorial and Eldridge (Appendix A, Figure 13). Total development of the proposed PHIREC Areas in Alternative 4 could result in the loss of wetlands. Wetland impacts that could not be avoided would be mitigated and coordinated for NEPA compliance.

Approximately 2,300 acres of wetlands are contained in the proposed MRM areas. Actions permissible under this proposed land use classification are limited to low impact trails, observation platforms, and various natural resource management programs (restoration of native communities and control of invasive species). The routing and construction of proposed actions would be coordinated and conducted to avoid or minimize impacts to wetlands. It is anticipated that natural resource management measures will be implemented to improve the conditions of existing wetlands. It is expected that no significant adverse impacts to wetlands in this land use classification would occur, and that there is potential for beneficial impacts to wetlands associated with the implementation of vegetative and wildlife management measures.

#### *4.4 ENVIRONMENTAL CONSEQUENCES - WILDLIFE*

##### *4.4.1 Fish*

The streams and bayous of Addicks and Barker Reservoirs are located within the ES land use classification and would be protected from development. Current water quality

issues would not be worsened by changes to land use classifications under the Master Plan Revision. As such, no significant adverse impact to fisheries is expected with the adoption of the Master Plan Revision. Proposed land use classifications could have beneficial consequences to the long-term management and health of reservoir fisheries by improving water quality through preservation and restoration of vegetated corridors along streams and bayous.

#### 4.4.2 Amphibians and Reptiles

Activities related to the construction of PHIRec and MRM facilities as well as the natural resource management activities potentially occurring in MRM areas may temporarily displace amphibian and reptile species in areas being treated. Proposed land use classifications may result in an overall beneficial impact by improving water quality and habitat through preservation and restoration of native vegetation and wetlands.

#### 4.4.3 Birds

Alternative 4 land use classifications would potentially result in the loss of approximately 450 acres of degraded prairie and shrub habitat. Trail construction and restoration activities conducted in the MRM land use areas could also adversely impact species through displacement. The ES land use classification would conserve the most ecologically important habitats within the reservoirs including riparian/bottomland hardwood forest prairie habitats. Preservation and restoration of these habitats will be beneficial to the bird populations of the reservoirs.

#### 4.4.4 Mammals

No significant adverse impacts to wildlife are expected to occur as a result of the implementation of the Alternative 4 land use classifications under the proposed Master Plan Revision. Minimal to significant beneficial impacts may occur, depending on the scope of restoration activities implemented.

### 4.5 *THREATENED AND ENDANGERED SPECIES*

Potential impacts to Federally listed threatened and endangered species potentially occurring in Harris and Fort Bend Counties are addressed in the attached *Draft Biological Assessment for Federally Listed Threatened and Endangered Species, Master Plan Revision, Addicks and Barker Reservoirs, Buffalo Bayou and Tributaries, Fort Bend and Harris Counties, Texas* (Appendix C). The biological assessment examines the potential

effects on threatened and endangered species potentially occurring within the project area, including the bald eagle (*Haliaeetus leucocephalus*), whooping crane (*Grus americana*), sharpnose Shiner (*Notropis oxyrhynchus*), and Texas prairie dawn-flower (*Hymenoxys texana*). Of these species, the Texas prairie dawn-flower is known to exist in Addicks and Barker Reservoirs. Under the proposed action, all known Texas prairie dawn-flower populations are included in the ES land use classification as well as new populations as they are identified. The determination of the draft biological assessment is that the proposed project is not likely to adversely affect the threatened and endangered species identified as potentially occurring in the project area.

The USACE, in coordination with resource agencies, conducts annual surveys during the spring in the March – April *Hymenoxys* flowering timeframe to track population and habitat dynamics. Several prairie dawn-flower populations are located within the picnic area located in Bear Creek Pioneer Park. Although the individual sites and buffers are included in the Environmentally Sensitive land use classification, they are physically located in a larger high impact recreational (HIREC) park area that is heavily maintained and mowed on a regular basis. Management measures have been developed and coordinated with the park outgrant lessee to establish a no-mow period from the beginning of March to mid-May (general flowering and seeding period) of each year and to mark a temporary boundary (e.g. spray-paint) to indicate the no-mow zones. Before mowing activities may resume in the no-mow zones, a survey is conducted to determine if the plants have gone to seed and have died off. If the surveys indicate plants are still active, the no-mow period is extended another two weeks and is followed by an additional survey. This process is repeated until it is determined that mowing activities may be resumed.

#### 4.6 CULTURAL RESOURCES

Known cultural resources are included in the proposed ES land use classification. Lands proposed as future High Impact Recreational areas do not include any known cultural resources. Proposed actions within Multiple Resource Management areas would be situated to avoid known cultural resources, or for areas not previously surveyed, a cultural resource survey may be required and proposed actions adapted as necessary. No significant adverse impact to cultural resources is expected from the adoption of the proposed Master Plan Revision.

#### 4.7 *AESTHETIC RESOURCES*

The proposed land use classifications have been developed considering existing aesthetic resources within the reservoirs. Proposed High Impact Recreational areas would be located in proximity to existing HIRec areas, and in areas of marginal habitat value devoid of unique aesthetic resources. Trails and observation platforms constructed in Multiple Resource areas using guidance contained in the proposed Master Plan Revision would provide additional opportunities for the public to recognize and enjoy the aesthetic resources within the reservoirs. The proposed land use classifications and the USACE Guiding Principles for Development Within Addicks and Barker Reservoirs (December 2006) would provide for improved management of reservoir resources. No significant adverse impact to aesthetic resources is expected from adoption of the proposed Master Plan Revision.

#### 4.8 *RECREATIONAL RESOURCES*

The analysis of potential impacts to recreational resources associated with Alternative 4, was based on the following assumptions: 1) recreational development within the PHIRec land classification would consist primarily of sports fields and associated infrastructure (access roads, parking lots, etc.); and 2) 125 acres approximately equates to 20 sports fields (mix of baseball/softball and soccer) with necessary infrastructure. The 450 acres identified in the selected alternative for PHIRec development, equates to approximately 70 additional sports fields, or a 60 percent increase in the number of available sports fields in the reservoirs. The PHIRec areas can be used for other uses such as nature centers, playgrounds, picnic areas, and trails, and may not necessarily be developed as sports fields. However, the sports fields scenario was considered to be the most probable future for assessing the level of impact to natural resources within the PHIRec areas. The MRM classification provides for low impact recreational opportunities such as hike and bike trails and educational trails. No significant adverse impact to recreation is anticipated from implementation of Alternative 4 under the Master Plan Revision. An overall beneficial impact is anticipated from the potential increase in quality outdoor recreational opportunities.

## 4.9 AIR QUALITY AND NOISE

### 4.9.1 Air Quality

The project area is located within the Houston-Galveston-Brazoria (HGB) area which is in nonattainment status for ground-level ozone under the eight-hour standard. All eight counties of the HGB (Harris, Montgomery, Chambers, Brazoria, Liberty, Galveston, Fort Bend and Waller Counties) exceed the standards for ozone.

The potential impacts to air quality are based on the assumption that the areas classified as PHIRec areas would be fully developed (primarily as sports fields) with related access roads and parking lots and the installation of trails and trail-head facilities in MRM areas. Other potential development within the PHIRec land classification such as visitor centers, trails or other typical park features were considered to have similar effects as sports field complexes in terms of increased vehicular traffic and associated emissions. Potential impacts to air quality related to construction activities are not addressed in this EA as the timing and extent of potential project construction is unknown at this time. Additional NEPA coordination and review will be conducted for specific project proposals and actions as they are submitted to the District for review and approval.

The proposed action of land use re-classification is not expected to significantly increase overall emissions for the HGB nonattainment area. It is assumed that the majority of the public using the existing and projected recreational facilities in the reservoirs is local and would utilize other similar facilities within the HGB nonattainment area outside the reservoirs, if no further development within the reservoirs was allowed. Potential impacts associated with specific, proposed construction activities will be addressed by additional NEPA coordination conducted for all individual projects, as appropriate.

### 4.9.2 Noise

The primary source of noise resulting from the proposed changes to land use classifications would be from the temporary use of equipment during construction and maintenance activities and are anticipated to be intermittent and of short-term duration. Typical noise levels generated by this equipment range from 71 to 98 decibels at 50 ft from the source (USEPA, 1971). These impacts would be primarily associated with Ops, PHIRec and MRM areas. The three PHIRec areas identified in Alternative 4 are located adjacent to existing major roadways and are situated between 630 ft and 7,000 ft from the nearest residential areas and potential sensitive receptors within the reservoirs (existing



sports fields). As the sound pressure level decreases six decibels with each doubling of the distance from the source, it is anticipated that sound levels would diminish to acceptable levels before reaching sensitive receptors.

**Table 17. Construction Noise / Distance Relationships (from State of Wisconsin DOT, Facilities Development Manual).**

Distance from Construction Site (feet)	Range of Typical Noise Levels (dBA) <sup>1</sup>
25	82 - 102
50	75 - 95
100	69 - 89
200	63 - 83
300	59 - 79
400	57 - 77
500	55 - 75
1000	49 - 69

The area surrounding the PHIRec and MRM areas are composed of undeveloped areas of mixed grasses and woody vegetation, roadways, and existing recreational and multi-use facilities and associated maintained open spaces. The additional noise impacts associated with the assumed future development of recreational facilities are not considered significant when compared to existing noise levels associated with roadways and traffic conditions. Noise impacts associated with specific, proposed construction activities will be addressed by additional NEPA coordination conducted for all individual projects, as appropriate.

#### *4.10 WATER QUALITY*

All streams and bayous within Addicks and Barker Reservoirs are classified as impaired. Land use classifications and management activities outlined in the proposed Master Plan Revision maintain vegetated buffers along reservoir streams and bayous. Outside of the areas proposed for future High Impact Recreation (PHIRec), vegetative cover would be maintained, preserving existing water quality. Opportunities to improve water quality (e.g. through the construction of wetlands to treat stormwater outfalls) would be considered where feasible. No adverse impact to water quality is expected from the adoption of the proposed Master Plan Revision.

#### *4.11 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE (HTRW)*

Currently, there are no known HTRW sites or problems existing within reservoir project lands. The proposed Alternative 4 land use classifications would not result in adverse HTRW impacts.

#### *4.12 SOCIOECONOMICS*

Executive Order 12898 of February 1994 “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” requires that agencies identify and address, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations in the United States. The proposed land use classifications represent only a change in policy for management of Federal lands. Any potential action resulting from implementing Alternative 4 land use classifications under the Master Plan Revision would occur within the reservoir boundaries and there would be no direct impacts on populations outside the boundaries. Several areas (zip codes) have populations living below the poverty level at higher percentages than those for the state of Texas (Section 3.14) and contained higher percentages of minority populations. Access to facilities would be open to all populations and the proposed land use classifications are expected to have an overall beneficial impact to reservoir resources and the human environment. Therefore, the proposed alternative would not result in disproportionately high or adverse impacts to minority and low-income populations in the area.

#### *4.13 PUBLIC SAFETY*

Temporary construction of future facilities and potential resource management activities resulting from the adoption of the proposed Master Plan Revision would be conducted using standard practices to insure the safety of the general public. Alternative 4 land use classifications and the Master Plan Revision do not affect the number of police and fire departments responsible for public safety in Addicks and Barker Reservoirs. No adverse impact to public safety is expected from the adoption of the proposed Master Plan Revision.

#### *4.14 PRIME AND UNIQUE FARMLANDS*

A Form AD-1006 was submitted to NRCS for their evaluation (Appendix E). NRCS determined that since Addicks and Barker Reservoirs were already part of an authorized flood risk management project, the reservoir project lands are not considered prime or unique farmlands.

#### *4.15 CUMMULATIVE IMPACTS*

Population growth forecasts project that the Houston metropolitan area (Brazoria, Chambers, Galveston, Fort Bend, Harris, Liberty, Montgomery, and Waller Counties) will grow by 64 percent from 4.7 million in year 2000 to approximately 7.0 million by year 2025. Fort Bend County comprises the majority of undeveloped land to the west of the reservoirs and is expected to experience the highest percent population change (approximately 120 percent) of the eight-county area (H-GAC, 2003). The population of Harris County is expected to grow by an additional two million people during the same time period. Recently completed major roadway construction in the area includes Segment D of the Grand Parkway, between Highway 59 and Interstate Highway 10 has been completed.

Existing habitat preserves and parks with open space and recreational opportunities similar to what can be found at Addicks and Barker Reservoirs include the Katy Prairie Conservancy lands located west of the reservoirs and 11,370 acres of park and recreational space in Harris County Precinct 3, and 2,460 acres of parks and recreational space in Fort Bend County. Of the combined total park, recreational and open space acres for these two entities, 86 percent are located in the reservoirs.

Past flood control projects in the area include the Buffalo Bayou Project comprised of Addicks and Barker Reservoirs, a system of canals to convey releases from the reservoirs to Galveston Bay, and a levee along Cypress Creek to prevent overflows into Addicks Reservoir. Other projects include channel improvements to various segments of Buffalo Bayou, Brays, and White Oak Bayous.

Foreseeable flood control projects include additional channel modifications and detention basins along Buffalo, White Oak and Brays Bayous. The Brays Bayou Project includes approximately 21 miles of channel improvements between Highway 6 and the Houston Ship Channel, modifications to 32 bridges, and various stormwater detention projects. The White Oak Bayou Project includes bypass channels and detention basins in the upper

portions of the watershed and channel modifications between Beltway 8 and North Houston Rosslyn (HCFCD, 2008). Ecosystem restoration components are also being studied as part of these projects and may be undertaken where feasible.

Foreseeable major road and highway construction in the area include the completion of the Grand Parkway (SH99) segments E and F-1 (more information available at: <http://www.grandpky.com/segments/default.asp> ), upgrading SH 249 to freeway status between Beltway 8 and the Grand Parkway, and improvements to US 59, US 290 and SH 288 (H-GAC, 2007). Conversion of agricultural lands and green space to urban land use will result from as the population and additional infrastructure increases.

While the proposed land use classification could result in an additional 450 acres being developed as high impact recreation (PHIRec), this would have minimal effect on the natural resources and the human environment of the reservoirs. The reclassification of reservoir lands from 20,800 acres of Intensive Use Recreation (1986 Master Plan), to 7,200 acres of Environmentally Sensitive (ES) and 11,250 acres of Multiple Resource Management (MRM) areas, and subsequent development and implementation of restoration and vegetative management plans would have a beneficial effect on natural resources in the reservoirs. Therefore, no significant adverse cumulative impacts to natural resources in the reservoirs would occur from the proposed reclassification of land use. An overall beneficial impact to the natural environment would result from the proposed land use reclassifications.

## **5.0 RELATIONSHIP OF PLAN TO PLANNING AND ENVIRONMENTAL REQUIREMENTS**

The planning of the proposed project is in accordance with USACES's "Actions for Change" policies. Plan formulation has been based on a comprehensive systems approach and potential direct and indirect affects inside and outside the project area have been considered. This assessment has been prepared to satisfy the requirements of all applicable environmental laws and regulations and has been prepared using USACE ER 200-2-2 (Environmental Quality: Policy and Procedures for Implementing the National Environmental Policy Act (NEPA), and the Council on Environmental Quality (CEQ) National Environmental Policy Act regulations (40 CFR 1500). The planning and implementation of the proposed action is consistent with the USACE 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.

### *5.1 NATIONAL ENVIRONMENTAL POLICY ACT*

This EA has been prepared in accordance with CEQ regulations for compliance with NEPA. The environmental and social consequences of the recommended plan have been analyzed in accordance with the Act and are presented in this EA.

### *5.2 FISH AND WILDLIFE COORDINATION ACT OF 1958, AS AMENDED*

The proposed plan has been coordinated with the USFWS and TPWD. During the coordination process, the agencies provided information on fish and wildlife resources and planning input for the project that was considered in the development of the land use classifications. No significant concerns were identified by the resource agencies. Appendix E contains the USFWS planning aid letter (PAL) prepared for this EA.

### *5.3 NATIONAL HISTORIC PRESERVATION ACT OF 1966, AS AMENDED*

All proposed projects with the potential to affect cultural resources shall be coordinated with the Texas State Historic Preservation Officer pursuant to the procedures established in 36 CFR 800. Proposed actions shall not be allowed to adversely impact Historic Properties determined eligible for listing on the National Register of Historic Places.

#### *5.4 ENDANGERED SPECIES ACT, AS AMENDED*

This Draft EA continues coordination with the USFWS regarding threatened and endangered, or proposed species and their critical habitats in the project area (Appendix C, Draft Biological Assessment). Available information, investigations, and informal consultation with USFWS have resulted in a determination that the proposed action is not likely to adversely affect any Federally-listed threatened or endangered species or critical habitat (Sections 3.7 and 4.5).

#### *5.5 CLEAN AIR ACT OF 1972, AS AMENDED*

The EPA established nationwide air quality standards to protect public health and welfare. The State of Texas has adopted the National Ambient Air Quality Standards [40 CFR Part 50] as the State's air quality criteria. The proposed action is in Harris and Fort Bend Counties, which are nonattainment areas for air quality (ozone). Direct and indirect emissions of ozone precursors from potential construction activities associated with development of PHIRec recreational areas are not addressed in this EA as the timing and extent of such activities cannot be determined at this time. Potential impacts associated with specific, proposed construction activities will be addressed by additional NEPA coordination conducted for all individual projects, as appropriate.

#### *5.6 CLEAN WATER ACT OF 1977, AS AMENDED*

The proposed Federal action in this EA is the reclassification of land uses for Federal lands within the Addicks and Barker Reservoirs. Water quality standards were considered and it was determined that the proposed land use classifications will not impact water quality in the reservoirs.

#### *5.7 EXECUTIVE ORDER 11990 – PROTECTION OF WETLANDS*

This EO directs Federal agencies to avoid undertaking or assisting in new construction located in wetlands unless there is no practical alternative. The proposed project has been analyzed for compliance with EO 11990. Approximately 940 acres of wetlands are classified as Operations due to the expansion of the Operational land use classification area to provide a buffer area between project operations lands and lands used for recreational purposes. Current operation of the reservoirs does not adversely impact these wetlands and no change is expected due to the revised land use classifications. Additional NEPA coordination would be conducted on a project specific basis to

determine if wetlands may be impacted. All wetlands impacted by future development will be mitigated so that there would be no net loss of wetland function in the reservoirs.

#### *5.8 EXECUTIVE ORDER 12898 – ENVIRONMENTAL JUSTICE*

In compliance with Executive Order 12898 – Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations, an evaluation has been performed to determine whether the proposed project will have a disproportionate adverse impact on minority or low-income population groups within the project area. The Executive Order requires minority and low-income populations do not receive disproportionately high adverse human health or environmental impacts, and requires that representatives of minority or low-income populations, who could be affected by the project, be involved in the community participation and public involvement process. Changes in land use classifications for would have no disproportionately high or adverse impacts on minority and low-income populations in the communities surrounding the reservoirs.

#### *5.9 FEDERAL WATER PROJECT RECREATION ACT*

This 1995 act requires consideration of opportunities for outdoor recreation and fish and wildlife enhancement in planning water resource projects. The proposed Master Plan Revision identifies PHIRec areas in addition to the substantial facilities already existing in the reservoirs. Other outdoor recreation opportunities include the classification of lands for Low Impact Recreation such as hike and bike trails and nature viewing platforms. The proposed land use classifications and management activities outlined in the Master Plan Revision would enable enhance the conservation and restoration of native vegetation and fish and wildlife habitats and is consistent with the Federal Water Project Recreation Act.

#### *5.10 CEQ MEMORANDUM DATED AUGUST 11, 1980 – PRIME OR UNIQUE FARMLANDS*

The Farmland Protection Policy Act was passed in 1981 requiring the consideration of those soils which the U.S. Department of Agriculture defines as best suited to producing food, feed, forage, fiber, and oilseed crops with the highest yield relative to the lowest expenditure of energy and economic resources. A Form AD-1006 was submitted to NRCS for their evaluation (Appendix E). NRCS determined that since Addicks and

Barker Reservoirs were already part of an authorized flood risk management project, the reservoir project lands are not considered prime or unique farmlands.

#### *5.11 EXECUTIVE ORDER 13112 ON INVASIVE SPECIES*

This EO directs Federal Agencies to, within Administration budgetary limits, prevent the introduction of invasive species, detect and respond rapidly to and control populations of such species in a cost-effective manner, monitor invasive species populations accurately and reliably, provide for restoration of native species and habitat condition in ecosystems that have been invaded, conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species, and promote public education on invasive species and the means to address them. Several invasive plant species (primarily *Sapium sebiferum*, *Rosa bracteata*, *Cyperus entrerianus*, *Ligustrum sinense*, and *Lonicera japonica*) are prevalent at Addicks and Barker Reservoirs. The adoption of the proposed Master Plan would aid USACE in developing vegetative management plans for the control of invasive species and the restoration of native species and habitat.

#### *5.12 EXECUTIVE ORDER 11988 FLOODPLAIN MANAGEMENT*

This EO directs Federal agencies to evaluate the potential effects of proposed actions on floodplains. Such actions should not be undertaken that directly or indirectly induce growth in the floodplain unless there is no practical alternative. The proposed action represents a change in land use classification only and is not expected to affect development within the floodplain.

#### *5.13 MIGRATORY BIRD TREATY ACT (MTBA)*

The MTBA 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. EO 13186 “Responsibility of Federal Agencies to Protect Migratory Birds” requires Federal agencies to assess potential effects of their actions on migratory birds. The timing of construction and resource management activities will be coordinated to avoid impacts to migratory and nesting birds.



## **6.0 RISK AND UNCERTAINTY**

The purpose of undertaking the Master Plan Revision for Addicks and Barker Reservoirs project is to revise land use classifications and update the inventory of natural and man-made resources in the reservoirs. Areas for risk and uncertainty regarding the adoption of the Master Plan Revision are the inherent risks associated with developing land within a reservoir, the location and amount of lands under each land use classification and the extent of potential environmental consequences anticipated in the Ops, PHIRec, and MRM areas.

Addicks and Barker Dams and Reservoirs were constructed for flood damage reduction purposes. Any existing or proposed facility within the reservoirs is subject to severe flooding and could be rendered unusable for an indeterminate period of time.

Even though activities in the Ops land use classification are not expected to be beyond what is currently in-place, it is feasible that additional borrow areas or construction of additional operations structures could occur, and incur environmental consequences not anticipated in this EA.

Outdoor recreational opportunities could be proposed for areas not identified as PHIRec in the Master Plan Revision or that are beyond the anticipated scale of environmental consequences in PHIRec and MRM land use classification areas. To counter these uncertainties, additional NEPA coordination will be required for all actions proposed to occur within Federal project lands at Addicks and Barker Reservoirs.

Another area of uncertainty identified is the capability to accomplish the restoration opportunities put forth in the Master Plan Revision. The USACE should encourage active partnerships among other Federal and state agencies and public/private groups to better realize large scale habitat restoration projects.

## **7.0 CONCLUSIONS**

This EA examined the consequences to the human environment resulting from the Alternative 4 land use classifications proposed under the proposed Master Plan Revision for Addicks and Barker Reservoirs, Buffalo Bayou and Tributaries, Fort Bend and Harris Counties, Texas. Based on an analysis of the anticipated adverse and beneficial impacts of the described Federal action and the changes to land use classification and management activities outlined in the Master Plan Revision, it is determined that the proposed actions do not warrant the preparation of an Environmental Impact Statement.

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## **Appendix A - Alternative Land Use Classification Figures**

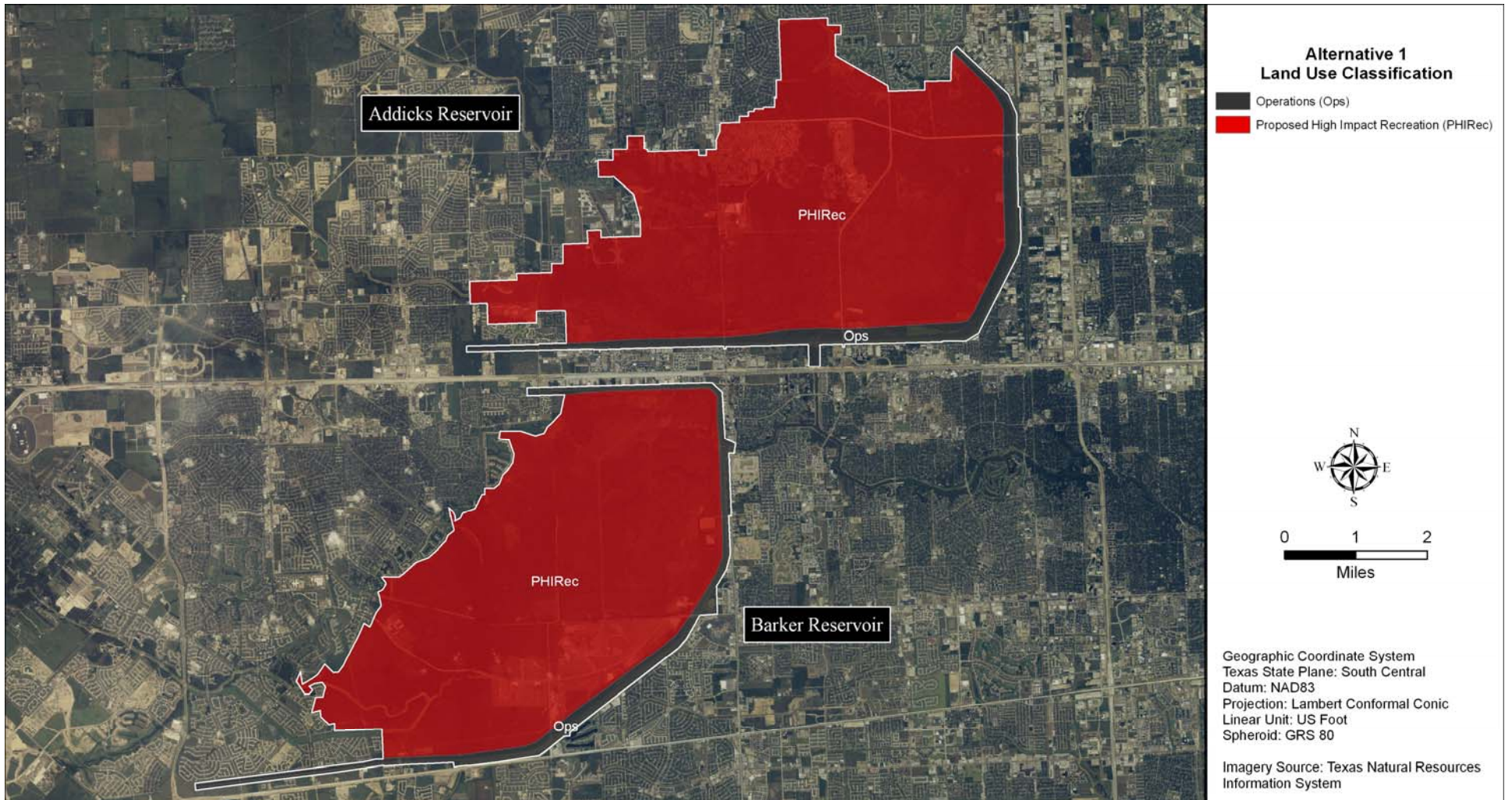


Figure 1. Alternative 1 No Action (Status quo) Land Use Classifications



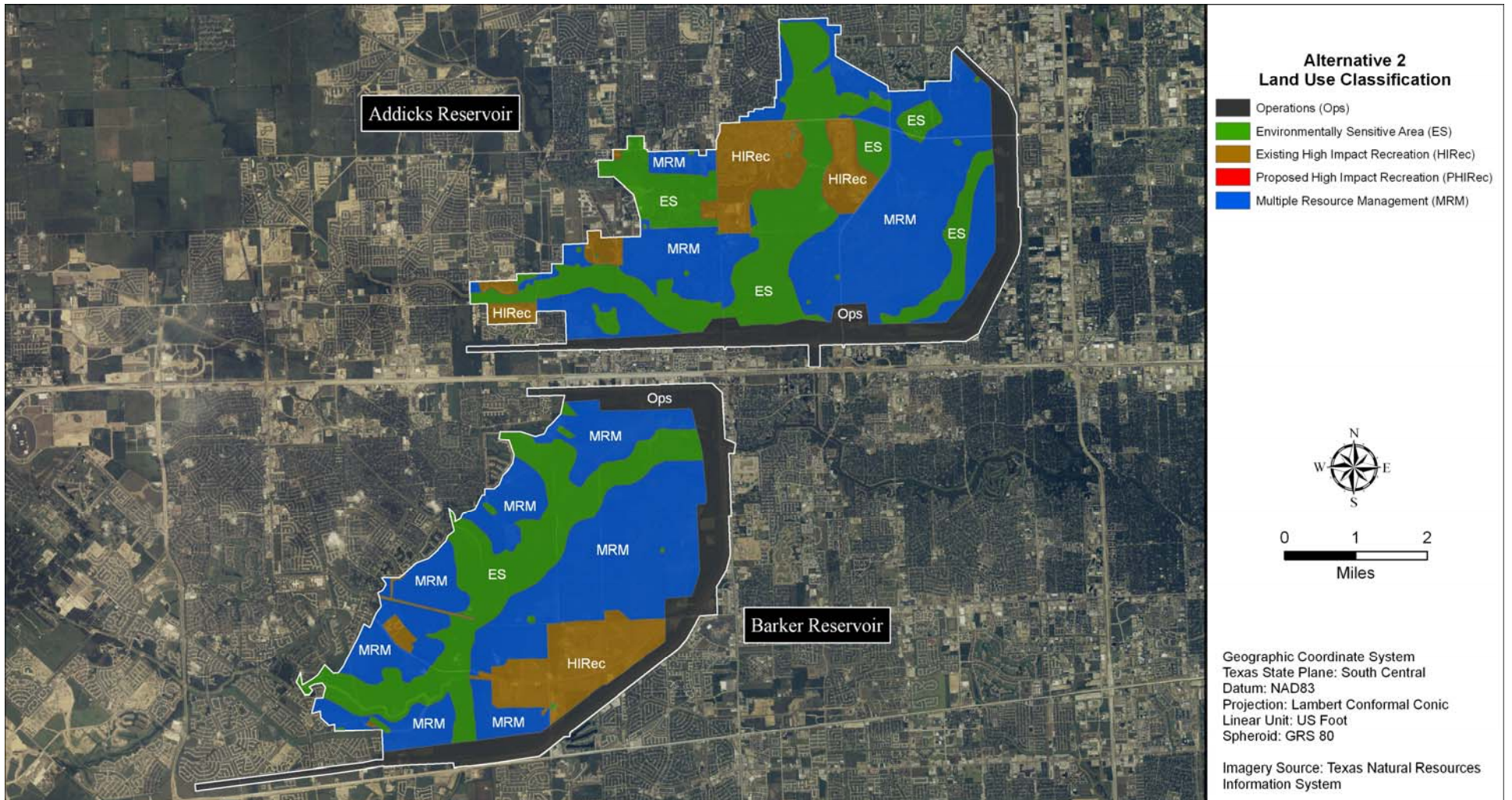


Figure 2. Alternative 2 Proposed Land Use Classification



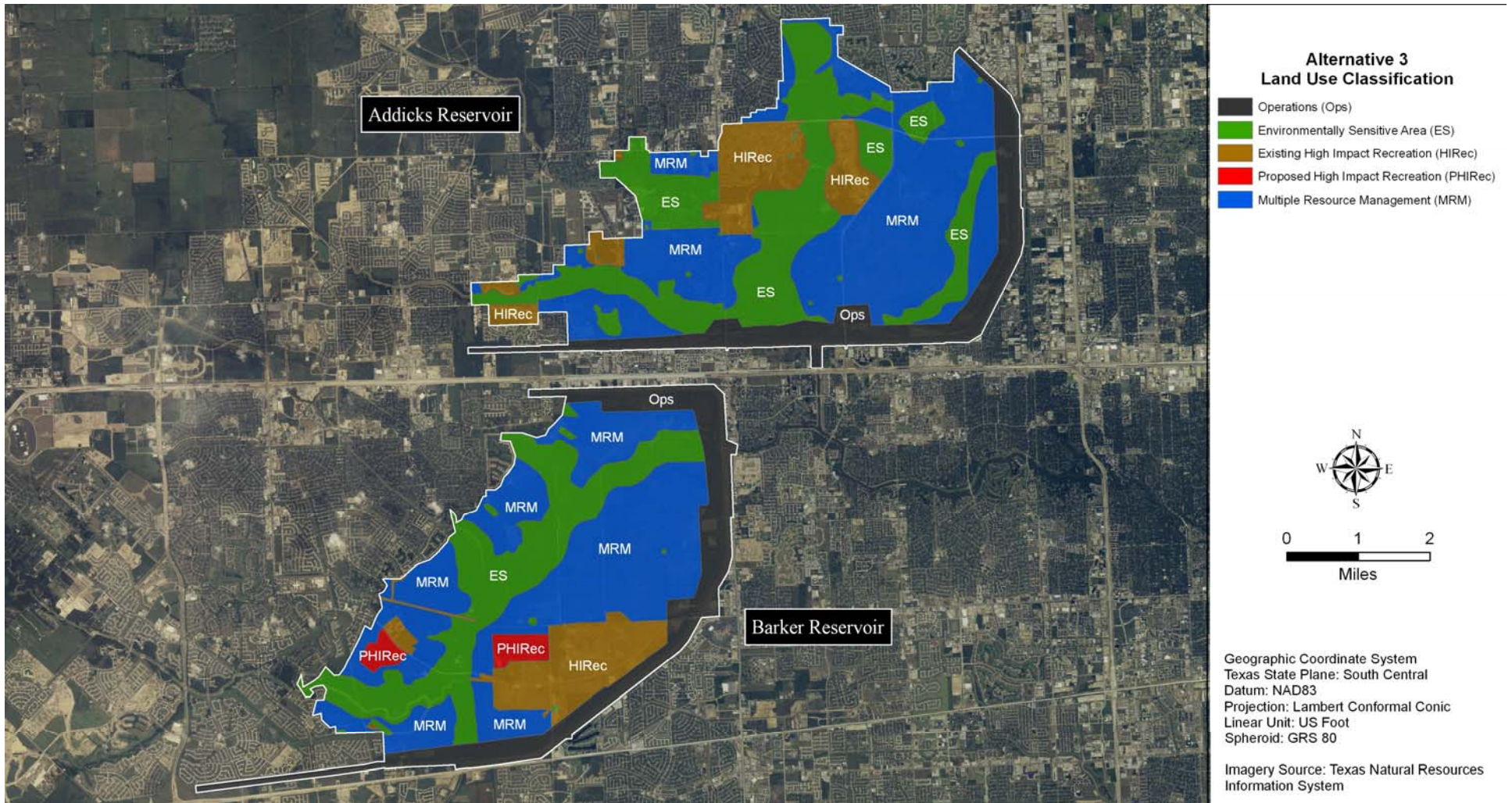


Figure 3. Alternative 3 Proposed Land Use Classifications



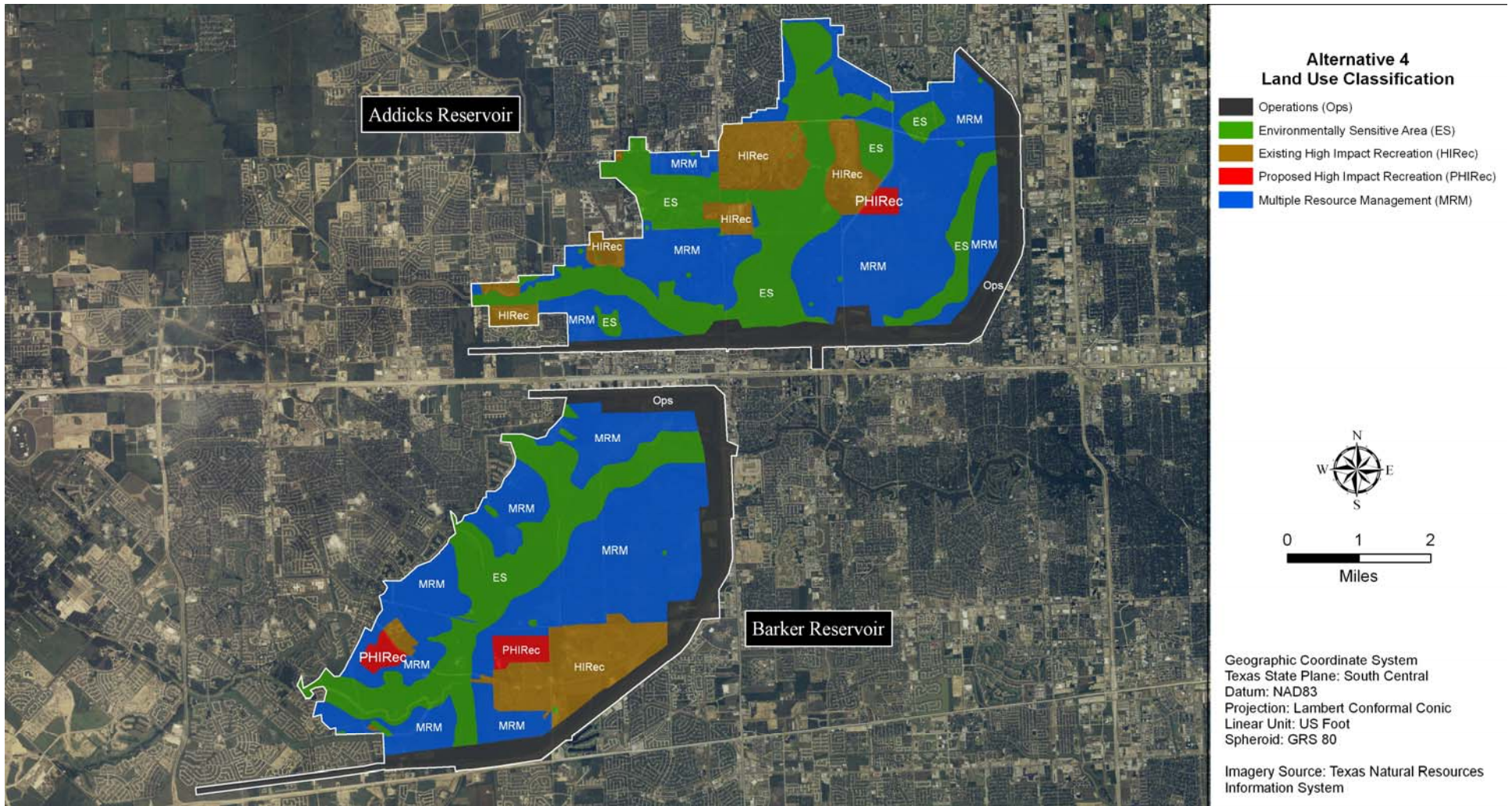


Figure 4. Alternative 4 (Preferred Alternative) Proposed Land Use Classifications



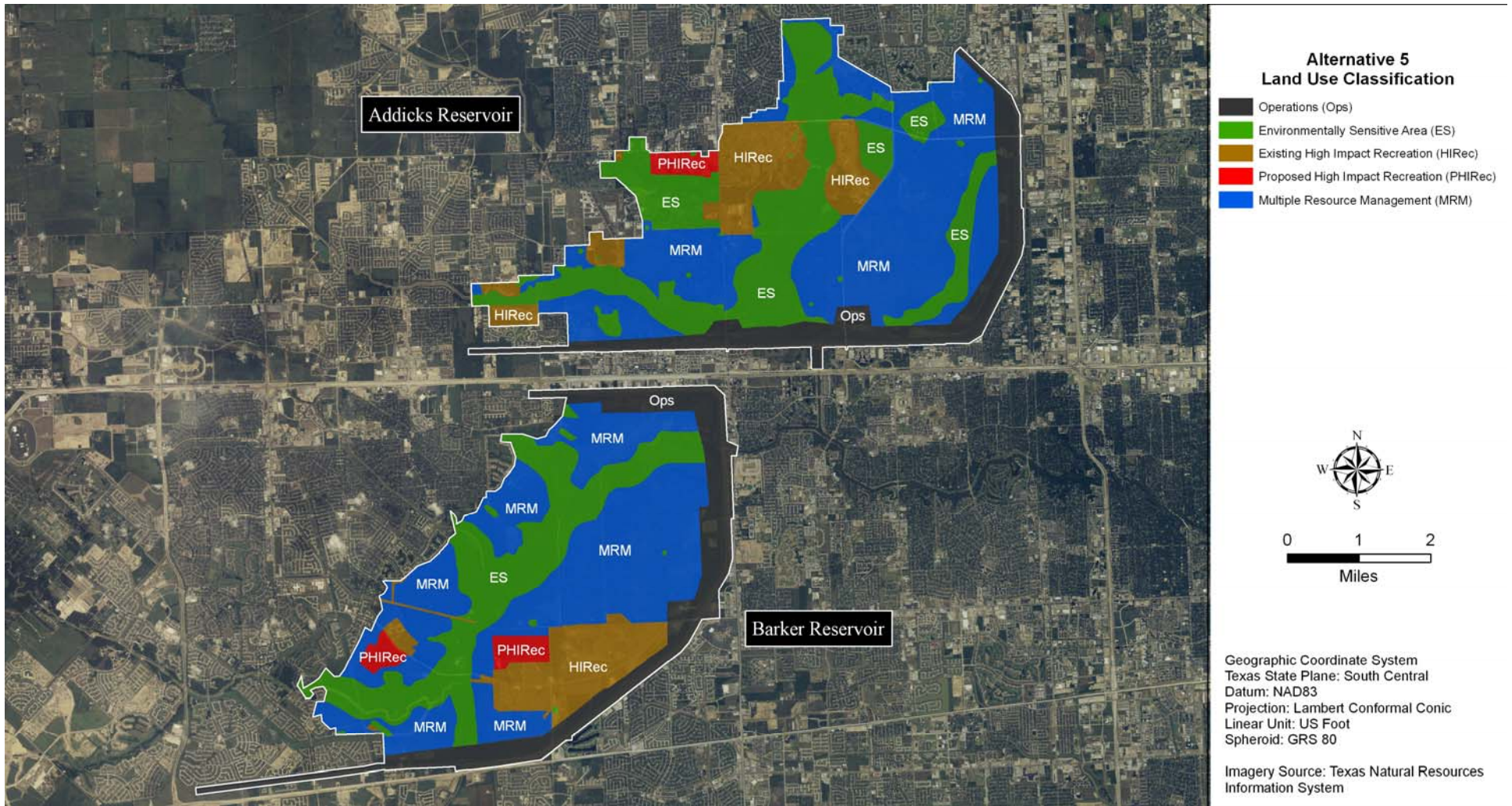


Figure 5. Alternative 5 Proposed Land Use Classifications



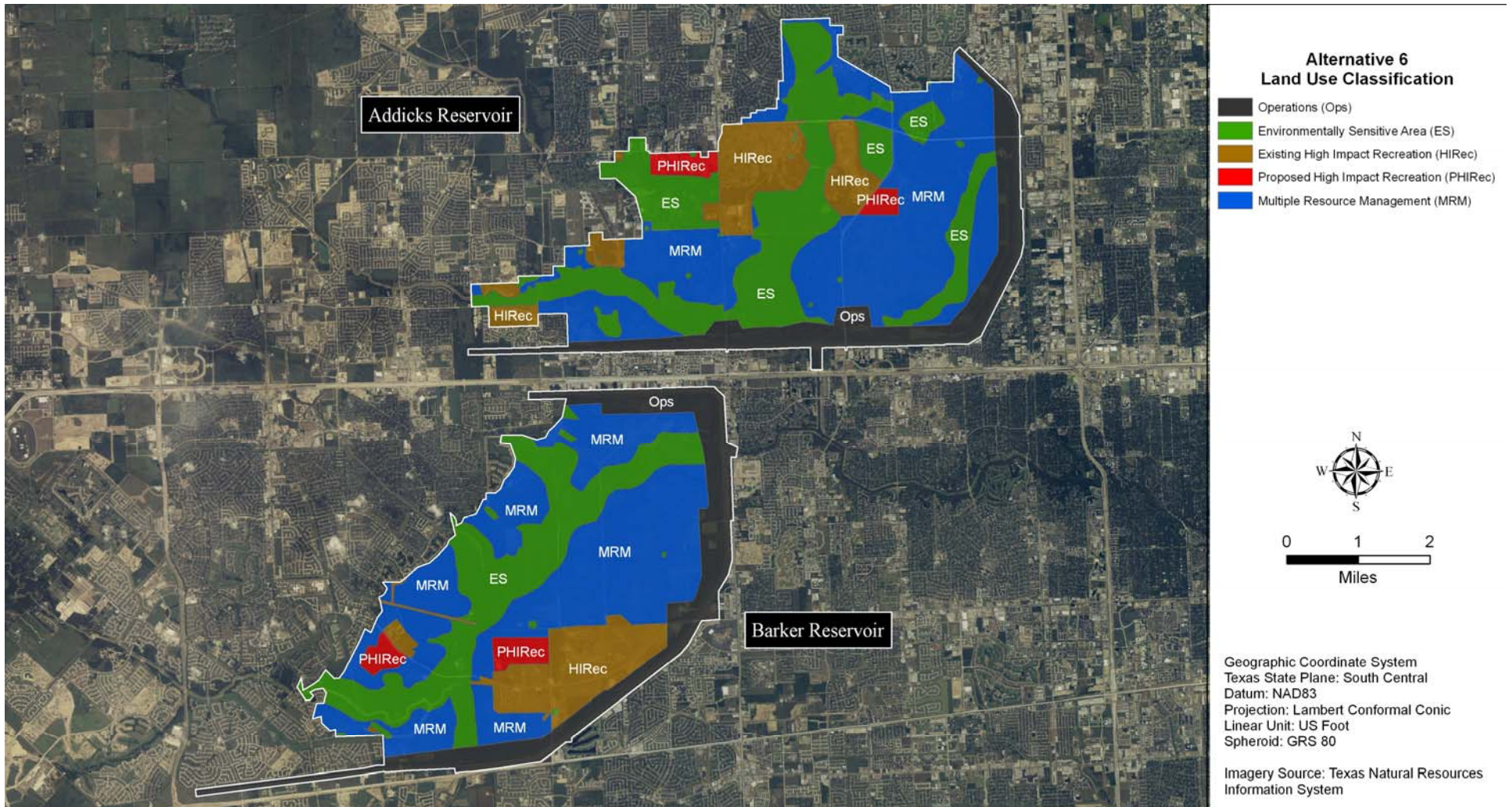


Figure 6. Alternative 6 Proposed Land Use Classifications



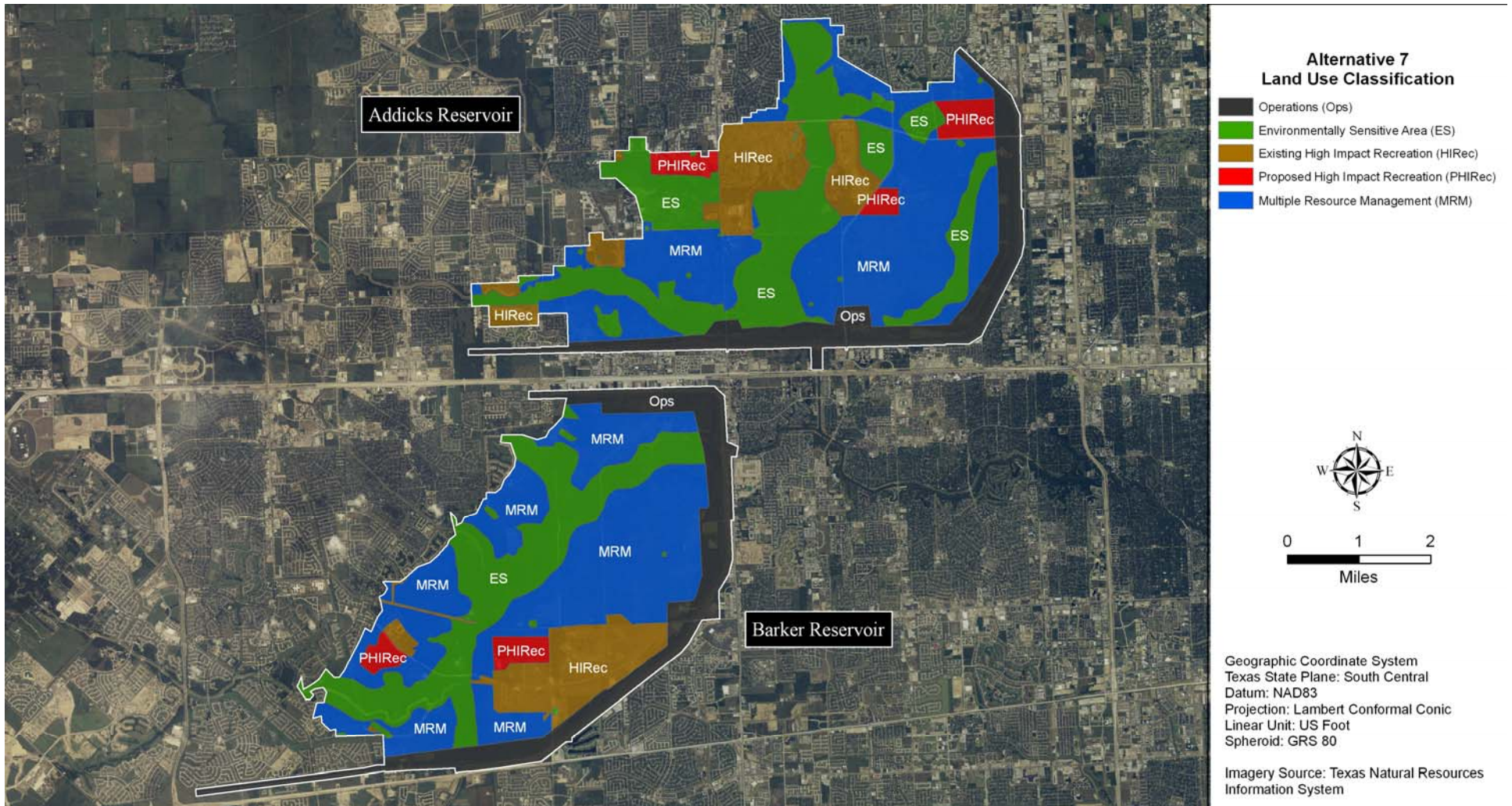


Figure 7. Alternative 7 Proposed Land Use Classifications



## **Appendix B - Public Notice and Coordination**

## **Appendix C – Biological Assessment**

**DRAFT BIOLOGICAL ASSESSMENT FOR FEDERALLY-LISTED  
THREATENED AND ENDANGERED SPECIES**

**FOR**

**MASTER PLAN REVISION**

**ADDICKS AND BARKER RESERVOIRS**

**BUFFALO BAYOU AND BEAR CREEK TRIBUTARIES**

**FORT BEND AND HARRIS COUNTIES**

1.0 INTRODUCTION

1.1 PURPOSE OF THE BIOLOGICAL ASSESSMENT

This Biological Assessment (BA) is being prepared for the purpose of fulfilling the U.S. Army Corps of Engineers (USACE) requirements as outlined under Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended. The proposed Federal action is the adoption of the Addicks and Barker Reservoirs Master Plan Revision. The Master Plan Revision proposes changes to land use classifications and adoption of current USACE natural resource management regulations and guidance and environmental stewardship principles.

This BA is being prepared to assist the U.S. Fish and Wildlife Service (USFWS) personnel in fulfilling their obligations under the ESA.

1.2 DESCRIPTION OF THE PROPOSED ACTION

The proposed action is located within and includes all Federal lands of Addicks and Barker Reservoirs. The reservoirs are located west of the City of Houston in Harris and Fort Bend Counties. They were authorized and constructed in the mid and late 1940's for the sole purpose of flood risk management. The USACE has made reservoir lands available to the counties and the City of Houston for development of recreational and multi-use facilities. The current Master Plan (Figure 1) identifies two land use classifications: 1) Operations; and 2) Intensive Use Recreation. The proposed Master Plan Revision (Figure 2) incorporates current standards set forth in EP 1130-2-550 and proposes the following land use classifications: 1) Operation Area; 2) High Impact (intensive) Recreation Area; 3) Environmentally Sensitive Area; and 4) Multiple

Resource Management Area. Proposed changes to the status quo would reclassify approximately 20,800 acres of Intensive Use Recreation under the categories listed above.

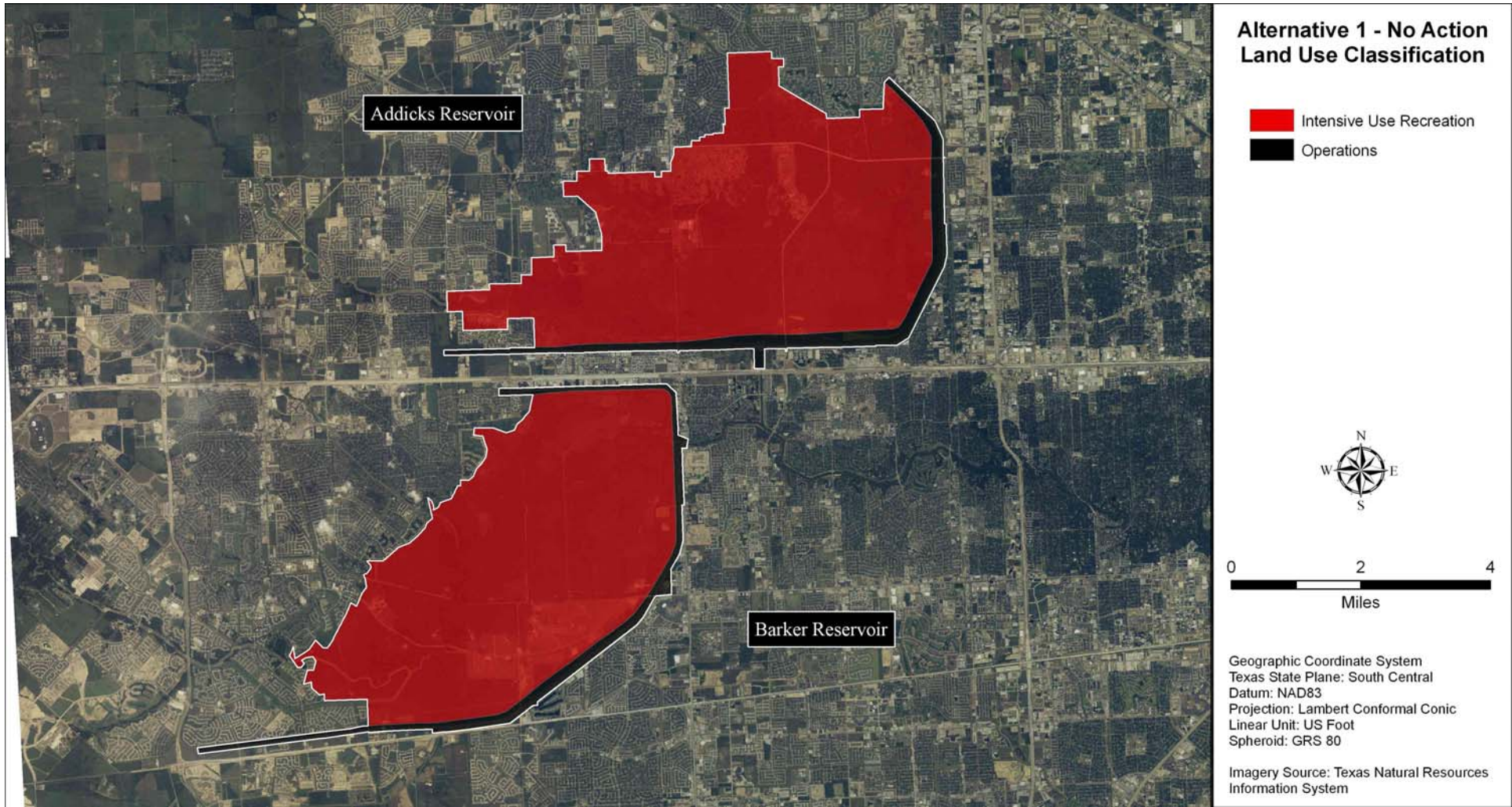


Figure 1. Current Land Use Classifications for Addicks and Barker Reservoirs



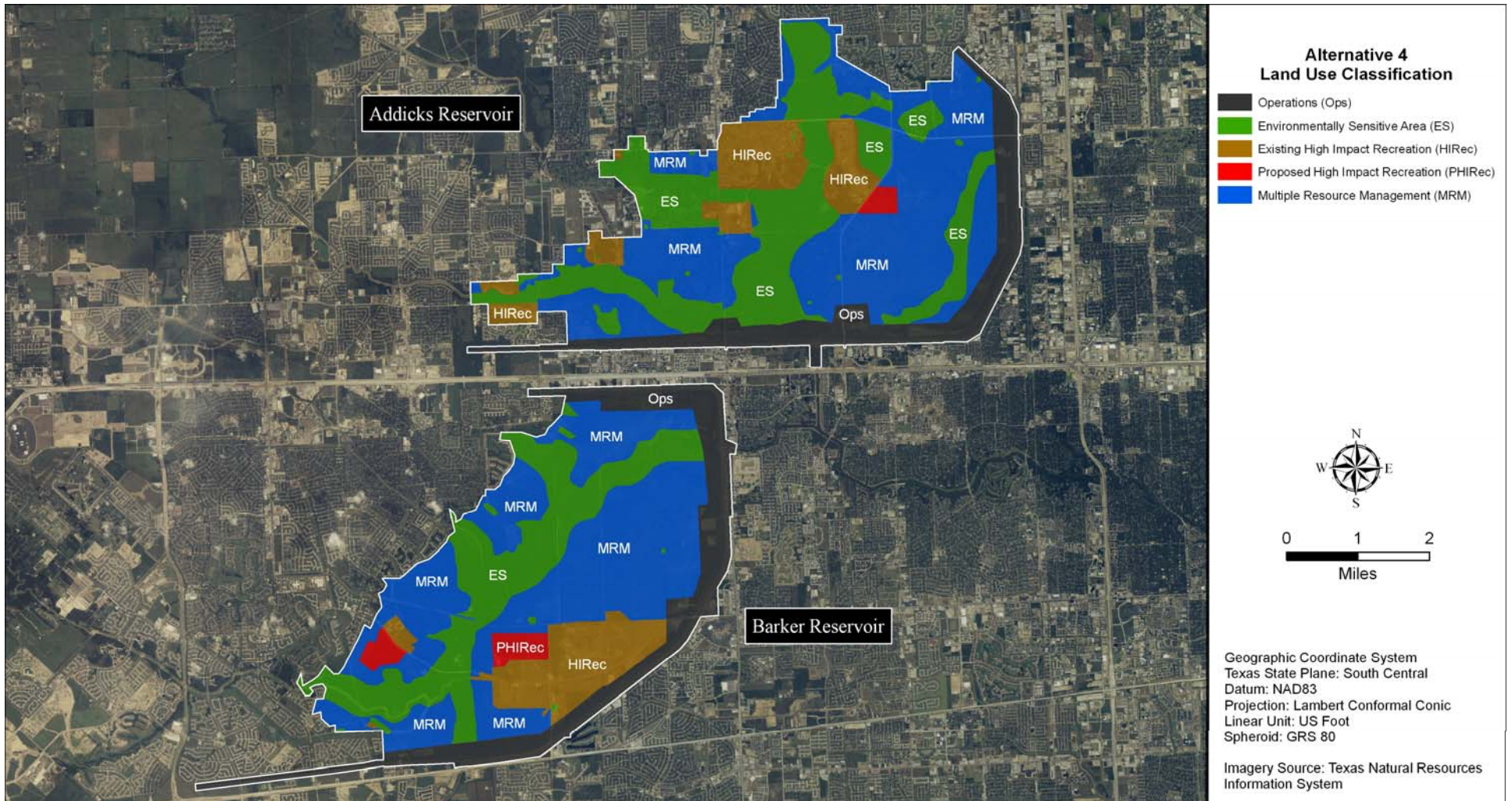


Figure 2. Proposed Addicks and Barker Master Plan Revision land use classifications

## 2.0 FEDERALLY-LISTED THREATENED AND ENDANGERED SPECIES

The project area is in Fort Bend and Harris Counties, Texas. The USFWS consider the threatened or endangered species contained in Table 1 as possibly occurring in the counties. No other species, and no other designated or proposed critical habitat under their jurisdiction were identified as possibly occurring in the project vicinity.

**Table 1. Federally Listed Threatened and Endangered Species – Fort Bend and Harris Counties, Texas**

Common Name	Scientific Name	Listing Status
<b>Birds</b>		
bald eagle	<i>Haliaeetus leucocephalus</i>	Delisted, Being Monitored
whooping crane	<i>Grus americana</i>	Endangered, Experimental Population, Non-essential
<b>Fish</b>		
sharpnose shiner	<i>Notropis oxyrhynchus</i>	Candidate, Ready for Proposal
<b>Plants</b>		
Texas prairie dawn-flower	<i>Hymenoxys texana</i>	Endangered

### 2.1 WHOOPING CRANE

The whooping crane (*Grus americana*) was Federally listed as endangered on 11 March 1967 (32 FR 4001). The whooping crane only occurs in North America and currently exist in three wild populations and in nine captive sites. In Texas, the Aransas National Wildlife Refuge and surrounding portions of Aransas, Calhoun, and Refugio Counties are designated as critical habitat (43 FR 36588). It breeds, migrates, winters, and forages in a variety of habitats, including coastal marshes and estuaries, inland marshes, lakes, ponds, wet meadows and rivers, and agricultural fields (CWS and USFWS, 2007). The whooping crane stands five feet tall and has a long, sinuous neck and long legs, a snowy white body with feathers accented by jet-black wingtips, and a red and black head with a long, pointed, beak. The whooping crane's wings measure about seven feet across and is named for its call, which has been described as a shrill, bugle-like trumpeting. Although foraging whooping cranes are found along the Texas Coast, they are not expected to occur in the project area due to the significant amount of urban development surrounding the reservoirs and the fact that no known nesting sites have been recorded in the project area.

## 2.2 BALD EAGLE

The bald eagle was delisted 08 August 2007 (72 FR 37346). The bald eagle is still protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Bald eagles are associated with riparian habitat along coasts, rivers, and lakes in areas protected from harsh weather and human disturbance. Bald eagles are found throughout North America from Canada and Alaska south to Florida. The breeding season of bald eagles tends to occur in the winter for southern locations with a gradual shift towards spring as one progresses northward. Population increases have been assisted by the banning of DDT, protective buffer zones around nests, reduced shooting, and restoration of aquatic habitat. Currently, shoreline development may be the most limiting factor impacting populations (USFWS, 2008a). Migrant bald eagles have rarely been observed in Addicks and Barker Reservoirs. However, due to the rarity of sightings and the fact that no nests have ever been recorded in the reservoirs, it is not expected that the eagle would occur in the project area.

## 2.3 SHARPNOSE SHINER

The sharpnose shiner is a small (two inches long), silvery minnow endemic to the Brazos River and its major tributaries in Texas. It occurs in stream habitats, primarily in fairly shallow water (less than three feet deep) in broad, open sandy channels with moderate to high current. The often saline and turbid waters of the Upper Brazos River are typical habitat for the shiner, which is adapted for finding and feeding on a variety of small aquatic invertebrates, as well as terrestrial arthropods entering the stream from the banks and riparian areas. Major reservoir construction on the main stem Brazos River and throughout the drainage in the mid 1900s is thought to be the major cause of reduction in the distribution in the shiners. Currently, they are restricted to the Upper Brazos system and are thought to be extirpated from the river downstream of Possum Kingdom Reservoir. Current threats to the shiner include invasion of salt cedar, future water development projects (new reservoirs, reservoir enhancement, chloride control, etc.), wastewater and agricultural discharges, and excessive erosion/sedimentation resulting from surrounding land use (USFWS 2008b). The streams in Addicks and Barker Reservoirs are not tributaries of the Brazos River and therefore the sharpnose shiner is not expected to occur in the project area.

## 2.4 TEXAS PRAIRIE DAWN-FLOWER

The Texas prairie dawn-flower (*Hymenoxys texana*) was Federally listed on 13 March 1986 (51 FR 8681). No critical habitat has been identified for this species. The Texas prairie dawn-flower is an annual usually less than 12 inches in height with several



divergent branches arising from a rosette of basal leaves. Flower heads are usually few in number, small, and yellow. The known *Hymenoxys* sites occur in Harris and Fort Bend Counties to the west of Houston, Texas and within the Gulf Coast Prairies and Marshes ecoregion.

Texas prairie dawn-flower is associated with poorly drained, sparsely vegetated areas ("slick spots") at the bases of small mounds (mima or pimple mounds) in open grassland or in almost barren areas. Soils are slightly saline, sticky when wet and powdery when dry. The plant is sometimes associated with other Texas Coastal Prairies and Marshes endemics such as Texas windmill-grass (*Chloris texensis*) and Houston machaeranthera (*Machaeranthera aurea*) (Natureserve, 2008). The plants do not grow on recently disturbed soils where the soil horizon has been eliminated. The plants flower and produce fruit mid-March to mid-April during the moist months of early spring and are usually dead by the end of May. The most serious threat to the species is the destruction of habitat from urban and industrial development (USFWS, 1989). Currently, there are approximately 114 known *Hymenoxys texana* sites within Addicks and Barker Reservoirs.

The USACE, in coordination with resource agencies, conducts annual surveys during the spring in the March – April flowering timeframe to track population and habitat dynamics. Several populations are located within picnic areas located in Bear Creek Pioneer Park. Although the individual sites and a small buffer area are included in the Environmentally Sensitive (ES) land use classification, they are physically located in a larger high impact recreational (HIRec) park area that is heavily maintained and mowed on a regular basis. Management measures have been developed and coordinated with the park outgrant lessee to establish a no-mow period from the beginning of March to mid-May (general flowering and seeding period) of each year and to mark a temporary boundary (e.g. spray-paint) to indicate the no-mow zones. Before mowing activities may resume in the no-mow zones, a survey is conducted to determine if the plants have gone to seed and have died off. If the surveys indicate plants are still active, the no-mow period is extended another two weeks and is followed by an additional survey. This process is repeated until it is determined that mowing activities may be resumed.

### 3.0 EFFECTS OF THE PROPOSED ACTION ON LISTED SPECIES

#### 3.1 EFFECTS ON TEXAS PRAIRIE DAWN-FLOWER

The Texas prairie dawn-flower (*Hymenoxys texana*) is known to exist within the project area. The USACE requires completion of a survey for *Hymenoxys texana* prior to approval of project proposals submitted to the District. If a survey documents the presence of the plant, coordination between the entity proposing the project and the District occurs to ensure the project plans are modified to avoid impacting the species. However, the current Master Plan for Addicks and Barker Reservoirs identifies all lands not classified as operations as open to development as intensive recreation (Table 2).

**Table 2. Current Addicks and Barker Reservoirs Master Plan Land Use Classifications and Approximate Acres**

Land Use Classification	Addicks	Barker	Total
Operations	1,200	1,000	2,200
Intensive Recreational Development	10,700	10,100	20,800
Existing Intensive Rec. Development	1,700	1,400	3,100
Total	13,600	12,500	26,100

The proposed land use classifications (Table 3) would designate Environmentally Sensitive (ES) areas which would include areas considered to be scientifically and ecologically significant, threatened and endangered species, and cultural resources. The ES classification will provide conservation protection to critical and unique habitats, sites, and species within the reservoirs. All known *Hymenoxys texana* populations within Addicks and Barker Reservoirs are included in the ES land use classification. As new sites are discovered, they will be added to the Environmentally Sensitive area land classification along with the existing sites. Under the proposed action, the District will continue to coordinate with state and Federal agencies to improve and implement conservation and recovery plans and will continue to revise/update land classifications to include new ES areas as they are identified. It is anticipated that the proposed project is not likely to adversely affect *Hymenoxys texana* populations in Addicks and Barker Reservoirs.

**Table 3. Proposed Land Use Classifications and Approximate Acres**

<b>Land Use Classification</b>	<b>Addicks</b>	<b>Barker</b>	<b>Total</b>
Operations Area	1,900	2,200	4,100
Existing High Impact Recreation Area	1,700	1,400	3,100
Proposed High Impact Recreation Area	110	340	450
Environmentally Sensitive Area	4,300	2,900	7,200
Multiple Resource Management Area	5,590	5,660	11,250
Total	13,600	12,500	26,100

#### 4.0 CONCLUSIONS

Although several threatened or endangered species may occur in the project vicinity, only *Hymenoxys texana* is known to exist within the project area. All known *Hymenoxys texana* populations are included under the proposed ES land use classification, which is not currently a land use classification under the 1986 Master Plan. Revised mowing management practices have been coordinated to protect the *Hymenoxys* populations included in the ES land use classification but that are within a larger HIRec land use classification area of Bear Creek Pioneer Park. Therefore, the proposed Federal action is not likely to adversely affect any Federally-listed threatened or endangered species.

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**Appendix D – State Species Lists - Addicks and Barker Reservoirs**

**Table 1. State Listed Threatened and Endangered Species – Fort Bend County, Texas**

<b>Common Name</b>	<b>Scientific Name</b>	<b>State Status</b>
<b>AMPHIBIANS</b>		
Houston toad	<i>Bufo houstonensis</i>	E
<b>BIRDS</b>		
American Peregrine Falcon	<i>Falco peregrinus anatum</i>	E
Arctic Peregrine Falcon	<i>Falco peregrinus tundrius</i>	T
Attwater's Greater Prairie-Chicken	<i>Tympanuchus cupido attwateri</i>	E
Bald Eagle	<i>Haliaeetus leucocephalus</i>	T
Henslow's Sparrow	<i>Ammodramus henslowii</i>	
Interior Least Tern	<i>Sterna antillarum athalassos</i>	E
Peregrine Falcon	<i>Falco peregrinus</i>	E T
Western Burrowing Owl	<i>Athene cunicularia hypugaea</i>	
White-faced Ibis	<i>Plegadis chihi</i>	T
White-tailed Hawk	<i>Buteo albicaudatus</i>	T
Whooping Crane	<i>Grus americana</i>	E
Wood Stork	<i>Mycteria americana</i>	T
<b>FISHES</b>		
American eel	<i>Anguilla rostrata</i>	
Sharpnose shiner	<i>Notropis oxyrhynchus</i>	
<b>MAMMALS</b>		
Louisiana black bear	<i>Ursus americanus luteolus</i>	T
Plains spotted skunk	<i>Spilogale putorius interrupta</i>	
Red wolf	<i>Canis rufus</i>	E
<b>MOLLUSKS</b>		
False spike mussel	<i>Quincuncina mitchelli</i>	
Pistolgrip	<i>Tritogonia verrucosa</i>	
Rock pocketbook	<i>Arcidens confragosus</i>	
Smooth pimpleback	<i>Quadrula houstonensis</i>	
Texas fawnsfoot	<i>Truncilla macrodon</i>	
<b>REPTILES</b>		
Alligator snapping turtle	<i>Macrochelys temminckii</i>	T
Texas horned lizard	<i>Phrynosoma cornutum</i>	T
Timber/Canebrake rattlesnake	<i>Crotalus horridus</i>	T
<b>PLANTS</b>		
Texas prairie dawn-flower	<i>Hymenoxys texana</i>	E
Threeflower broomweed	<i>Thurovia triflora</i>	

**Table 2. State Listed Threatened and Endangered Species – Harris County, Texas**

<b>Common Name</b>	<b>Scientific Name</b>	<b>Listing Status</b>
	<b>AMPHIBIANS</b>	State Status
Houston toad	<i>Bufo houstonensis</i>	E
	<b>BIRDS</b>	State Status
American Peregrine Falcon	<i>Falco peregrinus anatum</i>	E
Arctic Peregrine Falcon	<i>Falco peregrinus tundrius</i>	T
Bald Eagle	<i>Haliaeetus leucocephalus</i>	T
Black Rail	<i>Laterallus jamaicensis</i>	
Brown Pelican	<i>Pelecanus occidentalis</i>	E
Henslow's Sparrow	<i>Ammodramus henslowii</i>	
Mountain Plover	<i>Charadrius montanus</i>	
Peregrine Falcon	<i>Falco peregrinus</i>	E T
Red-cockaded Woodpecker	<i>Picoides borealis</i>	E
Snowy Plover	<i>Charadrius alexandrinus</i>	
Southeastern Snowy Plover	<i>Charadrius alexandrinus tenuirostris</i>	
White-faced Ibis	<i>Plegadis chihi</i>	T
White-tailed Hawk	<i>Buteo albicaudatus</i>	T
Whooping Crane	<i>Grus americana</i>	E
Wood Stork	<i>Mycteria americana</i>	T
	<b>FISHES</b>	State Status
American eel	<i>Anguilla rostrata</i>	
Creek chubsucker	<i>Erimyzon oblongus</i>	T
	<b>MAMMALS</b>	State Status
Louisiana black bear	<i>Ursus americanus luteolus</i>	T
Plains spotted skunk	<i>Spilogale putorius interrupta</i>	
Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii</i>	T
Red wolf	<i>Canis rufus</i>	E
Southeastern myotis bat	<i>Myotis austroriparius</i>	
	<b>MOLLUSKS</b>	State Status
Little spectaclecase	<i>Villosa lienosa</i>	
Louisiana pigtoe	<i>Pleurobema riddellii</i>	
Pistolgrip	<i>Tritogonia verrucosa</i>	
Rock pocketbook	<i>Arcidens confragosus</i>	
Sandbank pocketbook	<i>Lampsilis satura</i>	
Texas pigtoe	<i>Fusconaia askewi</i>	
Wabash pigtoe	<i>Fusconaia flava</i>	
<i>continued</i>		

(Table 20 continued)

Common Name	Scientific Name	Listing Status
	<b>REPTILES</b>	State Status
Alligator snapping turtle	<i>Macrochelys temminckii</i>	T
Green sea turtle	<i>Chelonia mydas</i>	T
Leatherback sea turtle	<i>Dermochelys coriacea</i>	E
Loggerhead sea turtle	<i>Caretta caretta</i>	T
Smooth green snake	<i>Liochlorophis vernalis</i>	T
Texas horned lizard	<i>Phrynosoma cornutum</i>	T
Timber/Canebrake rattlesnake	<i>Crotalus horridus</i>	T
	<b>PLANTS</b>	State Status
Coastal gay-feather	<i>Liatris bracteata</i>	
Giant sharpstem umbrella-sedge	<i>Cyperus cephalanthus</i>	
Houston daisy	<i>Rayjacksonia aurea</i>	
Texas meadow-rue	<i>Thalictrum texanum</i>	
Texas prairie dawn-flower	<i>Hymenoxys texana</i>	E
Texas windmill-grass	<i>Chloris texensis</i>	
Threeflower broomweed	<i>Thurovia triflora</i>	



## **Appendix E – Agency Coordination**

# FARMLAND CONVERSION IMPACT RATING

<b>PART I (To be completed by Federal Agency)</b>		Date Of Land Evaluation Request	5/8/08
Name Of Project	Master Plan Revision, Addicks and Barker Reserv	Federal Agency Involved	USACE Galveston
Proposed Land Use	High Density Recreation	County And State	Harris and Fort Bend Counties, Texas

<b>PART II (To be completed by NRCS)</b>		Date Request Received By NRCS	5/8/08
Does the site contain prime, unique, statewide or local important farmland? (If no, the FPPA does not apply – do not complete additional parts of this form).		Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Major Crop(s)		Farmable Land In Govt. Jurisdiction Acres: %	Acres Irrigated Average Farm Size
Name Of Land Evaluation System Used	Name Of Local Site Assessment System	Date Land Evaluation Returned By NRCS 6/12/08	

<b>PART III (To be completed by Federal Agency)</b>		Alternative Site Rating			
		Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	136.5	201.0	106.0		
B. Total Acres To Be Converted Indirectly					
C. Total Acres In Site	136.5	201.0	106.0	0.0	

<b>PART IV (To be completed by NRCS) Land Evaluation Information</b>	
A. Total Acres Prime And Unique Farmland	
B. Total Acres Statewide And Local Important Farmland	
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted	
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value	

<b>PART V (To be completed by NRCS) Land Evaluation Criterion</b> Relative Value Of Farmland To Be Converted (Scale of 0 to 100 Points)	0	0	0	0
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<b>PART VI (To be completed by Federal Agency)</b> Site Assessment Criteria (These criteria are explained in 7 CFR 658.5(b))	Maximum Points				
1. Area In Nonurban Use					
2. Perimeter In Nonurban Use					
3. Percent Of Site Being Farmed					
4. Protection Provided By State And Local Government					
5. Distance From Urban Builtup Area					
6. Distance To Urban Support Services					
7. Size Of Present Farm Unit Compared To Average					
8. Creation Of Nonfarmable Farmland					
9. Availability Of Farm Support Services					
10. On-Farm Investments					
11. Effects Of Conversion On Farm Support Services					
12. Compatibility With Existing Agricultural Use					
<b>TOTAL SITE ASSESSMENT POINTS</b>	160	0	0	0	0

<b>PART VII (To be completed by Federal Agency)</b>					
Relative Value Of Farmland (From Part V)	100	0	0	0	0
Total Site Assessment (From Part VI above or a local site assessment)	160	0	0	0	0
<b>TOTAL POINTS (Total of above 2 lines)</b>	260	0	0	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes <input type="checkbox"/> No <input type="checkbox"/>
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Reason For Selection:

Mr. Jones,

Attached is the completed Farmland Conversion Impact Rating Form you sent for the Master Plan Revision of the Addicks and Barker Reservoir in Harris and Fort Bend Counties, Texas. After reviewing the materials you provided we determined that the Farmland Protection Policy Act does not apply in this case. The project area was converted to a water storage or flood risk management project over 60 years ago and is still being used primarily for that purpose. Farmlands will not be converted when you revise your land classifications. The attached form indicates the exemption from the FPPA. Thank you for the materials you sent to evaluate the project.

Laurie Kiniry

Laurie N. Kiniry

Soil Scientist, USDA-NRCS Temple, TX  
254-742-9861

For information about your soils...

<http://websoilsurvey.nrcs.usda.gov/app/>

For published soil surveys

[http://soils.usda.gov/survey/printed\\_surveys](http://soils.usda.gov/survey/printed_surveys)

From: Jones, Seth W SWG [mailto:Seth.W.Jones@SWG02.usace.army.mil]

Sent: Thursday, May 08, 2008 6:10 PM

To: Kiniry, Laurie - Temple, TX

Subject: Determination of Prime and Unique Farmland - Addicks and Barker Reservoirs, Harris and Fort Bend Counties, Texas

Ms. Kiniry,

Per our phone conversation I'm sending you a project description and maps for the USACE Galveston District's project (Master Plan Revision for Addicks and Barker Reservoirs) and the form AD-1006. We are preparing NEPA documentation for the Master Plan Revision and are requesting an evaluation/determination for Prime and Unique Farmland under the FPPA reservoir project lands proposed to be reclassified as High Impact Recreation (Sites A, B, and C on the attached Map Figure 1 and Table 1).

The Addicks and Barker Reservoirs project lands are part of the Federal Buffalo Bayou flood risk management project authorized in 1938. The reservoirs were constructed in the mid to late 1940's. Thank you so much for your attention and guidance.

Please contact me at your convenience for any additional information you may need.

Sincerely,

Seth Jones

USACE Galveston

409-766-3068



# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

Division of Ecological Services

17629 El Camino Real #211

Houston, Texas 77058-3051

281/286-8282 FAX 281/488-5882



June 17, 2008

Colonel David C. Weston  
U.S. Army Corps of Engineers, Galveston District  
P.O. Box 1229  
Galveston, Texas 77553

Dear Colonel Weston:

This U.S. Fish and Wildlife Service (Service) Planning Aid Letter provides Service analysis of impacts and recommendations for important fish and wildlife resources related to the proposed high density development areas and classification of resources located within the Addicks and Barker Reservoirs. It is in fulfillment of our draft joint Scope of Work on this project, dated March 10, 2008.

The U.S. Army Corp of Engineers (USACE) is the steward of lands and waters at USACE projects. Its Natural Resource Management Mission is to "manage and conserve those natural resources, consistent with ecosystem management principles, while providing quality public outdoor recreation experiences to serve the needs of present and future generation." In addition, the USACE promotes environmental awareness and values, sound environmental stewardship, protection, compliance and restoration practices on its lands (USACE, 2007).

### **Project Location and Environment**

The project area occurs mostly in Harris County, a highly developed urbanized area of which the city of Houston is located. A small portion of Barker Reservoir falls within Fort Bend County. The dry-land reservoirs comprise approximately 26,000 acres and are strategically located above the confluence of Buffalo Bayou and South Mayde Creek. Both Reservoirs are located within the San Jacinto River basin and are directly upstream from the Buffalo Bayou Watershed.

The Addicks Reservoir watershed encompasses almost 130 square miles and includes four primary streams: Bear Creek, Horsepen Creek, Langham Creek and South Mayde Creek. Barker Reservoir watershed covers about 126 square miles and includes only two primary streams; Mason Creek and Upper Buffalo Bayou (HCFCD, 2007).

The Reservoirs are located approximately 17 miles upstream from the City of Houston and runoff eventually flows into downtown Houston via Buffalo Bayou, combines with White Oak Bayou and eventually passes through the Houston Ship Channel and connects to the San Jacinto River and Galveston Bay.

The land surrounding the Reservoirs has been almost completely developed and urbanized, thereby making the large tracts within the Reservoir more valuable for wildlife. There are several distinguishable habitats/ecosystems located in the Reservoirs. Coastal prairie, bottomland hardwood forests, disturbed prairie, other forested areas, and wetlands.

#### Coastal Prairie/Disturbed Prairie

Historically, the land surrounding and included in the Reservoirs is coastal prairie. This is characterized by meandering bayous and sloughs, riparian forested areas adjacent to the water ways, and grassland areas. Since the modern day settlement of this area, all that remains of the coastal prairie is less than 1% of the original 9 million acres. Conversion of the coastal prairie to crop land and grazing practices have degraded and fragmented the coastal prairie to the point that almost none exists. Remnant prairie can be found in some of the few sites that have not been urbanized in Harris County. Several of the surveyed sites within the Reservoirs were noted to be remnant coastal prairie and indeed presented with vegetation commonly found in a healthy coastal prairie ecosystem. However, these sites are quickly becoming invaded by woody and herbaceous invasive species that will crowd out and further degrade many of the surveyed coastal prairie sites. Table 1 (Native Plant and Wildlife Ranking Values of Addicks and Barker Reservoir Sites Visited) includes as ranking criteria for "plant community value ranking" diversity, richness, and disturbance for prairie sites.

#### Bottomland Hardwood Forests

This ecosystem is typically characterized by the presence of mature, hardwood-dominated, seasonally flooded forests within drainage basins. Several different forest cover types predominate in the Southeast Texas Gulf Coast region, including oak-hickory forest, cypress-tupelo forest in year-round wet regimes, cedar elm-American elm-hackberry forest, and other sub-types. Most of these forest cover types also contain diverse understory and vine communities, often dominated by yaupon holly, arrow-wood viburnum, hawthorn, dwarf palmetto, greenbriar, poison ivy, and wild grape. Most common herbaceous-layer plants in this region are Virginia creeper, slender woodoats, Cherokee sedge, wild iris, lizard-tail, and others.

Forests of the near-Gulf eastern Texas coast region are particularly important as stop-over habitat for nearctic neotropical migrant songbirds, as well as wintering and resident birds. At least 102 nearctic neotropical migrant bird species are known to utilize similar forests in the region. Several of these species, including the prothonotary warbler, northern parula, white-eyed vireo, and Kentucky warbler, remain to nest. All of these nesting birds have significantly declined on a continent-wide basis during the past 30 years (Sauer et al. 2007).



The diversity of the bottomland hardwood forest and the structure of the understory communities found on the reservoirs provide foraging and resting opportunities for these and other resident and migrant birds. In addition, this area provides year round foraging, breeding and nesting habitat for many mammals, reptile, and amphibian species. Large forest overstory and mast-producing trees, downed trees, abundant understory cover, and nearby wetland habitats provide cover, breeding and nesting habitats essential for wildlife. A comparison of breeding bird censuses in different habitats in Louisiana and east Texas (Dickson 1978) showed bird densities in three bottomland forest stands ranged from 752 to 1,400 territorial male birds per square kilometer, about 2 to 4 times that of the best upland stands.

Thirty-six species of amphibians and fifty-nine species of reptiles are known to inhabit bottomland hardwood forests in east Texas, more than any other habitat type in the state (Wharton et al. 1981). Table 1 includes "Plant Community Ranking" and "Wildlife Community Ranking" criteria which consider age and size, diversity, and coverage of forest sites and animal species lists.

#### Other Forested Areas

Invasive exotic and native vegetation has invaded much of the land, including wetlands, in Addicks and Barker Reservoirs and has resulted in large acreages of overgrown, scrubby forests of little native wildlife value. Chinese tallow (*Sapium sebiferum*) has invaded many disturbed prairie and forest sites, including wetlands, and many abandoned agricultural fields in southeast Texas since 1970. Brazilian pepper (*Schinus terribenthifolius*) has recently become a very invasive plant pest locally, but our surveys found no Brazilian pepper yet in Addicks or Barker. McCartney rose (*Rosa bracteata*) has long been a serious agricultural-land pest in east and coastal Texas, invading mostly fallow fields and pastures. Deep-rooted sedge (*Cyperus entriarianus*) has become a serious wetland invasive since 1990 in coastal Texas. Our surveys located several isolated stands, but no extensive coverage. Table 1 includes "Disturbance Ranking" criteria which consider invasive species abundance, diversity, and coverage.

#### Wetlands

As seen on maps using the National Wetlands Inventory layer, both Reservoirs have a considerable amount of acreage designated as wetlands (see figure 1.) These wetlands consist of forested wetlands and prairie potholes both of which are significant sources of foraging and breeding habitat for wildlife. Prairie potholes provide short term breeding habitats for amphibians and serve as watering holes for wildlife. The forested wetlands may be seasonally flooded by nearby creeks when experiencing high rain fall events and may serve as a catchment during regular rain storms. These areas are important as well and provide much needed cover for deer and other mammals.

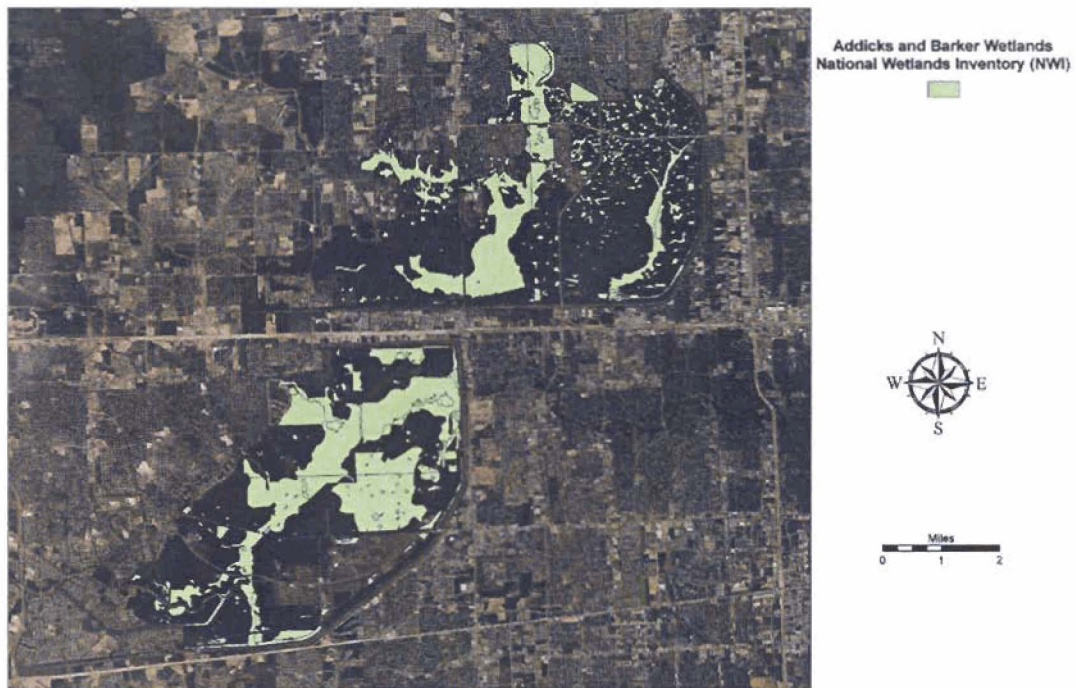


Figure 1 National Wetlands Inventory map of Addicks and Barker Reservoir

Many nearctic and neotropical birds use the bottomland hardwood, forested wetlands, prairie and wet prairie areas of the Reservoirs as important stopover habitat during long migrations. Waterbird migrants are more likely to winter in coastal Texas than their land bird counterparts. The reservoirs are located near the southern terminus of the Central Flyway, a major migration route for waterbirds which nest in the northern prairie states and Canada. Waterbird species seen during site surveys are: great blue heron, great egret, cattle egret, green-backed heron, and wood duck. Numerous other waterbirds have been seen on previous trips or could be expected to regularly occur.

Common amphibian species that may be found in the Reservoirs include, green tree frogs (*Hyla cinerea*), leopard frogs (*Rana sphenoccephala*), bullfrogs (*Lithobates catesbeianus*), and Gulf Coast toad (*Bufo valliceps*). Reptiles include, snapping turtle (*Chelydra serpentina*), red eared sliders (*Trachemys scripta*), box turtles, slender glass lizard (*Ophisaurus attenuatus*), green anole (*Anolis carolinensis*), and five-lined skink (*Eumeces fasciatus*). Several species of snakes are commonly found within the reservoir: cottonmouth (*Agkistrodon piscivorus*), prairie king snake (*Lampropeltis calligaster*), racers, and various waters snakes.

Common fish species most likely found in the generally turbid streams of the Reservoirs are gar (*Lepisosteus* sp.), carp (*Cyprinus* sp.), catfish (*Ictalurus punctatus*), sunfish (*Lepomis* sp.), crappie (*Promoxis* sp.), mosquito fish (*Gambusia affinis*), and sheepshead minnow (*Cyprinodon variegates*). Invertebrates such as gastropods, insect larvae, and several species of crayfish also can tolerate the fluctuating water levels and nutrient loads (USACE, 1986)



The presence of large mammals may be limited to the species that have become more tolerant of human presence in a somewhat increasingly fragmented habitat. White-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), and the bobcat (*Lynx rufus*) are species common to the Reservoirs. Medium sized mammals such as the raccoon (*Procyon lotor*), beaver (*Castor canadensis*), eastern fox squirrel (*Sciurus niger*), opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), cottontail rabbit (*Sylvilagus* sp.) and the nine-banded armadillo (*Dasypus novemcinctus*) are commonly found in the Reservoirs. Various rodents such as the deer mouse, whitefooted mouse and the hispid cotton rat, are common small mammals found in the area.

### **Project Background**

Addicks and Barker Reservoirs is a flood reduction project that was designed to prevent downstream flooding of Buffalo Bayou in the city of Houston. Authorized by the Rivers and Harbors Act of June 20, 1938, and constructed in the 1940's both the Reservoirs are considered dry. Addicks, constructed in 1946, finished in 1948 is the larger of the two and comprises 13,693 acres and has a maximum storage capacity of 233,840 acre feet. This reservoir is located north of Interstate 10 with Highway 6 bisecting the reservoir north to south. Barker Reservoir began construction in 1942, finished in 1945, covers 12,583 acres and has a maximum storage capacity of 192,500 acre feet.

This reservoir is located south of Interstate 10 and west of State Highway 6. The Reservoirs are located approximately 17 miles from Houston with Barker Reservoir located directly on Buffalo Bayou and Addicks Reservoir located on Bear Creek, South Mayde Creek, Langham and Horsepen Creek, all tributaries of Buffalo Bayou. Houston has experienced periodic flooding and has seen the brunt of 12 major storms since 1853. These storms have produced death, destruction and have cumulatively cost upwards of \$400 million to date. It is believed that the Reservoirs have provided a much needed relief for flooding waters heading to downtown Houston via Buffalo Bayou and prevented flood damages estimated to be approximately \$3.8 billion through 2007.

The original Addicks and Barker Master Plan was developed in 1963 and served as a guide for the orderly and coordinated development of all land and water resources located in the Addicks and Barker reservoirs. The Master Plan was updated in 1973, 1977 and the current version was created in 1986. The USACE is in the process of developing a revised Master Plan for the Reservoirs. This new plan will examine the land and water resources within the reservoirs, the existing land use and plans for future land use.

Areas in both Reservoirs have been developed for various recreational needs. Partners such as Harris County, Precinct 3, City of Houston, and Fort Bend County have participated with the USACE in the planning and development of land inside the Reservoirs. Recreational facilities such as golf courses, tennis courts, soccer, rugby, softball and baseball fields, walking/jogging trails, shooting range, model plane flying area and equestrian trails have all been developed for recreational use. Several of the above partners have requested additional land to develop into high impact recreation facilities.



In addition to recreational activities, the Reservoirs have areas currently leased for livestock grazing (cattle and/or horses). Five-year leases for identified land parcels become available each year, with sealed bidding taking place in November.

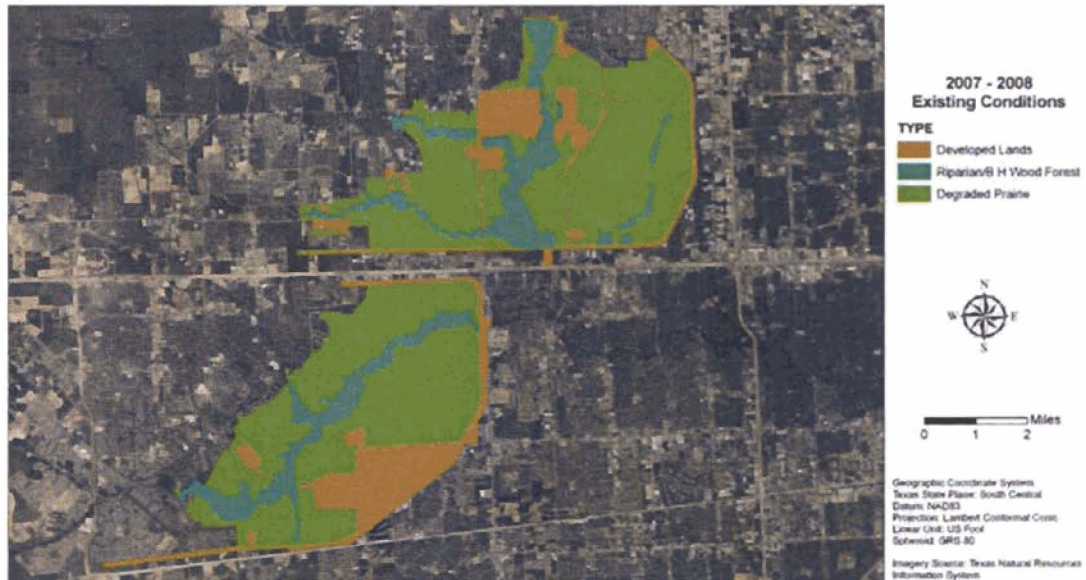


Figure 2 Current existing conditions of Addicks and Barker Reservoirs

### Proposed Work

Since 2006, the USACE has been revising their Master Plan for land usage. The Preliminary Draft Master Plan identifies, and provides GIS mapping information and map layers for several native forest and grassland habitat tracts and tracts identified for potential development as high impact recreational or multi-purpose facilities within the boundaries of Addicks and Barker. The USACE is seeking concurrence from the Service with its determination of identified environmentally sensitive areas located within the Reservoir boundaries as well as areas that can be converted to multi-use facilities.

### Selected Sites for Field Survey

The USACE is proposing revisions to existing Addicks and Barker Reservoirs land use classifications. The five land use classifications are (Figure 3):

**Environmentally Sensitive**— these may be defined as areas of significant ecological importance such as sites with records of Federally listed Threatened or Endangered species, remnant bottomland and forested wetlands and coastal prairie sites.

**Proposed High Impact Recreation** – these areas have been identified by the USACE as the best option for potential development as high impact recreational use.

**Multiple Resource Management** – areas identified for use of low impact activities such as hike and bike trails or nature watching, and wildlife or vegetation management.

**Operations** – Primarily includes the dams, outfall structures, rights of ways, etc.

**Existing High Impact Recreation** – these areas have been identified and developed as high impact recreation areas such as ball fields, tennis courts, golf course, shooting range and zoo.



Figure 3 Proposed Land use classification for Addicks and Barker Reservoir

### Survey Results

Field surveys conducted on April 8-9 and April 21-22 by biologists of the Clear Lake Ecological Services Field Office suggested that the classification of land use categories prepared by the USACE is useful for planning and establishing conservation priorities in Addicks and Barker Reservoir. Service biologists surveyed a total of 10 sites representative of each of the land use cover types (refer to fig. 4.) All sites were easily accessible by foot. Species list for each site are provided below. Exotic invasive species are indicated by the presence of an asterisk (\*).



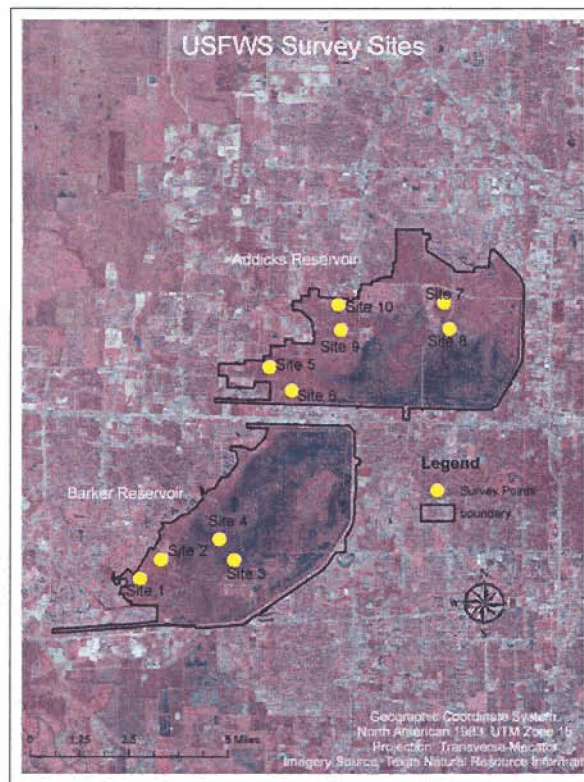


Figure 4 USFWS Survey Sites for Addicks and Barker Reservoirs

### **Barker Reservoir**

#### ***Site 1-SW Barker at Cinco Ranch***

This site comprised remnant bottomland hardwood, forested wetlands and areas disturbed by energy corridors and drainage features. We entered this site just north of Buffalo Bayou and traversed through an energy corridor of several hundred feet in width and came upon a large depressional wetland that led to this remnant site. Plant species diversity was very high in the canopy layer, understory and herbaceous layers. Disturbance at the site appeared to be low. Wildlife and bird species diversity was low but this could be due to the brief length of the survey, time of day and seasonal changes. We believe this site provides important habitat for fish and wildlife resources throughout the year, and is one of the last remaining intact and relatively undisturbed examples of forested wetlands in the region.

Plant species observed:

#### **Wetland canopy**

*Fraxinus pennsylvanica* (green ash)

*Quercus nigra* (water oak)

*Quercus phellos* (willow oak)

*Ulmus americana* (American elm)

#### **Wetland understory**

*Berchemia scandens* (Alabama supplejack)

*Fraxinus pennsylvanica* (green ash)

*Ilex decidua* (possumhaw)

*Planera aquatica* (planer tree)  
*Quercus nigra* (water oak)  
*Quercus phellos* (willow oak)  
*Sabal minor* (dwarf palmetto)  
\**Sapium sebiferum* (Chinese tallow-tree)  
*Ulmus americana* (American elm)

#### **Wetland herbaceous**

*Brunnichia ovata* (American buckwheat vine)  
*Callitriche heterophylla* (water starwort)  
*Carex caroliniana* (Carolina caric-sedge)  
*Carex complanata* (flat-fruit caric-sedge)  
*Carex frankii* (frank's caric-sedge)  
*Carex lupulina* (hop caric-sedge)  
*Carex lurida* (sallow caric-sedge)  
*Carex triangularis* (triangular caric-sedge)  
\**Cyperus entrerianus* (deep-rooted sedge)  
*Cyperus pseudovegetus* var. *pseudovegetus* (marsh flat-sedge)  
*Cyperus virens* (green flatsedge)  
*Eleocharis palustris* (common spikerush)  
*Hygrophila lacustris* (gulf swampweed)  
*Hymenocallis liriosme* (spring spider lily)  
*Juncus brachycarpus* (white-root rush)  
*Juncus effusus* (soft rush)  
*Juncus validis* (round-head rush)  
*Justica ovata* var. *lanceolata* (lance-leaf water-willow)  
*Leersia virginica* (white grass)  
*Lemna obscura* (duckweed)  
*Ludwigia octovalvis* (Mexican primerose willow)  
*Ludwigia repens* (creeping prim rose willow)  
*Mikania scandens* (climbing hempvine)  
*Myriophyllum pinnatum* (cut-leaf water-milfoil)  
*Panicum gymnocarpon* (savannah panicgrass)  
*Panicum hians* (gaping-grass)  
*Physostegia intermedia* (obedient-plant)  
*Polygonum hydropiperoides* (swamp smartweed)  
*Pontederia cordata* (pickerelweed)  
*Rhynchospora caduca* (angle-stem beakrush)  
*Saururus cernuus* (lizard's tail)  
*Spirodela polyrhiza* (duck weed)  
*Vernonia missurica* (Missouri ironweed)

#### **Upland Canopy**

*Celtis laevigata* (sugar hackberry)  
*Quercus phellos* (willow oak)  
*Ulmus americana* (American elm)

**Upland Understory**

*Callicarpa americana* (beautyberry)

*Celtis laevigata* (sugar hackberry)

*Ilex decidua* (possumhaw)

*Ilex vomitoria* (yaupon)

\**Ligustrum sinense* (Chinese privet)

\**Lonicera japonica* (japanese honeysuckle)

\**Rosa bracteata* (macartney rose)

\**Sapium sebiferum* (Chinese tallow-tree)

*Ulmus crassifolia* (cedar elm)

*Viburnum dentatum* (arrowwood)

**Upland herbaceous**

*Carex caroliniana* (Carolina caric-sedge)

*Carex complanata* (flat-fruit caric-sedge)

*Carex reniformis* (kidney fruit caric-sedge)

*Carex cherokeensis* (cherokee caric-sedge)

*Chasmanthium laxum* var. *laxum* (slender-leaf woodoats)

\**Cyperus entrerianus* (deep-rooted sedge)

*Elephantopus carolinianus* (Carolina elephant's-foot)

Bird species observed:

*Aix sponsa* (wood duck)

*Ardea alba* (great egret)

*Butorides virescens* (green-backed heron)

*Buteo jamaicensis* (red-tailed hawk)

*Cardinalis cardinalis* (northern cardinal)

*Cyanocitta cristata* (blue jay)

*Dryocopus pileatus* (pileated woodpecker)

*Melanerpes carolinus* (red-bellied woodpecker)

*Myiarchus crinitus* (great crested flycatcher)

*Passerina cyanea* (indigo bunting)

*Poecile carolinensis* (Carolina chickadee) *Protonotaria citrea* (prothonotary warbler)

*Thryothorus ludivicianus* (Carolina wren)

*Troglodytes troglodytes* (winter wren)

*Vireo crassirostris* (white-eyed vireo)

Wildlife species observed:

*Agkistrodon piscivorus leucostoma* (water moccasin)

*Bufo valliceps* (gulf coast toad)

*Rana catesbeiana* (bull frog)

*Sus scrofa* (feral hog)



### ***Site 2- South of Soccer Fields***

This site comprised severely degraded remnant prairies as indicated by the presence of conservative prairie species such as gulf muhly and little-toothed caric-sedge. Alterations to hydrology and topography and review of aerial photos suggest that this site had been converted to intensive agriculture use, such as rice rotation, and subsequently abandoned. This site is overgrown with invasive exotic and native woody plants and contributes little to the quality of habitat for wildlife as is reflected in the overall score for the site.

Plant species observed:

#### **Herbaceous**

*Andropogon virginicus* var. *virginicus* (broom-sedge bluestem)

*Arnoglossum plantagineum* (prairie indian-plantain)

*Carex austrina* (southern caric-sedge)

*Carex cherokeensis* (cherokee caric-sedge)

*Carex microdonta* (little-toothed caric-sedge)

\**Cyperus entrerianus* (deep-rooted sedge)

*Muhlenbergia capillaries* (gulf muhly)

*Tridens strictus* (long-spike tridens)

#### **Woody**

*Baccharis halimifolia* (eastern baccharis)

*Cornus drummondii* (rough-leaf dogwood)

*Ilex vomitoria* (yaupon holly)

\**Rosa bracteata* (macartney rose)

*Rubus argutus* (highbush blackberry)

\**Sapium sebiferum* (Chinese tallow-tree)

### ***Site 3- NW Model Airplane Field***

This site comprised very disturbed wet areas that were formerly rice fields. Old agricultural structures were noted on the aerial maps, verified during the site visit and may have contributed to the poorly drained and somewhat impounded soils. Woodlands were noted on the site but comprised exotic and native invasive species. No clear vertical plant community structure was observed with most woody plants having a low canopy. Overall, this site is degraded due to past agricultural activities, current grazing efforts and lack of management efforts to effectively restore the site back to a native prairie system.

Plant species observed:

*Baccharis halimifolia* (eastern baccharis)

*Celtis laevigata* (sugar hackberry)

*Fraxinus pennsylvanica* (green ash)

*Ilex vomitoria* (yaupon holly)

\**Rosa bracteata* (macartney rose)

*Rubus argutus* (highbush blackberry)

\**Sapium sebiferum* (Chinese tallow-tree)

**Site 4 – Forested Wetlands and Oxbow by the Footbridge**

This site adjacent to Buffalo Bayou comprises forested wetlands, oxbows and bottomland hardwoods. Structurally, this site still supported several rich forest cover types with well defined vegetation layers. The oxbows have a canopy dominated by planer-tree and, although hydrologically altered by draining, were still in relatively good condition. The riparian forest and planer-tree swamps provide breeding and foraging habitat for a variety of birds, reptiles and amphibian species. This planera swamp was mature by definition with trees toping 35 to 40 feet tall. While this is not a rare community in Texas, it may be considered a regional rarity in Harris County. Chinese tallow, an invasive exotic species was noted surrounding the edge of the swamp; however the ecological restoration potential at this location is great. Restoration of hydrology and removal and control of exotic invasive plant species should be a priority at this site.

Plant species observed:

**Canopy**

*Carya aquatica* (water hickory)  
*Celtis laevigata* (sugar hackberry)  
*Fraxinus pennsylvanica* (green ash)  
*Platanus occidentalis* (American sycamore)  
*Quercus nigra* (water oak)  
*Quercus phellos* (willow oak)  
\**Sapium sebiferum* (Chinese tallow-tree)  
*Ulmus americana* (American elm)  
*Ulmus crassifolia* (cedar elm)

**Understory**

*Campsis radicans* (trumpet-creeper)  
*Cocculus carolinus* (Carolina snailseed)  
*Ilex dicitdua* (possumhaw)  
*Planera aquatica* (planer-tree)  
*Sabal minor* (dwarf palmetto)  
*Toxicodendron radicans* (poison ivy)

**Herbaceous**

*Berchemia scandens* (Alabama supplejack)  
*Brunnichia ovata* (American buckwheat-vine)  
*Carex cherokeensis* (cherokee caric-sedge)  
*Carex crus-corvi* - (crowfoot caric-sedge)  
*Cyperus eragrostis* (flatsedge)  
*Leersia virginica* (Virginia cut-grass)  
*Mikania scandens* (climbing hempweed)  
*Myosotis macrosperma* (spring forget-me-not)  
*Poa annua* (annual blue-grass)  
*Polygonum punctatum* (water smartweed)  
*Rumex crispus* (curly-leaf dock)

*Sanicula canadensis* (canadian sanicle)  
*Valerianella woodsiana* (woods' cornsalad)  
*Veronica arvensis* (common speedwell)

Planer tree swamp

**Herbaceous**

*Carex crus-corvi* - (crowfoot caric-sedge)  
*Carex lurida* (sallow caric-sedge)  
*Cephalanthus occidentalis* (buttonbush)  
\**Cyperus entrerianus* (deep-rooted sedge)  
*Cyperus pseudovegetus* (marsh flat-sedge)

*Cyperus virens* (green flatsedge)  
*Hydrocotyle verticillata* (water-pennywort)  
*Ludwigia repens* (creeping primrose-willow)  
*Ludwigia* sp.  
*Myriophyllum pinnatum* (cut-leaf water-milfoil)  
*Panicum gymnocarpon* (savannah panicgrass)  
*Polygonum punctatum* (water smartweed)  
*Rumex crispus* (curly-leaf dock)  
*Sagittaria papillosa* (arrowhead)

Bird species observed:

*Baeolophus bicolor* (tufted titmouse)  
*Buteo lineatus* (red-shouldered hawk)  
*Icteria virens* (yellow-breasted chat)  
*Icterus galbula* (northern oriole)  
*Melanerpes carolinus* (red-bellied woodpecker)  
*Parula Americana* (northern parula)  
*Strix varia* (barred owl)  
*Thryothorus ludovicianus* (Carolina wren)  
*Vireo bellii* (Bell's vireo)  
*Vireo crassirostris* (white-eyed vireo)

Wildlife species observed:

*Eumeces fasciatus* (5 lined skink)  
*Lepisosteus* sp. (Gar)  
*Rana utricularia* (southern leopard frog)  
Snake sp.

**Addicks Reservoir**

***Site 5 – S. Maydee Creek***

Leading into this site is a highly disturbed prairie characterized by native and invasive exotic woody species and some lingering coastal prairie species such as gulf muhly. However, the habitat adjacent to S. Maydee Creek is characterized as a second-growth forest with well defined and rich vegetation layers. This site provides breeding and foraging habitat for a variety of birds, reptiles and amphibian species.



Plant species observed:

**Canopy**

*Acer negundo* (box-elder)

*Carya illinoensis* (pecan)

*Celtis laevigata* (sugar hackberry)

*Fraxinus pennsylvanica* (green ash)

*Platanus occidentalis* (American sycamore)

*Quercus nigra* (water oak)

*Quercus virginiana* (southern live oak)

*Ulmus americana* (American elm)

**Understory**

*Ilex vomitoria* (yaupon)

\**Ligustrum sinense* (Chinese privet)

*Matelea* sp. (climbing milkweed)

*Sambucus Canadensis* (elderberry)

*Vitis cinerea* (pigeon grape)

*Cocculus carolinus* (carolina snailseed)

*Cornus drummondii* (rough-leaf dogwood)

*Vitis rotundifolia* (muscadine grape)

*Campsis radicans* (trumpet-creeper)

*Sabal minor* (dwarf palmetto)

*Prunus caroliniana* (carolina laurel-cherry)

*Morus rubra* (red mulberry)

*Ilex decida* (possumhaw)

*Vitis mustangensis* (mustang grape)

*Viburnum dentatum* (arrowwood)

*Diospyros virginiana* (common persimmon)

**Herbaceous**

*Allium canadense* (canada meadow onion)

*Berchemia scandens* (Alabama supplejack)

*Callicarpa americana* (american beautyberry)

*Carex blanda* (charming caric-sedge)

*Carex cherokeensis* (cherokee caric-sedge)

*Carex corrugata* (wringle-fruit caric-sedge)

*Carex flaccosperma* (flaccid-fruit caric-sedge)

*Chasmanthium latifolium* (broad-leaf woodoats)

*Dichanthelium* spp. (panic grass)

*Elephantopus carolinianus* (carolina elephant's-foot)

*Galium aparine* (catchweed bedstraw)

*Geum canadense* (white avens)

*Juncus coriaceous* (leather-flower rush)

\**Lonicera japonica* (Japanese honeysuckle)

*Myosotis macrosperma* (spring forget-me-not)

*Parthenocissus quinquefolia* (virginia creeper)

*Poa autumnalis* (autumn blue-grass)  
*Polygonum punctatum* (water smartweed)  
*Sanicula canadensis* (Canadian sanicle)  
\**Sapium sebiferum* (Chinese tallow-tree)  
*Smilax* spp. (greenbrier)  
*Thelypteris kunthii* (southern shield fern)

*Toxicodendron radicans* (poison ivy)  
*Valerianella woodsiana* (woods' cornsalad)  
*Viola sororia* (bayou violet)

Bird species observed:

*Accipiter cooperii* (Cooper's hawk)  
*Bombycilla garrulous* (cedar waxwing)  
*Bubulcus ibis* (cattle egret)  
*Caracara cheriway* (crested caracara)  
*Cardinalis cardinalis* (northern cardinal)  
*Corvus brachyrhynchos* (American crow)  
*Mimus polyglottos* (northern mockingbird) *Baeolophus bicolor* (tufted titmouse)  
*Cardinalis cardinalis* (northern cardinal)  
*Mimus polyglottos* (northern mockingbird)  
*Quiscalus quisula* (common grackle)  
*Vireo crassirostris* (white-eyed vireo)  
*Zenaida macroura* (mourning dove)  
*Zenaida macroura* (mourning dove)

Wildlife species observed:

*Eumeces fasciatus* (5 lined skink)  
Gar sp.  
*Rana utricularia* (Southern leopard frog)  
*Sciurus niger* (Fox squirrel)  
*Trachemys scripta elegans* (Red eared slider)

**Site 6 – S.W. Corner Addicks Reservoir**

This site is remnant coastal prairie evident by the diversity of prairie species found at several locations. Much of this area is overgrown with native and invasive exotic woody plant species due to protection from fire. This site also has a past history of intensive agriculture as evident by the altered hydrology and the presence of irrigation ditches and levees. Currently, this site appears to have been heavily grazed. This site does have some pockets of wetland prairie vegetation that have been invaded by Chinese tallow. This area does support some wildlife species such as feral hogs, mourning dove, Cooper's hawk, cattle egrets, American crow. There is some potential at this site for ecological restoration.

Plant species observed:

**Herbaceous**

*Andropogon virginicus* var. *virginicus* (broom-sedge bluestem)

*Arnoglossum plantagineum* (prairie indian-plantain)

*Baptisia bracteata* var. *leucophaea* (plains wild indigo)

*Callirhoe involucrata* (wine-cup)

*Carex bushii* (bush's caric-sedge)

*Carex complanata* (flat-fruit caric-sedge)

*Cirsium horridulum* (bull thistle)

*Dichanthelium aciculare* (needle leaf panic grass)

*Dichanthelium scoparium* (panic grass)

*Fimbristylis puberula* (hairy fimbry)

*Muhlenbergia capillaries* (gulf muhly)

*Neptunia pubescens* var. *pubescens* (prairie neptunia)

*Paspalum plicatulum* (brown-seed paspalum)

*Polytaenia nuttallii* (prairie-parsley)

*Rhynchospora caduca* (angle-stem beakrush)

*Rhynchospora globularis* (globe beakrush)

\**Rosa bracteata* (macartney rose)

*Rudbeckia hirta* (brown-eyed susan)

*Schizachyrium scoparium* var. *scoparium* (little bluestem)

*Scleria pauciflora* (few-flowered nutrush)

*Silphium gracile* (slender rosinweed)

*Verbena halei* (texas vervain)

\**Verbena rigida* (tuber vervain)

\**Sapium sebiferum* (Chinese tallow-tree)

**Site 7 – E. of War Memorial Drive**

This site was historically coastal prairie that had agricultural disturbance and is now invaded with native and exotic invasive species. Although Texas prairie cone flower and gulf muhly were noted along with other prairie species, this site was disturbed and overgrown by native and exotic woody plant species.

Plant species observed:

*Arnoglossum plantagineum* (prairie indian-plantain)

*Carex bushii* (bush's caric-sedge)

*Carex microdonta* (little-toothed caric-sedge)

*Fimbristylis puberula* (hairy fimbry)

*Ilex vomitoria* (yaupon)

*Muhlenbergia capillaries* (gulf muhly)

*Myrica cerifera* (southern wax-myrtle)

*Pinus* sp. (pine)

*Quercus virginiana* (southern live oak)

\**Sapium sebiferum* (Chinese tallow-tree)

*Schizachyrium scoparium* var. *scoparium* (little bluestem)



Bird species observed:

*Baeolophus bicolor* (tufted titmouse)  
*Cardinalis cardinalis* (northern cardinal)  
*Mimus polyglottos* (northern mockingbird)  
*Quiscalus quisula* (common grackle)  
*Vireo crassirostris* (white-eyed vireo)  
*Zenaida macroura* (mourning dove)

**Site 8 – East of Eldridge Road**

This site comprises highly disturbed and overgrazed areas and is severely infested with *Cyperus entrerianus* (deep-rooted sedge). A review of historic aerial photos suggests that this site was originally Coastal Prairie that was converted to intensive agriculture use and later abandoned. In its current state, the original prairie vegetation has been eliminated, and this site is almost entirely dominated by native and exotic invasive woody species.

Plant species observed:

\**Cyperus entrerianus*  
*Fraxinus pennsylvanica* (green ash)  
*Quercus nigra* (water oak)  
\**Sapium sebiferum* (Chinese tallow-tree)  
*Ulmus americana* (American elm)

**Site 9 – North of Groeschke Road**

This site comprised coastal prairie in various states ranging from areas infested with native and exotic invasive woody species to several areas with excellent examples of Coastal Prairie and freshwater prairie wetlands. Of particular interest at this site is a well developed and endemic element of the Coastal Prairie previously described as Houston Prairie. Dominants included *Muhlenbergia capillaris*, *Schizachyrium scoparium*, and *Spartina spartinae*. Other species present were those typical of coastal prairie in excellent condition, including the Federally Listed *Hymenoxys texana* in the small highly saline grass-free openings adjacent to pimple mounds. This rare community, known only from the coastal plain of Texas, has a conservation rank of G1G2. Very few occurrences of this community are known outside the reservoirs, and nearly all are degraded by over-grazing, fire protection, invasion of native and exotic invasive woody plants, and alteration of hydrology.

Plant species observed:

*Andropogon virginicus* var. *virginicus* (broom-sedge bluestem)  
*Arnoglossum plantagineum* (prairie indian-plantain)  
*Baptisia bracteata* var. *leucophaea* (plains wild indigo)  
*Callirhoe involucrata* (wine-cup)  
*Carex bushii* (bush's caric-sedge)  
\**Cyperus entrerianus*  
*Dichanthelium aciculare* (needle leaf panic grass)  
*Dichanthelium scoparium* (panic grass)  
*Fimbristylis puberula* (hairy fimbry)  
*Hymenoxys texana* (prairie dawn)  
*Muhlenbergia capillaries* (gulf muhly)

*Neptunia pubescens* var. *pubescens* (prairie neptunia)  
*Paspalum plicatulum* (brown-seed paspalum)  
*Rhynchospora caduca* (angle-stem beakrush)  
*Rhynchospora globularis* (globe beakrush)  
*Rudbeckia hirta* (brown-eyed susan)  
\**Sapium sebiferum* (Chinese tallow-tree)  
*Schizachyrium scoparium* var. *scoparium* (little bluestem)  
*Scleria pauciflora* (few-flowered nutrush)  
*Silphium gracile* (slender rosinweed)  
*Spartina spartinae* (gulf cordgrass)  
*Verbena halei* (texas vervain)

#### ***Site 10 - South of Pine Forest Road***

A review of historical aerial photos suggests that this area was Coastal Prairie that was converted to intensive agricultural usage, mainly grazing. In its current state most of the original vegetation has been removed and is now dominated by native and exotic invasive species.

#### **Site Ranking**

Each site was ranked on 3 variables with values ranging from 0-5. Table 1, lists each site visited and are scored appropriately and then added together to get a cumulative score. Descriptions for each variable are as follows:

- Disturbance Ranking (1-5) - this ranking describes the extent to which the site exhibits disturbance. This ranking would include disturbance by invasive native and exotic species both faunal and floral, altered site or wetland hydrology, and other obvious alterations of topography such as roads and levees. A highly disturbed site would have a low quality value of 1 and an undisturbed site would have a higher quality ranking value of 5.
- Wildlife Habitat Quality Ranking (1-5) – this ranking describes the quality of the site in relation to forage, breeding and nesting for wildlife. The more diverse, native, and mature the herbaceous or tree stand, the higher the score (5). Site plant and wildlife lists were considered, although limited field survey times undoubtedly limited the numbers of bird species seen.
- Plant Community Quality Ranking (1-5) - this ranking describes the integrity of the plant communities found at each site. Sites that had a very high diversity of native vegetation scored higher (5) than sites with low vegetation diversity (1).

\*Note: Wildlife and plant species lists provided are not all inclusive and should be considered only as a visual inspection or observation list. No timed or measured wildlife surveys were conducted and no plot level vegetation data was collected.

Table 1: Site Ranking

Site	Site Name	Community Type	Disturbance Ranking (1-5)	Wildlife Habitat Quality Ranking (1-5)	Plant Community (1-5)	Total Site Ranking (0-15)
1	S.W. Barker at Cinco Ranch	Bottomland hardwood forest (Green ash-Water oak-Willow oak-American elm)	4	4	4	12
2	S. of Soccer Fields	Coastal Prairie	1	2	2	5
3	N.W. Model Airplane Field	Coastal Prairie	1	2	2	5
4	Footbridge	Bottomland hardwood Forest (Sycamore-American elm)	3	4	4	11
5	S. Mayde Creek	Bottomland hardwood Forest (Pecan-Sycamore-American elm)	4	4	4	12
6	S.W. Corner of Addicks	Coastal Prairie	2	2	3	7
7	War Memorial Dr.	Coastal Prairie	2	3	2	7
8	E. Eldridge Rd.	Coastal Prairie	1	2	1	4
9	N. of Groeschke Rd.	Coastal Prairie	4	4	4	12
10	S. of Pine Forest	Coastal Prairie	2	2	1	5

### Endangered Species and Critical Habitat

A review of Service files indicates that the federally listed threatened Texas prairie dawn (*Hymenoxys texana*) is present on both Reservoirs (see figure 5). A development and implementation of a management plan for this species has not been developed in conjunction with the Service but should be made a priority. Surveys have been conducted through 2007 when USACE had to apply resources to the Master Plan Revision. Excessive mowing by Harris County staff has been a concern and has been addressed in a letter from the USACE to Harris County.

Texas prairie dawn was Federally listed in March 1995, and is a small plant that matures in March to late April and is only found in specific habitats. It prefers small sparsely vegetated patches of fine-sandy compacted soils located on the edge or on flats between the naturally occurring pimple mounds that are characteristic of native prairie in this area. In addition to the pimple mounds, this species can be found in bare spots of soil located in highly disturbed open areas such as grazed pastures and abandoned rice fields (both which occur in the Reservoirs.) Texas prairie dawn is intolerant of drought conditions and in dry years or on sites with altered hydrology or excessive evapotranspiration by woody plants may have poor reproductive success.



Thus, timing of flowering and fruit development is tied to seasonal precipitation. One known Texas prairie dawn site was visited during one of the site visits and no plants were seen. This may be attributed to the lack of rain during the last several months as well as other factors. The plant is a very poor competitor and is losing what little habitat there is left in the Reservoirs to encroachment of native and exotic invasive woody plants and exotic invasive herbaceous plant species such as deep-rooted sedge. As the woody and herbaceous species invade, they out compete Texas prairie dawn for soil resources, shades it out directly, or both. Excessive mowing is known to remove the seed head before it matures.

Beginning in 1987, the USACE began a biological assessment for threatened and endangered species in the Reservoirs. The biological assessment revealed Barker Reservoir had only one prairie dawn population of about 900 individual plants. Addicks Reservoir had 15 populations that ranged in size from a few hundred to a thousand or more individual plants (Draft Management plan). Surveys conducted through 2007 have identified 114 known sites with a high count of approximately 62,000 plants in 2001.

There is no critical habitat designated in either of the Reservoirs.

**SEC. 7. (a) FEDERAL AGENCY ACTIONS AND CONSULTATIONS.**—(1) The Secretary shall review other programs administered by him and utilize such programs in furtherance of the purposes of this Act. All other Federal agencies shall, in consultation with and with the assistance of the Secretary, utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species listed pursuant to section 4 of this Act.

According to Section 7(a)(2) of the Endangered Species Act and the implementing regulations, it is the responsibility of each federal agency to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any federally listed species. Therefore, you should use this and other current information to evaluate the project for its potential effects to listed species. The Service's Consultation Handbook (<http://endangered.fws.gov/consultations/s7hndbk/s7hndbk.htm>) is available to assist you with further information on definitions, process, and fulfilling Endangered Species Act requirements.



Figure 5 Known prairie dawn locations

### Exotic Invasive Plants

Both Reservoirs lack necessary management to reduce the exotic and native invasive faunal and floral species. Areas that have been identified as “Environmentally Sensitive” may have been compromised by invasive species. Signs of feral hogs were noted on several of the sites visited. This species can destroy valuable habitat by creating large ruts thereby disturbing the soil and vegetation communities. In addition to the feral hog, Chinese tallow tree and deep-rooted sedge were seen on many of the sites. Chinese tallow tree, McCartney rose, Japanese honeysuckle, appears to have taken over much of the disturbed prairie sites. Site 2, Across from the Soccer field, the Model Airplane, and the S.W. Addicks Dam site (Pasture) have all become overgrown with native and exotic and invasive species due to fire suppression. This area was subject to regular burns naturally which suppressed the woody invaders and promoted natural seed regeneration. Fire suppression in conjunction with cattle grazing has allowed the coastal prairies sites in the Reservoirs to become overgrown. Native coastal prairie species are being crowded and out competed by these invasive species. In general, effective treatments for invasive species prevention and control include, mechanical (disking, roller chopping and cutting), herbicidal and controlled burns. The Service would welcome the opportunity to assist with creating an exotic plant species management plan for the Reservoirs.



### Recommendations

- ❖ The Service requests that the USACE continue to coordinate with the Service as plans are developed for this project.
- ❖ The Service would recommend that the USACE manage the Texas prairie dawn populations by developing and implementing a coordinated management plan within one year from the date of this letter to include performing annual surveys for the species and brush control.
- ❖ Create an exotic and native invasive species management plan to remove/control the invasive species that are invading many of the environmentally sensitive areas.
- ❖ The Service agrees with the USACE's determination on the use of Sites 2, 3, 8 and 10 for high impact development due to its low wildlife habitat quality value, high disturbance and lack of diverse plant communities. This area has been identified as being extremely overgrown with exotic and native invasive species and really does not support the diversity of vegetation necessary to sustain many wildlife species.
- ❖ The Service agrees with the USACE's determination that Sites 1, 5 and 9 are located in Environmentally Sensitive area and should remain as such. This area supports the diversity of vegetation and proper community structure necessary to sustain many avian, mammal, reptile and invertebrate communities.
- ❖ The Service feels that Sites 6 and 7 are restorable and should be classified as Multiple Resource Management.
- ❖ Site 4 at the Footbridge, exhibits restoration potential. Once restoration is complete, this site may be well suited as a hike/bike trail.
- ❖ The Service would be willing to assist with the development of a restoration plan and plans of control for invasive exotic plant species.

Thank you for the opportunity to provide input to assist the USACE in planning projects which protect and restore these important native Texas coastal fish and wildlife habitats. Please contact staff biologist Donna Anderson at 281/286-8282 if you have questions concerning these recommendations.

Sincerely,



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cc:

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