APPENDIX G
USFWS PLANNING AID REPORT (2014) AND DRAFT COORDINATION ACT REPORT (2014)

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Preliminary Final

U.S. FISH AND WILDLIFE SERVICE HABITAT CONDITIONS PLANNING AID REPORT FOR THE DALLAS FLOODWAY PROJECT DALLAS COUNTY, TEXAS

JANUARY 2014

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EXECUTIVE SUMMARY

This planning aid report describes fish and wildlife resources within the Dallas Floodway Project study area in Dallas County, Texas. It is intended to assist the U.S. Army Corps of Engineers (USACE) in their planning efforts for the on-going Dallas Floodway Project Feasibility Study and associated Environmental Impact Statement (EIS). U.S. Fish and Wildlife Service (USFWS), Texas Parks and Wildlife Department (TPWD), and USACE personnel cooperated in collecting the habitat field data required to complete this report.

There are five habitat types within the ROI for biological resources: aquatic riverine (421 acres), bottomland hardwood (1,414 acres), emergent wetland (419 acres), grassland (4,283 acres), and open water (206 acres). The study area encompasses a total of 17,142 acres; 6,742 acres were evaluated for wildlife habitat suitability after excluding developed (urban) areas (urban areas total 10,400 acres). The study area includes three evaluation groups: Confluence, Mainstem, and Interior Drainage System (IDS).

The Dallas Floodway Project Proposed Action consists of flood risk management (FRM) elements; ecosystem restoration and recreation enhancements; and Interior Drainage Plan (IDP) improvements. As detailed in the USACE Feasibility Report (USACE 2013a), the USACE proposes to raise the levees to provide management of a 277,000 cubic-feet per second flood event and to modify the AT&SF Railroad Bridge. In addition, the City of Dallas plans to flatten the riverside levee side slopes from 3:1 to 4:1 for maintenance purposes. Proposed ecosystem restoration and recreation features would develop a mix of active, passive, urban and nature-based uses, which would include the development of shallow lakes, wetlands, and play fields. Lastly, the IDP consists of proposed improvements to the existing East and West Levee Interior Drainage Systems (EWLIDS). The objective of the IDP improvements is to reduce flood risk for areas served by the EWLIDS from the 100-year storm event. Implementation of the IDP would reduce the flood risk for structures located within the interior levee protected areas. Two action alternatives (Alternative 2 and Alternative 3) differ in the alignment of the proposed ecosystem restoration and recreation enhancements.

No federally listed threatened or endangered species are likely residents in the ROI; however, there is suitable habitat for special status species within the area. There is also potential for some special status birds species to transit the ROI, using the grassland, bottomland hardwood, wetland, and riverine habitats for resting and feeding during migration. There are 10 listed birds in the ROI; 5 are federally listed, 3 are federally delisted but remain state-listed, and all 10 are state-listed. Also, there are three state-listed mollusks and three state-listed reptiles in Dallas County that have a potential to occur in the ROI. Twenty species of birds listed as Birds of Conservation Concern by the USFWS may occur within the general vicinity of ROI.

The terrestrial data collected were analyzed using the USFWS *Habitat Evaluation Procedures* (HEP) to describe the various existing habitats in the study area. Spatial data depicting habitat cover maps utilized in the analysis and evaluation were provided by the Corps. The 2004 aquatic riverine fisheries and 2010 open water fisheries data were used to analyze aquatic riverine and open water habitat in the study area and are included in this report (Appendix G and I, respectively).

The Dallas Floodway – Trinity River watershed has been heavily impacted by urban development. Of the 68 HEP data sites, all have been somewhat impacted by development. However, there are still some valuable wildlife habitats remaining within the watershed. Under the Future Without Project Condition (FW/OPC), the majority of acreage that would be permanently impacted by already approved projects is average quality grassland habitat. Permanent impacts to aquatic habitat would be mitigated on a project-specific basis to offset impacts to quality and/or coverage. Common aquatic and terrestrial wildlife that occur within the area are likely to continue to occur in the area after the implementation of the FW/OPC. Riverine flood events under the FW/OPC would continue to have a variety of impacts, both beneficial and adverse.

As shown in Table ES-1, under both Alternative 2 and Alternative 3, habitat quality would increase as compared to the FW/OPC. The greatest increase would be to open water from the creation of the BVP Study lakes. Bottomland hardwood habitat would also increase with the highest quality habitat at the southeastern end of the project area. Aquatic riverine habitat would increase from the realignment of the river. Emergent wetlands would have a small increase due to the creation of higher quality wetlands. The greatest decrease of habitat quality would be to grassland habitat.

Table ES-1. Comparison of Habitat Units at Year 50 for All Alternatives

Habitat Type	*Existing Conditions*	*FW/OPC*		*Alternative 2*		*Alternative 3*	
	HU	*HU*	*Difference*	*HU*	*Difference*	*HU*	*Difference*
Bottomland Hardwood	388.92	389.60	0.68	463.43	74.51	463.00	74.08
Emergent Wetland	97.53	94.48	-3.05	118.54	21.01	119.58	22.05
Grassland	2,309.00	2,227.24	-81.76	2,095.73	-213.27	2,073.98	-235.02
Aquatic Riverine	345.77	332.84	-12.93	444.85	99.08	444.85	99.08
Open Water	143.76	129.90	-13.86	341.25	197.49	341.25	197.49
Total	**3,285.98**	**3,174.06**	**-110.92**	**3,463.80**	**178.82**	**3,442.66**	**157.68**

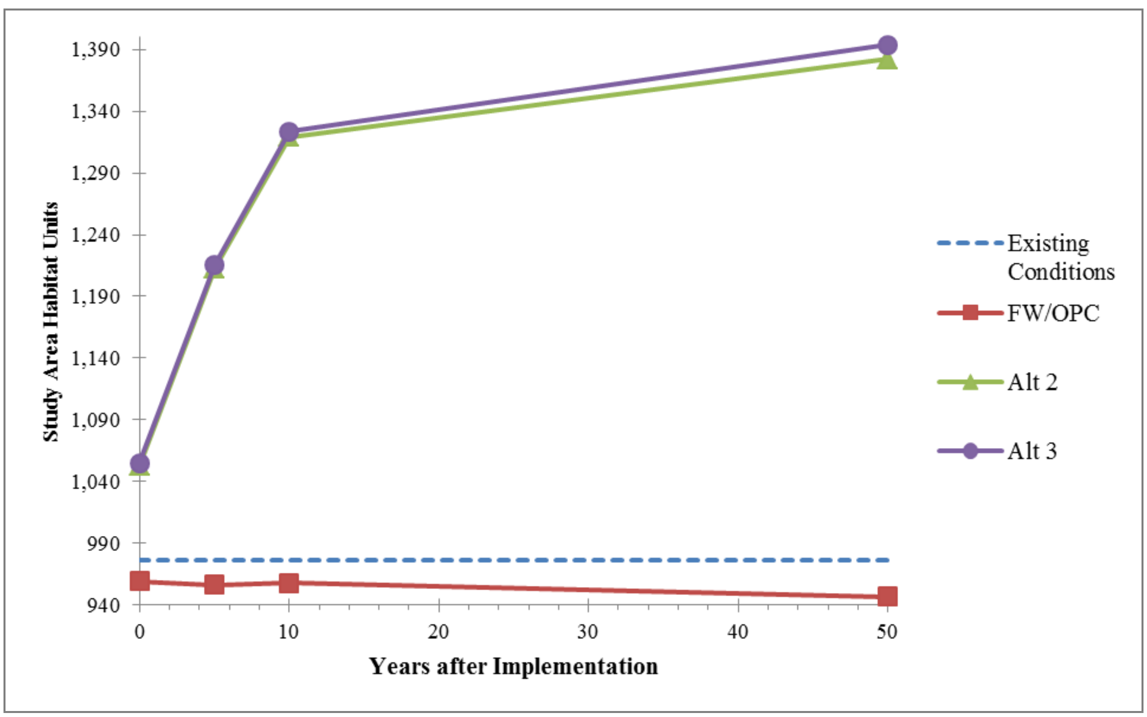
When the identified cumulative projects are included, habitat value (presented as Habitat Units [HU]) of sensitive habitat (including aquatic riverine, emergent wetland, bottomland hardwood and open water) would increase to above existing levels under Alternative 2 and 3, as compared to the FW/OPC (Table ES-2).

Table ES-2. Comparison of Cumulative Habitat Units at Year 50 for All Alternatives

Habitat Type	*Existing Conditions*	*FW/OPC*		*Alternative 2 Cumulative*		*Alternative 3 Cumulative*	
	HU	*HU*	*Difference*	*HU*	*Difference*	*HU*	*Difference*
Bottomland Hardwood	388.92	389.60	0.68	449.67	60.75	458.89	69.97
Emergent Wetland	97.53	94.48	-3.05	145.55	48.02	147.66	50.13
Grassland	2,309.00	2,227.24	-81.76	1,952.33	-356.67	1,982.68	-326.32
Aquatic Riverine	345.77	332.84	-12.93	445.75	99.98	445.75	99.98
Open Water	143.76	129.90	-13.86	341.25	197.49	341.25	197.49
Total	**3,285.98**	**3,174.06**	**-110.92**	**3,334.55**	**49.57**	**3,376.23**	**91.25**

All three alternatives would have significant short term impacts to habitat and the FW/OPC would result in a long term decrease in HUs. However, habitat improvements would develop over time under Alternatives 2 and 3. Chart ES-1 presents all the sensitive habitats HUs combined over time, with the cumulative projects. These HUs would increase the most from year 0 to 10 due to the rapid growth of most wetland and aquatic vegetation.

Chart ES-1. Change in Cumulative Combined Bottomland Hardwood, Emergent Wetland, Open Water, and Aquatic Riverine Habitat Units under All Alternatives



ACKNOWLEDGEMENTS

The Fort Worth District’s Planning, Environmental, and Regulatory Division provided the USFWS the information necessary for completing this report. William K. Colbert, Environmental Planner with the Fort Worth District, assisted with field work, reviewed data, and provided essential information. Marcia Hackett, USACE Regional Technical Specialist and Dallas Floodway EIS Project Manager, also reviewed data and provided information critical to completing this document.

Several USFWS biologists assisted with this report. Carol Hale served as lead Biologist for this study between 2004 and 2006, organized and led the field work, and completed preliminary data computation. Contaminants Biologist Craig Giggleman was the lead for the IBI portion of this study. Fisheries Biologist and GIS specialist Jacob Lewis assisted with the IBI and with the GIS information provided by the USACE. Tom Cloud, Field Supervisor, reviewed and provided guidance necessary to complete this report. Sean Edwards, was the lead Biologist from 2008-present.

Tom Heger and Karen Hardin of TPWD assisted with field work and provided input on the habitat assessment and maps.

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CHAPTER 1
PROJECT OVERVIEW

1.1 INTRODUCTION

In November 2010, the U.S. Fish and Wildlife Service (USFWS) submitted the Habitat Conditions Planning Aid Report (PAR) for the Dallas Floodway Project (DFP), Dallas County, Texas to the U.S. Army Corps of Engineers (USACE) (2010 PAR). The 2010 PAR presented habitat conditions within the Region of Influence (ROI) for the Proposed Action as they existed in 2010. In addition, the 2010 PAR projected the future conditions within the ROI if the Proposed Action were not implemented. As part of that effort, the USFWS, in coordination with the USACE, compiled a list of planned projects within the ROI, and evaluated their respective impacts using Habitat Evaluation Procedures (USFWS 2010). However, since preparing the 2010 PAR, preliminary implementation of some projects and substantial delays in others result in the 2010 PAR no longer accurately representing the existing conditions. In addition, the species used to evaluate existing and predict future habitat conditions have also changed from those approved for use in 2010. This document includes all the applicable information from the 2010 PAR updated to better reflect existing conditions, as well as Chapters 4 through 8 which were not included in the 2010 PAR.

The PAR outline is provided below.

- Chapter 1
    - Project overview
    - Project Description
    - Study Area
    - Alternatives
- Chapter 2
    - Habitat Evaluation Methods
    - Habitat Descriptions
    - Threatened and Endangered Species
    - Recommendations
    - Summary
- Chapter 3 presents the impacts to habitats and habitat value from implementation of Alternative 1, Future Without Project Condition.
- Chapter 4 presents the impacts to habitats and habitat value from implementation of Alternative 2.
- Chapter 5 presents the impacts to habitats and habitat value from implementation of Alternative 3.
- Chapter 6 presents the impacts to habitats and habitat value from implementation of Alternative 2 and cumulative projects.

- Chapter 7 presents the impacts to habitats and habitat value from implementation of Alternative 3 and cumulative projects.
- Chapter 8 presents a summary of the different habitats and habitat value changes over time among Alternatives 1, 2, and 3.
- Chapter 9 presents the references.

1.2 PURPOSE/PROJECT DESCRIPTION

The purpose of the Proposed Action is to reduce flood risk through flood risk management (FRM), enhance ecosystems, and provide greater recreation opportunities within the Trinity River Corridor in Dallas, Texas. Implementation of the Proposed Action is needed to comply with Section 5141 of the Water Resources Development Act (WRDA) of 2007 authorization.

Flooding events on the Trinity River have historically caused loss of lives and damage to property and structures. The Dallas Floodway currently is estimated to provide FRM benefits associated with passage of a flood event with a 1500-year recurrence interval without overtopping. This flood event has an estimated peak flow of 245,000 cubic feet per second (cfs). The current estimated peak flow for the Standard Project Flood (SPF) event is 269,000 cfs. The predicted future SPF peak flow is 277,000 cfs; thus, the Dallas Floodway is currently not able to contain the current or predicted future SPF event. Current hydrologic and hydraulic (H&H) models predict higher water surface profiles for the Dallas Floodway levees as compared to those modeled in 1958 due to a number of changes that have occurred. Some of these changes include watershed development, land use changes, floodplain encroachments, updated design methodology, and improved modeling technology, as described below. Recent local severe rainfall events have also demonstrated that improvements are needed to reduce the risk of flooding of levee interior developments.

In addition, urbanization and past channelization and clearing of the Dallas Floodway have significantly degraded the natural terrestrial and aquatic habitat of the Dallas Floodway. The Trinity River now reflects little of its historic course, water quality, or habitat. Furthermore, the City of Dallas lacks sufficient recreational opportunities for citizens and visitors. There is inadequate access to the Dallas Floodway, and it is not perceived by the public as a desirable destination for recreation.

The Proposed Action consists of three major project components:

- **Balanced Vision Plan (BVP) Study Flood Risk Management (FRM)**. This element includes implementing actions to provide FRM for the 277,000 cubic feet per second (cfs) riverine flood event (the Standard Project Flood). Elements include raising and flattening the levees, modifying the AT&SF Railroad Bridge, removing an embankment, and enacting non-structural improvements.
- **BVP Study Ecosystem Restoration and Recreation Enhancements**. This element includes the development of three lakes, modification to the Trinity River course, construction of approximately 300 acres of new wetlands, construction of 115 acres of groomed athletic fields, and general elements to improve safety and access to the larger BVP Study elements.

- **Interior Drainage Plan (IDP) Improvements**. The IDP improvements consist of improvements to the existing Charlie, Delta, and Hampton, pump stations, construction of a new Trinity-Portland Pump Station, and restoration of sump capacity to provide protection against the one percent chance (100-year) event. These features are defined in the report prepared by the City of Dallas entitled *The Interior Levee Drainage Study Phase-I Report, Dallas, Texas*, dated September 2006 and *The Interior Levee Drainage Study Phase-II Report, Dallas, Texas*, dated January 2009.

This document analyzes the potential comprehensive environmental consequences resulting from the implementation of the Proposed Action. Major elements of the Proposed Action are summarized in Table 1-1.

Table 1-1. Proposed Action Project Elements

Category	*Descriptive Element*
BVP Study Flood Risk Management	
Levees	Raise to 277,000 cfs Flood Height
AT&SF Railroad Bridge	Removal of Wood Bridge Segment
	Removal of Concrete Bridge Segment
	Removal of Embankment Segments
Santa Fe Trestle Trail	Embankment Removal
Levee Widening	Side Slopes at 4:1 Ratio
Nonstructural Flood Control Improvements	Emergency Response
	Public Awareness/Education
	Flood Forecasting
	Warning Systems
BVP Study Ecosystem and Recreation	
Lakes	West Dallas Lake
	Urban Lake
	Natural Lake
River	Realignment and Modification
Wetlands	Marshlands
	Cypress Ponds
	Corinth Wetlands
Athletic Facilities	Potential Flex Fields
	Playgrounds
	River Access Points

General Features	Parking and Public Roads
	Lighting
	Vehicular Access
	Pedestrian Amenities (Trails, Boardwalks, and Sidewalks)
	Restrooms
Interior Drainage Outfall Modifications	Pump Station Outfalls
	Pressure Sewer Outfalls
Interior Drainage Plan	
East Levee	Construct New Hampton Pump Station
	Nobles Branch Sump Improvements
	East Levee Sump Improvements
West Levee	Demolish Charlie Pump Station
	Construct New Charlie Pump Station
	Rehabilitate Existing Delta Pump Station
	Construct New Delta Pumping Station
	Eagle Ford and Trinity-Portland Sump Improvements
	Construct New Trinity-Portland Pumping Plant

1.3 STUDY AREA

1.3.1 Location

An environmental study area was delineated cooperatively by the USACE and the USFWS for use in this PAR. Spatial GIS data provided by the USACE indicate that the study area encompasses 17,142 acres in Dallas County, Texas within the Trinity River Basin (Figure 1). The study area assessed within this document generally equates to the extent of the Federal Emergency Management Agency (FEMA) predicted 500-year riverine flood event.

1.3.2 Dallas Floodway Levee System

The existing Dallas Floodway Levee System, authorized in 1945, extends along the Trinity River upstream from the Atchison, Topeka and Santa Fe (AT&SF) Railroad Bridge at Trinity River Mile (RM) 497.37, to the confluence of the West and Elm Forks at RM 505.50, thence upstream along the West Fork for 2.2 miles and upstream along the Elm Fork approximately 4 miles. Of the 22.6 miles of levees within this reach, the East Levee is 11.7 miles in length and the West Levee is 10.9 miles in length. In addition to the levees, the floodway includes a modified river channel and structures including seven pumping plants, five pressure conduits, and seven drainage structures. Construction of the existing Dallas Floodway Levee System was completed in 1959.

Figure 1. Dallas Floodway Study Area with HEP Sites

1.3.3 Climate, Topography, and Ecology

The climate of Dallas County is moderate humid subtropical with hot summers and mild winters, with an occasional front of extremely cold temperatures. The average low and high temperatures range from 36 °F in January to 96 °F in July. The lowest minimum recorded temperature is 1 °F in 1989 and the highest maximum 112 °F in 1980. Annual precipitation within the City averages 33.7 inches per year. The terrain consists of rolling hills ranging from 380 to 490 feet (115 to 150 meters) in elevation, generally sloping to the east and southeast.

The study area is located in the Blackland Prairie ecological area of Texas (Gould 1962) and is within the identically-named Blackland Prairie natural vegetation area (Diggs et al. 1999). Historically, the area was predominantly tall grass prairie with trees along watercourses, sometimes scattered on the prairie or concentrated in certain areas possibly as a result of locally favorable soil conditions or topography. Fire was probably an important factor in maintenance of the original prairie vegetation and had a major impact on the community structure (Strickland & Fox 1993). Tall grass prairie fires, intensely hot, would have been stopped only by the lack of dry fuel or a change in topography. Even stream bank vegetation was susceptible during dry years. The end result was that trees were rare even along some stream banks, and prairie margins probably extended somewhat beyond the limits of the soil types usually associated with prairie (Hayward & Yelderman 1991). There is considerable variation in the tall grass prairie communities of the Blackland Prairie (Diamond & Smeins 1993) and disagreement about specific community types (Simpson & Pease 1995). However, common dominant grasses of this tall grass prairie ecosystem include little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*), switchgrass (*Panicum virgatum*), eastern gamagrass (*Tripsacum dactyloides*), tall dropseed (*Sporobolus compositus*), Texas cupgrass (*Eriochloa sericea*), Florida paspalum (*Paspalum floridanum*), and long-spike tridens (*Tridens strictus*) (Collins et al. 1975). As a whole, most of the Blackland Prairie is a complex mosaic of tall grass communities; an example of this can be seen in northern Grayson County where four of the community types discussed above can be seen within a few miles (Diggs et al. 1999).

With the exception of preserves, small remnants, or native hay meadows, almost nothing remains of the original Blackland Prairie communities. Conversion of the Blackland Prairie for agriculture was the most significant cause of the destruction of this ecosystem, with only marginal, steeply sloped land not rapidly brought under cultivation. High prices for cotton and grains eventually resulted in the cultivation of these areas as well. Once stripped of protective grass, these areas eroded rapidly with disastrous effects. Given the relatively high rainfall and continuing suppression of fire by humans, native trees and shrubs (e.g. eastern red cedar [*Juniperus virginiana*] and cedar elm [*Ulmus crassifolia*]), as well as introduced species, are able to invade and eventually take over areas that were formerly prairie (Diggs et al. 1999).

Five habitat types were mapped and evaluated in the study area and include bottomland hardwood, emergent wetland, grassland, aquatic riverine, and open water. The five habitat types will be discussed in more detail in Chapter 2.

Soil-types within the study area are composed largely of the Trinity-Frio, Eddy-Stephen-Austin, Silawa-Silstid-Bastsil, and Austin-Houston Black representing the Tallgrass Prairie Community of soils associated with floodplains, stream terraces, and uplands along this portion of the Trinity River floodplain. This community is characterized by deeper soils underlain at rather shallow depths by dense, hard, clayey material. This "claypan" restricts air and water movements, as well as root penetration. It is typically dominated by warm-season, perennial tallgrasses, with warm-season, perennial midgrasses filling most of the remaining species composition. The warm-season, perennial forb component varies between 5 and 15 percent depending on climatic patterns and local precipitation. Historically, woody species made up a minor component of the community, 5 percent or less (U.S. Department of Agriculture 2009). The tree species noted most often in the study area during data collection were cottonwood (*Populus deltoides*), pecan (*Carya illinoinensis*), black willow (*Salix nigra*), American elm (*Ulmus americana*), hackberry (*Celtis occidentalis*), green ash (*Fraxinus pennsylvanica*), cedar elm, red mulberry (*Morus rubra*), and bur oak (*Quercus macrocarpa*). Although development has brought upland characteristics to portions of the study area nearest the river, historically more of it was likely dominated by bottomland hardwood forest.

The study area is used by both resident and migratory wildlife species that are tolerant of human activity. Small mammals and migratory and resident passerines use the wooded areas along the forks, Mainstem, and tributaries of the river for nesting, foraging, and as a dispersion corridor. The intact woodlands downstream of the study area are most likely used by a variety of migratory and resident passerine, owl, and hawk species that may disperse upstream. Some common resident bird species that may be observed in the study area are sparrows (various species), northern mockingbird (*Mimus polyglottos*), American robin (*Turdus migratorius*), northern cardinal (*Cardinalis cardinalis*), blue jay (*Cyanocitta cristata*), common grackle (*Quiscalus quiscula*), scissor-tailed flycatcher (*Tyrannus forficatus*), barred owl (*Strix varia*), common crow (*Corvus brachyrhynchos*), American kestrel (*Falco sparverius*), Carolina chickadee (*Parus carolinensis*), and red-tailed hawk (*Buteo jamaicensis*). Mammal species that may utilize appropriate habitats in the study area include raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), opossum (*Didelphis virginiana*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), eastern cottontail (*Sylvilagus floridanus*), fox squirrel (*Sciurus niger*), and small rodents. Various species of frogs and turtles may be found in less impacted reaches of the river, while lizards and snakes may also persist in viable terrestrial areas within the study area. A list of floral and faunal species that were observed during field investigations in the study area is included on each site observation sheet in Appendix A. Fish species within the study area are discussed in the aquatics and open water reports that were submitted to the USACE in 2004 and 2010 and are included in Appendix G and I, respectively.

1.4 ALTERNATIVES

The potential Trinity Parkway project is currently undergoing NEPA review in a separate EIS lead by the Federal Highway Administration (FHWA). This process includes a review of several alternative alignments, as well as the No-Action Alternative. While the potential Trinity Parkway analysis continues, the City of Dallas has taken steps to develop preliminary designs for the BVP Study features. Recognizing the alternative review process inherent in NEPA, the City of Dallas has initiated preliminary design of two different versions of the BVP Study Ecosystem and Recreation features. The first scenario, presented as Alternative 2, considers the implementation and alignment of the Proposed Action if the Trinity Parkway is constructed within the Dallas Floodway. The second scenario, captured in Alternative 3, considers the implementation of the Proposed Action if the Trinity Parkway is not constructed within the Dallas Floodway.

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CHAPTER 2
EXISTING HABITATS AND WILDLIFE RESOURCES

2.1 HABITAT EVALUATION METHODS

2.1.1 Bottomland Hardwood, Emergent Wetland, and Grassland

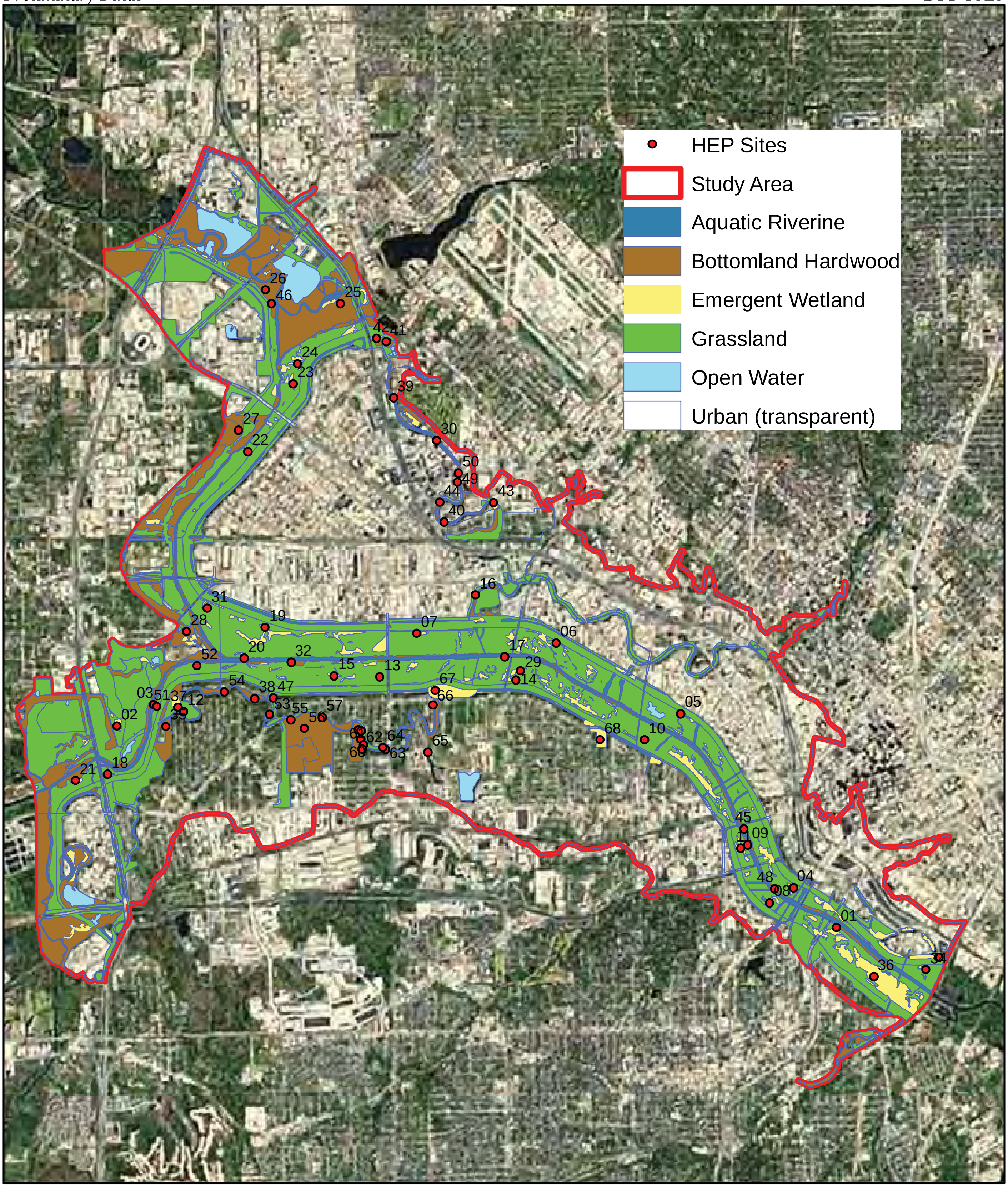
An interagency team composed of USACE, TPWD, and USFWS personnel was convened to conduct a habitat evaluation of the study area. The USFWS's *Habitat Evaluation Procedures* (HEP) (USFWS 1980) were used to analyze and describe the various existing habitats in the study area.

The interagency team comprised of biologists, collected field data on August 30 – September 1, 2004; October 12 – 14, 2005; and April 25, 2006. Data were also used for several of the HEP sites that were collected on May 5, 1999, while the USFWS was conducting another study. Sixty-eight survey sites were randomly selected within the three terrestrial habitat types in the study area: bottomland hardwoods, grasslands, and emergent wetlands. Figure 1 displays the locations of the data sites that were recorded using a Trimble GeoXT handheld unit. These sites are also depicted on aerial maps in Appendix E and their geographical locations are listed in Appendix F. The USACE and Cardno TEC provided spatial data used to analyze and evaluate habitat cover. The habitat cover is provided in Figure 2. Figure 3 presents the evaluation groups which will be discussed in the next section (Habitat Descriptions and Suitability Index Values).

Six different wildlife indicator species were selected to represent the wildlife communities that use the three habitats evaluated. The fox squirrel, barred owl, and wood duck (*Aix sponsa*) were selected to represent those species that use bottomland hardwoods. Species selected for emergent wetland habitat suitability evaluation include the American coot (*Fulica americana*), and wood duck. The eastern meadowlark (*Sturnella magna*), and eastern cottontail were selected to represent the wildlife communities in grasslands.

HEP requires the use of Habitat Suitability Index (HSI) models developed for each indicator species that best represent groups of species that use the habitats. The HEP models contain a list of structural habitat composition variables that are contained in optimum habitat. All variables for each species representing each habitat are compiled and measured in the field (Appendix C). Twenty-one variables were compiled for the bottomland hardwoods (Appendix C-1). There were 11 grassland habitat variables (Appendix C-2), and 14 emergent wetland variables (Appendix C-3). These variables were measured or estimated to a tenth of an acre data site within the habitat they represent. Habitat variables are used to provide a quantifiable value of habitat suitability.

Baseline habitat conditions are expressed as a numeric function (HSI value) ranging from 0.0 to 1.0, where 0.0 represents no suitable habitat for an indicator species and 1.0 represents optimum conditions for the species. HSI values ranging from 0.01 to 0.24 are considered "poor" habitat, 0.25 to 0.49 are considered "below average" habitat, 0.50 to 0.69 are "average" habitat, 0.70 to 0.89 are "good" habitat, and 0.90 to 1.00 are considered "excellent" habitat. Habitat Units (HU) are calculated by multiplying the HSI for each habitat by the amount of acres of the same habitat.



U.S. Fish & Wildlife Service

Arlington, Texas, Ecological Services Field Office

Projection: UTM Zone 14N, NAD 1983, GRS 1980

Production Date: 5/12/2010

0 0.25 0.5 1 Miles

0 0.25 0.5 1 Kilometers

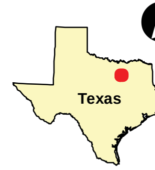
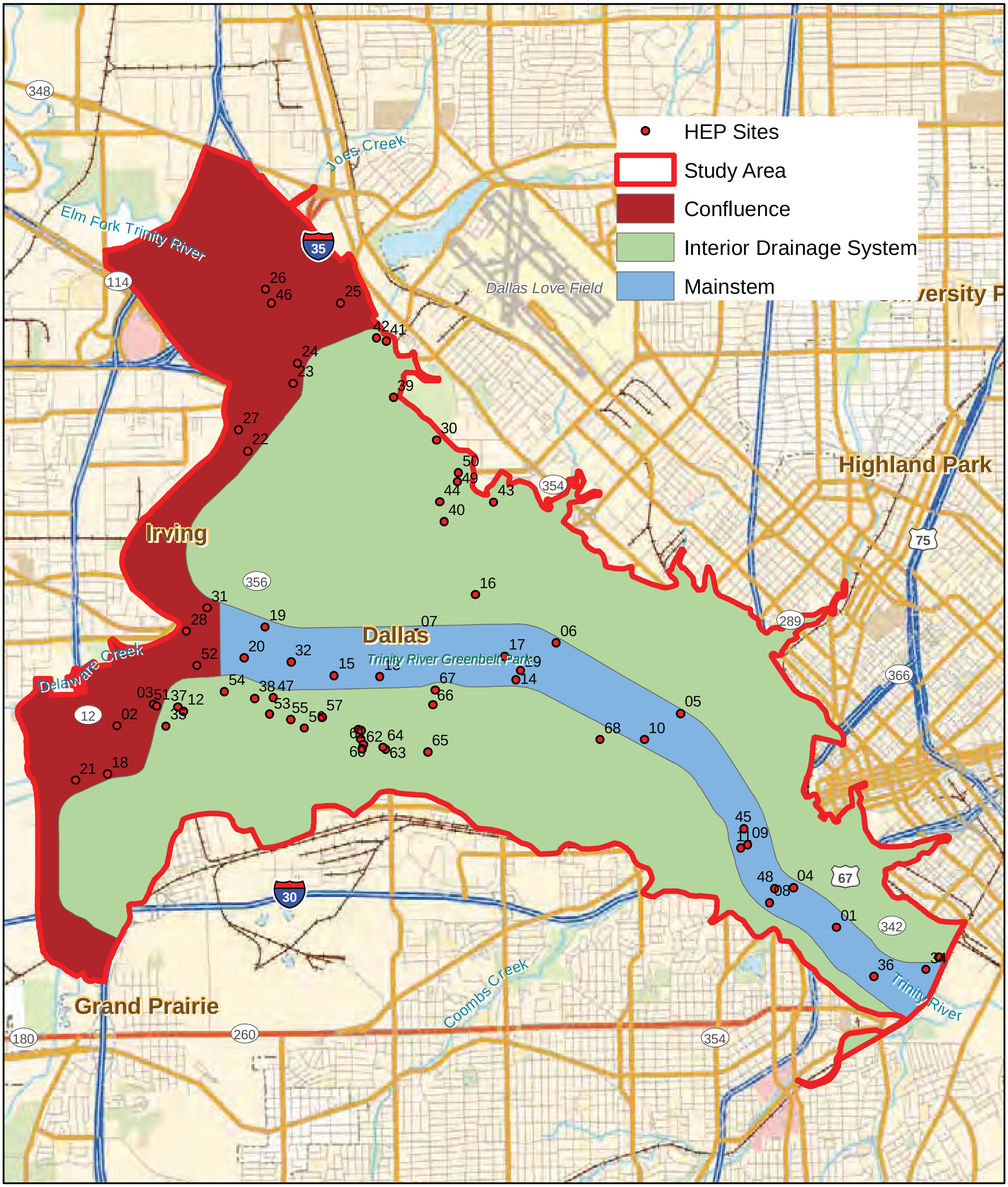


Figure 2. Dallas Floodway Study Area Cover Types



U.S. Fish & Wildlife Service

Arlington, Texas, Ecological Services Field Office

Projection: UTM Zone 14N, NAD 1983, GRS 1980

Production Date: 5/12/2010

Miles 0 0.25 0.5 1

Kilometers 0 0.25 0.5 1

Texas

Figure 3. Dallas Floodway Evaluation Areas

A complete list of plant species observed during the surveys is included in Appendix A. Appendix B includes the individual site observation sheets that contain a physical description of each site and a list of plants and animals observed at the site. Appendix D contains photographs taken in each compass direction from the center of each survey site.

2.1.2 Habitat Suitability Index Models

This 2014 PAR uses HSI models to quantify current and future habitat values under different alternatives in terms of HU. HUs are calculated by multiplying habitat acreage by the HSI. Table 2-1 identifies the indicator species used for this analysis by applicable habitat type. The HSI models for the indicator species are available in the References, Chapter 9 (USFWS 1982a, 1982b, 1983, 1984, 1985, 1987). A summary of the approved models is available here:

http://www.nwrc.usgs.gov/wdb/pub/hsi/USGS-BRD-ITR_1997-0005.pdf (USGS 1997).

Table 2-1 Indicator Species Used by Habitat Type

Habitat Type	*Species Used*
Bottomland Hardwood	Fox Squirrel
	Barred Owl
	Wood Duck
Emergent Wetland	Wood Duck
	American Coot
Grassland	Eastern Meadowlark
	Eastern Cottontail

2.1.3 Aquatic Riverine

The USFWS and the TPWD conducted a fisheries survey on the Trinity River in Dallas County, Texas from August 30 – September 1, 2004, during summer low flow conditions. The purpose of the survey was to determine baseline fish-community structure within the area of the Trinity River that could be potentially impacted by stream modifications, development, and/or construction activities associated with the proposed Dallas Flood Control Project. Data resulting from the survey were also qualitatively compared to previous fisheries studies conducted within this portion of the Trinity River to evaluate fish community trends within the proposed project area. In addition, 25 fish collected during the survey were retained for chemical analyses to qualitatively assess current contaminant levels in fish within the proposed project area. The results and recommendations from the survey are contained in the USFWS's report, *Assessment of Trinity River Fisheries within the Proposed Dallas Flood Control Project Area, Dallas County, Texas* (USFWS 2004) and are included as Appendix G.

Based on the 2004 Trinity River assessment, HSI and HUs were determined for the aquatic riverine habitat within the three evaluation groups in the study area, Confluence, Mainstem, and Interior Drainage System (IDS) (USFWS 2004). During the 2004 assessment, four reaches of the Trinity River were surveyed and are depicted in Figure 4. To assess the index of biotic integrity (IBI) scores and HSI values by habitat groupings (i.e., Mainstem, Confluence, and IDS), the Trinity River Basin Specific IBI scores were recalculated with reaches 1 and 2 representing the Mainstem and reaches 3 and 4 representing the Confluence. Reach 1, the lower reach of the Mainstem, had the lowest HSI of the four reaches and was determined to be the most similar of the four reaches to the IDS. The IDS is smaller than the Trinity River, has less species diversity, and is not connected to the Trinity River for species dispersal, thus it is expected to have a lower HSI than the rest of the River. The conversion of IBI values into HSI values does not reveal aquatic habitat suitability based upon measured habitat features. Rather, inferences may be made regarding aquatic habitat suitability and the aforementioned ranges (poor to excellent) correspond reasonably. This report is included as Appendix H.

2.1.4 Open Water

A fisheries survey was conducted on open water systems within the Trinity River floodway in Dallas County, Texas, on June 16, 2010, by the USFWS and USACE, with technical assistance provided by the TPWD. Another survey was conducted by USACE Fort Worth District and Lewisville Aquatic Ecosystem Restoration Facility (LAERF) personnel in summer 2009 (see Appendix I) (USACE 2010). The purpose of the surveys was to determine baseline fish-community structure for open-water habitat features within the Trinity River floodplain that could be potentially impacted by development and/or construction activities associated with the proposed Dallas Floodway Project. Data resulting from the surveys would be used to quantify existing open water habitat conditions, so that future with and without project fish community trends, impacts, and benefits can be assessed and compared. Surveys of existing fish communities within the Trinity River floodplain would help forecast the fish species that will likely inhabit the proposed Natural, Urban, and West Dallas lakes that are currently being proposed for implementation as part of the City of Dallas's Balanced Vision Plan (BVP) to be analyzed in the EIS.

To identify the survey sites within the Trinity River floodplain for the open water survey, seven individual screening criteria were used to identify water bodies that would be similar to the proposed Natural, Urban, and West Dallas lakes: (1) Located within the Trinity River floodplain; (2) No permanent connection to a tributary or other water source; (3) Provide water throughout the year; (4) Inundation by the Trinity River from a 0.5 to 2 year event; (5) Have a maximum depth less than 12 feet; (6) Range in size from 5 to 100 acres; and (7) Provide aquatic vegetation within the littoral zone of the water body. Six open water systems were identified that met the initial screening criteria: Crow Lake, Little Lemon Lake, Bart Simpson Lake, John Wiley Price Lake, Big Lemon Lake, and wetland cell D of the Dallas Floodway Extension (DFE) project. Of the six identified sites, three were surveyed: Crow Lake, Bart Simpson Lake, and wetland cell D of the DFE project and are shown on Figure 4. Based on the survey results from the three sites, HSI values for open water habitat were determined. This report is included as Appendix I.

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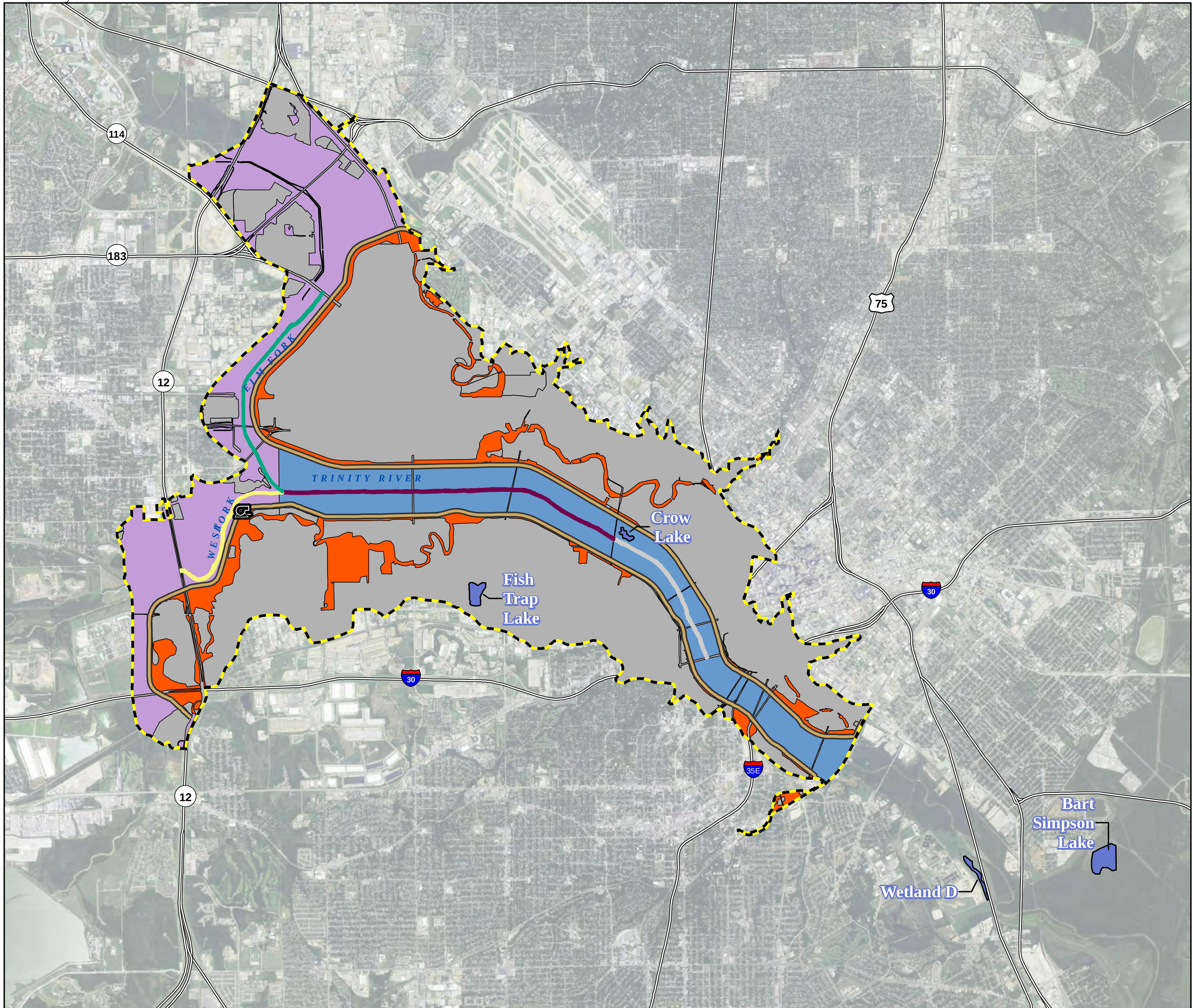
Figure 4
Aquatic Riverine and Open Water Assessment Areas and Evaluation Groups in the Dallas Floodway Study Area



LEGEND

ROI

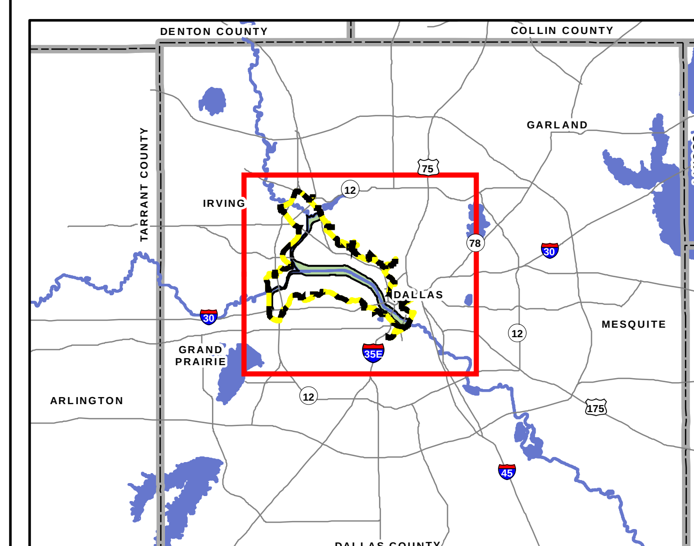
Aquatic Riverine Survey Sites
- Reach 1
- Reach 2
- Reach 3
- Reach 4

Evaluation Groups
- Confluence
- Mainstem
- Interior Drainage System

Open Water Survey Site

Dallas Floodway Levee

Freeway



0 0.5 1 2 Kilometers

0 0.5 1 2 Miles

GIS Sources:City of Dallas 2008a, NCTCOG 2008, USACE 2013b, USFWS 2006

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2.2 HABITAT DESCRIPTIONS AND SUITABILITY INDEX VALUES

The study area was divided into three evaluation groups: the Confluence, IDS, and Mainstem (refer to Figure 3). Each of these areas is expected to be impacted in different ways by the project and was independently analyzed for habitat suitability in order to assess possible differences in their existing conditions. Existing habitat conditions across these groupings also vary due to differences in topography and past impacts. This targeted approach is intended to better illustrate the likely impact of project alternatives on habitat values within the differing groups.

The project's study area, which roughly corresponds to the FEMA 500-year flood event level, contains 10,400 acres (61 percent of the study area) of urban development and roads. Three wildlife habitat types evaluated for the HEP within the study area include bottomland hardwoods, grasslands, and herbaceous wetlands. The two aquatic habitat types, aquatic riverine and open water, were evaluated separately (see Appendices G through I). The HSI values for bottomland hardwood, emergent wetland, and grassland habitat within the study area ranged from 0.21 (poor) for bottomland hardwoods within the Dallas Floodway evaluation area to 0.70 (good) for both emergent wetlands in the Confluence evaluation area and grasslands within the IDS evaluation area. The HSI values for aquatic riverine and open water ranged from 0.65 (average) for open water in the IDS to 0.90 (excellent) for aquatic riverine in the Confluence.

The following findings and tables contain the HSI for the five habitats per evaluation group per species or survey site and a summary table of the existing habitat acres, HSIs, and HU for each habitat type. Planning recommendations for these habitats are included at the end of this chapter.

2.2.1 Bottomland Hardwood

The HEP defines the bottomland hardwood cover type as wetland areas dominated by deciduous trees, usually along streams, and that are occasionally flooded. In optimum conditions, this cover type provides food, cover, nesting habitat, and living space to riparian forest dependent species. Large trees provide important nesting habitat for the fox squirrel, wood duck, and barred owl, and escape cover for raccoons, wood ducks, and passerines. Large mast producing trees and shrubs provide food for the fox squirrel. Brush piles and snags provide necessary food, cover, and shelter for the raccoon and passerines. The close proximity to water is important for the raccoon and wood duck. Riparian forest habitats are essential in maintaining biodiversity and providing important wildlife travel corridors.

Located primarily along the Trinity River and its inflows, many of these woodlands are periodically flooded and are predominately composed of cottonwood, cedar elm, green ash, pecan, black willow, and box elder. Other trees species present include bur oak, red mulberry, and sugar hackberry.

There are four bottomland hardwood data sites in the Confluence area: Sites 3, 25, 26, and 27. There are thirteen bottomland hardwood data sites in the IDS area: Sites 16, 35, 38, 39, 40, 44, 54, 55, 57, 58, 59, 60, and 66. There are seven bottomland hardwood data sites in the Mainstem area: Sites 1, 9, 17, 20, 32, 45, and 48. Bottomland hardwoods in the Confluence and Mainstem were valued as poor habitat (0-0.24). Those in the IDS were valued as below average habitat (0.25-0.49) (Tables 2-2 and 2-3). The majority of the bottomland hardwood habitat in the study area is in the Confluence (Table 2-3).

Table 2-2. Existing HSI Values for Bottomland Hardwood Habitat per Indicator Species

Indicator Species	*Evaluation Areas*		
	Confluence	*IDS*	*Mainstem*
Barred Owl	0.31	0.54	0.26
Wood Duck	0.29	0.16	0.11
Fox Squirrel	0.13	0.46	0.28
HSI Average	0.24	0.39	0.21

Table 2-3. Existing Acres, HSI Values, and Habitat Units for Bottomland Hardwood

Evaluation Area	*Acres*	*HSI Average*	*HUs*
Confluence	966.49	0.24	231.96
IDS	351.50	0.39	137.09
Mainstem	94.64	0.21	19.87
Total	1,412.63	N/A	388.92

The limiting factors for bottomland hardwood habitat for the three evaluation groups were similar and are listed below.

- Minimal winter and brood cover along the banks for the wood duck.
- Minimal winter food (hard mast producing vegetation) available for the fox squirrel.
- The overstory trees are generally too small to provide nest sites for barred owl.
- Available trees provide minimal nesting opportunities for wood duck (IDS and Mainstem).

2.2.2 Emergent Wetland

Herbaceous emergent wetlands are wetland areas dominated by non-woody vegetation. Wetlands provide food and cover for fish, resident and migratory birds, small mammals, invertebrates, and the predators that feed on these species. Wetlands are important nesting habitat for wading birds and waterfowl and are comprised primarily of rushes, sedges, wetland grasses, and aquatic plants located along the edges of water bodies and creeks, and in seasonally flooded areas. Some of the wetlands evaluated are permanent, but most are likely seasonal.

There are six emergent wetland data sites in the Confluence area: Sites 2, 21, 24, 28, 46, and 52. There are nine emergent wetland data sites in the IDS area: Sites 33, 37, 42, 43, 49, 61, 63, 67, and 68. There are seven emergent wetland data sites in the Mainstem area: Sites 34, 5, 11, 14, 15, 19, and 36. The Confluence was valued at the lower range of below average quality emergent wetland habitat. Wetlands in the IDS and Mainstem were valued as poor quality wetland habitat (Tables 2-4 and 2-5). The majority of the wetland habitat in the study area is in the Mainstem (Table 2-5).

Table 2-4. Existing HSI Values for Emergent Wetland Habitat per Indicator Species

Indicator Species	*Evaluation Areas*		
	Confluence	*IDS*	*Mainstem*
Wood Duck	0.29	0.16	0.11
American Coot	0.31	0.29	0.33
HSI Average	0.30	0.22	0.22

Table 2-5. Existing Acres, HSI Values, and Habitat Units for Emergent Wetland

Evaluation Area	*Acres*	*HSI Average*	*HUs*
Confluence	67.95	0.30	20.39
IDS	87.72	0.22	19.30
Mainstem	262.91	0.22	57.84
Total	418.58	N/A	97.53

The limiting factors for emergent wetland habitat for the three evaluation groups were similar and are listed below.

- Available trees provide minimal nesting opportunities for wood duck.
- Minimal winter and brood cover along the banks for the wood duck.
- Minimal nesting and winter cover along the banks for the American coot.

The HSI calculations for wood duck in the Confluence and IDS did not require interspersion factoring because neither the bottomland hardwoods nor emergent wetlands within those areas scored 0.0 for any life requisite. Although emergent wetlands within the Mainstem area contained a life requisite score of 0.0 for nesting, bottomland hardwoods containing suitable nesting sites are within 800 meters precluding the need for interspersion factoring.

2.2.3 Grassland

Grasslands are dominated by grasses (native or introduced) that are not regularly planted or mowed, and have a canopy cover of 25 percent or less. Grasslands provide open space, a food source for passerines and the eastern cottontail, and cover for escape and nesting by means of tall grass, scattered brush piles, and shrubs for a variety of animals. Red-tailed hawks hunt for prey in open grasslands.

Grasslands within the study area may generally be characterized as "managed" grasslands that are routinely mowed. They are comprised of short native and introduced grasses and forbs, and occasional scattered trees. The grass species found in the data plots were switchgrass, Johnsongrass (*Sorghum halepense)*, Bermuda grass (*Cynodon dactylon*), and dallisgrass (*Paspalum dilatatum)*. Forb species also found include oxalis sp., daisy fleabane (*Erigeron strigosus*), dollarweed (*Hydrocotyle umbellata*), giant ragweed (*Ambrosia trifida*), snow on the prairie (*Euphorbia bicolor*), and balloon vine (*Cardiospermum halicacabum*).

There are five grassland data sites in the Confluence area: Sites 18, 22, 23, 31, and 51. There are ten grassland data sites in the IDS area: Sites 12, 30, 41, 47, 50, 53, 56, 62, 64, and 65. There are seven grassland data sites in the Mainstem area: Sites 6, 7, 8, 10, 13, 29, and 34. The grassland habitat within the Confluence area was valued as below average. Grassland habitats within the IDS and Mainstem were valued as average (Tables 2-6 and 2-7). Grasslands are the dominant habitat type throughout the study area (Table 2-7).

Table 2-6. Existing HSI Values for Grassland Habitat per Indicator Species

Indicator Species	*Evaluation Areas*		
	Confluence	*IDS*	*Mainstem*
Eastern Meadowlark	0.27	0.54	0.53
Eastern Cottontail	0.59	0.61	0.70
HSI Average	0.43	0.57	0.62

Table 2-7. Existing Acres, HSI Values, and HU for Grassland

Evaluation Area	*Acres*	*HSI Average*	*Hus*
Confluence	1,573.16	0.43	676.46
IDS	958.26	0.57	546.21
Mainstem	1,752.15	0.62	1,086.33
Total	4,283.57	N/A	2,309.00

The limiting factors for grassland habitat for the three evaluation groups were the same and are listed below.

- Distance to perch sites typically too great for eastern meadowlark.
- Minimal cover for eastern cottontail (shrub/tree and persistent herbaceous vegetation).

2.2.4 Aquatic Riverine

Aquatic riverine habitat within the study area includes 421.34 acres of the Elm Fork and West Fork in the Confluence, the main channel of the Trinity River in the Mainstem, and sumps within the IDS.

To assess IBI scores and HSI values by habitat groupings, (Mainstem, Confluence, and IDS), the 2004 Trinity River Basin Specific IBI scores were recalculated with reaches 1 and 2 representing the Mainstem, and reaches 3 and 4 representing the Confluence. A weighted average was used; thus the Mainstem and Confluence HSIs are not just the average of the corresponding reaches. Reach 1, the lower reach of the Mainstem, had the lowest HSI of the four reaches and was determined to be the most similar of the four reaches to the IDS. The IDS is smaller than the Trinity River, has less species diversity, and is not connected to the Trinity River for species dispersal, thus it is expected to have a lower HSI than the rest of the River.

Aquatic riverine habitat in the Confluence was valued as excellent and aquatic riverine habitat in the IDS and Mainstem was valued as good (Tables 2-8 and 2-9). The IDS contains the most aquatic riverine habitat and the Mainstem contains the least but the difference is only 40 acres (Table 2-9).

Table 2-8. Existing HSI Values for Aquatic Riverine Survey Sites

Reach	*Confluence*	*Mainstem*
1	-	0.75
2	-	0.87
3	0.90	-
4	0.82	-

Table 2-9. Existing Acres, HSI Values, and Habitat Units for Aquatic Riverine Habitat

Evaluation Area	*Acres*	*HSI Average*	*HUs*
Confluence	132.42	0.90	119.18
IDS	165.18	0.75	123.89
Mainstem	123.73	0.83	102.70
Total	421.33	N/A	345.77

The limiting factors for aquatic riverine habitat for the Confluence and Mainstem are from the 2004 USFWS IBI report (Appendix G) and are listed below (USFWS 2004). The limiting factors for the IDS are assumed to be the same limiting factors as listed below.

- Number of benthic invertivore species (Confluence).
- Percent of individuals as tolerants (Mainstem).
- Percent of individuals as omnivores (Confluence and Mainstem).
- Percent of individuals as invertivores (Mainstem).
- Number of individuals per seine haul (Confluence and Mainstem).
- Number of individuals per minute of electro-fishing (Confluence and Mainstem).
- Percent of individuals with disease or other anomaly (Confluence).
- Total number of intolerant species (Confluence).

2.2.5 Open Water

Outside of the river and drainage channels, the study area contains 206.65 acres of open water, including Crow Lake in the Mainstem, Fish Trap Lake in the IDS, and other ponds in the IDS and Confluence.

For the Dallas Floodway project, three lakes (Crow Lake, Bart Simpson Lake, and DFE Wetland Cell D) were surveyed to establish HSIs for the study area. Crow Lake is within the Mainstem, and Bart Simpson Lake and DFE Wetland Cell D are southeast of the project area (see Appendix I).

The HSI for the Confluence and the Mainstem were determined by using the average of the three survey sites (Tables 2-10 and 2-11). Because the IDS is smaller than the Trinity River, has less species diversity, and is not connected to the Trinity River for species dispersal, it is expected to have a lower HSI than the Mainstem or Confluence areas of the Trinity River. Thus, the average open water HSI score was adjusted to 0.71 (Table 2-10).

The open water habitat within the Confluence and Mainstem are on the low end of good. The open water habitat in the IDS is on the high end of average (Tables 2-10 and 2-11). The majority of the open water habitat in the study area occurs in the Confluence (Table 2-11).

Table 2-10. Existing HSI Values for Open Water Survey Sites

Survey Site	*HSI*
Crow Lake	0.77
Bart Simpson Lake	0.77
DFE Wetland Cell D	0.60
Average	0.71

Table 2-11. Existing Acres, HSI Values, and Habitat Units for Open Water

Evaluation Area	*Acres*	*HSI Average*	*HUs*
Confluence	150.93	0.71	107.16
IDS	49.30	0.65	32.05
Mainstem	6.41	0.71	4.55
Total	206.64	N/A	143.76

The limiting factors for open water habitat for the three evaluation groups were assumed to be the same as the limiting factors for the open water survey sites (Crow Lake, Bart Simpson Lake, and DFE Wetland Cell D) (Appendix I) and are listed below.

- Total number of fish species.
- Number of cyprinid species.
- Number of catfish species.
- Number of intolerant species.

2.3 HABITAT UNITS SUMMARY

Table 2-12 presents a summary of total HUs for each habitat type within the study area. The majority of the habitat and HUs in the study area is grassland. Grassland is the dominant vegetation in the floodway and on the levees. Open water and emergent wetlands have the lowest HUs in the project area. Open water has the least habitat acreage in the study area including Crow Lake, Fish Trap Lake, and other ponds in the Confluence and IDS. However, emergent wetlands have the fewest HUs (97.53) in the study area due to limited habitat, disturbance, and low HSIs.

Table 2-12. Existing HUs per Habitat Type

Habitat Types	*Baseline HU*
Bottomland Hardwood	388.92
Emergent Wetland	97.53
Grassland	2,309.00
Aquatic Riverine	345.77
Open Water	143.76
Total	3,284.98

2.4 THREATENED AND ENDANGERED SPECIES AND BIRDS OF CONSERVATION CONCERN

The federally-listed threatened or endangered species known to occur in Dallas County include the endangered whooping crane (*Grus americana*), interior least tern (*Sternula antillarum*), black-capped vireo (*Vireo atricapilla*), golden-cheeked warbler (*Dendroica chrysoparia*), and the threatened piping plover (*Charadrius melodus*).

Endangered whooping cranes may be encountered in any county in north central Texas during migration. Autumn migration normally begins in mid-September, with most birds arriving on the wintering grounds at Aransas National Wildlife Refuge between late October and mid-November. Spring migration occurs during March and April. Whooping cranes prefer isolated areas away from human activity for feeding and roosting, with vegetated wetlands and wetlands adjacent to cropland being utilized along the migration route. Foods consumed usually include frogs, fish, plant tubers, crayfish, insects, and waste grains in harvested fields. It is possible that whooping cranes may temporarily utilize habitats present within the study area during their annual migration but an encounter would be a rare occurrence. It is unlikely that any of the current activities or proposed modifications to the floodplain would have an adverse impact on this species.

The endangered interior least tern nests in colonies on bare to sparsely vegetated sandbars along rivers and streams in Texas from May through August. Nesting areas are ephemeral, changing as sandbars form, move, and become vegetated. Because natural nesting sites have become sparse, interior least terns have nested in atypical/non-natural areas, which provide similar habitat requirements. For example, one colony has been nesting for several years at the Southside Wastewater Treatment Plant in Dallas. Non-natural nesting sites include sandpits, exposed areas near reservoirs, gravel levee roads, dredge islands, gravel rooftops, and dike-fields. In recent years, terns have been utilizing artificial habitat more frequently within the Dallas area with small colonies being established in highly developed areas. Ground disturbance related to construction activities near the Trinity River may incidentally create areas that are attractive to least terns for use as potential nesting sites. Should least terns arrive at any of the project areas during the breeding season, the USFWS should be notified to discuss alternative development plans or the need for consultation under Section 7 of the Endangered Species Act.

The golden-cheeked warbler's habitat is generally described as mature (at least 12 feet tall) oak-juniper woodlands, with 50 percent or greater canopy cover, although warblers have been found in habitat with as little as 30 percent canopy cover. Steep, narrow canyons, with deciduous trees located along the drainage bottoms and juniper on the side slopes, provide an ideal mix of vegetation for this species. However, suitable habitat may also occur on hilltops or other relatively flat areas. Ideal habitat areas have a diverse mixture of juniper and hardwood trees, including oaks, hackberry, sycamore, and cedar elm.

The black-capped vireo is a habitat specialist, nesting in mid-successional brushy areas (i.e., before the area develops into a mature woodland) where the dominant woody species are oaks, sumacs, persimmon, and other broad-leaved shrubs. Juniper may be common in vireo habitat, but juniper prominence is not essential or even preferred by the species. Typical nesting habitat is composed of a shrub layer extending from the ground to about 6 feet and covering about 35-55 percent of the total area, combined with a tree layer that may reach to 30 feet or more. Open, sometimes grassy spaces separate clumps of trees and shrubs. The vireo also depends on broad-leaved shrubs and trees, especially oaks, which provide insects on which the vireo feeds.

The habitat evaluation team did not encounter any habitats that appeared suitable for nesting golden-cheeked warblers or black-capped vireos. Therefore, it is unlikely that either species would be present within the study area.

The threatened piping plover is considered to be a statewide migrant in Texas. Current information indicates that this species may stop-over during migration in Grayson County, especially near Lake Texoma and the Red River. Winters are spent along the Gulf Coast. Habitat requirements include bare to sparsely vegetated river sandbars for nesting and foraging. Its diet consists mainly of marine worms, mollusks, crustaceans, and insects. Although piping plovers have been seen in Dallas County, an encounter would be expected to be a very rare event. Therefore, it is unlikely that any of the current activities or proposed modifications to the floodplain would have an adverse impact on this species.

The bald eagle (*Haliaeetus leucocephalus*) was formerly listed in Dallas County but was removed from the federal threatened and endangered species list effective August 8, 2007. However, bald eagles are still afforded safeguards under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. We recommend all activities be conducted in accordance with the USFWS's National Bald Eagle Management Guidelines which may be accessed at:

http://www.fws.gov/migratorybirds/issues/BaldEagle/NationalBaldEagleManagementGuidelines.pdf.

The USFWS published the *Birds of Conservation Concern 2008* (BCC) in December 2008. "The overall goal of the BCC is to accurately identify the migratory and non-migratory bird species (beyond those already designated as Federally threatened or endangered) that represent our highest conservation priorities and draw attention to species in need of conservation action" (USFWS 2008).

Copies of the Birds of Conservation Concern 2008 may be obtained by writing to the Chief, Division of Migratory Bird Management, U.S. Fish and Wildlife Service, 4401 North Fairfax Drive, Mail Stop 4107, Arlington, VA 22203-1610, ATTN: BCC 2008. It is also available for downloading on the Division of Migratory Bird Management's web page at:

http://www.fws.gov/migratorybirds/NewReportsPublications/SpecialTopics/BCC2008/BCC2008.pdf.

The following are 21 species on the BCC lists that may utilize appropriate habitat types within the general vicinity of study area:

- little blue heron (*Egretta caerulea*) **-** inlands marshes and ponds
- peregrine falcon (*Falco peregrinus*) -generalist
- long-billed curlew (*Numenius americanus*) – open water, prairies, and savannas
- Hudsonian godwit (*Limosa haemastica*) - inlands marshes
- buff-breasted sandpiper (*Tryngites subruficollis*) - prairies, margins of lakes
- red-headed woodpecker (*Melanerpes erythrocephalus*) - woodlands
- scissor-tailed flycatcher (*Tyrannus forficatus*) – prairies, savannas, and open shrubland
- loggerhead shrike (*Lanius excubitor*) – open savanna, shrubland
- Bell's vireo (*Vireo bellii*) - dense thicket
- Sprague's pipit (*Anthus spragueii*) - short grass prairie
- prothonotary warbler (*Protonotaria citrea*) – riparian woodland
- worm-eating warbler (*Helmitheros vermivorum*) -woodlands
- Swainson's warbler (*Limnothlypis swainsonii*) - riparian woodland
- Kentucky warbler (*Oporornis formosus*) - riparian woodland
- field sparrow (*Spizella pusilla*) – old fields, scrubland, forest edge
- Henslow's sparrow (*Ammodramus henslowii*) – grasslands with scattered shrub
- Le Conte's sparrow (*Ammodramus caudacutus*) – thick, damp grassy areas, wetlands
- Harris' sparrow (*Zonotrichia querula*) - scrub, undergrowth in open woodlands and savanna, thickets, brushy fields, and hedgerows
- Smith's longspur (*Calcarius pictus*) – short grassland
- chestnut-collared longspur (*Calcarius ornatus*) - shortgrass prairie, plowed field, overgrazed pasture
- painted bunting (*Passerina ciris*) **-** riparian and thorn forest, oak woodlands, savanna, brushy pastures, and hedgerows

Because some of these species could potentially utilize appropriate habitats within the study area**,** especially as temporary stopover breaks during annual migration, we recommend that future projects avoid and/or minimize adverse impacts to intact upland and riparian habitats whenever possible.

2.5 RECOMMENDATIONS

The habitat analysis indicates the following specific measures could be beneficial for the restoration of natural habitats impacted by urban development within the study area.

1. Widen the riparian woodland corridors along the creeks and their associated tributaries as much as possible (up to 150 feet on each side) by planting native mast producing trees and shrubs to create a more functional riparian buffer zone. Riparian buffer zones provide several benefits for terrestrial and aquatic resources.
    a. First, riparian zones stabilize eroding banks by absorbing the erosive force of flowing water while roots hold soil in place.
    b. Second, riparian zones filter sediment, nutrients, pesticides, and animal waste runoff.
    c. Finally, riparian zones provide shade, shelter, and food for wildlife and aquatic organisms.

   d. Native mast producing trees and shrubs, such as pecan, bur oak, red oak, black walnut (*Juglans nigra*), wild plum (*Prunus mexicana*), sumac (*Rhus* sp.), hawthorne (*Crataegus* sp.), and coral-berry, should be planted in the expanded portion of the riparian woodland to improve canopy cover and food base.

   e. Recommend planting 70 percent woody stems, with no more that 25 percent consisting of soft mast producers. Shrubs should be planted at no more than 30 percent stems. Some scattered open spaces should be maintained for fox squirrel movement.

2. Thin portions, but not all, of the existing riparian corridor and upland deciduous forest under mast producing trees where the understory is too dense in order to improve fox squirrel habitat and to open the stands as preferred by numerous species.

3. Recommend planting mast producing trees and shrubs in the existing woodlands where they are lacking to improve the canopy cover and food base. The thick overstory and/or understory may need to be thinned and cleared around young trees to provide space and sunlight. Leave snags standing and let downed logs remain. Existing mast producing trees should be allowed to mature and increase in size.

4. Provide brush and log piles in all existing habitats where needed to provide cover for small mammals.

5. If hazardous materials contamination testing has not been conducted in areas to be restored as habitat, USFWS recommends that it be done before any restoration work is initiated.

6. Herbaceous wetlands could be created off stream in addition to water bodies planned for construction which are not designed specifically for typical wetland functions. Wetlands constructed off stream could provide nonpoint source pollution control. In this role, wetlands would provide several benefits that contribute to water quality improvements.

   a. First, the wetlands provide water quality function through solids settling, nutrient transformation, and biological uptake.

   b. Second, because they provide a fairly large surface area, wetlands provide floodwater storage and serve to collect peak flood flows known to carry most of the polluted runoff from nonpoint sources.

   c. Finally, wetlands provide diversity in the landscape and supply a unique habitat for many plant and animal species.

7. Plant locally available native aquatic plants and shrubs around the water edges. We recommend the use of locally available sedges, water-willow (*Justicia americana*), softstem bulrush (*Schoenoplectus tabernaemontani*), water pennywort (*Hydrocotyle umbellata*), switchgrass, smartweeds (*Polygonum* sp.), and buttonbush (*Cephalanthus occidentalis*). The wetland should not be mowed unless it is absolutely necessary to manage non-desirable plant species (i.e., invasives/exotics).

   a. Recommend that mowing be reduced as much as possible near the water's edge.

8. Recommend that water bodies within the project area be constructed with shelved floors of variable depths and appropriate substrates such as boulders and cobbles, where possible, to provide adequate habitat cover and spawning conditions within riverine and open-water systems.

9. In riverine and open water systems, a fish stocking plan is recommended.
    a. Fish are often available from and can be delivered by TPWD.
    b. Do not stock carp for vegetation control.
10. Conduct native aquatic vegetation planting and monitoring program.
11. In riverine systems, habitat suitability might greatly benefit from attempts to mimic natural flow systems with the construction of “riffle, pool, and run” sections where conditions allow.
12. Canopy overhang, which shades this littoral zone, might also improve habitat conditions and should be left intact where possible.
13. Create native grasslands, where possible, throughout the study area to replace Bermuda grass and Johnsongrass.
    a. Recommend planting native grass and forb species appropriate for the soils. Little bluestem, big bluestem, Indian grass, sideoats grama (*Bouteloua* sp.), switchgrass, vine-mesquite, Illinois bundle-flower (*Desmanthus illinoensis*), Maximilian sunflower (*Helianthus maximiliani*), and Engelmann’s daisy (*Engelmannia peristenia*) are excellent forage and seed producing species to consider.
    b. Plant shrub mottes and briar thickets in grasslands, and shrub and tree savannas, but maintain them to only about 5 percent canopy cover.
14. Any mowing schedule that may be developed should promote tall grass growth, but not interfere with tall-grass nesting birds.
    a. The grassland should not be mowed until after July 15.
    b. Maintain a “no mow” zone around herbaceous wetlands and stream shorelines, to the extent these actions are possible in public parklands.
15. Recommend that the direct, indirect, and cumulative impacts and conservation needs of the *Birds of Conservation Concern 2008* be considered during any Dallas Floodway restoration or flood control project planning.
16. Recommend that a biological analysis is conducted every few years using the same habitat evaluation technique to monitor and quantify habitat impacts resulting from future flood-control or restoration projects. Such an analysis would provide information for adaptive management and for future habitat restoration planning projects.

In addition, the following are some general recommendations for improving and maintaining lands in and adjacent to the study area for wildlife habitat that the city could practice and recommend to landowners:

1. Reduce mowing on city lands and along the water’s edge.
    a. Reseed and manage portions of these areas as native grasslands or emergent wetlands.
2. Develop a program to eradicate exotic plants on city lands.
    a. Use only native plants during the restoration project.
3. Control bank erosion through use of biological engineering to the extent possible and necessary.

4. Develop a plan to greatly reduce or eliminate the use of fertilizers, pesticides, and herbicides on public lands.
5. Initiate a program to help landowners/developers avoid and minimize impacts to sensitive areas and provide upland buffers adjacent to streams.

2.6 SUMMARY

The Dallas Floodway – Trinity River watershed has been heavily impacted by urban development. Of the 68 HEP data sites, all have been somewhat impacted by development. However, there are still some valuable wildlife habitats remaining within the watershed. The specific habitat restoration measures recommended in this report could help restore some of the natural habitats that have been lost and improve habitat diversity and quality of remaining habitats; therefore, benefitting a variety of resident and migratory wildlife species.

CHAPTER 3
ALTERNATIVE 1 - FUTURE WITHOUT PROJECT CONDITION

3.1 INTRODUCTION

This chapter describes potential impacts to fish and wildlife habitats from the implementation of the identified 19 cumulative projects as part of Alternative 1, the Future without Project Condition (FW/OPC), over the next 50 years within the ROI. The study area, habitat types (bottomland hardwood, emergent wetland, grassland, aquatic riverine, and open water) and evaluation groups (Confluence, IDS, and Mainstem) from Chapter 2 are used for the FW/OPC evaluation. Alternative 1 presents the estimated future conditions in the absence of the Proposed Action. The 19 FW/OPC projects in the study area are described below and shown in Figure 5.

3.1.1 Able Pumping Plant (A)

The City of Dallas and the USACE are planning to relocate and improve the Able Pumping Plant in order to reduce the potential for stormwater flooding impacts to people and property in the Able Basin. The Proposed Action consists of constructing a new 875,000-gpm capacity pump station and outfall, and decommissioning and removing the existing Small Able and Large Able pump stations. The new Able Pumping Plant would be located near the existing Bellevue Pressure Sewer, adjacent to Riverfront Boulevard near the east levee. In addition, the Proposed Action includes implementing stormwater conveyance improvements in the Able Sump ponds (HDR 2013). The construction of the Able Pumping Plant would likely have small negative impacts to fish and wildlife through temporary and permanent impacts to forage, shelter, and breeding habitat. The project area is small and would impact small areas of habitat.

3.1.2 Baker Pumping Plant (B)

The City of Dallas and USACE are planning to improve the Baker Pumping Plant in order to reduce the potential stormwater flood risk to people and property in the City of Dallas and extend the service life of existing facilities for at least another 50 years. Improvements would include constructing a new pump station (which would work along with the 1975 Baker Pump Station), rehabilitating the Baker Pump Station to modernize the electrical system of the building, and decommissioning the Old Baker Pumping Plant. The project area is approximately 4.5 acres. Construction began in 2013 and will last for 18 months (USACE 2012). The construction of the Baker Pumping Plant would likely have small negative impacts to fish and wildlife through temporary and permanent impacts to forage, shelter, and breeding habitat. The project would only impact small areas of habitat.

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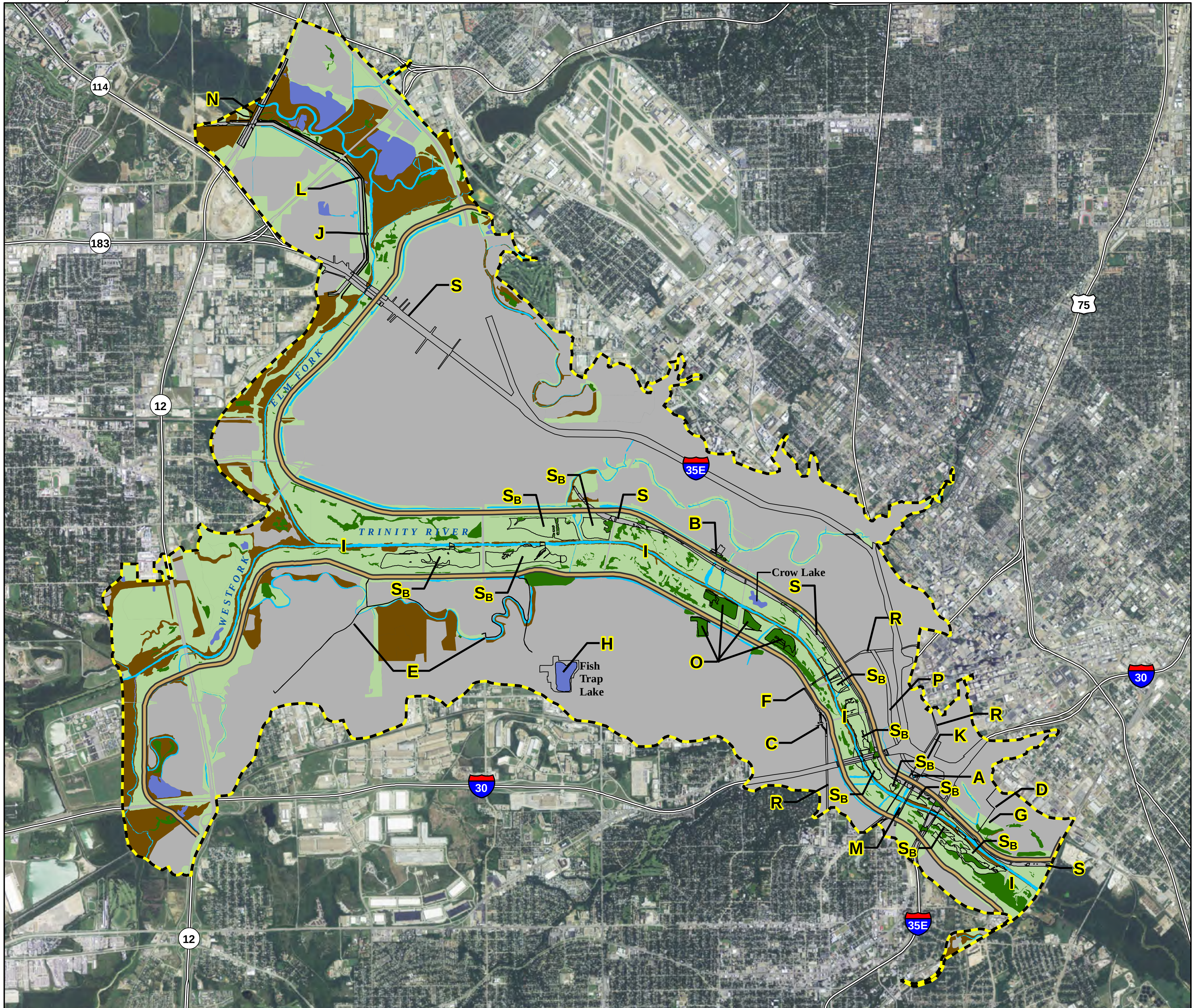


Figure 5
Habitat Types Under the Future Without Project Condition

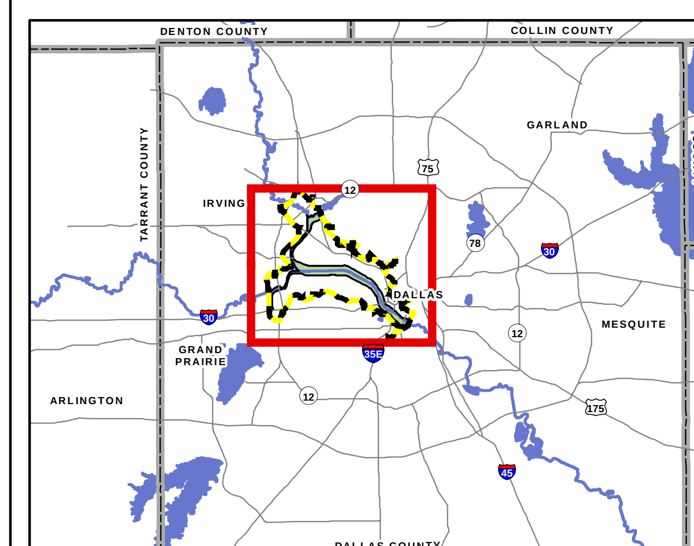
Future Without Project Condition Projects

- A Able Pumping Plant
- B Baker Pumping Plant
- C Beckley Avenue Improvements
- D Belleview Trail Connector
- E Bernal Trail
- F Continental Pedestrian Bridge
- G Dallas Maritime Museum
- H Dallas Watersports Complex
- I Dallas Water Utility Lines
- J EF2 Wastewater Interceptor Line & Laterals
- K Horseshoe Project
- L Irving Northwest Levee Repair
- M Jefferson-Memorial Bridge
- N Loop 12 Bridge
- O Pavaho Wetlands
- P Riverfront Boulevard
- Q SH-183 Bridge
- R Trinity Lakes Streetcar Loop
- S Trinity Parkway
- S_B Trinity Parkway Borrow Pits

ROI
Dallas Floodway Levee
Freeway

Habitat Types

- Aquatic Riverine
- Bottomland Hardwood
- Emergent Wetland
- Grassland
- Open Water
- Urban



0 0.5 1 2 Kilometers
0 0.5 1 2 Miles

GIS Sources: Black and Veatch 2010; City of Dallas 2008a, 2010a; TxDOT 2010; USACE 2007; USFWS 2006

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3.1.3 Beckley Avenue Improvements (C)

The City of Dallas plans to improve Beckley Avenue at Commerce Street by adding four new vehicle lanes, reinforced concrete sidewalks, a new major drainage system, and upgraded water and wastewater mains. The project area is approximately 3 acres. Construction is estimated to begin in fall 2014 (City of Dallas 2012a). The proposed project area for the Beckley Avenue Improvements is within an area that is already developed/urban; therefore, no impacts to habitat types or fish and wildlife are expected. Temporary impacts to aquatic habitats could occur from runoff and siltation during construction.

3.1.4 Belleview Trail Connector (D)

The City of Dallas proposes to construct a trail connecting development, entertainment, and art districts via mass transit in the Cedars District. The trail would be slightly less than an acre and would connect the proposed Trinity Park to the DART Cedars Station. This project does not currently have an estimated start date (City of Dallas 2012b). The implementation of the Belleview Trail Connector would permanently impact up to 0.02 acre of emergent wetland and 0.11 acre of grassland habitat within the study area. The construction of the Belleview Trail Connector could negatively impact terrestrial habitats and runoff from the trails could negatively impact aquatic habitats in the area. Wildlife in the area could be negatively impacted by noise from the trail, trash, and an increase in predators.

3.1.5 Bernal Trail (E)

The City of Dallas would extend the existing Bernal Trail to link the Westmoreland Heights area to the Trinity Levee Trail along the West Levee. The trail would go from Emma Carter Park to Tipton Park, and would be approximately 4.6 acres. This project currently has no funding for construction and does not have an estimated start date (City of Dallas 2012b). The construction of the Bernal Trail could permanently impact up to 0.24 acre of aquatic riverine, 0.04 acre of bottomland hardwood, 0.11 acre of emergent wetland, and 1.00 acre of grassland habitat within the study area. Runoff from the trail could negatively impact aquatic habitats in the area. Wildlife in the area could be negatively impacted by noise from the trail, trash, and an increase in predators. The construction of the trail could increase the spread of invasive plant species.

3.1.6 Continental Pedestrian Bridge (F)

The existing Continental Avenue Bridge would be converted from vehicular use to pedestrian and bicycle use. The vehicle to pedestrian conversion and associated ancillary elements would cover 4.6 acres. The project is estimated to be completed in 2014 (City of Dallas 2012c). Since the purpose of the proposed project is to convert an existing vehicle bridge to a pedestrian bridge, no impacts to habitat types or fish and wildlife are expected.

3.1.7 Dallas Maritime Museum (G)

The Dallas Maritime Museum is a proposed 3.5-acre museum located along the Trinity River, at 1501 Riverfront Boulevard in a currently undeveloped grassland parcel. The $80 million project is sponsored by a non-profit organization, the Dallas Maritime Museum Foundation. The museum plans to acquire and display the 362-foot USS Dallas and other vessels next to the 30,000 square-foot museum building

(Dallas Morning News 2013). Permanent impacts to grassland habitat would occur from the implementation of proposed project.

3.1.8 Dallas Watersports Complex (H)

The Dallas Watersports Complex (DWC) would include a waterskiing cableway, a pro-shop, snack bar, full-service restaurant, and viewing deck. The DWC would be located on Fish Trap Lake at the intersection of Hampton Road and Singleton Boulevard in West Dallas, and cover approximately 42 acres. This project does not currently have an estimated start date (DWC 2012). The Dallas Watersports Complex consists of 18.74 acres of urban area and 22.75 acres of open water (Fish Trap Lake). As part of the project, 0.28 acre of emergent wetlands would be created within the open water habitat. The area would mostly be used for recreation so it would only provide limited habitat for fish and wildlife. Transporting boats in and out of the area could introduce invasive aquatic species.

3.1.9 Dallas Water Utility Lines (I)

The Dallas waterlines project proposes to relocate four water mains and one drainage pipeline that currently underlie the floodway and/or the levees. In addition to the relocation of the existing pipelines, the City of Dallas may also remove all or part of three force mains, one wastewater bypass main, two wastewater mains, and four water mains that have previously been abandoned and that currently underlie the floodway and/or the levees (City of Dallas 2008b). Temporary impacts would occur from the implementation of the proposed utility lines.

3.1.10 EF2 Wastewater Interceptor Line and Laterals (J)

This project consists of a new 108-inch diameter wastewater interceptor that would be installed parallel to and riverward, of an existing 90-inch wastewater line located within the Dallas Floodway and immediately adjacent to the Northwest Levee in Irving. Also included in this project are four lateral wastewater lines (points of entry) that are proposed to cross beneath the levee and connect to either the existing 90-inch line or the new 108-inch line. The project area would be approximately 3.7 acres. The Trinity River Authority anticipates the construction period to last 2 years, beginning in late 2012 (Black & Veatch Corporation 2011; City of Dallas 2012d). This project would result in temporary impacts to aquatic and terrestrial habitat from pipeline construction; however, the construction of the junction boxes would permanently impact as much as 0.26 acre of grassland. Minimal impacts to fish and wildlife are expected.

3.1.11 Horseshoe Project (K)

A subset of the larger Project Pegasus, the Horseshoe Project would replace two key bridges and connecting roadways crossing the Trinity River at IH-30 and IH-35, as well as upgrade outdated roadway geometry, improve safety, and increase capacity and mobility. The project would begin at Sylvan Avenue on IH-30, extend to the IH-30/IH-35 interchange (commonly referred to as the Mixmaster) and head south on IH-35 to cross the Trinity River, ending just south of Colorado Boulevard. The project started construction in 2013 and is to be completed by late 2016 (Texas Department of Transportation [TxDOT] 2012a). The construction of the Horseshoe Project would likely negatively impact fish and wildlife through temporary and permanent impacts to forage, shelter, and breeding habitat. Aquatic surveys for this project found the state threatened Texas pigtoe mussel in the Trinity River.

3.1.12 Irving Northwest Levee Repair (L)

This 23-acre project would complete the rehabilitation of the Irving Northwest Levee for re-certification and re-accreditation for protection from up to and including a 100-year riverine flood event. This project consists of installing a slurry wall on the riverside toe of the existing levee (approximately 13,000 feet long and 25 feet deep) to minimize the potential for under seepage issues associated with the levee during major flood events. It would also include the rehabilitation of a portion of the levee, by either overlaying with clay material or grouting the sand to reduce the potential for through seepage of the levee during flood events. The project is currently on hold (Halff Associates 2012). No permanent impacts to habitat are expected from the Irving Northwest Levee Repair. The levee repair would temporarily impact grassland habitat from the construction of a slurry wall. Minimal impacts to fish and wildlife are expected.

Please note that outside of the DFP documentation, this project is occasionally referred to as the Conceptual Levee Height Restoration Project.

3.1.13 Jefferson-Memorial Bridge (M)

The Jefferson-Memorial Bridge would replace the existing Jefferson Street Bridge; the project is currently in the planning stage at TxDOT. The new bridge would provide a direct connection to and from IH-35E (TxDOT 2012b). The construction of the Jefferson Memorial Bridge would likely negatively impact fish and wildlife through temporary and permanent impacts to forage, shelter, and breeding habitat.

3.1.14 Loop 12 Bridge (N)

Under this project the Loop 12 corridor, near the western SH-183 crossing, would be reconstructed to accommodate eight general-purpose lanes (plus auxiliary lanes), four continuous frontage road lanes (plus auxiliary lanes near ramp locations and cross-streets), and a reversible High-Occupancy Vehicle (HOV)/Managed facility. The Loop 12 project will be the first in a series of TxDOT reconstruction projects surrounding the former Texas Stadium site, collectively to be known as the Irving Diamond Interchange. The project area would cover approximately 34 acres; construction scheduling is on hold pending funding (Bridgefarmer & Associates 2012, 2013). The construction of the Loop 12 Bridge would permanently impact up to 3.38 acres of bottomland hardwood, 0.03 acre of emergent wetland, and 11.47 acres of grassland habitat within the study area. Permanent habitat impacts are expected to be much less because the majority of the existing habitat would remain unaffected under the bridge. Permanent impacts would only occur where the bridge pylons permanently impact the habitat. The construction of the Loop 12 Bridge would likely negatively impact fish and wildlife through the destruction of forage, shelter, and breeding habitat and potentially degrade aquatic habitats long-term from increased runoff.

3.1.15 Pavaho Wetlands (O)

The proposed Pavaho Stormwater Wetland Project would include construction of approximately 64 acres of wetlands consisting of four separate cells located near the Pavaho Pumping Plant outfall. The wetland area is intended to provide water quality improvement for storm flows collected in the sump prior to conveyance to the river by the Pavaho Pumping Plant. The primary purpose for the three wetland cells located on the river side of the West Levee would be to create diverse, high quality wetland habitat for multiple migratory and resident wildlife and bird species. To a lesser degree the wetland cells would provide water quality improvement for stormwater runoff from the adjacent floodplain area and during flood events. Construction is expected to start in 2014 (USACE 2013b).

3.1.16 Riverfront Boulevard (P)

This 27-acre project involves converting Riverfront Boulevard (formerly Industrial Boulevard) to a 1.5-mile, eight-lane thoroughfare with a 150-foot wide right of way. Riverfront Boulevard would become a "complete street" and include landscape zones, bicycle lanes, and pedestrian sidewalks. The project would also include an upgrade of the drainage system and replacement/upgrade of existing water and wastewater transmission and distribution lines. Construction is estimated to begin in January 2014 (City of Dallas 2012d). The proposed project area for Riverfront Boulevard improvements is within an area that is already developed/urban; therefore, no impacts to habitat types or fish and wildlife are expected. Temporary impacts to aquatic habitats could occur from runoff and siltation during construction.

3.1.17 SH-183 Bridge (Q)

The TxDOT is planning a new bridge crossing at the Elm Fork of the Trinity River as part of an overall development plan for SH-183. The TxDOT is studying several alternatives in order to develop a plan for improvements; currently the project would cover approximately 76 acres. In addition to the bridge, alternatives include revising the HOV lanes to provide three lanes in each direction. Subject to funding availability, construction is estimated to begin in January 2017 (TxDOT 2012c).

3.1.18 Trinity Lakes Streetcar Loop (R)

The proposed Trinity Lake Streetcar Loop would improve the connection of Oak Cliff and West Dallas to downtown. The approximately 5-mile route would zigzag from the convention center hotel, down the east-west commercial district, and up to the Arts District. It would create economic development opportunities for downtown along with West Dallas, the Design District, and Oak Cliff (DART 2012).

The majority of the project footprint within the study area is urban (18.75 acres). As much as 0.13 acre of aquatic riverine habitat would be permanently impacted by the Trinity Lakes Streetcar Loop project. Minimal impacts to fish and wildlife are expected.

3.1.19 Trinity Parkway (S)

The Trinity Parkway project is a proposed 9-mile toll road that would extend from the SH-183/IH 35E juncture to U.S. 175/Spur 310. Several route alternatives are currently being reviewed by the FHWA. The North Texas Tollway Authority is currently working on an EIS for this roadway. The Trinity Parkway would be a tolled reliever route around downtown Dallas, and would assist in managing traffic congestions on IH 30 and IH 35E. As this project has the potential to affect the form and function of the Dallas Floodway Levee System, the USACE is a cooperating agency in the development of the FHWA Trinity Parkway EIS (Trinity River Corridor Project 2013).

The construction of the Trinity Parkway would likely negatively impact fish and wildlife through temporary and permanent impacts to forage, shelter, and breeding habitat. During construction of the Trinity Parkway, large borrow pits would be excavated in the Mainstem. The borrow pits would remain primarily grassland habitat but may retain water following rain events.

3.2 Changes to Habitat Acreages Under The Future Without Project Condition

As presented in Table 3-1, 192.57 acres of existing habitat would become urban from the implementation of the 19 identified cumulative FW/OPC projects. A breakdown of changes in each of the three evaluation groups is described in the following sections.

Table 3-1. Estimated Changes to Habitat Acreages under the Future Without Project Condition

Habitat Type	*Acres*		
	Existing Conditions (2013)	*FW/OPC (Year 0)*	*Change*
Bottomland Hardwood	1412.63	1402.23	-10.40
Emergent Wetland	418.58	417.36	-1.22
Grassland	4,283.57	4,112.00	-171.57
Aquatic Riverine	421.33	412.23	-9.10
Open Water	206.64	206.36	-0.28
Habitat Subtotal	*6,742.75*	*6,550.18*	*-192.57*
Urban Area	10,400.01	10,592.58	192.57
Total	**17,142.76**	**17,142.76**	**0.00**

In 2010, the USFWS and the USACE predicted acreage modifications for the habitat types in the three groups, Confluence, Mainstem, and IDS over the next 50 years. Year 0 is assumed to be after the FW/OPC projects are implemented. Overtime habitat acreages are expected to decrease due to population increases in the Dallas area, development, invasive species, and climate change. Climate change is expected to create warmer (increases in temperature) and drier (decreases in precipitation) conditions in the region; thus, areas of aquatic, open water, and emergent wetland habitat are expected to convert to drier habitats (bottomland hardwoods and grasslands).

3.2.1 Confluence

The Confluence Group includes the Elm Fork and West Fork of the Trinity River and the associated emergent wetland and upland habitat in the area. Table 3-2 presents the predicted acreages for the habitat types in the Confluence Group over the next 50 years.

Table 3-2. Estimated Changes in Habitat Acreages in the Confluence Group over the Next 50 Years

Habitat Type	*Year*				
	Existing Conditions	*0*	*5*	*10*	*50*
Bottomland Hardwood	966.49	963.41	963.41	973.13	1,011.20
Emergent Wetland	67.95	67.95	67.95	67.95	67.27
Grassland	1,573.16	1,501.04	1,501.04	1,471.02	1,412.86
Aquatic Riverine	132.42	132.36	132.36	131.04	124.49
Open Water	150.93	150.93	150.93	147.91	136.08
Habitat Subtotal	*2,890.95*	*2,815.69*	*2,815.69*	*2,791.05*	*2,751.90*
Urban Area	926.58	1,001.84	1,001.84	1,026.48	1,065.63
Total	**3,817.53**	**3,817.53**	**3,817.53**	**3,817.53**	**3,817.53**

Note: Year 0 is after FW/OPC projects' implementation.

Bottomland Hardwood. The bottomland hardwood acreage is expected to remain at 963 acres from year 0 to 5. Bottomland hardwood areas within the confluence are expected to decrease over time due to development. At years 5 and 10, one percent of the bottomland hardwood habitat is expected to be developed. However, at years 10 and 50, the total bottomland hardwood acreage is expected to increase from the conversion of aquatic riverine, grassland, and open water habitat to bottomland hardwood as a result of drier conditions.

Grassland. From year 0 to 5, the grassland acreage is expected to remain at 1,501 acres. At year 10, one percent of grassland habitat is expected to be converted to bottomland hardwood and one percent is expected to be developed. At year 50, two percent of grassland habitat is expected to be converted to bottomland hardwood from drier conditions and two percent is expected to be developed.

Aquatic Riverine. The aquatic riverine acreage is expected to remain at 132 acres from year 0 to 5. At year 10, one percent of the aquatic habitat is expected to convert to bottomland hardwoods due to less water reaching the Confluence. This could be from drier conditions and/or residents and business retaining more water on their properties. By year 50, five percent of the aquatic riverine habitat is expected to be converted to bottomland hardwoods, primarily due to warmer and drier conditions from climate change.

Open Water. The open water acreage would remain at 151 acres from year 0 to 5. At year 10, two percent of open water is expected to be converted to bottomland hardwood. The habitat conversion is expected to occur as a result of sedimentation and less rainfall. At year 50, conditions are expected to be drier from climate change; thus, 8 percent of open water is expected to convert to bottomland hardwoods.

Urban. Urban habitat would increase, from the development of Elm Fork Trail, Loop 12 Bridge, SH-183 Bridge, and other development projects that occur in the IDS over the next 50 years. At year 10, and 50 additional grassland habitat and bottomland hardwood habitat are expected develop.

3.2.2 Mainstem

The habitat in the Mainstem Group has existed in its current state for the last 50 years. The majority of the aquatic riverine habitat in the Mainstem is the main channel of the Trinity River. The only open water in the Mainstem is Crow Park Lake. Grassland habitat within the Mainstem is regularly mowed and maintained. Bottomland hardwood habitat occurs as fringe habitat along the edge of the Trinity River; it does not expand because of the routine mowing of the area. Emergent wetlands in the Mainstem are low quality wetlands. Table 3-3 presents the predicted acreages for the habitat types in the Mainstem Group over the next 50 years.

Table 3-3. Estimated Changes in Habitat Acreages in the Mainstem Group over the Next 50 Years

Habitat Type	*Existing Conditions*	*Year*			
		0	*5*	*10*	*50*
Bottomland Hardwood	94.64	87.35	87.35	88.50	94.19
Emergent Wetland	262.91	260.41	260.41	260.41	257.81
Grassland	1,752.15	1,669.64	1,669.64	1,669.64	1,672.24
Aquatic Riverine	123.73	114.95	114.95	113.80	108.11
Open Water	6.41	6.41	6.41	6.41	6.41
Habitat Subtotal	*2,239.84*	*2,138.76*	*2,138.76*	*2,138.76*	*2,138.76*
Urban Area	36.15	137.23	137.23	137.23	137.23
Total	**2,275.99**	**2,275.99**	**2,275.99**	**2,275.99**	**2,275.99**

Bottomland Hardwood. The acreage of bottomland hardwoods is not expected to increase from year 0 to year 5 because the adjacent grasslands are mowed which does not allow new trees to become established or the bottomland hardwood habitat to expand. At year 10 and 50, an increase of bottomland habitat is expected from the conversion of aquatic riverine to bottomland hardwood.

Emergent Wetland. The emergent wetlands are periodically flooded and probably mowed when dry. Due to the maintenance and mowing in the Mainstem, the acreage of emergent wetlands in the Mainstem is expected to stay the same over the next 10 years. At year 50, one percent of the emergent wetlands are expected to convert to grassland due to siltation and warmer and drier conditions from climate change.

Grassland. The grasslands are regularly mowed and maintained. The maintenance is expected to continue; thus, no change to acreage is expected over the next 50 years. At year 50 the acreage is expected to increase by one percent due to the conversion of emergent wetland to grassland.

Aquatic Riverine. The aquatic riverine acreage is expected to remain at 115 acres from year 0 to 5. At year 10, one percent of the aquatic habitat is expected to convert to bottomland hardwoods due to less water reaching the Mainstem. This could be a result of warmer and drier conditions and/or residents and business retaining more water on their properties. By year 50, five percent of the aquatic riverine habitat is expected to be converted to bottomland hardwoods, primarily due to warmer and drier conditions from climate change.

Open Water. The only open water is Crow Park Lake, 6.41 acres. The lake is maintained within a park; therefore, no change to acreage is expected over the next 50 years.

3.2.3 Interior Drainage Systems

The IDS Group is primarily an urban area with pockets of habitat surrounding the existing sumps, pumps, and drainage channels. Table 3-4 presents the predicted acreages for the habitat types in the IDS Group over the next 50 years.

Table 3-4. Estimated Changes in Habitat Acreages in the Interior Drainage Systems Group over the Next 50 Years

Habitat Type	*Existing Conditions*	*Year*			
		0	*5*	*10*	*50*
Bottomland Hardwood	351.50	351.47	347.96	339.66	325.97
Emergent Wetland	87.72	89.00	89.00	89.00	89.00
Grassland	958.26	941.32	931.91	903.95	840.67
Aquatic Riverine	165.18	164.92	164.92	163.27	155.11
Open Water	49.30	49.02	49.02	48.04	44.20
Habitat Subtotal	*1,611.96*	*1,595.73*	*1,582.81*	*1,543.92*	*1,454.95*
Urban Area	9,437.28	9,453.51	9,466.44	9,505.33	9,594.30
Total	**11,049.24**	**11,049.24**	**11,049.25**	**11,049.25**	**11,049.25**

Bottomland Hardwood. At year 5, one percent of bottomland hardwood habitat is expected to be developed. At year 10, three percent of bottomland hardwood habitat is expected to be developed. At year 50, seven percent of bottomland hardwood habitat is expected to be lost to urban development.

Emergent Wetland. The emergent wetlands are part of the sump pump areas and would remain. No change to acreage is expected over the next 50 years. The primary purpose of the emergent wetland areas is flood control, not to provide habitat.

Grassland. At year 5, one percent of grassland habitat is expected to be developed. At year 10, three percent of grassland habitat is expected to be developed. At year 50, seven percent of grassland habitat is expected to be lost to urban development.

Aquatic Riverine. The aquatic riverine acreage is expected to remain at 165 acres from year 0 to 5. At year 10, one percent of the aquatic habitat is expected to convert to bottomland hardwoods due to less water from the urban area reaching the IDS. This could be due to warmer and drier conditions and/or residents and businesses retaining more water on their properties so less water reaches the storm drains. By year 50, five percent of the aquatic riverine habitat is expected to convert to bottomland hardwoods, primarily due to warmer and drier conditions from climate change.

Open Water. Open water includes the proposed Dallas Watersports Complex at Fish Trap Lake (22.75 acres) and ponds associated with the IDS in the southwestern section of the study area. As part of the

Dallas Watersports Complex, 0.28 acre of open water would be converted to emergent wetlands. The open water acreage would remain the same from year 0 to 5. At year 10, two percent of open water is expected to convert to bottomland hardwood (1 percent) and urban (1 percent). The habitat conversion is expected to occur from the open water filling in due to siltation and as a result of less rainfall and more evaporation from warmer temperatures. It is anticipated that half the area would grow into bottomland hardwood and the other half would become disturbed (urban). At year 50, conditions are expected to be warmer and drier from climate change, thus more habitat would convert to bottomland hardwoods and disturbed (urban) areas.

3.3 Habitat Suitability Indexes and Habitat Unit Values

Below are HSI, acreage, and HU tables for the habitats within the Confluence, Mainstem, and IDS Groups. HSIs in aquatic habitats are expected to increase over the next 50 years due to increased regulations and technological advances to increase water quality. HUs are determined by multiplying HSI and acreage.

3.3.1 Confluence

Table 3-5 presents FW/OPC HSIs, acres, and HUs for the Confluence for bottomland hardwood, emergent wetland, grassland, aquatic riverine, and open water habitat over the next 50 years. The habitat in the Confluence Group has existed in its current state as partially maintained and partially natural for the last 50 years. It is an extension of the Mainstem Group; therefore, the HSIs are expected to change very little over the next 50 years. The quality (HSI) of bottomland hardwoods and open water is expected to remain the same over the next 50 years whereas emergent wetland, grassland, and aquatic riverine would only increase slightly. The aquatic riverine HSI is from the Trinity River IBI for reaches 3 and 4 (USFWS 2004). The HSI is expected to remain constant from year 0 to 10. At year 50, the HSI is expected to improve due to increased regulations and technology for improvements to water quality. The open water HSI was determined from 2010 fisheries sampling (USACE 2010). No change to the quality (HSI) of the open water is expected over the next 50 years.

Table 3-5. Estimated HSIs, Acreages, and HUs for Habitat Types in the Confluence Group over the Next 50 Years under the Future Without Project Condition

Metric	*Existing Conditions*	*Year*			
		0	*5*	*10*	*50*
Bottomland Hardwood					
HSI	0.24	0.24	0.24	0.24	0.24
Acres	966.49	963.41	963.41	973.13	1,011.20
HUs	231.96	231.22	231.22	233.55	242.69
Emergent Wetland					
HSI	0.30	0.30	0.30	0.30	0.31
Acres	67.95	67.95	67.95	67.95	67.27
HUs	20.39	20.39	20.39	20.39	20.85

Grassland					
HSI	0.43	0.43	0.43	0.43	0.45
Acres	1,573.16	1,501.04	1,501.04	1,471.02	1,412.86
HUs	676.46	645.45	645.45	632.54	635.79
Aquatic Riverine					
HSI	0.9	0.9	0.9	0.9	0.93
Acres	132.42	132.36	132.36	131.04	124.49
HUs	119.18	119.12	119.12	117.94	115.78
Open Water					
HSI	0.71	0.71	0.71	0.71	0.71
Acres	150.93	150.93	150.93	147.91	136.08
HUs	107.16	107.16	107.16	105.02	96.62

3.3.2 Mainstem

Below is Table 3-6 for FW/OPC HSIs, acres, and HUs for the Mainstem for bottomland hardwood, emergent wetland, grassland, aquatic riverine, and open water habitat over the next 50 years. The habitat in the Mainstem Group has existed in its current state for the last 50 years and is highly maintained. Therefore, the HSIs are not expected to change over the next 50 years. The bottomland hardwoods are not expected to increase because the adjacent grasslands are mowed which does not allow new trees to become established or allow the bottomland hardwood habitat to expand. The maintenance is expected to continue; thus, no change to HSI or acreage is expected over the next 50 years. The emergent wetlands are periodically flooded and probably mowed when dry. Due to the maintenance and mowing, the HSI of emergent wetlands are expected to stay the same over the next 50 years. The grasslands are regularly mowed and maintained. The maintenance is expected to continue; thus, only slight change to HSI is expected over the next 50 years. The aquatic riverine HSI is from the Trinity River IBI for Reaches 1 and 2 (USFWS 2004). The aquatic riverine HSI would be constant from year 0 to 10. At year 50 the HSI is expected to increase due to increased regulations and technology for improvements to water quality. The open water HSI was determined from 2010 fisheries sampling in Crow Lake, Bart Simpson Lake, and Cell D of the Dallas Floodway Extension (USACE 2010). The only open water is Crow Park Lake. The lake is maintained within a park; therefore, no change to HSI or acreage is expected over the next 50 years.

Table 3-6. Estimated HSIs, Acreages, and HUs for Habitat Types in the Mainstem Group over the Next 50 Years under the Future Without Project Condition

Metric	*Existing Conditions*	*Year*			
		0	*5*	*10*	*50*
Bottomland Hardwood					
HSI	0.21	0.22	0.21	0.21	0.21
Acres	94.64	87.35	87.35	88.50	94.19
HUs	19.87	19.22	18.34	18.59	19.78
Emergent Wetland					
HSI	0.22	0.22	0.22	0.22	0.22
Acres	262.91	260.41	260.41	260.41	257.81
HUs	57.84	57.29	57.29	57.29	56.72
Grassland					
HSI	0.62	0.62	0.62	0.62	0.64
Acres	1,752.15	1,669.64	1,669.64	1,669.64	1,672.24
HUs	1,086.33	1,035.18	1,035.18	1,035.18	1,070.23
Aquatic Riverine					
HSI	0.83	0.83	0.83	0.83	0.86
Acres	123.73	114.95	114.95	113.80	108.11
HUs	102.70	95.41	95.41	94.45	92.97
Open Water					
HSI	0.71	0.71	0.71	0.71	0.71
Acres	6.41	6.41	6.41	6.41	6.41
HUs	4.55	4.55	4.55	4.55	4.55

3.3.3 Interior Drainage Systems

Table 3-7 presents the FW/OPC HSIs, acres, and HUs for the IDS for bottomland hardwood, emergent wetland, grassland, aquatic riverine, and open water habitat over the next 50 years. The majority of the bottomland hardwoods occur along the drainage channels. The quality (HSI) of the bottomland hardwoods are expected to be consistent over time. However, bottomland hardwood areas within the IDS are expected to decrease over time due to development. Bottomland hardwood habitats do not have any special protection from development, and thus the quantity of bottomland hardwood would decrease even as the HSI remains the same.

The emergent wetlands are part of the sump pump areas and will remain. Drier conditions would reduce the quality of the emergent wetland habitat under long term (50 year) conditions. The primary purpose of the emergent wetland areas are flood control, not to provide habitat.

The majority of the grasslands occur along the drainage channels. The quality (HSI) of the grassland habitat would increase slightly in the long term as trees in the urban forest provide increased foraging opportunities for grassland species. Grassland areas are expected to decrease over time because of development. Grassland habitats do not have any special protection from development.

The aquatic riverine HSI was determined using the Trinity River IBI (USFWS 2004). Reach 1, the lower reach of the Mainstem, had the lowest HSI of the four reaches and was determined to be the most similar of the four reaches to the aquatic riverine habitat within the IDS. The IDS is smaller than the Trinity River, has less species diversity, and is not connected to the Trinity River for species dispersal, thus it is expected to have a lower HSI than the rest of the River. The HSI is expected to remain at 0.7 from year 0 to 5 due to siltation, erosion, and other temporary impacts from construction. At year 10, the HSI is expected to be back at 0.75 (pre-construction conditions). By year 50, the HSI is expected to increase to 0.80 due to increased regulations and technology for improvements to water quality.

The open water HSI was determined from 2010 fisheries sampling (USACE 2010). Because the IDS is smaller than the Trinity River, has less species diversity, and is not connected to the Trinity River for species dispersal, it is expected to have a lower HSI than the Mainstem or Confluence areas of the Trinity River. Thus, the average open water HSI score was adjusted to 0.65. The water quality in the open water is not expected to change in next 50 years; therefore, the HSI would remain the same for the next 50 years.

Table 3-7. Estimated HSIs, Acreages, and HUs for Habitat Types in the Interior Drainage System Group over the Next 50 Years under the Future Without Project Condition

Metric	*Existing Conditions*	*Year*			
		0	*5*	*10*	*50*
Bottomland Hardwood					
HSI	0.39	0.39	0.39	0.39	0.39
Acres	351.50	351.47	347.96	339.66	325.97
HUs	137.09	137.07	135.70	132.47	127.13
Emergent Wetland					
HSI	0.22	0.23	0.22	0.22	0.19
Acres	87.72	89.00	89.00	89.00	89.00
HUs	19.30	20.47	19.58	19.58	16.91
Grassland					
HSI	0.57	0.57	0.57	0.57	0.62
Acres	958.26	941.32	931.91	903.95	840.67
HUs	546.21	536.55	531.19	515.25	521.22
Aquatic Riverine					
HSI	0.75	0.70	0.70	0.75	0.80
Acres	165.18	164.92	164.92	163.27	155.11
HUs	123.89	115.44	115.44	122.45	124.09

Open Water					
HSI	0.65	0.65	0.65	0.65	0.65
Acres	49.30	49.02	49.02	48.04	44.20
HUs	32.05	31.86	31.86	31.23	28.73

3.4 HABITAT UNITS SUMMARY

As presented in Table 3-8, overall HUs would decrease in 50 years under the FW/OPC. The greatest loss of HUs would occur to grassland habitat. Aquatic Riverine HUs would decrease the least.

Table 3-8. Habitat Units per Habitat Type Within the Study Area under the Future Without Project Condition

Habitat Types	*HUs*		
	Baseline	*FW/OPC (Year 50)*	*Change*
Bottomland Hardwood	388.92	389.6	0.68
Emergent Wetland	97.53	94.48	-3.05
Grassland	2,309.00	2,227.24	-81.76
Aquatic Riverine	345.77	332.84	-12.93
Open Water	143.76	129.9	-13.86
Total	**3,284.98**	**3,174.06**	**-110.92**

Table 3-9 presents the existing conditions (baseline) and FW/OPC (Year 50) HUs for the five habitat types in the Confluence, IDS, and Mainstem. The majority of the bottomland hardwood HUs are within the Confluence. Bottomland hardwood HUs in the Confluence would increase in 50 years under the FW/OPC due to grassland, aquatic riverine, and open water habitat converting to bottomland hardwood. However, the bottomland hardwood HUs in the IDS would decrease due bottomland hardwood habitat being developed. Emergent wetland HUs in the IDS and Mainstem would decrease in 50 years under the FW/OPC due to emergent wetlands converting to grasslands due to warmer and drier conditions. Grassland HUs in the Confluence, IDS, and Mainstem would decrease in 50 years under the FW/OPC due to development and grassland converting to bottomland hardwoods. The majority of the grassland HUs would be lost in the Confluence due to development. Aquatic riverine HUs in the Confluence and Mainstem would decrease in 50 years under the FW/OPC due to aquatic riverine habitat converting to bottomland hardwoods from warmer and drier conditions. Aquatic riverine HUs in the IDS would increase in 50 years under the FW/OPC due to increased regulations and technological advances to increase water quality. Open water HUs in the Confluence and IDS would decrease in 50 years under the FW/OPC due to development in the IDS and open water habitat converting to bottomland hardwoods in the Confluence and IDS from warmer and drier conditions. Open water HUs in the Mainstem are expected to remain unchanged in 50 years under the FW/OPC.

Table 3-9. Estimated HU Values for Habitats within the Study Area under Baseline and Future Without Project Condition (Year 50)

Evaluation Areas	*HUs*		
	Baseline	*FW/OPC*	*Change*
Bottomland Hardwood			
Confluence	231.96	242.69	10.73
IDS	137.09	127.13	-9.96
Mainstem	19.87	19.78	-0.09
Total	**388.92**	**389.60**	**0.68**
Emergent Wetland			
Confluence	20.39	20.85	0.46
IDS	19.30	16.91	-2.39
Mainstem	57.84	56.72	-1.12
Total	**97.53**	**94.48**	**-3.05**
Grassland			
Confluence	676.46	635.79	-40.67
IDS	546.21	521.22	-24.99
Mainstem	1,086.33	1,070.23	-16.10
Total	**2,309.00**	**2,227.24**	**-81.76**
Aquatic Riverine			
Confluence	119.18	115.78	-3.40
IDS	123.89	124.09	0.20
Mainstem	102.70	92.97	-9.73
Total	**345.77**	**332.84**	**-12.93**
Open Water			
Confluence	107.16	96.62	-10.54
IDS	32.05	28.73	-3.32
Mainstem	4.55	4.55	0.00
Total	**143.76**	**129.90**	**-13.86**

3.5 THREATENED AND ENDANGERED SPECIES AND BIRDS OF CONSERVATION CONCERN

Please refer to Section 2.3 for a description of threatened and endangered species and birds of conservation concern within the project area.

The bald eagle (*Haliaeetus leucocephalus*) was removed from the federally threatened and endangered species list on August 8, 2007. However, bald eagles are still protected under the Bald and Golden Eagle Protection Act, as well as the Migratory Bird Treaty Act (which protects all migratory birds). The *2010 Post-delisting Monitoring Plan for the Bald Eagle (Haliaeetus leucocephalus) in the Contiguous 48 States* may be accessed via this link:

http://ecos.fws.gov/docs/species/doc3240.pdf.

It is recommended that all activities be conducted in accordance with the USFWS National Bald Eagle Management Guidelines, which may be accessed via this link:

http://www.fws.gov/migratorybirds/issues/BaldEagle/NationalBaldEagleManagementGuidelines.pdf.

The updated 2008 list of Birds of Conservation Concern is described previously in Section 2.3 and is available via this link:

http://www.fws.gov/migratorybirds/NewReportsPublications/SpecialTopics/BCC2008/BCC2008.pdf.

3.6 RECOMMENDATIONS

The planning recommendations for the implementation of Alternative 1 are the same as those recommended in Chapter 2 Section 2.4.

3.7 SUMMARY

Under the FW/OPC, the majority of acreage that would be permanently impacted is average quality grassland habitat. Identified permanent impacts to aquatic habitat would be mitigated on a project-specific basis to offset impacts to quality and/or coverage. Common aquatic and terrestrial wildlife that occur within the area are likely to continue to occur in the area after the implementation of the FW/OPC. Riverine flood events under the FW/OPC would continue to have a variety of impacts, both beneficial and adverse.

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CHAPTER 4
ALTERNATIVE 2 – PROPOSED ACTION WITH PARKWAY

4.1 INTRODUCTION

This chapter describes potential impacts to fish and wildlife habitats from the implementation of Alternative 2 over the next 50 years. The study area habitat types (bottomland hardwood, emergent wetland, grassland, aquatic riverine, and open-water) and evaluation groups (Confluence, IDS, and Mainstem) from Chapter 2 are used for the Alternative 2 evaluation. The impacts to fish and wildlife habitats from the implementation of Alternative 2, including the implementation of the BVP Study features, FRM elements, and IDP improvements, are described below and shown in Figure 6. The BVP Study features are still notional in nature. As a result, the impacts of these features cannot be determined with the same precision as the existing conditions. Thus, impacts from DFP implementation are estimated to the nearest whole acre. Similarly, existing conditions have also been recalculated to the nearest whole acre to maintain a consistent level of precision for comparison with the Alternative 2 predicted habitats. In some cases, this has resulted in slightly different values as compared to those presented in Chapter 3.

4.2 CHANGES TO HABITAT ACREAGES

As presented in Table 4-1, 99 acres of existing habitat would become urban from the implementation of Alternative 2. Open water habitat would increase under Alternative 2 from the creation of the Urban, Natural, and West lakes. Bottomland hardwood acreage would also increase with hardwoods planted along the Trinity River; the largest amount of hardwoods would be planted at the southeastern end of the project area. Aquatic riverine acreage would increase from the realignment of the river. The greatest decrease of habitat would be to grassland habitat.

Table 4-1. Estimated Changes to Habitat Acreages under Alternative 2

Habitat Type	*Acres*		
	Existing Conditions	*Alternative 2 (Year 0)*	*Change*
Bottomland Hardwood	1,414	1,511	97
Emergent Wetland	419	319	-100
Grassland	4,283	3,783	-500
Aquatic Riverine[1]	421	545	124
Open Water	206	486	280
Habitat Subtotal	*6,743*	*6,644*	*-99*
Urban Area	10,400	10,499	99
Total	**17,143**	**17,143**	**0**

Note: [1]Alternative 2 aquatic riverine includes fringe riparian habitat.

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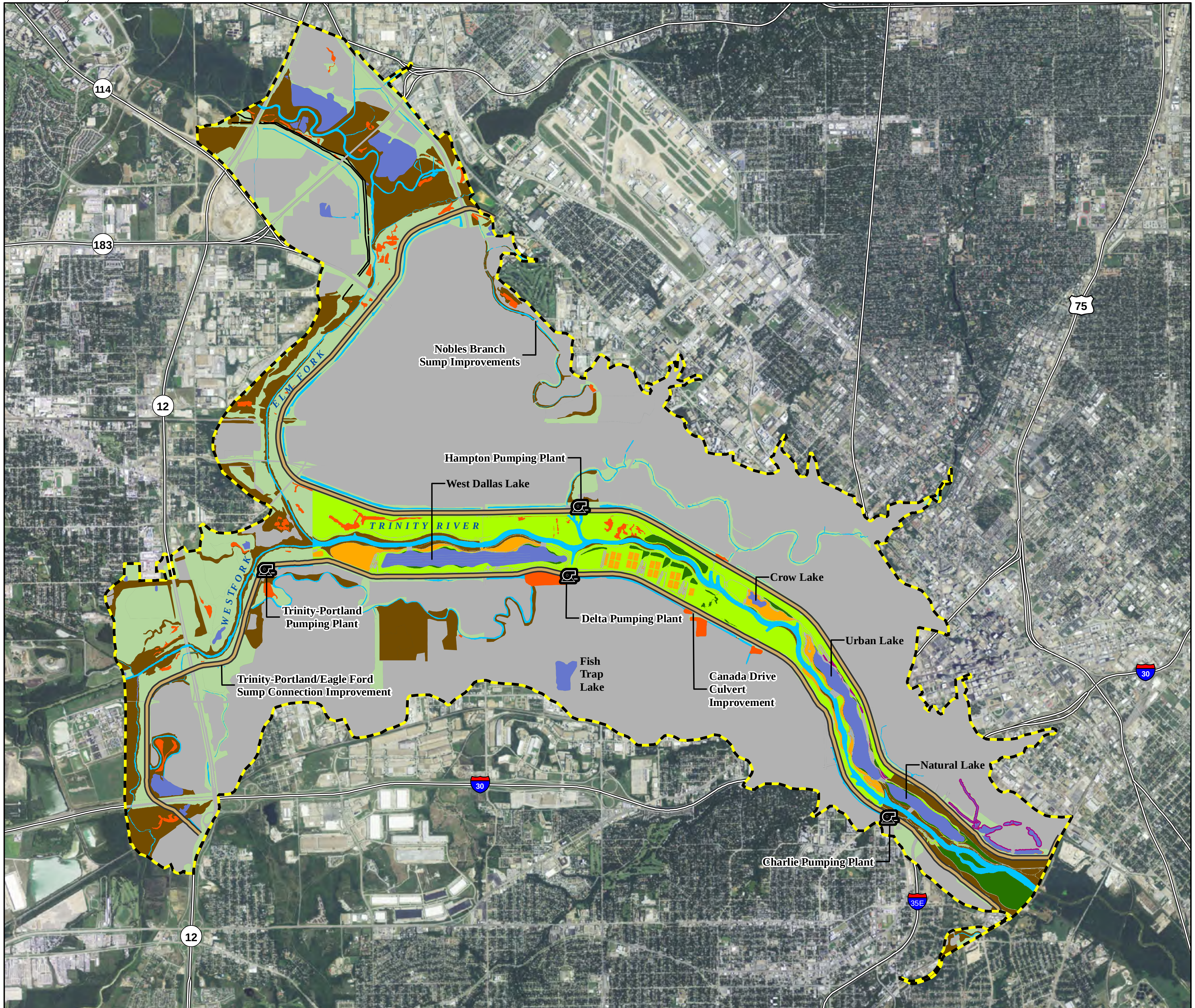
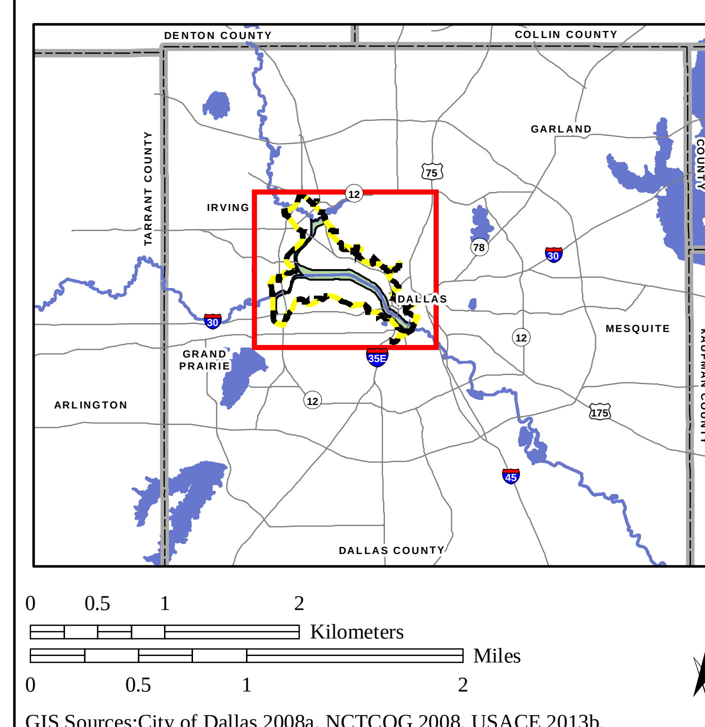


Figure 6
Habitat Types Under Alternative 2



GIS Sources:City of Dallas 2008a, NCTCOG 2008, USACE 2013b, USFWS 2006

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4.2.1 Confluence

The Confluence Group includes the Elm Fork and West Fork of the Trinity River and the associated emergent wetland and upland habitat in the area. The Alternative 2 actions in the Confluence consist of the FRM Elements and the IDP Trinity-Portland Pumping Plant and Eagle Ford and Trinity-Portland sump improvements.

Table 4-2 presents the predicted acreages for the habitat types in the Confluence Group over the next 50 years from the implementation of Alternative 2.

Table 4-2. Estimated Changes in Habitat Acreages in the Confluence Group over the Next 50 Years under Alternative 2

Habitat Type	*Existing Conditions*	*Year (acres)*			
		0	*5*	*10*	*50*
Bottomland Hardwood	967	966	966	976	1,016
Emergent Wetland	68	68	68	68	67
Grassland	1,573	1,574	1,574	1,543	1,482
Aquatic Riverine	132	133	133	132	125
Open Water	151	151	151	148	136
Habitat Subtotal	*2,891*	*2,892*	*2,892*	*2,867*	*2,826*
Urban Area	927	926	926	951	992
Total	**3,818**	**3,818**	**3,818**	**3,818**	**3,818**

Bottomland Hardwood. The acreage of bottomland hardwoods under Alternative 2 would follow the same progression predicted under Alternative 1 (refer to Section 3.2.1).

Emergent Wetland. The acreage of emergent wetlands under Alternative 2 would follow the same progression predicted under Alternative 1 (refer to Section 3.2.1).

Grassland. The acreage of grasslands under Alternative 2 would follow the same progression predicted under Alternative 1 (refer to Section 3.2.1).

Aquatic Riverine. The Aquatic Riverine progression is anticipated to be the same as that under Alternative 1 (refer to Section 3.2.1).

Open Water. The open water progression is anticipated to be the same as that under Alternative 1 (refer to Section 3.2.1).

4.2.2 Mainstem

The habitat in the Mainstem Group has existed in its current state for the last 50 years. Under Alternative 2, most of the habitat in the Mainstem would be temporarily impacted during the implementation of the BVP Study features. After the 10-year construction period for the BVP Study features is complete (2015-

2025), most of the habitat would be restored to a higher habitat value than its current state. Three large lakes, re-alignment of the Trinity River, fringe riparian habitat, native grassland meadows, additional bottomland hardwoods, and additional higher quality wetlands would be created with the implementation of the BVP (refer to Figure 6). Alternative 2 FRM elements would improve the levees and have minimal impacts on habitat. Alternative 2 IDP improvements would add a small amount of aquatic riverine acreage to the Mainstem from the creation of outfalls at Charlie and Hampton pump stations. The majority of the increase in aquatic riverine habitat results from the river modification proposed under Alternative 2.

Table 4-3 presents the predicted acreages for the habitat types in the Mainstem Group over the next 50 years with the implementation of Alternative 2.

Table 4-3. Estimated Changes in Habitat Acreages in the Mainstem Group over the Next 50 Years under Alternative 2

Habitat Type	*Existing Conditions*	*Year*					
		0	*1*	*5*	*10*	*25*	*50*
Bottomland Hardwood	**95**	**195**	**195**	**195**	**198**	**203**	**215**
Emergent Wetland							
Existing	263	32	32	32	32	32	32
Proposed	-	152	152	152	152	152	150
Total Emergent Wetlands	*263*	*184*	*184*	*184*	*184*	*184*	*182*
Grassland							
Existing Maintenance Levels	1,752	192	192	192	192	192	194
Meadow	-	887	887	887	887	887	887
Urban Forest	-	5	5	5	5	5	5
Turf	-	158	158	158	158	158	158
Total Grasslands	*1,752*	*1,242*	*1,242*	*1,242*	*1,242*	*1,242*	*1,244*
Aquatic Riverine[1]	**124**	**250**	**250**	**250**	**247**	**242**	**230**
Open Water							
Existing - Crow Lake	6	6	6	6	6	6	6
Natural Lake	-	50	50	50	50	50	50
Urban and West Dallas Lake	-	207	207	207	207	207	207
Total Open Water	*6*	*263*	*263*	*263*	*263*	*263*	*263*
Habitat Subtotal	***2,240***	***2,134***	***2,134***	***2,134***	***2,134***	***2,134***	***2,134***
Urban Area	36	142	142	142	142	142	142
Total	**2,276**	**2,276**	**2,276**	**2,276**	**2,276**	**2,276**	**2,276**

Note: [1]Aquatic riverine includes fringe riparian habitat.

Bottomland Hardwood. Under Alternative 2, most of the existing bottomland hardwoods would be removed during the re-alignment of the Trinity River under the BVP Study features. During the implementation of the BVP Study features, 195 acres of bottomland hardwood would be planted in the Mainstem, primarily along the southeastern section of the new Trinity River channel.

The bottomland hardwoods would be planted in an area adjacent to the levee and would be managed to prevent any impact to the levee. At years 10, 25, and 50, an increase of bottomland habitat is expected from the conversion of aquatic riverine to bottomland hardwood.

Emergent Wetland. The Mainstem wetlands under Alternative 2 would comprise approximately 184 acres, 32 acres of existing wetlands and 152 acres of wetlands created from the implementation of the BVP Study features. The created wetlands would include Corinth, Cypress, and fringe marsh wetlands along the edge of the lakes.

With the proposed maintenance of the BVP in the Mainstem, the acreage of emergent wetlands in the Mainstem is expected to stay the same over the next 10 to 25 years. At year 50, one percent of the emergent wetlands are expected to convert to grassland because of siltation and warmer and drier conditions from climate change.

Grassland. With the implementation of the BVP Study features, the majority of the existing grasslands would be temporarily disturbed and would be replanted and realigned.. The grasslands would consist of low quality mowed turf, native meadows, and urban forests.

Due to the proposed maintenance of the grasslands in the Mainstem, no change to BVP grassland acreage is expected over the next 50 years. At year 50, the acreage is expected to increase due to the emergent wetland converting to grassland.

Aquatic Riverine. The aquatic riverine habitat value and acreage in the Mainstem would change significantly under Alternative 2. As a result of the BVP Study features the Trinity River is proposed to be re-routed to increase sinuosity and increase habitat value. The Mainstem aquatic riverine would include fringe riparian habitat.

The aquatic riverine acreage is expected to remain at 250 acres from year 0 to 5. At year 10, one percent of the aquatic habitat is expected to convert to bottomland hardwoods as a result of less water reaching the Mainstem. This could be due to warmer and drier conditions and/or residents and businesses retaining more water on their properties. At year 25, two percent of aquatic riverine is expected to be converted to bottomland hardwoods. By year 50, five percent of the aquatic riverine habitat is expected to be converted to bottomland hardwoods, primarily due to warmer and drier conditions from climate change.

Open Water. Under Alternative 2, the Mainstem would comprise 263 acres of open water, including the existing Crow Lake and three BVP Study lakes, Urban, West, and Natural. The lakes would be maintained; therefore, no change to open water acreage is expected over the next 50 years.

4.2.3 Interior Drainage Systems

The IDS Group is primarily an urban area with pockets of habitat surrounding the existing sumps, pumps, and drainage channels. Alternative 2 actions in the IDS consist of the Charlie, Delta, and Hampton, Pumping Plant improvements, and the Nobles Branch and East Levee sump improvements. Table 4-4 presents the predicted acreages for the habitat types in the IDS Group over the next 50 years with the implementation of Alternative 2.

Bottomland Hardwood. The acreage of bottomland hardwoods under Alternative 2 would follow the same progression predicted under Alternative 1 (refer to Section 3.2.3).

Emergent Wetland. The acreage of emergent wetlands under Alternative 2 would follow the same progression predicted under Alternative 1 (refer to Section 3.2.3).

Grassland. The acreage of grasslands that would be maintained under Alternative 2 would follow the same progression predicted under Alternative 1 (refer to Section 3.2.3).

Due to the proposed maintenance of the urban forest landscaping, primarily around the Able Sumps, no change to urban forest-type grassland acreage is expected over the next 50 years.

Aquatic Riverine. The aquatic riverine progression is anticipated to be the same as that under Alternative 1 (refer to Section 3.2.3).

Open Water. The open water progression is anticipated to be the same as that under Alternative 1 (refer to Section 3.2.3).

Table 4-4. Estimated Changes in Habitat Acreages in the Interior Drainage Systems Group over the Next 50 Years under Alternative 2

Habitat Type	*Existing Conditions*	*Year*			
		0	*5*	*10*	*50*
Bottomland Hardwood	352	350	347	339	326
Emergent Wetland	88	67	67	67	67
Grassland					
Existing Maintenance Levels	958	945	936	908	844
Urban Forest	-	22	22	22	22
Grassland Subtotal	*958*	*967*	*958*	*930*	*866*
Aquatic Riverine	165	162	162	160	152
Open Water	49	72	72	71	65
Habitat Subtotal	***1,612***	***1,618***	***1,606***	***1,567***	***1,476***
Urban Area	9,437	9,431	9,443	9,482	9,573
Total	**11,049**	**11,049**	**11,049**	**11,049**	**11,049**

4.3 HABITAT SUITABILITY INDEXES AND HABITAT UNIT VALUES

HSI values for Alternative 2 were based in the species models used for the baseline assessment (Section 2.2) (USACE 2013c). In April 2013, the USFWS hosted the USACE to coordinate and assist in prediction of the future conditions with the action alternative completed. The *Trinity River Corridor Design Guidelines* (City of Dallas 2009) was used to inform the models in terms of future plant assemblage and habitat anticipated within the Floodway.

4.3.1 Confluence

The HSI and HU values progressions for the Confluence are presented in Table 4-5. The analysis associated with the progressions predicted is the same as that presented for Alternative 1 (refer to Section 3.3.1).

Table 4-5. Estimated HSIs, Acreages, and HUs for Habitat Types in the Confluence Group over the Next 50 Years under Alternative 2

Metric	*Existing Conditions*	*Year*			
		0	*5*	*10*	*50*
Bottomland Hardwood					
HSI	0.24	0.24	0.24	0.24	0.24
Acres	966.49	966	966	976	1016
HUs	231.96	231.84	231.84	234.24	243.84
Emergent Wetland					
HSI	0.30	0.30	0.30	0.30	0.31
Acres	67.95	68	68	68	67
HUs	20.39	20.40	20.40	20.40	20.77
Grassland					
HSI	0.43	0.43	0.43	0.43	0.45
Acres	1,573.16	1,574	1,574	1,543	1,482
HUs	676.46	676.82	676.82	663.49	666.90
Aquatic Riverine					
HSI	0.90	0.90	0.90	0.90	0.93
Acres	132.42	133	133	132	125
HUs	119.18	119.7	119.7	118.8	116.25
Open Water					
HSI	0.71	0.71	0.71	0.71	0.71
Acres	150.93	151	151	148	136
HUs	107.16	107.21	107.21	105.08	96.56

Note: Existing conditions acreages are to 100th of an acre to be consistent with the existing condition HUs in Chapter 3. The Proposed Action acreages are presented in whole numbers.

4.3.2 Mainstem

Table 4-6 presents the Alternative 2 HSIs, acres, and HUs for the Mainstem for bottomland hardwood, emergent wetland, grassland, aquatic riverine, and open water habitat over the next 50 years. With the implementation of the BVP Study features, most of the habitat in the Mainstem would be temporarily disturbed. Following the implementation of the BVP Study features (years 0, 1, and 5), the bottomland hardwood, emergent wetland, and urban forest HSIs would be low because the habitats would have just been created and would take time to become established. The bottomland hardwood HSIs are expected to increase over time as the trees mature, and the emergent wetland HSIs are expected to increase over time as the wetlands become more established.

The Mainstem grasslands would consist of native meadow, turf, and urban forest. The native meadow is expected to have a higher HSI than the existing non-native dominated grassland and is expected to increase in value over the next 50 years from increased native species diversity. The turf HSI is not expected to change over time because mowed grass is expected to remain at the same low habitat value over the next 50 years. Urban forest is considered a subset of grassland because the majority of the proposed trees would be non-native ornamental trees and do not provide the same habitat value as a native forest.

Aquatic riverine and open water habitat HSIs are not expected to increase much over time because they would contain water and are expected to be functioning aquatic ecosystems once the BVP Study features are completed. At year 50, the aquatic riverine HSI is expected to increase due to increased regulations and technology for improvements to water quality. The open water HSI was determined by referring to the 2010 fisheries sampling in Crow Lake, Bart Simpson Lake, and Cell D of the Dallas Floodway Extension (USACE 2010).

Table 4-6. Estimated HSIs, Acreages, and HUs for Habitat Types in the Mainstem Group over the Next 50 Years under Alternative 2

Metric	*Existing Conditions*	*Year*					
		0	*1*	*5*	*10*	*25*	*50*
Bottomland Hardwood							
HSI	0.21	0.09	0.09	0.09	0.13	0.21	0.43
Acres	94.64	195	195	195	198	203	215
HUs	19.87	17.55	17.55	17.55	25.74	42.63	92.45
Emergent Wetland							
Existing							
HSI	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Acres	262.91	32	32	32	32	32	32
HUs	57.84	7.04	7.04	7.04	7.04	7.04	7.04

Proposed							
HSI	-	0.13	0.13	0.34	0.42	0.47	0.52
Acres	-	152	152	152	152	152	150
HUs	0.00	19.76	19.76	51.68	63.84	71.44	78
Total Wetland HU	**57.84**	**26.8**	**26.8**	**58.72**	**70.88**	**78.48**	**85.04**
Grassland							
Existing Maintenance Levels							
HSI	0.62	0.40	0.40	0.40	0.40	0.40	0.40
Acres	1,752.15	192	192	192	192	192	194
HUs	1,086.33	76.8	76.8	76.8	76.8	76.8	77.6
Meadow							
HSI	-	0.50	0.60	0.70	0.65	0.70	0.85
Acres	-	887	887	887	887	887	887
HUs	0.00	443.50	532.20	620.90	576.55	620.90	753.95
Landscaping: Turf							
HSI	-	0	0	0.40	0.40	0.40	0.40
Acres	-	158	158	158	158	158	158
HUs	0.00	0.00	0.00	63.20	63.20	63.20	63.20
Landscaping: Urban Forest							
HSI	-	0.50	0.50	0.40	0.40	0.40	0.40
Acres	-	5	5	5	5	5	5
HUs	0.00	2.50	2.50	2.00	2.00	2.00	2.00
Total Grassland HU	**1,086.33**	**522.8**	**611.5**	**762.9**	**718.55**	**762.9**	**896.75**
Aquatic Riverine							
HSI	0.83	0.83	0.75	0.83	0.85	0.87	0.90
Acres	123.73	250	250	250	247	242	230
HUs	102.70	207.50	187.50	207.50	209.95	210.54	207.00
Open Water							
Crow Lake							
HSI	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Acres	6.41	6.41	6.41	6.41	6.41	6.41	6.41
HUs	4.55	4.55	4.55	4.55	4.55	4.55	4.55

Urban Lake & West Dallas Lake							
HSI	-	0.00	0.00	0.43	0.77	0.77	0.77
Acres	-	207	207	207	207	207	207
HUs	-	0.00	0.00	89.01	159.39	159.39	159.39
Natural Lake							
HSI	-	0.00	0.00	0.60	0.77	0.77	0.77
Acres	-	50	50	50	50	50	50
HUs	-	0.00	0.00	30.00	38.50	38.50	38.50
Total Open Water HU	**4.55**	**4.55**	**4.55**	**123.56**	**202.44**	**202.44**	**202.44**

4.3.3 Interior Drainage Systems

Table 4-7 presents the Alternative 2 HSIs, acres, and HUs for the IDS for bottomland hardwood, emergent wetland, grassland, aquatic riverine, and open water habitat over the next 50 years.

The majority of the bottomland hardwoods occur along the drainage channels. Bottomland hardwood areas within the IDS are expected to decrease over time due to development. Bottomland hardwood habitats do not have any special protection from development.

The emergent wetlands are part of the sump pump areas and will remain. As a drying trend is predicted for the region, the quality and quantity of emergent wetlands is expected to decrease in the long term. The primary purpose of the emergent wetland areas are flood control, not to provide habitat.

The majority of the grasslands occur along the drainage channels. The quality (HSI) of the grassland habitat would increase slightly in the long term as trees in the urban forest provide increased foraging opportunities for grassland species. Grassland areas are expected to decrease over time because of development. Grassland habitats do not have any special protection from development.

The aquatic riverine HSI was determined using the Trinity River IBI (USFWS 2004). Reach 1, the lower reach of the Mainstem, had the lowest HSI of the four reaches and was determined to be the most similar of the four reaches to the IDS. The IDS is smaller than the Trinity River, has less species diversity, and is not connected to the Trinity River for species dispersal; therefore, it is expected to have a lower HSI than the rest of the River. The HSI is expected to remain at 0.7 from year 0 to 5 because of siltation, erosion, and other temporary impacts from construction. At year 10, the HSI is expected to be back at 0.75 (pre-construction conditions). By year 50, the HSI is expected to increase to 0.80 due to increased regulations and technology for improvements to water quality.

The open water HSI was determined from 2010 fisheries sampling (USACE 2010). Because the IDS is smaller than the Trinity River, has less species diversity, and is not connected to the Trinity River for species dispersal, it is expected to have a lower HSI than the Mainstem or Confluence areas of the Trinity River. Therefore, the average open water HSI score was adjusted to 0.65. The water quality in the open water is not expected to change in the next 50 years; therefore, the HSI would remain the same for the next 50 years.

Table 4-7. Estimated HSIs, Acreages, and HUs for Habitat Types in the Interior Drainage System Group over the Next 50 Years under Alternative 2

Metric	*Existing Conditions*	*Year*			
		0	*5*	*10*	*50*
Bottomland Hardwood					
HSI	0.39	0.39	0.39	0.39	0.39
Acres	351.50	350	347	339	326
HUs	137.09	136.50	135.33	132.21	127.14
Emergent Wetland					
HSI	0.22	0.23	0.22	0.22	0.19
Acres	87.72	67	67	67	67
HUs	19.3	15.41	14.74	14.74	12.73
Grassland					
Existing Maintenance Levels					
HSI	0.57	0.57	0.57	0.57	0.62
Acres	958.26	945	936	908	844
HUs	546.21	538.65	533.52	517.56	523.28
Landscaping: Urban Forest					
HSI		0.50	0.40	0.40	0.40
Acres		22	22	22	22
HUs	0	11	8.8	8.8	8.8
Total Grassland HU	**546.21**	**549.65**	**542.32**	**526.36**	**532.08**
Aquatic Riverine					
HSI	0.75	0.70	0.70	0.75	0.80
Acres	165.18	162	162	160	152
HUs	123.89	113.40	113.40	120.00	121.60
Open Water					
HSI	0.65	0.65	0.65	0.65	0.65
Acres	49.30	72	72	71	65
HUs	32.05	46.80	46.80	46.15	42.25

4.4 HABITAT UNITS SUMMARY

As presented in Table 4-8, overall HUs would increase under Alternative 2 over the next 50 years. The greatest increase would be to open water from the creation of the BVP Study lakes. Bottomland hardwood habitat would also increase with the highest quality habitat at the southeastern end of the project area. Aquatic Riverine habitat would increase from the realignment of the river. The greatest decrease of HUs would be to grassland habitat.

Table 4-8. HUs per Habitat Type Within the Study Area under Alternative 2

Habitat Types	*HUs*		
	Baseline	*Year 50*	*Change*
Bottomland Hardwood	388.92	463.43	74.51
Emergent Wetland	97.53	118.54	21.01
Grassland	2,309.00	2,095.73	-213.27
Aquatic Riverine	345.77	444.85	99.08
Open Water	143.76	341.25	197.49
Total	3,284.98	3,463.80	178.82

Table 4-9 presents the existing conditions (baseline) and Alternative 2 (Year 50) HUs for the five habitat types in the Confluence, IDS, and Mainstem.

Table 4-9. Estimated HU Values for Habitats within the Study Area under Baseline and Alternative 2 (Year 50)

Evaluation Areas	*HUs*		
	Baseline	*Alternative 2*	*Change*
Bottomland Hardwood			
Confluence	231.96	243.84	11.88
IDS	137.09	127.14	-9.95
Mainstem	19.87	92.45	72.58
Total	**388.92**	**463.43**	**74.51**
Emergent Wetland			
Confluence	20.39	20.77	0.38
IDS	19.30	12.73	-6.57
Mainstem	57.84	85.04	27.20
Total	**97.53**	**118.54**	**21.01**
Grassland			
Confluence	676.46	666.90	-9.56
IDS	546.21	532.08	-14.13
Mainstem	1,086.33	896.75	-189.58
Total	**2,309.00**	**2,095.73**	**-213.27**

Aquatic Riverine			
Confluence	119.18	116.25	-2.93
IDS	123.89	121.60	-2.29
Mainstem	102.70	207.00	104.30
Total	**345.77**	**444.85**	**99.08**
Open Water			
Confluence	107.16	96.56	-10.60
IDS	32.05	42.25	10.20
Mainstem	4.55	202.44	197.89
Total	**143.76**	**341.25**	**197.49**

Bottomland Hardwood. HUs in the Confluence and Mainstem would increase in 50 years under Alternative 2 due to bottomland hardwoods being planted as part of the BVP Study features, and grassland, aquatic riverine, and open water habitat converting to bottomland hardwood. However, the bottomland hardwood HUs in the IDS would decrease due bottomland hardwood habitat being developed.

Emergent Wetland. HUs in the Confluence and Mainstem would increase in 50 years under Alternative 2 due to the creation and maintenance of more emergent wetlands. Emergent wetland HUs in the IDS would decrease in 50 years under Alternative 2 due to emergent wetlands converting to grasslands as a result of warmer and drier conditions.

Grassland. HUs in the Confluence, IDS, and Mainstem would decrease in 50 years under Alternative 2 due to development and grassland converting to bottomland hardwoods. The majority of the grassland HUs would be lost in the Mainstem due to development.

Aquatic Riverine. HUs in the Mainstem would increase in 50 years under Alternative 2 due to the realignment of the Trinity River and increased regulations and technological advances to increase water quality. Aquatic riverine HUs in the Confluence and IDS would decrease in 50 years under Alternative 2 due to aquatic riverine habitat converting to bottomland hardwoods from warmer and drier conditions.

Open Water. HUs in the Mainstem would increase in 50 years due to the creation of West, Urban, and Natural Lakes. Open water HUs in the Confluence would decrease in 50 years under Alternative 2 due to open water habitat converting to bottomland hardwoods in the Confluence from warmer and drier conditions.

4.5 THREATENED AND ENDANGERED SPECIES AND BIRDS OF CONSERVATION CONCERN

The potential for threatened or endangered species, or birds of conservation concern within the study area under Alternative 2 is anticipated to be the same as that under Alternative 1 (refer to Section 3.5).

Alternative 2 would create higher habitat values than both those of the existing conditions and those predicted under the FW/OPC. However, as under Alternative 1, federally-listed species are not likely to breed or establish permanent residences in the study area under Alternative 2.

4.6 RECOMMENDATIONS

The planning recommendations for the implementation of Alternative 2 are the same as those recommended for Alternative 1, refer to Section 2.4.

4.7 SUMMARY

Under Alternative 2, overall HUs would increase. The greatest increase would be to open water from the creation of the BVP Study lakes. Bottomland hardwood habitat would also increase with the highest quality habitat at the southeastern end of the project area. Aquatic riverine habitat would increase from the realignment of the river. Emergent wetlands would have a small increase due to the creation of higher quality wetlands. The greatest decrease of HUs would be to grassland habitat.

CHAPTER 5
ALTERNATIVE 3 – PROPOSED ACTION WITHOUT PARKWAY

5.1 INTRODUCTION

This chapter describes potential impacts to fish and wildlife habitats from the implementation of Alternative 3 over the next 50 years. The study area, habitat types (bottomland hardwood, emergent wetland, grassland, aquatic riverine, and open water) and evaluation groups (Confluence, IDS, and Mainstem) from Chapter 2 are used for the Alternative 3 evaluation. The impacts to fish and wildlife habitats from the implementation of the Alternative 3, including the implementation of the FRM elements, BVP Study features, and IDP improvements are described below and shown in Figure 7.

5.2 CHANGES TO HABITAT ACREAGES

As presented in Table 5-1, 104 acres of existing habitat would become urban from the implementation of Alternative 3. Under Alternative 2, 99 acres of existing habitat would become urban. Therefore, Alternative 3 would create five more acres of urban habitat than would Alternative 2.

The greatest decrease of habitat would be to grassland. The greatest increase would be to open water from the creation of the BVP Study lakes. Bottomland hardwood habitat would also increase with the highest quality habitat at the southeastern end of the project area. Aquatic riverine habitat would increase from the realignment of the river.

Table 5-1. Estimated Changes to Habitat Acreages under Alternative 3

Habitat Type	*Acres*		
	Existing Conditions	*Alternative 3 (Year 0)*	*Change*
Bottomland Hardwood	1,414	1,510	96
Emergent Wetland	419	321	-98
Grassland	4,283	3,777	-506
Aquatic Riverine	421	545	124
Open Water	206	486	280
Habitat Subtotal	*6,743*	*6,639*	*-104*
Urban Area	10,400	10,504	104
Total	**17,143**	**17,143**	**0**

5.2.1 Confluence

Alternative 3 and Alternative 2 propose the same activities in the Confluence area with the same impacts. Therefore, the changes in habitat acreages within the Confluence would be the same under Alternative 3 as with Alternative 2. Please refer to Section 4.2.1.

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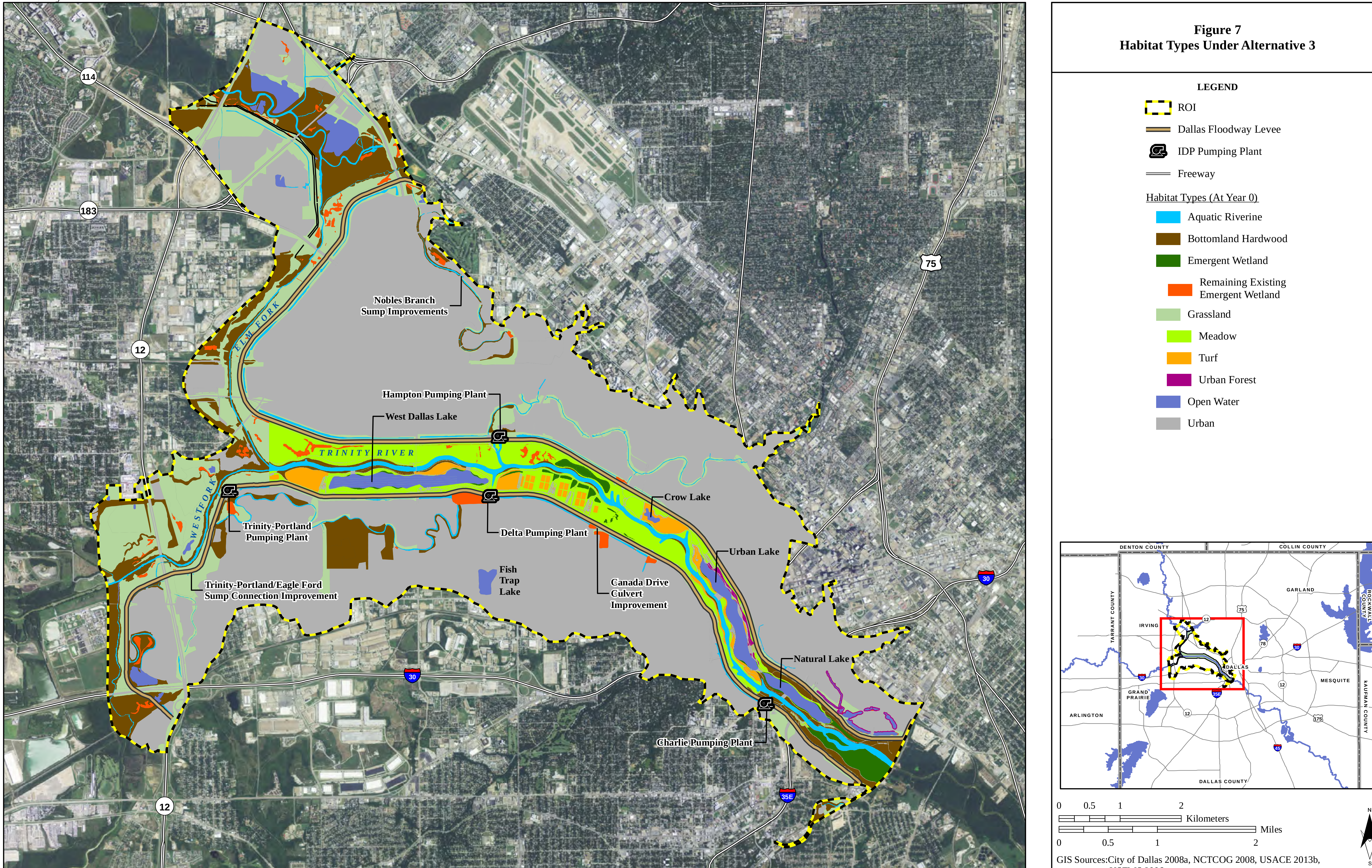

Figure 7
Habitat Types Under Alternative 3

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5.2.2 Mainstem

The habitat in the Mainstem Group has existed in its current state for the last 50 years. Under Alternative 3, most of the habitat in the Mainstem would be temporarily impacted during the implementation of the BVP Study features. After the 10-year construction period for the BVP Study features (2015-2025), most of the habitat would be restored to a higher habitat value than its current state. Three large lakes, realignment and modification of the Trinity River, fringe riparian habitat, native grassland meadows, additional bottomland hardwoods, and additional higher quality wetlands would be created with the implementation of the BVP Study features. Alternative 3 FRM elements would improve the levees but would have minimal impacts on habitat. Alternative 3 IDP improvements would add a small amount of aquatic riverine acreage to the Mainstem from the creation of outfalls at Charlie and Hampton pump stations. Table 5-2 presents the predicted acreages for the habitat types in the Mainstem Group over the next 50 years with the implementation of Alternative 3.

Table 5-2. Estimated Changes in Habitat Acreages in the Mainstem Group over the Next 50 Years under Alternative 3

Habitat Type	*Existing Conditions*	*Year*					
		0	*1*	*5*	*10*	*25*	*50*
Bottomland Hardwood	**95**	**194**	**194**	**194**	**197**	**202**	**214**
Emergent Wetland							
Existing	263	32	32	32	32	32	32
Proposed	-	154	154	154	154	154	152
Total Emergent Wetland	**263**	**186**	**186**	**186**	**186**	**186**	**184**
Grassland							
Existing Maintenance Levels	1,752	191	191	191	191	191	193
Landscaping: Meadow		844	844	844	844	844	844
Landscaping: Urban Forest		15	15	15	15	15	15
Landscaping: Turf		186	186	186	186	186	186
Total Grassland	*1,752*	*1,236*	*1,236*	*1,236*	*1,236*	*1,236*	*1,238*
Aquatic Riverine[1]	**124**	**250**	**250**	**250**	**247**	**242**	**230**
Open Water							
Existing - Crow Lake	6	6	6	6	6	6	6
Natural Lake		50	50	50	50	50	50
Urban and West Dallas Lake	-	207	207	207	207	207	207

Total Open Water	*6*	*263*	*263*	*263*	*263*	*263*	*263*
Habitat Subtotal	***2,240***	***2,129***	***2,129***	***2,129***	***2,129***	***2,129***	***2,129***
Urban Area	36	147	147	147	147	147	147
Total	**2,276**	**2,276**	**2,276**	**2,276**	**2,276**	**2,276**	**2,276**

Note: [1]Aquatic riverine includes fringe riparian habitat.

Bottomland Hardwood. Under Alternative 3, most of the existing bottomland hardwoods would be removed during the realignment and modification of the Trinity River under the BVP Study features. During the implementation of the BVP Study features, 194 acres of bottomland hardwood would be planted in the Mainstem, primarily along the southeastern section of the new Trinity River channel.

The acreage of bottomland hardwoods is not expected to increase because the hardwoods would be planted in an area adjacent to the levee and would not be allowed to expand next to the levee. Therefore, no change to acreage is expected over the next 10 years. At years 10 and 50, an increase of bottomland habitat is expected from the conversion of aquatic riverine to bottomland hardwood.

Emergent Wetland. The Mainstem wetlands under Alternative 3 would consist of approximately 186 acres of wetlands consisting of approximately 32 acres of existing wetlands and approximately 154 of wetlands created from the implementation of the BVP Study features. The created wetlands would include Corinth, Cypress, and fringe marsh wetlands along the edge of the lakes.

Due to the proposed maintenance of the BVP Study features in the Mainstem, the acreage of emergent wetlands in the Mainstem is expected to stay the same over the next 10 years. At year 50, one percent of the emergent wetlands are expected to convert to grassland due to siltation and warmer and drier conditions resulting from climate change.

Grassland. With the implementation of the BVP Study features, the majority of the existing grasslands would be temporarily disturbed and would be replanted and realigned after the completion of the BVP Study features. BVP grasslands would consist of low quality mowed turf, native meadows, and urban forests.

Due to the proposed maintenance of the BVP Study features in the Mainstem, no changes to grassland acreage is expected over the next 50 years. At year 50, the acreage is expected to increase by one percent, due to the emergent wetland converting to grassland.

Aquatic Riverine. The aquatic riverine habitat value and acreage in the Mainstem would change significantly under Alternative 3. Under the BVP Study features, the Trinity River is proposed to be realigned and modified to increase sinuosity and increase habitat value. The Mainstem aquatic riverine would include fringe riparian habitat.

The aquatic riverine acreage is expected to remain at 250 acres from year 0 to 5. At year 10, one percent of the aquatic habitat is expected to convert to bottomland hardwoods due to less water reaching the Mainstem. This could be from warmer and drier conditions and/or residents and businesses retaining more water on their properties. By year 50, five percent of the aquatic riverine habitat is expected to be converted to bottomland hardwoods, primarily due to warmer and drier conditions resulting from climate change.

Open Water. The Mainstem under Alternative 3 would encompass 263 acres of open water consisting of the existing Crow Lake and Urban, West, and Natural lakes which would be created under the BVP Study features. The lakes would be maintained; therefore, no change to open water acreage is expected over the next 50 years.

5.2.3 Interior Drainage Systems

Alternative 3 and Alternative 2 propose the same activities in the IDS with the same impacts. Therefore, the changes in habitat acreages within the IDS would be the same under Alternative 3 as with Alternative 2. Please refer to Section 4.2.3.

5.3 Habitat Suitability Index Values

HSIs for Alternative 3 were based in the species models used for the baseline assessment (Section 2.2) (USACE 2013c). In April 2013, the USFWS hosted the USACE to coordinate and assist in prediction of the future conditions with the action alternative completed. The *Trinity River Corridor Design Guidelines* (City of Dallas 2009) was used to inform the models in terms of future plant assemblage and habitat anticipated within the Floodway.

5.3.1 Confluence

Alternative 3 and Alternative 2 propose the same activities in the Confluence area with the same impacts. Therefore, The HSI and HU values for the Confluence are anticipated to be the same as those under Alternative 2 (refer to Section 4.3.1).

5.3.2 Mainstem

Table 5-3 provides HSIs, acres, and HUs under Alternative 3 for the Mainstem for bottomland hardwood, emergent wetland, grassland, aquatic riverine, and open water habitat over the next 50 years. With the implementation of the BVP Study features, most of the habitat in the Mainstem would be temporarily disturbed. Following the implementation of the BVP Study features (Years 0, 1, and 5), the bottomland hardwood, emergent wetland, and urban forest HSIs would be low because the habitats would take time to become established. The bottomland hardwood HSIs are expected to increase over time as the trees mature, and the emergent wetland HSIs are expected to increase over time as the wetlands become more established.

The Mainstem grasslands would consist of native meadow, turf, and urban forest. The native meadow is expected to have a higher HSI than the existing non-native dominated grassland, and is expected to increase in value over the next 50 years from increased native diversity. The turf HSI is not expected to change over time because mowed grass is expected to remain at the same low habitat value over the next 50 years. Urban forest is considered a subset of grassland because the majority of the trees are planted non-native ornamental trees and do not provide the same habitat value as a native forest.

Aquatic riverine and open water habitat HSIs are not expected to increase much over time because they would contain water and are expected to be functioning aquatic ecosystems once the BVP is completed. At year 50, the aquatic riverine HSI is expected to increase due to increased regulations and technology for improvements to water quality. The open water HSI was determined by referencing the 2010 fisheries sampling in Crow Lake, Bart Simpson Lake, and Cell D of the Dallas Floodway Extension (USACE 2010).

Table 5-3. Estimated HSIs, Acreages, and HUs for Habitat Types in the Mainstem Group over the Next 50 Years under Alternative 3

Metric	*Existing Conditions*	*Year*					
		0	*1*	*5*	*10*	*25*	*50*
Bottomland Hardwood							
HSI	0.21	0.09	0.09	0.09	0.13	0.21	0.43
Acres	94.64	194	194	194	197	202	214
HUs	19.87	17.46	17.46	17.46	25.61	42.42	92.02
Emergent Wetland							
Existing/Continuing							
HSI	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Acres	262.91	32	32	32	32	32	32
HUs	57.84	7.04	7.04	7.04	7.04	7.04	7.04
Proposed							
HSI	-	0.13	0.13	0.34	0.42	0.47	0.52
Acres	-	154	154	154	154	154	152
HUs	0	20.02	20.02	52.36	64.68	72.38	79.04
Emergent Wetland HU	***57.84***	***27.06***	***27.06***	***59.4***	***71.72***	***79.42***	***86.08***
Grassland							
Existing Maintenance Levels							
HSI	0.62	0.40	0.40	0.40	0.40	0.40	0.40
Acres	1,752.15	191	191	191	191	191	193
HUs	1,086.33	76.40	76.40	76.40	76.40	76.40	77.20
Landscaping: Meadow							
HSI	-	0.50	0.60	0.70	0.65	0.70	0.85
Acres	-	844	844	844	844	844	844
HUs	0.00	422.00	506.40	590.80	548.60	590.80	717.40
Landscaping: Turf							
HSI	-	0.00	0.00	0.40	0.40	0.40	0.40
Acres	-	186	186	186	186	186	186
HUs	0.00	0.00	0.00	74.40	74.40	74.40	74.40

Landscaping: Urban Forest							
HSI	-	0.50	0.50	0.40	0.40	0.40	0.40
Acres	-	15	15	15	15	15	15
HUs	0.00	7.50	7.50	6.00	6.00	6.00	6.00
Grassland HU	***1,086.33***	***505.90***	***590.30***	***747.60***	***705.40***	***747.60***	***875.00***
Aquatic Riverine							
HSI	0.83	0.83	0.75	0.83	0.85	0.87	0.90
Acres	123.73	250	250	250	247	242	230
HUs	102.70	207.50	187.50	207.50	209.95	210.54	207.00
Open Water							
Crow Lake							
HSI	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Acres	6.41	6.41	6.41	6.41	6.41	6.41	6.41
HUs	4.55	4.55	4.55	4.55	4.55	4.55	4.55
Urban Lake & West Dallas Lake							
HSI		0.00	0.00	0.43	0.77	0.77	0.77
Acres		207	207	207	207	207	207
HUs		0.00	0.00	89.01	159.39	159.39	159.39
Natural Lake							
HSI		0.00	0.00	0.60	0.77	0.77	0.77
Acres		50	50	50	50	50	50
HUs		0.00	0.00	30.00	38.50	38.50	38.50
Open Water HU	***4.55***	***4.55***	***4.55***	***123.56***	***202.44***	***202.44***	***202.44***

5.3.3 Interior Drainage Systems

Alternative 3 and Alternative 2 propose the same activities in the IDS with the same impacts. Therefore, The HSI and HU values for the IDS are anticipated to be the same as those under Alternative 2 (refer to Section 4.3.3).

5.4 HABITAT UNITS SUMMARY

As presented in Table 5-4, overall HUs would decrease in 50 years under Alternative 3. The greatest decrease of HUs would occur to grassland habitat. The greatest increase would be to open water from the creation of the BVP Study lakes. Bottomland hardwood habitat would also increase with the highest quality habitat at the southeastern end of the project area. Aquatic riverine habitat would increase from the realignment of the river.

Table 5-4. HUs per Habitat Type Within the Study Area under Alternative 3

Habitat Types	*HUs*		
	Baseline	*Year 50*	*Change*
Bottomland Hardwood	388.92	463.00	74.08
Emergent Wetland	97.53	119.58	22.05
Grassland	2,309.00	2,073.98	-235.02
Aquatic Riverine	345.77	444.85	99.08
Open Water	143.76	341.25	197.49
Total	3,284.98	3,442.66	157.68

Table 5-5 presents the existing conditions (baseline) and Alternative 3 (Year 50) HUs for the five habitat types in the Confluence, IDS, and Mainstem.

Bottomland Hardwood. HUs in the Confluence and Mainstem would increase in 50 years under Alternative 3 due to bottomland hardwoods being planted as part of the BVP Study features and grassland, aquatic riverine, and open water habitats converting to bottomland hardwood. However, the bottomland hardwood HUs in the IDS would decrease due to bottomland hardwood habitat being developed.

Emergent Wetland. HUs in the Confluence and Mainstem would increase in 50 years under Alternative 3 due to the creation and maintenance of more emergent wetlands. Emergent wetland HUs in the IDS would decrease in 50 years under Alternative 3 due to emergent wetlands converting to grasslands because of warmer and drier conditions.

Grassland. HUs in the Confluence, IDS, and Mainstem would decrease in 50 years under Alternative 3 due to development and grassland converting to bottomland hardwoods. The majority of the grassland HUs would be lost in the Mainstem due to development.

Aquatic Riverine. HUs in the Mainstem would increase in 50 years under Alternative 3 due to the realignment of the Trinity River and increased regulations and technological advances to increase water quality. Aquatic riverine HUs in the Confluence and IDS would decrease in 50 years under Alternative 3 due to aquatic riverine habitat converting to bottomland hardwoods from warmer and drier conditions.

Open Water. HUs in the Mainstem would increase in 50 years due to the creation of West, Urban, and Natural Lakes. Open water HUs in the Confluence would decrease in 50 years under the Alternative 3 due to open water habitat converting to bottomland hardwoods in the Confluence from warmer and drier conditions.

Table 5-5. Estimated HU Values for Habitats within the Study Area under Baseline and Alternative 3 (Year 50)

Evaluation Areas	*HUs*		
	Baseline	*Alternative 3*	*Change*
Bottomland Hardwood			
Confluence	231.96	243.84	11.88
IDS	137.09	127.14	-9.95
Mainstem	19.87	92.02	72.15
Total	**388.92**	**463.00**	**74.08**
Emergent Wetland			
Confluence	20.39	20.77	0.38
IDS	19.30	12.73	-6.57
Mainstem	57.84	86.08	28.24
Total	**97.53**	**119.58**	**22.05**
Grassland			
Confluence	676.46	666.90	-9.56
IDS	546.21	532.08	-14.13
Mainstem	1,086.33	875.00	-211.33
Total	**2,309.00**	**2,073.98**	**-235.02**
Aquatic Riverine			
Confluence	119.18	116.25	-2.93
IDS	123.89	121.60	-2.29
Mainstem	102.70	207.00	104.30
Total	**345.77**	**444.85**	**99.08**
Open Water			
Confluence	107.16	96.56	-10.60
IDS	32.05	42.25	10.20
Mainstem	4.55	202.44	197.89
Total	**143.76**	**341.25**	**197.49**

5.5 THREATENED AND ENDANGERED SPECIES AND BIRDS OF CONSERVATION CONCERN

The potential for threatened or endangered species, or birds of conservation concern within the study area under Alternative 3 is anticipated to be the same as that under Alternative 1 (refer to Section 3.5).

Alternative 3 would create higher habitat values than both those of the existing conditions and those predicted under the FW/OPC. However, as under Alternative 1, federally-listed species are not likely to breed or establish permanent residences in the study area under Alternative 3.

5.6 RECOMMENDATIONS

The planning recommendations for the implementation of Alternative 3 are the same as those recommended for Alternative 1, refer to Section 2.4.

5.7 SUMMARY

Overall, HUs would increase in 50 years under Alternative 3. The greatest decrease of HUs would occur to grassland habitat. The greatest increase would be to open water from the creation of the BVP Study lakes. Bottomland hardwood habitat would also increase with the highest quality habitat at the southeastern end of the project area. Aquatic riverine habitat would increase from the realignment of the river.

CHAPTER 6
CUMULATIVE IMPACT ASSESSMENT ALTERNATIVE 2

6.1 INTRODUCTION

This chapter describes potential impacts to fish and wildlife habitats from the implementation of Alternative 2 and the cumulative projects over the next 50 years. The study area habitat types (bottomland hardwood, emergent wetland, grassland, aquatic riverine, and open water) and evaluation groups (Confluence, IDS, and Mainstem) from Chapter 2 are used for the Alternative 2 and cumulative projects evaluation. The impacts to fish and wildlife habitats from the implementation of Alternative 2 and cumulative projects, including the implementation of the BVP Study features, FRM elements, IDP improvements, and FW/OPC projects described in Chapter 3 are described below and shown in Figure 8. The BVP Study features are notional in nature. As a result, the impacts of these features cannot be determined with the same precision as the existing conditions. Thus, impacts from DFP implementation are estimated to the nearest whole acre.

6.2 CHANGES TO HABITAT ACREAGES

As presented in Table 6-1, 295 acres of existing habitat would become Urban from the implementation of Alternative 2 and the other cumulative projects. Open water habitat would increase under Alternative 2 and the cumulative projects from the creation of Urban, West, and Natural lakes. Bottomland hardwood acreage would also increase with hardwoods planted along the Trinity River; the largest amount of hardwoods would be planted at the southeastern end of the project area. Aquatic riverine acreage would increase from the realignment of the river. The greatest decrease of habitat would be to grassland habitat.

Table 6-1. Estimated Cumulative Changes to Habitat Acreages with Alternative 2

Habitat Type	*Acres*		
	Existing Conditions	*Alternative 2 (Year 0)*	*Change*
Bottomland Hardwood	1,414	1,480	66
Emergent Wetland	419	371	-48
Grassland	4,283	3,565	-718
Aquatic Riverine[1]	421	546	125
Open Water	206	486	280
Habitat Subtotal	*6,743*	*6,448*	*-295*
Urban Area	10,400	10,695	295
Total	**17,143**	**17,143**	**0**

Note: [1]Aquatic riverine includes fringe riparian habitat.

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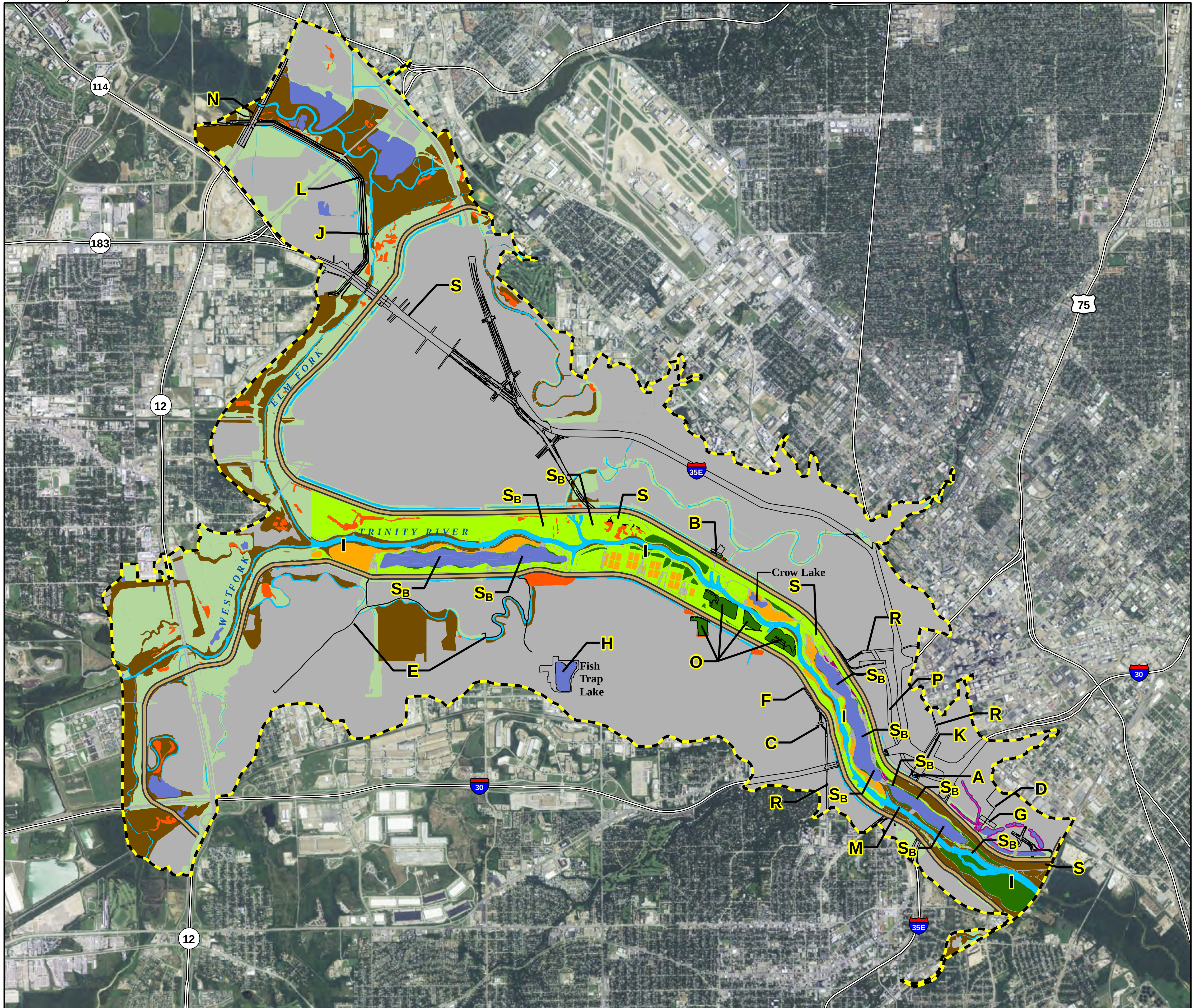


Figure 8
Habitat Types Under Alternative 2 with Cumulative Projects

Future Without Project Condition Projects

- A Able Pumping Plant
- B Baker Pumping Plant
- C Beckley Avenue Improvements
- D Belleview Trail Connector
- E Bernal Trail
- F Continental Pedestrian Bridge
- G Dallas Maritime Museum
- H Dallas Watersports Complex
- I Dallas Water Utility Lines
- J EF2 Wastewater Interceptor Line & Laterals
- K Horseshoe Project
- L Irving Northwest Levee Repair
- M Jefferson-Memorial Bridge
- N Loop 12 Bridge
- O Pavaho Wetlands
- P Riverfront Boulevard
- Q SH-183 Bridge
- R Trinity Lakes Streetcar Loop
- S Trinity Parkway
- S_B Trinity Parkway Borrow Pits

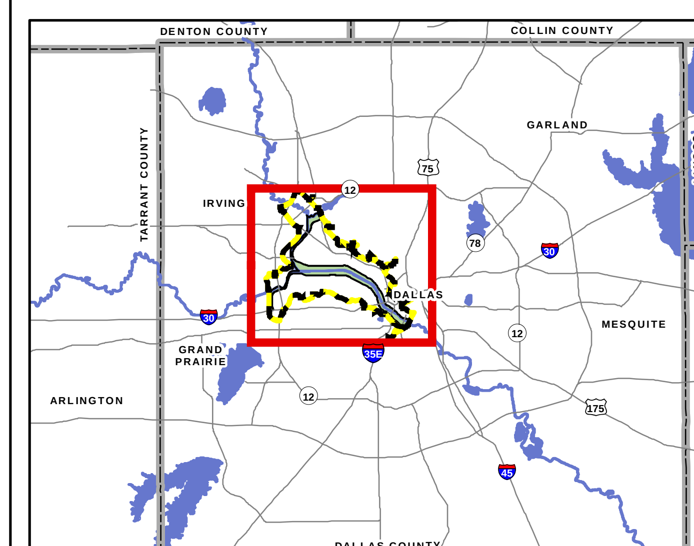
ROI

Dallas Floodway Levee

Freeway

Habitat Types (At Year 0)

- Aquatic Riverine
- Bottomland Hardwood
- Emergent Wetland
- Remaining Existing Emergent Wetland
- Grassland
- Meadow
- Turf
- Urban Forest
- Open Water
- Urban



0 0.5 1 2 Kilometers

0 0.5 1 2 Miles

GIS Sources: Black and Veatch 2010; City of Dallas 2008a, 2010a; TxDOT 2010; USACE 2007, 2013b; USFWS 2006

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6.2.1 Confluence

The Confluence Group includes the Elm Fork and West Fork of the Trinity River and the associated emergent wetland and upland habitat in the area. The Alternative 2 actions and cumulative projects in the Confluence consist of the IDP Trinity-Portland Pumping Plant and Eagle Ford and Trinity-Portland sump improvements, FRM Elements, EF2 Wastewater Interceptor Line and Laterals, the Irving Northwest Levee Repair, and the Loop 12 Bridge. Table 6-2 presents the predicted acreages for the habitat types in the Confluence Group over the next 50 years from the implementation of Alternative 2 and the cumulative projects.

Table 6-2. Estimated Cumulative Changes in Habitat Acreages in the Confluence Group over the Next 50 Years with Alternative 2

Habitat Type	*Existing Conditions*	*Year*			
		0	*5*	*10*	*50*
Bottomland Hardwood	967	967	967	977	1,016
Emergent Wetland	68	68	68	68	67
Grassland	1,573	1,499	1,499	1,469	1,411
Aquatic Riverine	132	133	133	132	125
Open Water	151	151	151	148	136
Habitat Subtotal	*2,891*	*2,818*	*2,818*	*2,794*	*2,755*
Urban Area	927	1,000	1,000	1,024	1,063
Total	**3,818**	**3,818**	**3,818**	**3,818**	**3,818**

Bottomland Hardwood. The acreage of bottomland hardwoods under Alternative 2 and cumulative projects would follow the same progression predicted under Alternative 1 (refer to Section 3.2.1).

Emergent Wetland. The acreage of emergent wetlands under Alternative 2 and cumulative projects would follow the same progression predicted under Alternative 1 (refer to Section 3.2.1).

Grassland. The acreage of grasslands under Alternative 2 and cumulative projects would follow the same progression predicted under Alternative 1 (refer to Section 3.2.1).

Aquatic Riverine. The aquatic riverine progression is anticipated to be the same as that under Alternative 1 (refer to Section 3.2.1).

Open Water. The open water progression is anticipated to be the same as that under Alternative 1 (refer to Section 3.2.1).

6.2.2 Mainstem

The habitat in the Mainstem Group has existed in its current state for the last 50 years. Under Alternative 2 and cumulative projects, most of the habitat in the Mainstem would be temporarily impacted during the implementation of the BVP Study features. After the 10-year construction period for the BVP Study features is complete (2015-2025), most of the habitat would be restored to a higher habitat value than its current state. Three large lakes, re-alignment of the Trinity River, fringe riparian habitat, native grassland meadows, additional bottomland hardwoods, and additional higher quality wetlands would be created with the implementation of the BVP (refer to Figure 8). Alternative 2 FRM elements would improve the levees and have minimal impacts on habitat. Table 6-3 presents the predicted acreages for the habitat types in the Mainstem Group over the next 50 years with the implementation of Alternative 2 and cumulative projects.

Bottomland Hardwood. Under Alternative 2, most of the existing bottomland hardwoods would be removed during the re-alignment of the Trinity River as part of the BVP Study features. During the implementation of the BVP Study features, 163 acres of bottomland hardwood would be planted in the Mainstem, primarily along the southeastern section of the new Trinity River channel.

The acreage of bottomland hardwoods is not expected to increase because the hardwoods would be planted in an area adjacent to the levee and would not be allowed to expand next to the levee. Therefore, no change to acreage is expected over the next 5 years. At years 10, 25, and 50, an increase of bottomland habitat is expected from the conversion of aquatic riverine to bottomland hardwood.

Table 6-3. Estimated Cumulative Changes in Habitat Acreages in the Mainstem Group over the Next 50 Years with Alternative 2

Habitat Type	*Existing Conditions*	*Year*					
		0	*1*	*5*	*10*	*25*	*50*
Bottomland Hardwood	**95**	**163**	**163**	**163**	**166**	**171**	**183**
Emergent Wetland							
Existing	263	31	31	31	31	31	31
Proposed	-	204	204	204	204	204	202
Total Emergent Wetland	*263*	*235*	*235*	*235*	*235*	*235*	*233*
Grassland							
Existing Maintenance Levels	1,752	182	182	182	182	182	184
Landscaping: Meadow	-	772	772	772	772	772	772
Landscaping: Urban Forest	-	5	5	5	5	5	5
Landscaping: Turf	-	157	157	157	157	157	157
Total Grassland	*1,752*	*1,116*	*1,116*	*1,116*	*1,116*	*1,116*	*1,118*
Aquatic Riverine [1]	**124**	**251**	**251**	**251**	**248**	**243**	**231**
Open Water							
Existing - Crow Lake	6	6	6	6	6	6	6
Natural Lake	-	50	50	50	50	50	50
Urban and West Dallas Lake	-	207	207	207	207	207	207

Total Open Water	*6*	*263*	*263*	*263*	*263*	*263*	*263*
Habitat Subtotal	***2,240***	***2,028***	***2,028***	***2,028***	***2,028***	***2,028***	***2,028***
Urban Area	36	248	248	248	248	248	248
Total	**2,276**	**2,276**	**2,276**	**2,276**	**2,276**	**2,276**	**2,276**

Note: [1]Aquatic riverine includes fringe riparian habitat.

Emergent Wetland. The Mainstem wetlands under Alternative 2 would comprise approximately 235 acres: 31 acres of existing wetlands and 204 acres of wetlands created from the implementation of the BVP Study features. The created wetlands would include Corinth, Cypress, and fringe marsh wetlands along the edge of the lakes.

With the proposed maintenance of the BVP in the Mainstem, the acreage of emergent wetlands in the Mainstem is expected to stay the same over the next 10 to 25 years. At year 50, one percent of the emergent wetlands are expected to convert to grassland because of siltation and warmer and drier conditions from climate change.

Grassland. With the implementation of the BVP Study features, the majority of the existing grasslands would be temporarily disturbed and would be replanted and realigned after the completion of the BVP Study features. The grasslands would consist of low quality mowed turf, native meadows, and urban forests.

Due to the proposed maintenance of the grasslands in the Mainstem, no change to BVP grassland acreage is expected over the next 50 years. At year 50, the acreage is expected to increase due to one percent of emergent wetland converting to grassland.

Aquatic Riverine. The aquatic riverine habitat value and acreage in the Mainstem would change significantly under Alternative 2 and cumulative projects. Under the BVP Study features, the Trinity River is proposed to be re-routed to increase sinuosity and increase habitat value. The Mainstem aquatic riverine would include fringe riparian habitat.

The aquatic riverine acreage is expected to remain at 251 acres from year 0 to 5. At year 10, one percent of the aquatic habitat is expected to convert to bottomland hardwoods as a result of less water reaching the Mainstem. This could be from warmer and drier conditions and/or residents and businesses retaining more water on their properties. At year 25, two percent of aquatic riverine is expected to be converted to bottomland hardwoods. By year 50, five percent of the aquatic riverine habitat is expected to be converted to bottomland hardwoods, primarily due to warmer and drier conditions from climate change.

Open Water. Under Alternative 2 and cumulative projects, the Mainstem would comprise 263 acres of open water, including the existing Crow Lake and three BVP Study lakes, Urban, West, and Natural. The lakes would be maintained; therefore, no change to open water acreage is expected over the next 50 years.

6.2.3 Interior Drainage Systems

The IDS Group is primarily an urban area with pockets of habitat surrounding the existing sumps, pumps, and drainage channels. Alternative 2 actions and cumulative projects in the IDS consist of the Charlie, Delta, and Hampton, Pumping Plant improvements, the Nobles Branch and East Levee sump improvements, and 12 cumulative projects. Table 6-4 presents the predicted acreages for the habitat types in the IDS Group over the next 50 years with the implementation of Alternative 2 and cumulative projects.

Table 6-4. Estimated Cumulative Changes in Habitat Acreages in the Interior Drainage Systems Group over the Next 50 Years with Alternative 2

Habitat Type	*Existing Conditions*	*Year*			
		0	*5*	*10*	*50*
Bottomland Hardwood	352	350	347	339	326
Emergent Wetland	88	68	68	68	68
Grassland					
Existing Maintenance Levels	958	928	919	891	829
Urban Forest	-	22	22	22	22
Grassland Subtotal	*958*	*950*	*941*	*913*	*851*
Aquatic Riverine	165	162	162	160	152
Open Water	49	72	72	71	65
Habitat Subtotal	*1,612*	*1,602*	*1,590*	*1,551*	*1,462*
Urban Area	9,437	9,447	9,459	9,498	9,587
Total	**11,049**	**11,049**	**11,049**	**11,049**	**11,049**

Bottomland Hardwood. The acreage of bottomland hardwoods under Alternative 2 and cumulative projects would follow the same progression predicted under Alternative 1 (refer to Section 3.2.3).

Emergent Wetland. The acreage of emergent wetlands under Alternative 2 and cumulative projects would follow the same progression predicted under Alternative 1 (refer to Section 3.2.3).

Grassland. The acreage of grasslands under Alternative 2 and cumulative projects would follow the same progression predicted under Alternative 1 (refer to Section 3.2.3).

Aquatic Riverine. The aquatic riverine progression is anticipated to be the same as that under Alternative 1 (refer to Section 3.2.3).

Open Water. The open water progression is anticipated to be the same as that under Alternative 1 (refer to Section 3.2.3).

6.3 HABITAT SUITABILITY INDEXES AND HABITAT UNIT VALUES

HSI values for Alternative 2 and cumulative projects were based on the species models used for the baseline assessment (Section 2.2) (USACE 2013c). In April 2013, the USFWS hosted the USACE to coordinate and assist in prediction of the future conditions with the action alternative completed. The *Trinity River Corridor Design Guidelines* (City of Dallas 2009) was used to inform the models in terms of future plant assemblage and habitat anticipated within the Floodway.

6.3.1 Confluence

The HSI and HU values progressions for the Confluence are presented in Table 6-5. The analysis associated with the progressions predicted is the same as that presented for Alternative 1 (refer to Section 3.3.1).

Table 6-5. Estimated Cumulative HSIs, Acreages, and HUs for Habitat Types in the Confluence Group over the Next 50 Years with Alternative 2

Metric	*Existing Conditions*	*Year*			
		0	*5*	*10*	*50*
Bottomland Hardwood					
HSI	0.24	0.24	0.24	0.24	0.24
Acres	966.49	967	967	977	1,016
HUs	231.96	232.08	232.08	234.48	243.84
Emergent Wetland					
HSI	0.30	0.30	0.30	0.30	0.31
Acres	67.95	68	68	68	67
HUs	20.39	20.40	20.40	20.40	20.77
Grassland					
HSI	0.43	0.43	0.43	0.43	0.45
Acres	1,573.16	1,499	1,499	1,469	1,411
HUs	676.46	644.57	644.57	631.67	634.95
Aquatic Riverine					
HSI	0.90	0.90	0.90	0.90	0.93
Acres	132.42	133	133	132	125
HUs	119.18	119.7	119.7	118.8	116.25
Open Water					
HSI	0.71	0.71	0.71	0.71	0.71
Acres	150.93	151	151	148	136
HUs	107.16	107.21	107.21	105.08	96.56

6.3.2 Mainstem

Table 6-6 presents the Alternative 2 HSIs, acres, and HUs for the Mainstem for bottomland hardwood, emergent wetland, grassland, aquatic riverine, and open water habitat over the next 50 years. With the implementation of the BVP Study features, most of the habitat in the Mainstem would be temporarily disturbed. Following the implementation of the BVP Study features (years 0, 1, and 5), the bottomland hardwood, emergent wetland, and urban forest HSIs would be low because the habitats would have just been created and would take time to become established. The bottomland hardwood HSIs are expected to increase over time as the trees mature, and the emergent wetland HSIs are expected to increase over time as the wetlands become more established.

The Mainstem grasslands would consist of native meadow, turf, and urban forest. The native meadow is expected to have a higher HSI than the existing non-native dominated grassland and is expected to increase in value over the next 50 years from increased native species diversity. The turf HSI is not expected to change over time because mowed grass is expected to remain at the same low habitat value over the next 50 years. Urban forest is considered a subset of grassland because the majority of the proposed trees would be non-native ornamental trees and do not provide the same habitat value as a native forest.

Aquatic riverine and open water habitat HSIs are not expected to increase much over time because they would contain water and are expected to be functioning aquatic ecosystems once the BVP Study features are completed. At year 50, the aquatic riverine HSI is expected to increase due to increased regulations and technology for improvements to water quality. The open water HSI was determined by referring to the 2010 fisheries sampling in Crow Lake, Bart Simpson Lake, and Cell D of the Dallas Floodway Extension (USACE 2010).

Table 6-6. Estimated Cumulative HSIs, Acreages, and HUs for Habitat Types in the Mainstem Group over the Next 50 Years with Alternative 2

Metric	*Existing Conditions*	*Year*					
		0	*1*	*5*	*10*	*25*	*50*
Bottomland Hardwood							
HSI	0.21	0.09	0.09	0.09	0.13	0.21	0.43
Acres	94.64	163	163	163	166	171	183
HUs	19.87	14.67	14.67	14.67	21.58	35.91	78.69
Emergent Wetland							
Existing/Continuing							
HSI	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Acres	262.91	31	31	31	31	31	31
HUs	57.84	6.82	6.82	6.82	6.82	6.82	6.82
Proposed							
HSI	-	0.13	0.13	0.34	0.42	0.47	0.52
Acres	-	204	204	204	204	204	202
HUs	0	26.52	26.52	69.36	85.68	95.88	105.04
Emergent Wetland HU	**57.84**	**33.34**	**33.34**	**76.18**	**92.5**	**102.7**	**111.86**

Grassland							
Existing/Continuing							
HSI	0.62	0.4	0.4	0.4	0.4	0.4	0.4
Acres	1,752.15	182	182	182	182	182	184
HUs	1,086.33	72.8	72.8	72.8	72.8	72.8	73.6
Landscaping: Meadow							
HSI	-	0.50	0.60	0.70	0.65	0.70	0.85
Acres	-	772	772	772	772	772	772
HUs	-	386.00	463.20	540.40	501.80	540.40	656.20
Landscaping: Turf							
HSI	-	0	0	0.4	0.4	0.4	0.4
Acres	-	157	157	157	157	157	157
HUs	-	0.00	0.00	62.80	62.80	62.80	62.80
Landscaping: Urban Forest							
HSI	-	0.50	0.50	0.40	0.40	0.40	0.40
Acres	-	5	5	5	5	5	5
HUs	-	2.50	2.50	2.00	2.00	2.00	2.00
Grassland HU	**1,086.33**	**461.30**	**538.50**	**678.00**	**639.40**	**678.00**	**794.60**
Aquatic Riverine							
HSI	0.83	0.83	0.75	0.83	0.85	0.87	0.90
Acres	123.73	251	251	251	248	243	231
HUs	102.70	208.33	188.25	208.33	210.80	211.41	207.90
Open Water							
Crow Lake							
HUs	4.55	4.55	4.55	4.55	4.55	4.55	4.55
Urban Lake & West Dallas Lake							
HSI	-	0.00	0.00	0.43	0.77	0.77	0.77
Acres	-	207	207	207	207	207	207
HUs	-	0.00	0.00	89.01	159.39	159.39	159.39
Natural Lake							
HSI	-	0.00	0.00	0.60	0.77	0.77	0.77
Acres	-	50	50	50	50	50	50
HUs	-	0.00	0.00	30.00	38.50	38.50	38.50
Open Water HU	**4.55**	**4.55**	**4.55**	**123.56**	**202.44**	**202.44**	**202.44**

6.3.3 Interior Drainage Systems

Table 6-7 presents the Alternative 2 HSIs, acres, and HUs for the IDS for bottomland hardwood, emergent wetland, grassland, aquatic riverine, and open water habitat over the next 50 years.

The majority of the bottomland hardwoods occur along the drainage channels. Bottomland hardwood areas within the IDS are expected to decrease over time due to development. Bottomland hardwood habitats do not have any special protection from development.

The emergent wetlands are part of the sump pump areas and will remain. As a drying trend is predicted for the region, the quality and quantity of emergent wetlands is expected to decrease in the long term. The primary purpose of the emergent wetland areas are flood control, not to provide habitat.

The majority of the grasslands occur along the drainage channels. The quality (HSI) of the grassland habitat would increase slightly in the long term as trees in the urban forest provide increased foraging opportunities for grassland species. Grassland areas are expected to decrease over time because of development. Grassland habitats do not have any special protection from development.

The aquatic riverine HSI was determined using the Trinity River IBI (USFWS 2004). Reach 1, the lower reach of the Mainstem, had the lowest HSI of the four reaches and was determined to be the most similar of the four reaches to the IDS. The IDS is smaller than the Trinity River, has less species diversity, and is not connected to the Trinity River for species dispersal; therefore, it is expected to have a lower HSI than the rest of the River. The HSI is expected to remain at 0.7 from year 0 to 5 because of siltation, erosion, and other temporary impacts from construction. At year 10, the HSI is expected to be back at 0.75 (pre-construction conditions). By year 50, the HSI is expected to increase to 0.80 due to increased regulations and technology for improvements to water quality.

The open water HSI was determined from 2010 fisheries sampling (USACE 2010). Because the IDS is smaller than the Trinity River, has less species diversity, and is not connected to the Trinity River for species dispersal, it is expected to have a lower HSI than the Mainstem or Confluence areas of the Trinity River. Therefore, the average open water HSI score was adjusted to 0.65. The water quality in the open water is not expected to change in the next 50 years; therefore, the HSI would remain the same for the next 50 years.

Table 6-7. Estimated Cumulative HSIs, Acreages, and HUs for Habitat Types in the Interior Drainage Systems Group over the Next 50 Years with Alternative 2

Metric	*Existing Conditions*	*Year*			
		0	*5*	*10*	*50*
Bottomland Hardwood					
HSI	0.39	0.39	0.39	0.39	0.39
Acres	351.50	350	347	339	326
HUs	137.09	136.50	135.33	132.21	127.14
Emergent Wetland					
HSI	0.22	0.23	0.22	0.22	0.19
Acres	87.72	68	68	68	68
HUs	19.3	15.64	14.96	14.96	12.92
Grassland					
Existing Maintenance Levels					
HSI	0.57	0.57	0.57	0.57	0.62
Acres	958.26	928	919	891	829
HUs	546.21	528.96	523.83	507.87	513.98
Landscaping: Urban Forest					
HSI	-	0.50	0.40	0.40	0.40
Acres	-	22	22	22	22
HUs	0	11	8.8	8.8	8.8
Grassland Total HU	**546.21**	**539.96**	**532.63**	**516.67**	**522.78**
Aquatic Riverine					
HSI	0.75	0.70	0.70	0.75	0.80
Acres	165.18	162	162	160	152
HUs	123.89	113.40	113.40	120.00	121.60
Open Water					
HSI	0.65	0.65	0.65	0.65	0.65
Acres	49.30	72	72	71	65
HUs	32.05	46.80	46.80	46.15	42.25

6.4 HABITAT UNITS SUMMARY

As presented in Table 6-8, overall HUs would increase under Alternative 2 and cumulative projects over the next 50 years. The greatest increase would be to open water from the creation of the BVP Study lakes. Bottomland hardwood habitat would also increase with the highest quality habitat at the southeastern end of the project area. Aquatic Riverine habitat would increase from the realignment of the river. The greatest decrease of HUs would be to grassland habitat.

Table 6-8. Cumulative HUs per Habitat Type Within the Study Area with Alternative 2

Habitat Types	*HUs*		
	Baseline	*Year 50*	*Change*
Bottomland Hardwood	388.92	449.67	60.75
Emergent Wetland	97.53	145.55	48.02
Grassland	2,309.00	1,952.33	-356.67
Aquatic Riverine	345.77	445.75	99.98
Open Water	143.76	341.25	197.49
Total	**3,284.98**	**3,334.55**	**49.57**

Table 6-9 presents the existing conditions (baseline) and Alternative 2 and cumulative projects (Year 50) HUs for the five habitat types in the Confluence, IDS, and Mainstem.

Bottomland Hardwood. HUs in the Confluence and Mainstem would increase in 50 years under Alternative 2 and cumulative projects due to bottomland hardwoods being planted as part of the BVP Study features, and grassland, aquatic riverine, and open water habitat converting to bottomland hardwood. However, the bottomland hardwood HUs in the IDS would decrease due to bottomland hardwood habitat being developed.

Emergent Wetland. HUs in the Confluence and Mainstem would increase in 50 years under Alternative 2 and cumulative projects due to the creation and maintenance of more emergent wetlands. Emergent wetland HUs in the IDS would decrease in 50 years under Alternative 2 and cumulative projects due to emergent wetlands converting to grasslands as a result of warmer and drier conditions.

Grassland. HUs in the Confluence, IDS, and Mainstem would decrease in 50 years under Alternative 2 and cumulative projects due to development and grasslands converting to bottomland hardwoods. The majority of the grassland HUs would be lost in the Mainstem due to development.

Aquatic Riverine. HUs in the Mainstem would increase in 50 years under Alternative 2 and cumulative projects due to the realignment of the Trinity River and increased regulations and technological advances to increase water quality. Aquatic riverine HUs in the Confluence and IDS would decrease in 50 years under Alternative 2 due to aquatic riverine habitat converting to bottomland hardwoods from warmer and drier conditions.

Open Water. HUs in the Mainstem would increase in 50 years due to the creation of West, Urban, and Natural Lakes. Open water HUs in the Confluence would decrease in 50 years under Alternative 2 and cumulative projects due to open water habitat converting to bottomland hardwoods in the Confluence as a result of warmer and drier conditions.

Table 6-9. Estimated Change in Cumulative HU Values for Habitats within the Study Area under Alternative 2 (Year 50)

Evaluation Areas	*HUs*		
	Baseline	*Alternative 2 Cumulative*	*Change*
Bottomland Hardwood			
Confluence	231.96	243.84	11.88
IDS	137.09	127.14	-9.95
Mainstem	19.87	78.69	58.82
Total	**388.92**	**449.67**	**60.75**
Emergent Wetland			
Confluence	20.39	20.77	0.38
IDS	19.30	12.92	-6.38
Mainstem	57.84	111.86	54.02
Total	**97.53**	**145.55**	**48.02**
Grassland			
Confluence	676.46	634.95	-41.51
IDS	546.21	522.78	-23.43
Mainstem	1,086.33	794.60	-291.73
Total	**2,309.00**	**1,952.33**	**-356.67**
Aquatic Riverine			
Confluence	119.18	116.25	-2.93
IDS	123.89	121.60	-2.29
Mainstem	102.70	207.90	105.20
Total	**345.77**	**445.75**	**99.98**
Open Water			
Confluence	107.16	96.56	-10.60
IDS	32.05	42.25	10.20
Mainstem	4.55	202.44	197.89
Total	**143.76**	**341.25**	**197.49**

6.5 THREATENED AND ENDANGERED SPECIES AND BIRDS OF CONSERVATION CONCERN

The potential for threatened or endangered species, or birds of conservation concern within the study area under Alternative 2 and cumulative projects is anticipated to be similar to Alternative 2 (refer to Section 4.5).

6.6 RECOMMENDATIONS

The planning recommendations for the implementation of Alternative 2 and cumulative projects are the same as those recommended for Alternative 1, refer to Section 2.4.

CHAPTER 7
CUMULATIVE IMPACT ASSESSMENT ALTERNATIVE 3

7.1 INTRODUCTION

This chapter describes potential impacts to fish and wildlife habitats from the implementation of Alternative 3 and the cumulative projects over the next 50 years. The study area habitat types (bottomland hardwood, emergent wetland, grassland, aquatic riverine, and open water) and evaluation groups (Confluence, IDS, and Mainstem) from Chapter 2 are used for the Alternative 3 and cumulative projects evaluation. The impacts to fish and wildlife habitats from the implementation of Alternative 3 and cumulative projects, including the implementation of the BVP Study features, FRM elements, IDP improvements, and FWOP projects described in Chapter 3 are described below and shown in Figure 9. The BVP Study features are still notional in nature. As a result, the impacts of these features cannot be determined with the same precision as the existing conditions. Thus, impacts from DFP implementation are estimated to the nearest whole acre.

7.2 CHANGES TO HABITAT ACREAGES

As presented in Table 7-1, 210 acres of existing habitat would become Urban from the implementation of Alternative 3 and the other cumulative projects. Open water habitat would increase under Alternative 3 and the cumulative projects from the creation of Urban, West, and Natural lakes. Bottomland hardwood acreage would also increase with hardwoods planted along the Trinity River; the largest amount of hardwoods would be planted at the southeastern end of the project area. Aquatic riverine acreage would increase from the realignment of the river. The greatest decrease of habitat would be to grassland habitat.

Table 7-1. Estimated Cumulative Changes to Habitat Acreages with Alternative 3

Habitat Type	*Acres*		
	Existing Conditions	*Alternative 3 Cumulative*	*Change*
Bottomland Hardwood	1,414	1,502	88
Emergent Wetland	419	375	-44
Grassland	4,283	3,624	-659
Aquatic Riverine	421	546	125
Open Water	206	486	280
Habitat Subtotal	*6,743*	*6,533*	*-210*
Urban Area	10,400	10,610	210
Total	**17,143**	**17,143**	**0**

Sources: USACE 2007, 2013b.

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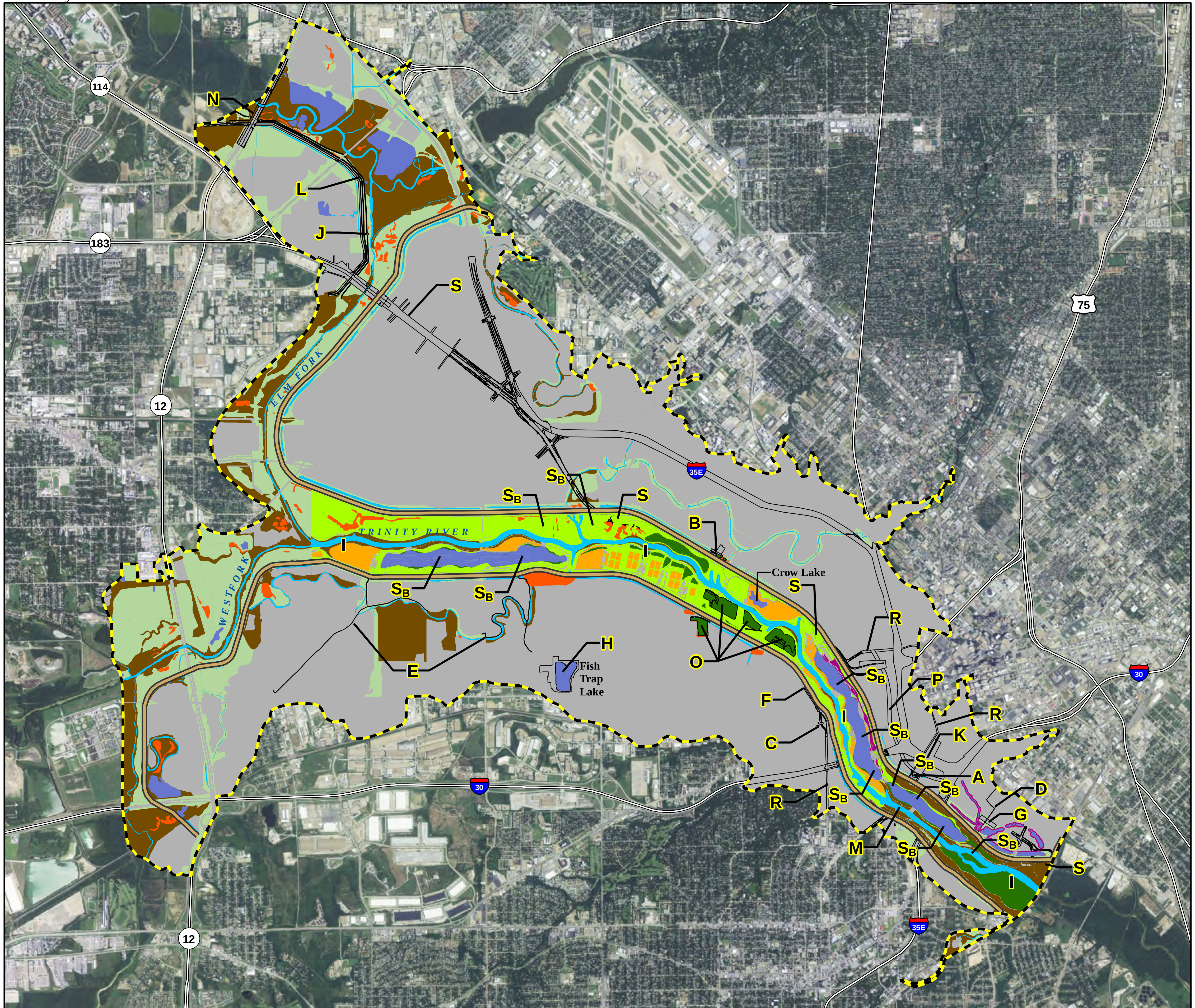


Figure 9
Habitat Types Under Alternative 3 with Cumulative Projects

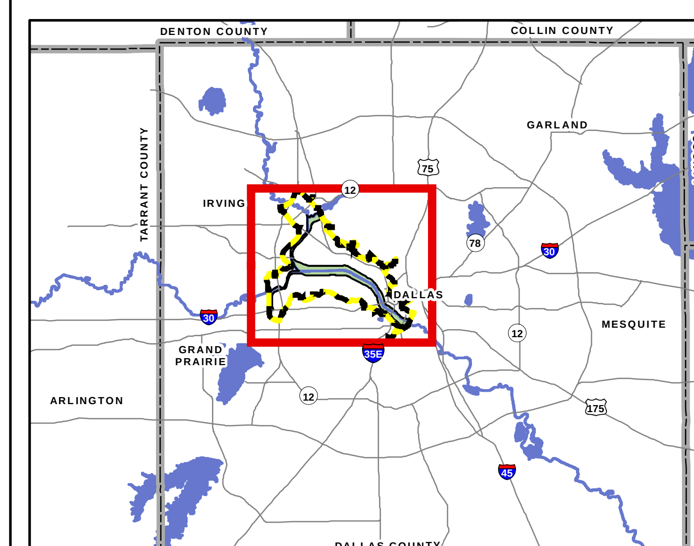
Future Without Project Condition Projects

- A Able Pumping Plant
- B Baker Pumping Plant
- C Beckley Avenue Improvements
- D Belleview Trail Connector
- E Bernal Trail
- F Continental Pedestrian Bridge
- G Dallas Maritime Museum
- H Dallas Watersports Complex
- I Dallas Water Utility Lines
- J EF2 Wastewater Interceptor Line & Laterals
- K Horseshoe Project
- L Irving Northwest Levee Repair
- M Jefferson-Memorial Bridge
- N Loop 12 Bridge
- O Pavaho Wetlands
- P Riverfront Boulevard
- Q SH-183 Bridge
- R Trinity Lakes Streetcar Loop
- S Trinity Parkway
- S_B Trinity Parkway Borrow Pits

ROI
Dallas Floodway Levee
Freeway

Habitat Types (At Year 0)

- Aquatic Riverine
- Bottomland Hardwood
- Emergent Wetland
- Remaining Existing Emergent Wetland
- Grassland
- Meadow
- Turf
- Urban Forest
- Open Water
- Urban



0 0.5 1 2 Kilometers
0 0.5 1 2 Miles

GIS Sources: Black and Veatch 2010; City of Dallas 2008a, 2010a; TxDOT 2010; USACE 2007, 2013b; USFWS 2006

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7.2.1 Confluence

Alternative 3 and Alternative 2 propose the same activities in the Confluence area with the same impacts. There is no difference in the Confluence under the cumulative condition between Alternative 2 and 3. Therefore, the changes in habitat acreages within the Confluence with cumulative projects would be the same under Alternative 3 as with Alternative 2. Please refer to Section 6.2.1.

7.2.2 Mainstem

The habitat in the Mainstem Group has existed in its current state for the last 50 years. Under Alternative 3 and cumulative projects, most of the habitat in the Mainstem would be temporarily impacted during the implementation of the BVP Study features. After the 10-year construction period for the BVP Study features is complete (2015-2025), most of the habitat would be restored to a higher habitat value than its current state. Three large lakes, re-alignment of the Trinity River, fringe riparian habitat, native grassland meadows, additional bottomland hardwoods, and additional higher quality wetlands would be created with the implementation of the BVP (refer to Figure 9). Alternative 3 FRM elements would improve the levees and have minimal impacts on habitat. Table 7-2 presents the predicted acreages for the habitat types in the Mainstem Group over the next 50 years with the implementation of Alternative 3 and cumulative projects.

Table 7-2. Estimated Cumulative Changes in Habitat Acreages in the Mainstem Group over the Next 50 Years with Alternative 3

Habitat Type	*Existing Conditions*	*Year*					
		0	*1*	*5*	*10*	*25*	*50*
Bottomland Hardwood	**95**	**186**	**186**	**186**	**189**	**194**	**206**
Emergent Wetland							
Existing	263	32	32	32	32	32	32
Proposed	-	208	208	208	208	208	206
Wetland Subtotal	*263*	*240*	*240*	*240*	*240*	*240*	*238*
Grassland							
Existing Maintenance Levels	1,752	187	187	187	187	187	189
Landscaping: Meadow	-	787	787	787	787	787	787
Landscaping: Urban Forest	-	15	15	15	15	15	15
Landscaping: Turf	-	186	186	186	186	186	186
Grassland Subtotal	*1,752*	*1,175*	*1,175*	*1,175*	*1,175*	*1,175*	*1,177*
Aquatic Riverine[1]	**124**	**251**	**251**	**251**	**248**	**243**	**231**
Open Water							
Existing - Crow Lake	6	6	6	6	6	6	6
Natural Lake	-	50	50	50	50	50	50

Urban and West Dallas Lake	-	207	207	207	207	207	207
Open Water Subtotal	6	*263*	*263*	*263*	*263*	*263*	*263*
Habitat Subtotal	***2,240***	***2,115***	***2,115***	***2,115***	***2,115***	***2,115***	***2,115***
Urban Area	36	161	161	161	161	161	161
Total	**2,276**	**2,276**	**2,276**	**2,276**	**2,276**	**2,276**	**2,276**

Note: [1]Aquatic riverine includes fringe riparian habitat.

Bottomland Hardwood. Under Alternative 3, most of the existing bottomland hardwoods would be removed during the re-alignment of the Trinity River under the BVP Study features. During the implementation of the BVP Study features, 186 acres of bottomland hardwood would be planted in the Mainstem, primarily along the southeastern section of the new Trinity River channel.

The acreage of bottomland hardwoods is not expected to increase because the hardwoods would be planted in an area adjacent to the levee and they would not be allowed to expand next to the levee. Therefore, no change to acreage is expected over the next 50 years. At years 10, 25, and 50, an increase of bottomland habitat is expected from the conversion of aquatic riverine to bottomland hardwood.

Emergent Wetland. The Mainstem wetlands under Alternative 3 would comprise approximately 240 acres, 32 acres of existing wetlands and 208 acres of wetlands created from the implementation of the BVP Study features. The created wetlands would include Corinth, Cypress, and fringe marsh wetlands along the edge of the lakes.

With the proposed maintenance of the BVP in the Mainstem, the acreage of emergent wetlands in the Mainstem is expected to stay the same over the next 10 to 25 years. At year 50, one percent of the emergent wetlands are expected to convert to grassland because of siltation and warmer and drier conditions due to climate change.

Grassland. With the implementation of the BVP Study features, the majority of the existing grasslands would be temporarily disturbed and would be replanted and realigned after the completion of the BVP Study features. The grasslands would consist of low quality mowed turf, native meadows, and urban forests.

Due to the proposed maintenance of the grasslands in the Mainstem, no change to BVP grassland acreage is expected over the next 25 years. At year 50, the acreage is expected to increase due to one percent of emergent wetland converting to grassland.

Aquatic Riverine. The aquatic riverine habitat value and acreage in the Mainstem would change significantly under Alternative 3 and cumulative projects. Under the BVP Study features, the Trinity River is proposed to be re-routed to increase sinuosity and increase habitat value. The Mainstem aquatic riverine would include fringe riparian habitat.

The aquatic riverine acreage is expected to remain at 251 acres from year 0 to 5. At year 10, one percent of the aquatic habitat is expected to convert to bottomland hardwoods as a result of less water reaching the Mainstem. This could be from warmer and drier conditions and/or residents and businesses retaining more water on their properties. At year 25, two percent of aquatic riverine is expected to be converted to bottomland hardwoods. By year 50, five percent of the aquatic riverine habitat is expected to be converted to bottomland hardwoods, primarily due to warmer and drier conditions resulting from climate change.

Open Water. Under Alternative 3 and cumulative projects, the Mainstem would comprise 263 acres of open water, including the existing Crow Lake and three BVP Study lakes, Urban, West, and Natural. The lakes would be maintained; therefore, no change to open water acreage is expected over the next 50 years.

7.2.3 Interior Drainage Systems

Alternative 3 and Alternative 2 propose the same activities in the IDS with the same impacts. There is no difference in the IDS under the cumulative condition between Alternative 2 and 3. Therefore, the changes in habitat acreages within the IDS with cumulative projects would be the same under Alternative 3 as with Alternative 2. Please refer to Section 6.2.3.

7.3 HABITAT SUITABILITY INDEXES AND HABITAT UNIT VALUES

HSI values for Alternative 3 and cumulative projects were based on the species models used for the baseline assessment (Section 2.2) (USACE 2013c). In April 2013, the USFWS hosted the USACE to coordinate and assist in prediction of the future conditions with the action alternative completed. The *Trinity River Corridor Design Guidelines* (City of Dallas 2009) was used to inform the models in terms of future plant assemblage and habitat anticipated within the Floodway.

7.3.1 Confluence

Alternative 3 and Alternative 2 propose the same activities in the Confluence with the same impacts. There is no difference in the Confluence under the cumulative condition between Alternative 2 and 3. Therefore, the changes in HSI and HU values within the Confluence with cumulative projects would be the same under Alternative 3 as with Alternative 2. Please refer to Section 6.3.1.

7.3.2 Mainstem

Table 7-3 presents the Alternative 3 HSIs, acres, and HUs for the Mainstem for bottomland hardwood, emergent wetland, grassland, aquatic riverine, and open water habitat over the next 50 years. With the implementation of the BVP Study features, most of the habitat in the Mainstem would be temporarily disturbed. Following the implementation of the BVP Study features (years 0, 1, and 5), the bottomland hardwood, emergent wetland, and urban forest HSIs would be low because the habitats would have just been created and would take time to become established. The bottomland hardwood HSIs are expected to increase over time as the trees mature, and the emergent wetland HSIs are expected to increase over time as the wetlands become more established.

The Mainstem grasslands would consist of native meadow, turf, and urban forest. The native meadow is expected to have a higher HSI than the existing non-native dominated grassland and is expected to increase in value over the next 50 years from increased native species diversity. The turf HSI is not expected to change over time because mowed grass is expected to remain at the same low habitat value over the next 50 years. Urban forest is considered a subset of grassland because the majority of the proposed trees would be non-native ornamental trees and do not provide the same habitat value as a native forest.

Aquatic riverine and open water habitat HSIs are not expected to increase much over time because they would contain water and are expected to be functioning aquatic ecosystems once the BVP Study features are completed. At year 50, the aquatic riverine HSI is expected to increase due to increased regulations and technology for improvements to water quality. The open water HSI was determined by referring to the 2010 fisheries sampling in Crow Lake, Bart Simpson Lake, and Cell D of the Dallas Floodway Extension (USACE 2010).

Table 7-3. Estimated Cumulative HSIs, Acreages, and HUs for Habitat Types in the Mainstem Group over the Next 50 Years with Alternative 3

Metric	*Existing Conditions*	*Year*					
		0	*1*	*5*	*10*	*25*	*50*
Bottomland Hardwood							
HSI	0.21	0.09	0.09	0.09	0.13	0.21	0.43
Acres	94.64	186	186	186	189	194	206
HUs	19.87	16.74	16.74	16.74	24.57	40.74	88.58
Emergent Wetland							
Existing/Continuing							
HSI	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Acres	262.91	32	32	32	32	32	32
HUs	57.84	7.04	7.04	7.04	7.04	7.04	7.04
Proposed							
HSI	-	0.13	0.13	0.34	0.42	0.47	0.52
Acres	-	208	208	208	208	208	206
HUs	0	27.04	27.04	70.72	87.36	97.76	107.12
Emergent Wetland HU	***57.84***	***34.08***	***34.08***	***77.76***	***94.40***	***104.80***	***114.16***
Grassland							
Existing Maintenance Levels							
HSI	0.62	0.4	0.4	0.4	0.4	0.4	0.4
Acres	1,752.15	187	187	187	187	187	189
HUs	1,086.33	74.80	74.80	74.80	74.80	74.80	75.60
Landscaping: Meadow							
HSI	-	0.50	0.60	0.70	0.65	0.70	0.85
Acres	-	787	787	787	787	787	787
HUs	0.00	393.50	472.20	550.90	511.55	550.90	668.95

Landscaping: Turf							
HSI	-	0	0	0.4	0.4	0.4	0.4
Acres	-	186	186	186	186	186	186
HUs	0.00	0.00	0.00	74.40	74.40	74.40	74.40
Landscaping: Urban Forest							
HSI	-	0.50	0.50	0.40	0.40	0.40	0.40
Acres	-	15	15	15	15	15	15
HUs	0.00	7.50	7.50	6.00	6.00	6.00	6.00
Grassland HU	***1,086.33***	***475.80***	***554.50***	***706.10***	***666.75***	***706.10***	***824.95***
Aquatic Riverine							
HSI	0.83	0.83	0.75	0.83	0.85	0.87	0.90
Acres	123.73	251	251	251	248	243	231
HUs	102.70	208.33	188.25	208.33	210.80	211.41	207.90
Open Water							
Crow Lake							
HSI	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Acres	6.41	6.41	6.41	6.41	6.41	6.41	6.41
HUs	4.55	4.55	4.55	4.55	4.55	4.55	4.55
Urban Lake & West Dallas Lake							
HSI	-	0.00	0.00	0.43	0.77	0.77	0.77
Acres	-	207	207	207	207	207	207
HUs	-	0.00	0.00	89.01	159.39	159.39	159.39
Natural Lake							
HSI	-	0.00	0.00	0.60	0.77	0.77	0.77
Acres	-	50	50	50	50	50	50
HUs	-	0.00	0.00	30.00	38.50	38.50	38.50
Open Water HU	***4.55***	***4.55***	***4.55***	***123.56***	***202.44***	***202.44***	***202.44***

7.3.3 Interior Drainage Systems

Alternative 3 and Alternative 2 propose the same activities in the IDS with the same impacts. There is no difference in the IDS under the cumulative condition between Alternative 2 and 3. Therefore, the changes in HSI and HU values within the IDS with cumulative projects would be the same under Alternative 3 as with Alternative 2. Please refer to Section 6.3.3.

7.4 HABITAT UNITS SUMMARY

As presented in Table 7-4, overall HUs would increase under Alternative 3 and cumulative projects over the next 50 years. The greatest increase would be to open water from the creation of the BVP Study lakes. Bottomland hardwood habitat would also increase with the highest quality habitat at the southeastern end of the project area. Aquatic riverine habitat would increase from the realignment of the river. The greatest decrease of HUs would be to grassland habitat.

Table 7-4. Cumulative HUs per Habitat Type Within the Study Area with Alternative 3

Habitat Types	*HUs*		
	Baseline	*Year 50*	*Change*
Bottomland Hardwood	388.92	459.32	70.40
Emergent Wetland	97.53	147.66	50.13
Grassland	2,309.00	1,982.68	-326.32
Aquatic Riverine	345.77	445.75	99.98
Open Water	143.76	341.25	197.49
Total	**3,284.98**	**3,376.66**	**91.68**

Table 7-5 presents the existing conditions (baseline) and Alternative 2 and cumulative projects (Year 50) HUs for the five habitat types in the Confluence, IDS, and Mainstem.

Bottomland Hardwood. HUs in the Confluence and Mainstem would increase in 50 years under Alternative 3 and cumulative projects due to bottomland hardwoods being planted as part of the BVP Study features, and grassland, aquatic riverine, and open water habitat converting to bottomland hardwood. However, the bottomland hardwood HUs in the IDS would decrease due bottomland hardwood habitat being developed.

Emergent Wetland. HUs in the Confluence and Mainstem would increase in 50 years under Alternative 3 and cumulative projects due to the creation and maintenance of more emergent wetlands. Emergent wetland HUs in the IDS would decrease in 50 years under Alternative 3 and cumulative projects due to emergent wetlands converting to grasslands due to warmer and drier conditions.

Grassland. HUs in the Confluence, IDS, and Mainstem would decrease in 50 years under Alternative 3 and cumulative projects due to development and grassland converting to bottomland hardwoods. The majority of the grassland HUs would be lost in the Mainstem due to development.

Aquatic Riverine. HUs in the Mainstem would increase in 50 years under Alternative 3 and cumulative projects due to the realignment of the Trinity River and increased regulations and technological advances to increase water quality. Aquatic riverine HUs in the Confluence and IDS would decrease in 50 years under Alternative 3 due to aquatic riverine habitat converting to bottomland hardwoods from warmer and drier conditions.

Open Water. HUs in the Mainstem would increase in 50 years due to the creation of West, Urban, and Natural Lakes. Open water HUs in the Confluence would decrease in 50 years under the Alternative 3 and cumulative projects due to open water habitat converting to bottomland hardwoods in the Confluence from warmer and drier conditions.

Table 7-5. Estimated Change in Cumulative HU Values for Habitats within the Study Area under Alternative 3 (Year 50)

Evaluation Areas	*HUs*		
	Baseline	*Alternative 3*	*Change*
Bottomland Hardwood			
Confluence	231.96	243.60	11.64
IDS	137.09	127.14	-9.95
Mainstem	19.87	88.15	68.71
Total	**388.92**	**458.89**	**70.40**
Emergent Wetland			
Confluence	20.39	20.77	0.38
IDS	19.30	12.73	-6.57
Mainstem	57.84	114.16	56.32
Total	**97.53**	**147.66**	**50.13**
Grassland			
Confluence	676.46	634.95	-41.51
IDS	546.21	522.78	-23.43
Mainstem	1,086.33	824.95	-261.38
Total	**2,309.00**	**1,982.68**	**-326.32**
Aquatic Riverine			
Confluence	119.18	116.25	-2.93
IDS	123.89	121.60	-2.29
Mainstem	102.70	207.90	105.20
Total	**345.77**	**445.75**	**99.98**
Open Water			
Confluence	107.16	96.56	-10.60
IDS	32.05	42.25	10.20
Mainstem	4.55	202.44	197.89
Total	**143.76**	**341.25**	**197.49**

7.5 THREATENED AND ENDANGERED SPECIES AND BIRDS OF CONSERVATION CONCERN

The potential for threatened or endangered species, or birds of conservation concern within the study area under Alternative 3 and cumulative projects is anticipated to be similar to Alternative 3 (refer to Section 5.5).

7.6 RECOMMENDATIONS

The planning recommendations for the implementation of Alternative 3 and cumulative projects are the same as those recommended for Alternative 1, refer to Section 2.4.

CHAPTER 8
COMPARISON OF ALTERNATIVES

All three of the alternatives evaluated in this report would potentially result in a loss of habitat acreage in the future environment as compared to the baseline existing conditions. As shown in Table 8-1, the implementation of Alternative 3 and cumulative projects would maintain 85 more acres of habitat than the implementation of Alternative 2 and cumulative projects; the FW/OPC would maintain 15 acres more than would Alternative 3. For all three potential future conditions, the majority of potential habitat loss would occur in the grassland habitats. The FW/OPC would also include a loss of aquatic riverine and open water habitats; these habitats would be increased under both Alternative 2 and Alternative 3. The FW/OPC, Alternative 2, and Alternative 3 would all include a loss of emergent wetland acreage (Table 8-1).

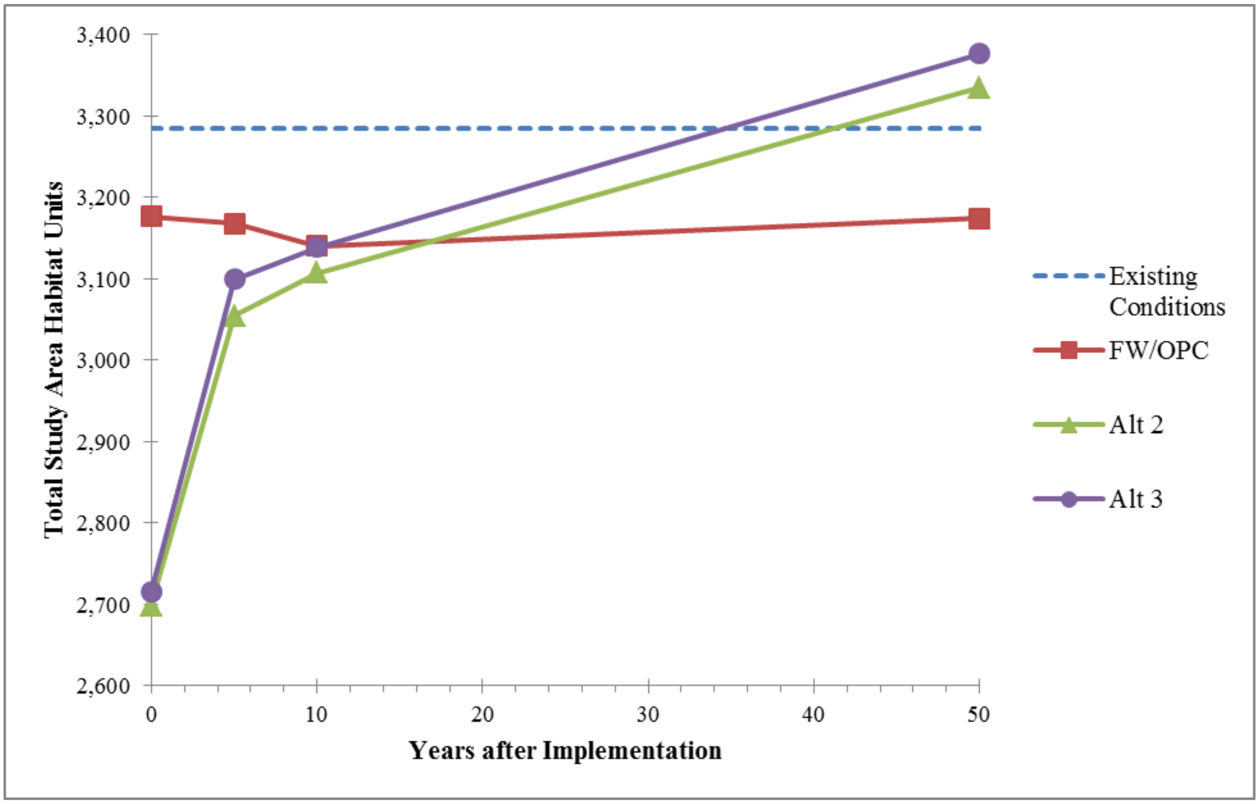
Table 8-1. Comparison of Cumulative Habitat Acres at Year 50 for All Alternatives

Habitat Type	*Existing Conditions*	*FW/OPC*		*Alternative 2 Cumulative*		*Alternative 3 Cumulative*	
	Acres	*Acres*	*Difference*	*Acres*	*Difference*	*Acres*	*Difference*
Bottomland Hardwood	1,414	1,431	17	1,525	111	1,547	133
Emergent Wetland	419	414	-5	368	-51	372	-47
Grassland	4,283	3,926	-357	3,380	-903	3,439	-844
Aquatic Riverine	421	388	-33	508	87	508	87
Open Water	206	186	-20	464	258	464	258
Habitat Subtotal	*6,743*	*6,345*	*-398*	*6,245*	*-498*	*6,330*	*-413*
Urban Area	10,400	10,798	398	10,898	498	10,813	413
Total	**17,143**	**17,143**	**0**	**17,143**	**0**	**17,143**	**0**

Sources: USACE 2007, 2013b.

All three alternatives would have significant short term impacts to habitat and the FW/OPC would result in a long term decrease in HUs. However, habitat improvements would develop over time under Alternatives 2 and 3 (Chart 8-1). While all three alternatives would result in a reduction of HUs within the study area, Alternative 2 and 3 would begin to approach preexisting habitat unit levels around year 34 (Alternative 3) and Year 41 (Alternative 2) and then continue to increase (Chart 8-1).

Chart 8-1. Change in Cumulative HUs for All Alternatives



Furthermore, as shown in Table 8-2, habitat value and associated HUs of sensitive habitat (including aquatic riverine, emergent wetland, bottomland hardwood and open water) would increase to above existing levels under Alternative 2 and 3. Under the FW/OPC, HUs would decrease from existing levels for all habitat types except bottomland hardwood.

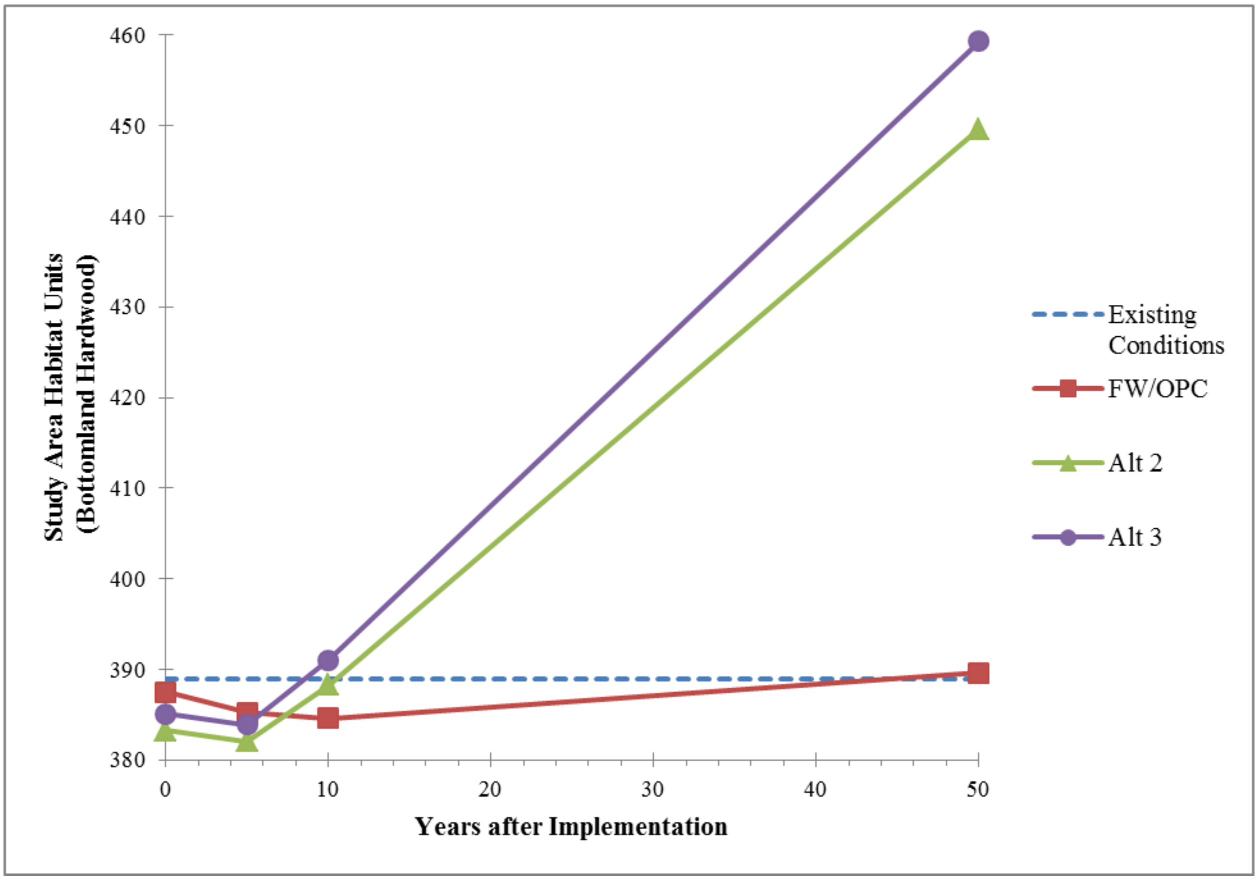
Table 8-2. Comparison of Cumulative HUs at Year 50 for All Alternatives

Habitat Type	*Existing Conditions*	*FW/OPC*		*Alternative 2 Cumulative*		*Alternative 3 Cumulative*	
	HU	*HU*	*Difference*	*HU*	*Difference*	*HU*	*Difference*
Bottomland Hardwood	388.92	389.60	0.68	449.67	60.75	458.89	69.97
Emergent Wetland	97.53	94.48	-3.05	145.55	48.02	147.66	50.13
Grassland	2,309.00	2,227.24	-81.76	1,952.33	-356.67	1,982.68	-326.32
Aquatic Riverine	345.77	332.84	-12.93	445.75	99.98	445.75	99.98
Open Water	143.76	129.90	-13.86	341.25	197.49	341.25	197.49
Total	**3,285.98**	**3,174.06**	**-110.92**	**3,334.55**	**49.57**	**3,376.23**	**91.25**

Charts 8-2 through 8-4 present the HUs over time for each sensitive habitat type, bottomland hardwoods (Chart 8-2), emergent wetlands (Chart 8-3), and open water and aquatic riverine (Chart 8-4). HUs for sensitive vegetation would increase over time.

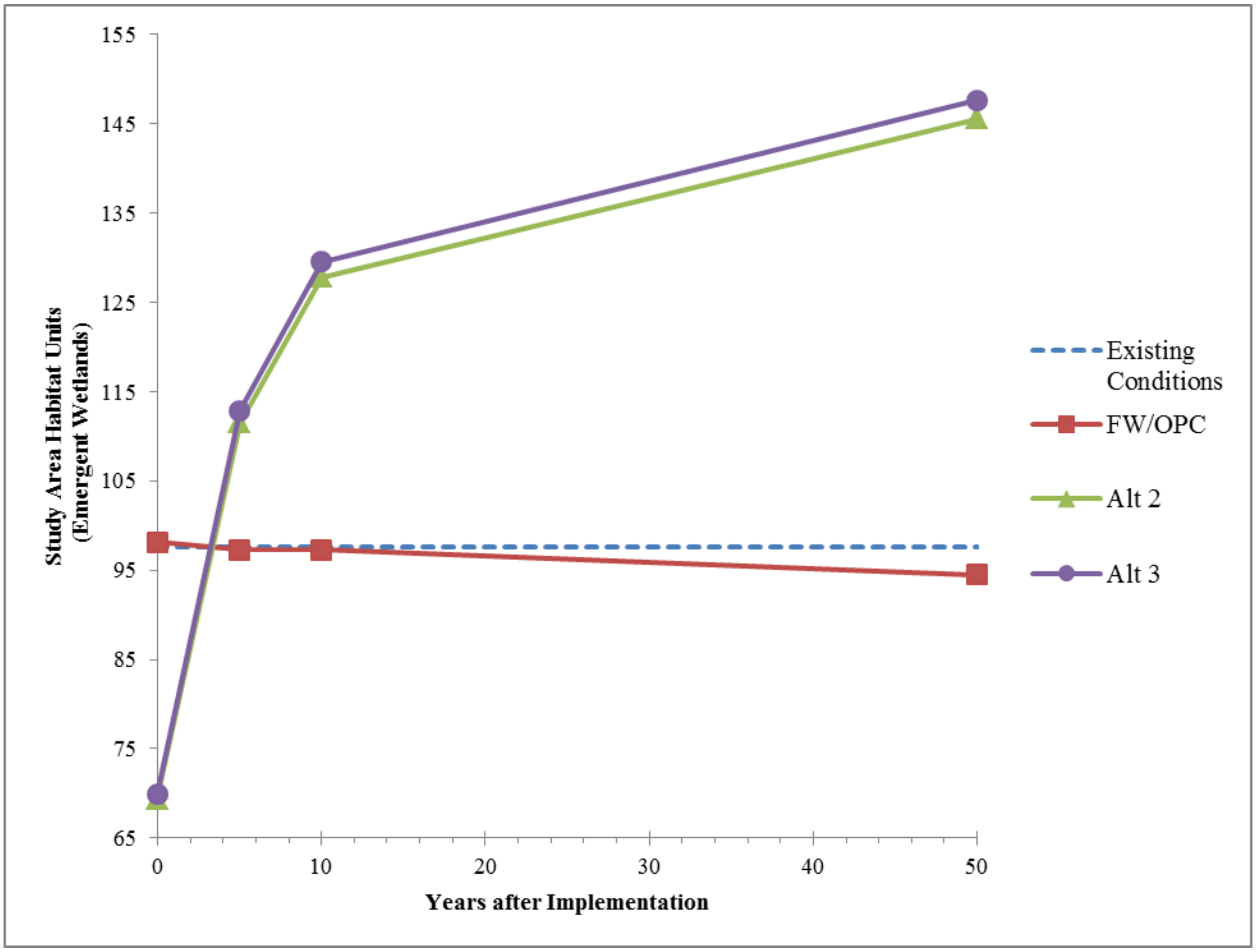
As shown in Chart 8-2, under the FW/OPC, bottomland hardwood habitat quality would decrease from year 0 to year 10. Afterwards, however, bottomland hardwood would recover until it is a slightly improved condition over the baseline condition. While both Alternative 2 and 3 also show a decline in quality below baseline conditions from year 0 to year 5, the active planting and management proposed under both alternatives result in a much more rapid recovery of bottomland hardwood. The increase in acreage and maintenance at high quality habitat would result in substantial gains in HUs of bottomland hardwoods under Alternatives 2 and 3. Alternative 3 would have higher HU values because more acreage of bottomland hardwood habitat is proposed.

Chart 8-2. Change in Cumulative Bottomland Hardwood HUs under All Alternatives



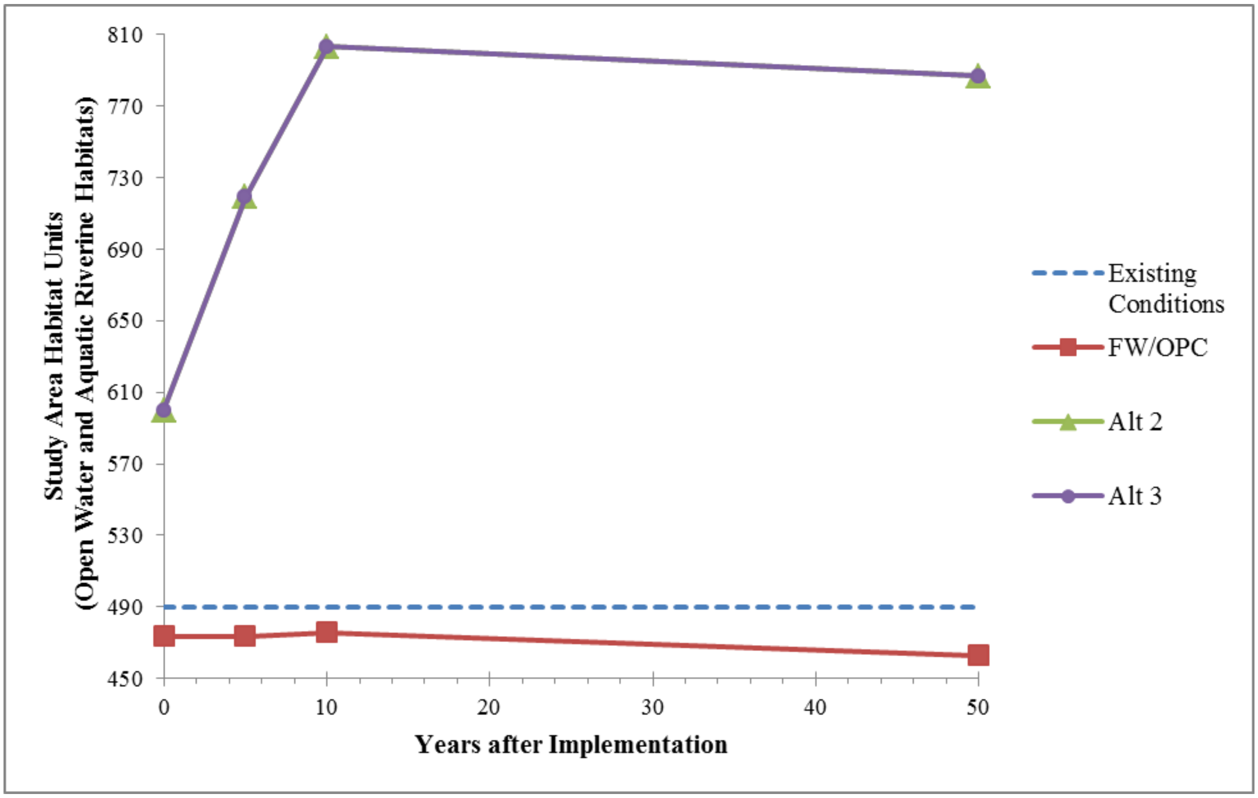
As show in Chart 8-3, under the FW/OPC, emergent wetland habitat quality would decrease steadily from year 0 to year 50. Emergent wetlands are not expected to return to existing quality levels for the next 50 years under the FW/OPC. While both Alternative 2 and 3 show a substantial loss of emergent wetland quality at year 0 (resulting from construction), the plantings would become established by year 5. By year 10 both Alternative 2 and 3 are predicted to surpass the quality of existing conditions. The increase in acreage and maintenance at high quality habitat would result in substantial gains in HUs of emergent wetlands under Alternatives 2 and 3. Alternative 3 would have higher HU values because acreage of emergent wetland would be lost to the Trinity Parkway.

Chart 8-3. Change in Cumulative Emergent Wetlands HUs under All Alternatives



As shown in Chart 8-4, under the FW/OPC, aquatic riverine habitat quality would decrease from year 0 to year 50. Aquatic riverine habitats are not expected to return to existing quality levels for the next 50 years under the FW/OPC. Conversely, the improved habitat structure (i.e. increase meanders and physical complexity) proposed in Alternative 2 and 3 would immediately increase the quality of the aquatic riverine habitat. As plantings become established and maintained, the habitat would continue to improve in quality from years 0 to year 10. The habitat would continue at a high level through year 50, with a slight decrease predicted based on drying trends anticipated through various climate change models.

Chart 8-4. Change in Cumulative Open Water and Aquatic Riverine HUs under All Alternatives

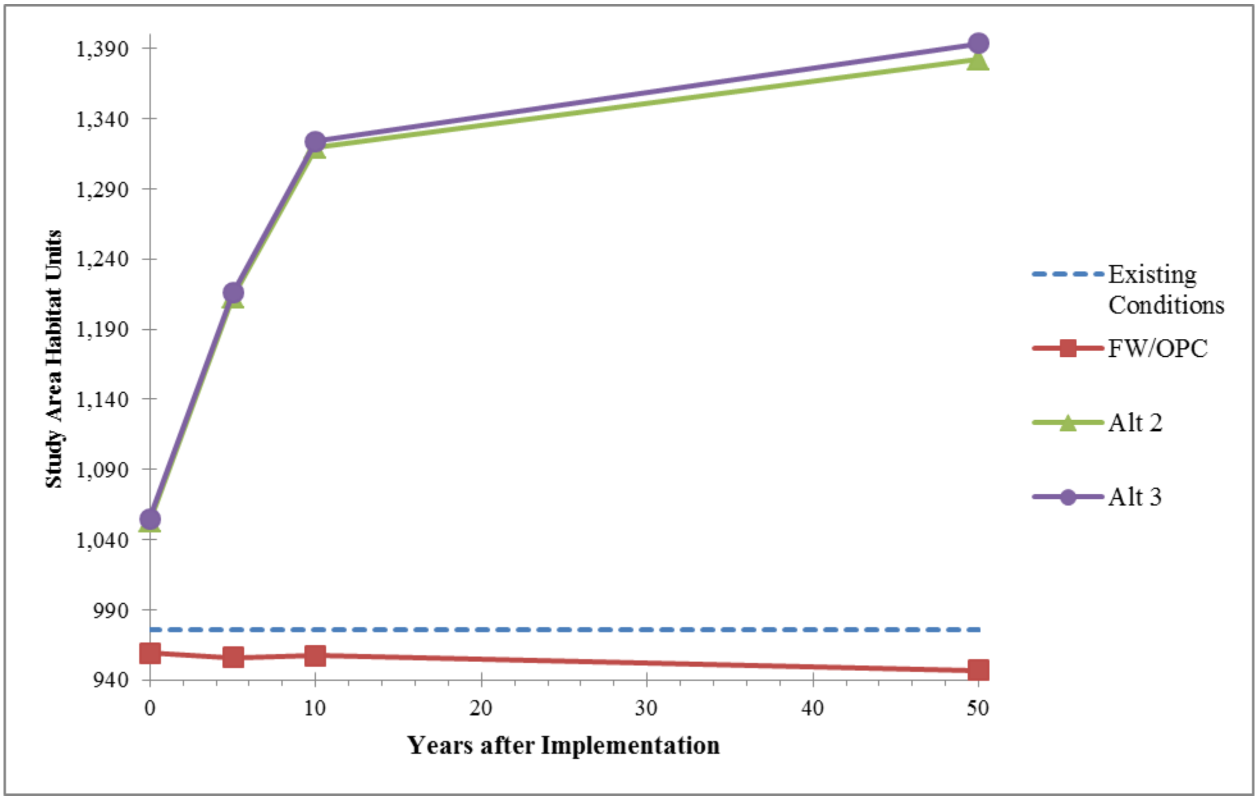


Referring back to project specific impacts for Alternative 2 and Alternative 3 (Sections 4.4 and 5.4, respectively), Alternative 2 generates more HUs than does Alternative 3 (178.82 HU for Alternative 2 and 157.68 HU for Alternative 3). Looking at sensitive habitat alone, the difference is smaller, with Alternative 2 generating 0.61 HU more than Alternative 3.

When the alternatives are considered in a cumulative setting, the impacts of the Trinity Parkway and other large-scale projects are observed. While on a project-only basis Alternative 2 generated the most habitat among alternatives, Alternative 3 generates the most total habitat and sensitive habitat (42.11 HU and 11.76 HU, respectively, more than Alternative 2) among the alternatives.

Chart 8-5 presents all the sensitive habitat HUs combined (bottomland hardwoods, emergent wetland, aquatic riverine, and open water) over time. These HUs would increase the most from year 0 to 10 due to the rapid growth of most wetland and aquatic vegetation. As shown in Chart 8-5, both Alternative 2 and Alternative 3 would result in substantially greater HUs as compared to the FW/OPC, with Alternative 3 predicted to have the greatest increase.

Chart 8-5. Change in Cumulative Bottomland Hardwood, Emergent Wetland, Open Water, and Aquatic Riverine HUs under All Alternatives



CHAPTER 9
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February 26, 2014

Colonel Charles H. Klinge Jr., P.E.
Commander, Fort Worth District, US Army Corps of Engineers Fort Worth, TX
U.S. Army Corps of Engineers
(Attn: Marcia Hackett, CESWF-PER-EC)
P.O. Box 17300
Fort Worth, Texas 76102-0300

Re: Preliminary Draft Fish and Wildlife Coordination Act Report for the Dallas Floodway Project, Dallas County, Texas.

Dear Colonel Klinge:

Enclosed for your information and review is a copy of our preliminary draft report on the Dallas Floodway Project pursuant to the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq*.). We have previously provided a Planning Aid Report (PAR) in November 2010 to your office regarding the existing environmental conditions within the project area. The enclosed report is based upon the PAR and its subsequent revisions, and the project alternatives information your Environmental Resources planning staff has provided. This preliminary draft is being provided for review purposes only at this time. Our final FWCA report will be coordinated with the Texas Parks and Wildlife Department and submitted to accompany your final Detailed Project Report. Please provide any review comments on this preliminary draft report at your earliest convenience.

Please contact Sean Edwards of my staff at the above address or telephone number (817) 277-1100 if you have any questions or require additional assistance.

Sincerely,

Debra T. Bills

Debra Bills
Field Supervisor

enclosure

Colonel Charles H. Klinge Jr., P.E.
Commander, Fort Worth District, US Army Corps of Engineers Fort Worth, TX
U.S. Army Corps of Engineers
(Attn: Marcia Hackett, CESWF-PER-EC)
P.O. Box 17300
Fort Worth, Texas 76102-0300

Dear Colonel Klinge:

This letter constitutes the Secretary of the Interior's report on the Dallas Floodway Project. It is submitted by the U.S. Fish and Wildlife Service (Service) to the U.S. Army Corps of Engineers (Corps) under the authority, and in accordance with, Section 2(b) of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) to accompany the Corps' final Detailed Project Report. The study was initiated by the Corps under authority of Section 205 of the 1948 Flood Control Act, as amended, to identify potential alternatives to reduce flood damage within the Trinity River watershed within the City of Dallas, Dallas County, Texas. Our report has been coordinated with the Texas Parks and Wildlife Department (TPWD).

The purpose of this report is to identify and evaluate anticipated impacts of implementing the proposed project on fish and wildlife resources in the project area within the Trinity River watershed and to recommend conservation measures for resource protection. This report is based on data collected during field investigations conducted by the Service, TPWD, and Corps on August 30 – September 1, 2004; October 12 – 14, 2005; April 25, 2006; coordination with environmental consultants representing Cardno TEC, Inc.; information received from the Corps and the project sponsor, the City of Dallas; and review comments from TPWD. A planning aid report has previously been submitted to the Corps regarding the existing environmental conditions within the project area in November 2010 (USFWS 2010).

1. STUDY AREA

An environmental study area was delineated cooperatively by the Corps and the Service. Spatial data provided by the Corps indicate that the study area encompasses approximately 17,141.97 acres located within the City of Dallas, Dallas County, Texas within the Trinity River Basin. The term "Region of Influence," coined by the Corps, is synonymous with the term "study area." For consistency, "study area" will be used throughout this report.

The existing Dallas Floodway Levee System, authorized in 1945, extends along the Trinity River upstream from the Atchison, Topeka and Santa Fe (AT&SF) Railroad Bridge at Trinity River Mile (RM) 497.37, to the confluence of the West and Elm Forks at RM 505.50, thence upstream along the West Fork for approximately 2.2 miles and upstream along the Elm Fork approximately 4 miles. Of the 22.6 miles of levees within this reach, the East Levee is 11.7 miles in length and the West Levee is 10.9 miles in length. In addition to the levees, the floodway includes a modified river channel, and structures including seven pumping plants, five pressure conduits, and seven drainage structures. Construction of the existing Dallas Floodway Levee System was completed in 1959. The Dallas Floodway Project study area assessed within this document lies within the existing project boundaries and generally follows the Federal Emergency Management Agency 500-year flood extent.

2. PLAN OF DEVELOPMENT

Since the early 1900s, the City of Dallas has been periodically flooded and incurred damages. These flood events present the potential for significant and repetitive economic losses in the study area. A variety of previous studies, reports, and water projects have been conducted regarding flooding and various water resources related to the Dallas Floodway System. A selection of these activities led by the Corps and non-Federal entities including the City of Dallas are described below.

2.1 Historic Dallas Floodway Development

A catastrophic flood in 1908 led the City of Dallas to seek protection from Trinity River flooding. Between 1928 and 1932, the Dallas County Levee Improvement District (DCLID) constructed earthen levees to protect the City of Dallas from riverine flooding. The DCLID relocated the confluence of the West and Elm Forks, rerouted the Trinity River by constructing a channel within the leveed floodway, and filled or set aside the original channel for sump storage. These original levees had a total length of 22.6 miles, an average crest width of 6 feet, an average height of 26 feet, and a maximum height of 37 feet (USACE 1955).

2.2 U. S. Army Corps of Engineers

To reduce the riverine flood risk within the City of Dallas, Congress authorized the flood control project (commonly referred to as the Dallas Floodway, or the Dallas Floodway Levee System) in 1945, and again in 1950. From August 1952 to June 1955, the Corps produced six reports for design of the Dallas Floodway improvements to the original (DCLID) levees and interior drainage facilities.

In May 1960, the non-Federal sponsor for the Dallas Floodway Levee System, the Dallas County Flood Control District (DCFCD) formally accepted the Corps Operation and Maintenance (O&M) Manual for the Dallas Floodway Levee System (USACE 1960). The purpose of the O&M Manual was to furnish detailed information regarding the Dallas Floodway Levee System and its essential features, and to aid local interests in carrying out their obligation under the regulations governing acceptance of a completed project constructed by the Corps. The DCFCD formally transferred O&M responsibilities to the City of Dallas in 1968.

In compliance with the National Environmental Policy Act (NEPA), the Trinity River and Tributaries Regional Environmental Impact Statement (TREIS) was prepared by the Corps Fort Worth District to address the proposed increases in floodplain development occurring in the upper Trinity River basin during the Dallas-Fort Worth Metroplex development boom in the mid-1980s (USACE 1988a). Individually or cumulatively, future projects are expected to have the potential to increase flood risk to existing floodplain developments.

The Record of Decision (ROD) prepared for the TREIS specified criteria that the Corps would use to evaluate future Section 404 permit applications in the Trinity River Basin; specifically, projects located within the Standard Project Flood (SPF) floodplain of the Elm Fork Trinity River, the West Fork Trinity River, and the main stem of the Trinity River. The TREIS ROD established criteria for actions that require a USACE permit to address hydrologic and hydraulic impacts and mitigation of habitat losses (USACE 1988a). The findings in the TREIS provided the impetus for follow-on studies under the 1988 Upper Trinity River Study Authority (USACE 1988b).

In response to the TREIS and ROD, cities and counties in the Trinity River watershed formed the Trinity River Steering Committee (Steering Committee), facilitated by the North Central Texas Council of Governments (NCTCOG). The Steering Committee adopted a Draft Statement of Principles for Common Permit Criteria (in January 1988), a Resolution for a Joint Trinity River Corridor Development Certificate (CDC) Process (in December 1988), and a Regional Policy Position on the Trinity River Corridor (in January 1989).

The CDC and the 1988 ROD hydrologic and hydraulic criteria are used to ensure that projects are designed in such a way that there are no flood rises in the water surface profile and that there are no valley storage losses for the 100-year flood and less than 5% valley storage loss for the SPF event. The process requires that a permit applicant prepare a Hydraulic Engineering Center River Analysis System (HEC-RAS) hydraulic model for the proposed project using the current CDC HEC-RAS model as a base condition. The CDC HEC-RAS model was developed to model the hydraulics of water flow through rivers and other channels. It is maintained and usually distributed by the Corps to be used for evaluation of any and all projects that require a Section 404 Permit or a CDC Permit.

The Corps initiated the Upper Trinity River Feasibility Study (UTRFS) in response to the authority contained in the U.S. Committee on Environment and Public Works Resolution dated April 22, 1988 and the findings of the 1990 Upper Trinity River Basin Reconnaissance Report. The UTRFS identified approximately 90 potential projects addressing flood risk management, ecosystem restoration, and recreation within the Upper Trinity River Basin (USACE 1988b). Of these 90 projects, three Corps projects were identified that had local sponsorship and were viewed as reasonably foreseeable, including modifications to the Dallas Floodway Project.

Initiated in 1996, the Upper Trinity River Basin Programmatic EIS (UTRB PEIS) focused on various potential Corps projects that were identified and investigated as part of the UTRFS. The Corps initiated the study under the 1988 authority.

The Dallas Floodway Extension (DFE) Project, authorized by the Flood Control Act of 1965, was initiated in December 2001 to construct the Chain of Wetlands, the Cadillac Heights and Lamar Levees, and recreation features immediately downstream of the existing Dallas Floodway Levee System (USACE 2003).

The Corps performed Period Inspection (PI) No. 9 (PI No. 9) using a new inspection template on December 3-5, 2007 (USACE 2009). This inspection was the 9th PI for the East Levee and West Levee, and the first PI for both the Rochester Park Levee and the Central Wastewater Treatment Plant (CWWTP) Levee systems which are components of the DFE Project. All eight prior PIs resulted in an acceptable rating for the Dallas Floodway Levee System. Very specific language and rating criteria described in the new inspection template resulted in an "unacceptable rating" for the Dallas Floodway Levee System meaning that it would not contain a Standard Project Flood. FEMA subsequently de-accredited the Dallas Floodway and began the process of redrawing a new 100-year floodplain map for the City for its National Flood Insurance Program.

2.3 City of Dallas

The approximate 2.8 mile Rochester Park Levee was constructed by the City of Dallas in 1991. The City of Dallas has since maintained the levee as part of their overall project operation and maintenance program. The Rochester Levee protects residential and commercial interests in East Dallas. The approximate 2.6 mile CWWTP Levee was constructed by the City of Dallas in the 1940s and the levee was raised and improved by the City in 1994. The CWWTP Levee protects critical utility infrastructure in South Dallas. At the direction of Congress, these two levee systems were added to the DFE project in 1996.

Beginning in the late 1990s and continuing through 2000, the City of Dallas has made improvements to the Trinity River channel, levees, and interior drainage system. These improvements included widening portions of the existing river channel and increasing the height of some portions of the levees to two feet above the 1950s design elevation.

2.3.1 Balanced Vision Plan

As a result of floods in 1989 and 1990, the City of Dallas stated its interest in revitalizing a number of projects to restore and expand the level of protection along the Trinity River within the City of Dallas limits. In 1994, the City of Dallas (in conjunction with regional stakeholders) began looking at ways to outline a long-range vision for the entire Trinity River Corridor: to reclaim the Trinity River as a great natural resource, create a great public domain, and achieve a model of environmental stewardship. In the subsequent years of planning and community input, the City of Dallas and stakeholders developed concepts for addressing five key issues:

1. Flood Risk Management (FRM)
2. Environmental Restoration and Management
3. Parks and Recreation
4. Transportation
5. Community and Economic Development

In 2004, the outcome of this effort cumulated in an update to the 2003 report. The Balanced Vision Plan (BVP) contains the FRM features and the ecosystem restoration and recreation features defined in the report prepared by the City of Dallas entitled, *The Balanced Vision Plan* (BVP) *for the Trinity River Corridor, Dallas, Texas,* dated December 2003, and amended in March 2004 as summarized in Table 2-1.

Table 2-1 Summary of Balanced Vision Plan Elements

Category	*Descriptive Action*
BVP Flood Risk Management	
Levees	Raise to 277,000 cfs Flood Height
AT&SF Railroad Bridge	Removal of Wood Bridge Segment
	Removal of Concrete Bridge Segment
	Removal of Embankment Segments
Levee Flattening	Flattening the Riverside Levee Side Slopes to 4:1
Non-structural Flood Control Improvements	Emergency Response
	Public Awareness/Education
	Flood Forecasting
	Warning Systems
BVP Ecosystem and Recreation	
Lakes	West Dallas Lake
	Urban Lake
	Natural Lake
River	Realignment and Modification
Wetlands	Marshlands
	Hampton and Biofiltration Wetlands
	Cypress Ponds
	Corinth Wetlands
Athletic Facilities	Potential Flex Fields
	Playgrounds
	River Access Points
General Features	Parking and Public Roads
	Lighting

Category	*Descriptive Action*
	Vehicular Access
	Pedestrian Amenities
	Restrooms
Interior Drainage Outfall Modifications	Pump Station Outfalls
	Pressure Sewer Outfalls
Able Sump Ponds	Recreation and Ecosystem Enhancements

The BVP FRM component includes levee raises to provide flood risk management for the 277,000 cubic feet per second (cfs) riverine flood event. Features also include flattening the levee side slopes, removing an embankment, modifying the AT&SF Railroad Bridge, and non-structural public education and flood warning systems.

BVP Ecosystem Restoration and Recreation Enhancements include the development of three lakes, modification to the course of the Trinity River, construction of approximately 152 acres of new wetlands, construction of 115 acres of groomed athletic fields, and general elements to improve safety and access to the larger BVP elements.

On March 9, 2005, the Dallas City Council adopted the Trinity River Corridor Comprehensive Land Use Plan (TRCCLUP) as a tool for guiding development and investment decisions in the Trinity River Corridor (TRC). In this way, the TRCCLUP guides zoning decisions relating to potential future private development towards land uses that complement identified public BVP elements.

Stormwater flooding events have demonstrated that improvements are needed to the East and West Levee Interior Drainage Systems (EWLIDS) to reduce the risk of interior flooding. In March 2006, the need for improving the EWLIDS was demonstrated when a significant local storm caused widespread stormwater flooding in the City of Dallas, resulting in one fatality and significant property damage.

2.3.2 Interior Drainage Plan

The Interior Drainage Plan (IDP) consists of proposed improvements to the existing EWLIDS. The objective of the IDP improvements is to provide stormwater FRM for areas served by the EWLIDS from the 100-year storm event. Implementation of the IDP would reduce the stormwater flood risk for structures located with the predicted flood area.

The threat of interior flooding within the EWLIDS remains a concern in light of stormwater flooding events including the aforementioned loss of life and substantial property damage during a March 2006 flooding event. Police and Fire-Rescue responded to hundreds of emergency calls from stranded residents and motorists during this storm as well. Upgrading of existing individual pump stations and associated sump areas within the floodway has been an ongoing effort of the City of Dallas in recent years. Ongoing IDP projects include improvements to the Pavaho Pump Station which have been completed and improvements to the Baker and Able Pump Stations are in design or underway. Other proposed IDP projects are depicted in Table 2-2.

Table 2-2. Proposed Interior Drainage Plan Improvements

Category	*Descriptive Action*
Interior Drainage Plan	
East Levee	Demolish Old Hampton Pump Station
	Construct New Hampton Pump Station
	Nobles Branch Sump Improvements
	East Levee Sump Improvements
West Levee	Demolish Charlie Pump Station
	Construct New Charlie Pump Station
	Rehabilitate Existing Delta Pump Station
	Construct New Delta Pumping Station
	Eagle Ford and Trinity-Portland Sump Improvements
	Construct New Trinity-Portland Pumping Plant

2.4 Local Features - Section 408 Projects

Projects referred to as Local Features are proposed additions or modifications to features within the Dallas Floodway, submitted by the Corps, and require Section 408 review. While Local Features are not part of the Recommended Plan for Dallas Floodway, their implementation does represent a modification to an existing Federal project. As such, these Local Features will be considered as part of the Comprehensive Analysis for Dallas Floodway along with the BVP and IDP features. Local features to be evaluated in the Comprehensive Analysis include the Trinity Parkway, Trinity River Standing Wave, the Santa Fe Trestle Trail, the Pavaho Wetlands, the Dallas Horseshoe Project, the Sylvan Avenue Bridge, Jefferson Bridge, Dallas Water Utilities (DWU) Waterlines, Continental Bridge, the East Bank/West Bank Interceptor Line, and IDP-Phase II pump stations (Charlie, Delta, Pavaho, and Trinity/Portland).

2.5 Trinity Parkway

The Trinity Parkway is a proposed toll road that would span approximately 9 miles from the juncture of State Highway 183 and Interstate Highway 35E to US-175/Spur 310. Several route alternatives are being reviewed by the Federal Highway Administration under a separate Environmental Impact Statement (EIS) independent of the Dallas Floodway Project. Because it has the potential to significantly affect the Dallas Floodway Project, it is being considered as part of the Comprehensive Analysis for Dallas Floodway as a Local Feature (USACE 2014).

The EIS being prepared by the USACE for the Trinity Parkway includes alternatives placing its construction within and outside the Dallas Floodway Levee System. As part of the Dallas Floodway Comprehensive Analysis, the Trinity Parkway alternative(s) that are within the Dallas Floodway Levee System are being evaluated to determine if they would be hydraulically, geotechnically, and structurally sound. Because, depending on which alternative is selected, the potential construction of this feature could have significant impacts on the BVP FRM and BVP Ecosystem and Recreation features. The implementation guidance for Section 5141 authorization mandated that the comprehensive analyses include both a With and Without Trinity Parkway alternative analyses. The City of Dallas has preliminarily designed two different BVP alternatives to accommodate either scenario. The With Parkway alternative assumes the chosen alignment of the Trinity Parkway will be within the Dallas Floodway Levee System and constructed as a local feature. This alternative includes modifications to the BVP Ecosystem and Recreation features to accommodate the inclusion of the Trinity Parkway within the Dallas Levee System. The Without Parkway alternative assumes Trinity Parkway is not constructed within the contexts of this evaluation or that the recommended alternative selected is one that is located outside of the Dallas Floodway Levee System and would have no bearing on the BVP Ecosystem and Recreation features (USACE 2014).

Preliminary designs of the Trinity Parkway are at less than a 35% submittal and show the proposed tollway extending along the face of the East Levee for approximately 5.3 miles, starting at the far downstream end of the Dallas Floodway Levee System at the AT&SF Railroad Bridge before exiting the Floodway just east of the Hampton Pump Station. As proposed, the Trinity Parkway would be built through a combination of elevated earthen berms and bridge structures. The berms and bridges would support six lanes of traffic, three in each direction. Exit and entrance ramps and bridges would be built as needed to merge with existing roadways crossing the Levee System. The earthen berm, built on the face of the East Levee, ranges in height from within a few feet of the top of the levee to an elevation of a few feet above the existing toe of the levee. This fluctuates from upstream to downstream depending on the constraints of bridges and other features within the Dallas Floodway. The Trinity Parkway and its earthen berm are separated from the remainder of the Floodway by a flood separation wall, designed for the 100-year recurrence interval flood event. Supporting the Trinity Parkway and its operation and maintenance goals is a network of access roads that are on the interior of the levee system and on the levee crest (USACE 2014).

3. FISH AND WILDLIFE RESOURCES WITHOUT THE PROJECT

Sites were selected in an effort to document biotic communities in the study area. Two general assessment tools were selected for aquatic and terrestrial habitats: TPWD’s Index of Biotic

Integrity (IBI) for assessing aquatic life use within a given waterbody and Service's habitat evaluation procedure (HEP).

3.1 Terrestrial Resources

The pre-development landscape of the study area was likely predominantly tall grass prairie with trees along watercourses, sometimes scattered on the prairie or concentrated in certain areas possibly as a result of locally favorable soil conditions or topography. Trees along the mainstem of the Trinity would have been those species tolerant to frequent flooding with additional species less tolerant of flooding found along inflows to the river. With the exception of preserves, small remnants, or native hay meadows, almost nothing remains of the original Blackland Prairie communities (Diggs et al., 1999). Conversion of the Blackland Prairie for agriculture was the most significant cause of the destruction of this ecosystem, with only marginal, steeply sloped land not rapidly brought under cultivation. Once stripped of protective grass, these areas eroded rapidly with disastrous effects. Given the relatively high rainfall and continuing suppression of fire by humans, native trees and shrubs (e.g. eastern red cedar (*Juniperus virginiana*) and cedar elm (*Ulmus crassifoliia*), as well as introduced species are able to invade and eventually take over areas that were formerly prairie (Diggs et al., 1999).

The study area was further divided into three evaluation groups: the Confluence, Interior Drainage System (IDS), and Mainstem. Each of these areas is expected to be impacted in different ways by the project and was independently analyzed for habitat suitability in order to assess possible differences in their existing conditions. Existing habitat conditions across these groupings also vary due to differences in topography and past impacts. This targeted approach is intended to better illustrate the likely impact of project alternatives on habitat values within these differing reaches.

Three terrestrial habitat types were evaluated using the Service's Habitat Evaluation Procedures (HEP); grassland (4,283.57 acres), bottomland hardwood (1,412.63 acres), and emergent wetland (418.58 acres). A majority (70.05%) of terrestrial habitat in the study area is classified as grassland, much of it managed through mowing and other means. Bottomland hardwood habitats in the study area are largely concentrated upstream with in the Elm Fork and West Fork reaches. Emergent wetlands are scattered throughout but generally concentrated along the mainstem within the downstream two-thirds of the study area.

HEP requires the use of Habitat Suitability Index (HSI) models developed for indicator species that best represent groups of species that use existing habitat types. Baseline terrestrial habitat conditions are expressed as a numeric function (HSI value) ranging from 0.0 to 1.0, where 0.0 represents no suitable habitat for an indicator species and 1.0 represents optimum conditions for the species. HSI values ranging from 0.99 to 0.75 represents "good" habitat. HSI values ranging from 0.74 to 0.50 represent habitats considered "average." HSI values ranging from 0.49 to 0.25 represent habitats considered "below average." HSI values ranging from 0.24 to 0.01 represent habitats considered “poor.” Habitat Units (HU) are calculated by multiplying the numeric HSI values by the amount of acres of habitat available.

The biologist team collected field data on August 30 – September 1, 2004; October 12 – 14, 2005; April 25, 2006. Data were also used for several of the HEP sites that were collected on May 5, 1999, while the Service was conducting another study. In November 2010, the Service provided the Corps with a Planning Aid Report (PAR) containing HEP scores for indicator species selected, HSI values and HUs for each habitat type evaluated, and detailed descriptions of these habitats as observed during fieldwork.

The 2010 PAR presented habitat conditions within the study area for the proposed action as they existed in 2010. In addition, the 2010 PAR projected the future conditions with the study area if the Proposed Action were not implemented. As part of that effort, the Service, in coordination with the Corps, compiled a list of planned projects with the study area, and evaluated their potential impacts using HEP. Planning delays resulted in a need to update the 2010 PAR, as several of these planned projects went to construction. Due to this need for updated information, a supplemental PAR (largely assembled by the firm of Cardno TEC, Inc.) was provided to the Corps in May of 2013. This document provided information supplemental to the 2010 PAR including:

1. Revised existing conditions for grasslands.
2. The 2010 PAR considered a project as part of the Future Without Project Condition if it had not started construction as of December 31, 2009. The Supplemental PAR considered any project that had not begun construction before March 31, 2012 as part of the future condition.
3. Future With Project Conditions chapters provided new information regarding impacts to habitats and habitat values from implementation of Alternatives 2 and 3.

Since that time, the Corps elected to discard the use of several indicator species’ HEP models that are not currently considered fully certified for use by Corps standards. Species no longer included in HEP evaluation for this project are the raccoon, American kestrel, Carolina chickadee, and green heron. Emergent wetlands were then left with data for only a single species (wood duck) for HEP/HSI/HU evaluation. To augment data for emergent wetlands, the HEP model for American coot was also utilized with data collected in the field prior for other emergent wetland species, through examination of photographs taken during data collection for emergent wetlands, and review of aerial photography of the HEP data plots taken in 2004 and 2005.

In January 2014, Cardno TEC, Inc. compiled all of these changes to approved HEP species and all new information since the 2010 PAR and provided the resulting figures to the Service and the Corps as a revision to the May 13 Supplement to the 2010 PAR. The most current analysis of habitat Existing Conditions, Future Without Project, and Future With Project for the Dallas Floodway project can be found in our January 2014 Preliminary Final PAR (USFWS 2014).

Current data, also found within the Dallas Floodway January 2014 Preliminary Final PAR, are as follows:

3.1.1 Bottomland Hardwoods:

Table 3-1. Existing HIS Values for Bottomland Hardwood Habitat per Indicator Species within the Dallas Floodway Project Area

Indicator Species	*Evaluation Areas*		
	Confluence	*IDS*	*Mainstem*
Barred Owl	0.31	0.54	0.26
Wood Duck	0.29	0.16	0.11
Fox Squirrel	0.13	0.46	0.28
HIS Average	**0.24**	**0.39**	**0.21**

Table 3-2. Existing Acres, HIS Values, and Habitat Units for Bottomland Hardwood within the Dallas Floodway Project Area

Evaluation Area	*Acres*	*HIS Average*	*HUs*
Confluence	966.49	0.24	231.96
IDS	351.50	0.39	137.09
Mainstem	94.64	0.21	19.87
Total	**1,412.63**	**N/A**	**388.92**

Bottomland hardwoods in the Confluence and Mainstem were valued as poor habitat (0-0.24) while bottomland hardwoods in the IDS were valued as below average habitat (0.25-0.49). The limiting factors for bottomland hardwood habitat for the three evaluation groups were similar and are listed below.

- Minimal winter and brood cover along the banks for the wood duck
- Minimal winter food (hard mast producing vegetation) available for the fox squirrel
- The overstory trees are generally too small to provide nest sites for barred owl
- Available trees provide minimal nesting opportunities for wood duck (IDS and Mainstem)

Riparian woodland corridors are critical in maintaining an abundance of quality water to meet future demands. They have several hydrological and biological functions, including flood control, surface water storage, ground water supply recharge, and biological diversity. Vegetation in riparian corridors acts as a filter trapping sediment, organics, nutrients, and pesticides from surface runoff from agricultural fields, pastures, and lawns, therefore improving water quality.

3.1.2 Emergent Wetlands:

Table 3-3. Existing HSI Values for Emergent Wetland Habitat per Indicator Species within the Dallas Floodway Project Area

Indicator Species	*Evaluation Areas*		
	Confluence	*IDS*	*Mainstem*
Wood Duck	0.29	0.16	0.11
American Coot	0.31	0.29	0.33
HSI Average	**0.30**	**0.22**	**0.22**

Table 3-4. Existing Acres, HSI Values, and Habitat Units for Emergent Wetland within the Dallas Floodway Project Area

Evaluation Area	*Acres*	*HSI Average*	*HUs*
Confluence	67.95	0.30	20.39
IDS	87.72	0.22	19.30
Mainstem	262.91	0.22	57.84
Total	**418.58**	**N/A**	**97.53**

Emergent wetland habitats within the Confluence were valued at the lower range of below average quality while emergent wetland habitats in the IDS and Mainstem were valued as poor quality. The limiting factors for emergent wetland habit for the three evaluation groups were similar and are listed below.

- Available trees provide minimal nesting opportunities for wood duck
- Minimal winter and brood cover along the banks for wood duck
- Minimal nesting and winter cover along the banks for American coot

Emergent wetlands provide food and cover for fish, resident and migratory birds, small mammals, invertebrates, and the predators that feed on these species. Wetlands are important nesting habitat for waterfowl. Wetlands in the project area consists of rushes, sedges, wetland grasses, and aquatic plants located along the edges of the river and creeks, small impoundments, sumps, and seasonally flooded areas. Some of these wetlands are permanent, but most are seasonal. The emergent wetlands in the sump areas along the floodway have the potential of providing relatively good habitat for wildlife species if enhanced with vegetation for cover.

3.1.3 Grasslands:

Table 3-5. Existing HSI Values for Grassland Habitat per Indicator Species within the Dallas Floodway Project Area

Indicator Species	*Evaluation Areas*		
	Confluence	*IDS*	*Mainstem*
Eastern Meadowlark	0.27	0.54	0.53
Eastern Cottontail	0.59	0.61	0.70
HSI Average	**0.43**	**0.57**	**0.62**

Table 3-6. Existing Acres, HSI Values, and HU for Grassland within the Study Area

Evaluation Area	*Acres*	*HSI Average*	*HUs*
Confluence	1,573.16	0.43	676.46
IDS	958.26	0.57	546.21
Mainstem	1,752.15	0.62	1,086.33
Total	**4,283.57**	**N/A**	**2,309.00**

Grassland habitats within the Confluence were valued as below average while grassland habitats within the IDS and Mainstem were valued as average. The limiting factors for grassland habitat for the three evaluation groups were the same and listed below.

- Distance to perch sites too great for eastern meadowlark
- Minimal cover for eastern cottontail (shrub/tree and persistent herbaceous vegetation)

Grasslands provide open space, a food source for passerines and the eastern cottontail, and cover for escape and nesting by means of tall grass, scattered brush piles, and shrubs for a variety of animals. Red-tailed hawks hunt for prey in open grasslands. There are two types of grasslands in the study area, managed and unmanaged. Managed grasslands are located in lawns, parks, sump areas and the floodway on and along the levees that are routinely mowed. They are comprised of short native and introduced grasses and forbs, and sometimes scattered trees. A few acres are located on private lands. Unmanaged grasslands are fallow fields also containing a combination of native and introduced grasses, forbs, and trees, but the composition is different from those in the short grass areas. There are very few of these grasslands in the project area.

Table 3-7. Existing HUs per Habitat Type Within the Study Area

Habitat Types	*Baseline HU*
Bottomland Hardwood	388.92
Emergent Wetland	97.53
Grassland	2,309.00
Aquatic Riverine	345.77
Open Water	143.76
Total	**3,284.98**

4. Aquatic resources

4.1 Riverine:

The aquatic habitat in the project area is limited as a result of numerous and continuous landscape modifications over time. Degradation as a result of urbanization, vegetative maintenance, contaminated stormwater runoff, and conversion of native rangeland to exotic grasses in the associated watershed has led to a narrowing of the riparian corridor and loss of habitat. Much of the river channel through the project area has been subjected to routine mowing making it difficult for woody and certain native herbaceous plants to establish further, an expected byproduct of prior levee and floodway maintenance.

A fisheries survey was conducted on the Trinity River in Dallas County, Texas, from August 30 - September 1, 2004, by the Service and the Corps, with technical assistance provided by TPWD (USFWS 2004). The purpose of this survey was to determine baseline fish-community structure within the area of the Trinity River that could be potentially impacted by stream modifications, development, and/or construction activities associated with the proposed Dallas Flood Control Project. Four reaches were selected on the Trinity River to conduct this survey. Reaches 1 and 2 were within the mainstem of the Trinity River while Reaches 3 and 4 were upstream within the Elm Fork and West Fork, respectively. All reaches were located within an area of the river that could be potentially impacted by the proposed project.

An IBI provides a means to assess aquatic life use within a given water body using multiple metrics. Two differing IBI methods were utilized:

1. <u>State regional IBI</u> - Accounting for the high variability in fish assemblages in aquatic systems between various ecological regions (eco-regions) in Texas.

2. Trinity River Basin IBI - regionalized IBI developed specifically for the Trinity River.

Results of the state regional IBI assessments demonstrated high aquatic life use values for Reaches 2 (mainstem) and 3 (Elm Fork), while fish assemblages at Reaches 1 (mainstem) and 4 (West Fork) were characterized as intermediate. The fish community within the overall study area was classified as high. Scoring of the Trinity River basin specific IBIs yielded slightly different results. The basin specific aquatic life use value calculated for Reach 1 was intermediate to high, while aquatic life use values were high at Reaches 2 and 4. At Reach 3 and within the overall study area, the fish communities were characterized as high to exceptional.

In comparing these 2004 results with previous studies conducted in the area, fish community indices demonstrated a shift to higher aquatic life use values. A greater number of total species, including more species considered intolerant to poor water quality conditions as well as a greater number of individual game fish were encountered during this assessment then had been observed in the past. These observed trends would suggest a recovering system.

Table 4-1. Existing HSI Values for Aquatic Riverine Survey Sites within the Dallas Floodway Project Area

Reach	*Confluence*	*Mainstem*
1	-	0.75
2	-	0.87
3	0.90	-
4	0.82	-

Table 4-2. Existing Acres, HSI Values, and Habitat Units for Aquatic Riverine Habitat within the Dallas Floodway Project Area

Evaluation Area	*Acres*	*HSI Average*	*HUs*
Confluence	132.42	0.90	119.18
IDS	165.18	0.75	123.89
Mainstem	123.73	0.83	102.70
Total	**421.33**	**N/A**	**345.77**

The limiting factors for aquatic riverine habitat for the Confluence and Mainstem are taken from the Service's 2004 Dallas Floodway IBI report (USFWS 2004) and are listed below. The limiting factors for the IDS are assumed to be the same.

- Number of benthic invertivore species (Confluence)
- Percent of individuals as tolerants (Mainstem)
- Percent of individuals as omnivores (Confluence and Mainstem)
- Percent of individuals as invertivores (Mainstem)
- Number of individuals per seine haul (Confluence and Mainstem)

- Number of individuals per minute of electro-fishing (Confluence and Mainstem)
- Percent of individuals with diseases or other anomaly (Confluence)
- Total number of intolerant species (Confluence)

4.2 Open water systems:

A follow-up IBI study was conducted on June 16, 2010 by the Service, Corps, and TPWD targeting open water bodies expected to be similar to the proposed Natural, Urban, and West Dallas Lakes (USACE 2010). This was done to draw assumptions about eventual fish communities expected to be present in these proposed waterbodies that will have no direct inflows, but would periodically be inundated by the Trinity River during heavy rain events at 0.5 to 2.0 year intervals. Since the Trinity River serves as the primary population source for the off-channel waterbodies, it is likely that most of the species within the Trinity River may also be found within these systems. However, species with more specific habitat requirements may not successfully make the transition from lotic to lentic environments. Six open water systems were initially identified to meet initial screening criteria, of which three were later determined feasible for survey: Trammel Crow Lake, Bart Simpson Lake, and Dallas Floodway Extension (DFE) Cell D.

IBI metrics were modified accordingly to assess lentic systems. Results of these modified IBI assessments demonstrated high aquatic life use values for Trammel Crow and Bart Simpson Lake, while the fish assemblage at DFE Cell D was characterized as intermediate.

Table 4-3.Existing HSI Values for Open Water Survey Sites within the Dallas Floodway Project Area

Survey Site	*HSI*
Crow Lake	0.77
Bart Simpson Lake	0.77
DFE Wetland Cell D	0.60
Average	**0.71**

Table 4-4. Existing Acres, HSI Values, and Habitat Units for Open Water within the Dallas Floodway Project Area

Evaluation Area	*Acres*	*HSI Average*	*HUs*
Confluence	150.93	0.71	107.16
IDS	49.30	0.65	32.05
Mainstem	6.41	0.71	4.55
Total	**206.64**	**N/A**	**143.76**

The limiting factors for open water habitat for the three evaluation groups were assumed to be the same as the limiting factors for the open water survey sites (Crow Lake, Bart Simpson Lake, and DFE Wetland Cell D) and are listed below.

- Total number of fish species
- Number of cyprinid species
- Number of catfish species
- Number of intolerant species

Riverine fish sampled in 2004 from the Trinity River (discussed prior) showed detectable amounts of organochloride contaminants (USFWS 2004). It is likely that the fish sampled in the open water systems also have these contaminants since they are also utilizing the Trinity River as a primary water and population source. The open water survey sites are also located with a region of the Trinity River currently under a fish consumption advisory due to elevated organochlorine levels. These are legacy contaminants that have not been commercially distributed in the United States for almost 20 years. Most likely, the fish are obtaining these contaminants from the sediments or from the water column through stormwater run-off from the surrounding watershed.

5. Endangered and Threatened Species

The federally listed threatened or endangered species known to occur in Dallas County include the endangered whooping crane (*Grus americana*), interior least tern (*Sternula antillarum*), black-capped vireo (*Vireo atricapilla*), golden-cheeked warbler (*Setophaga chrysoparia*) and the threatened piping plover (*Charadrius melodus*).

Whooping cranes may be encountered in any county in north central Texas during migration. Autumn migration normally begins in mid-September, with most birds arriving on the wintering grounds at Aransas National Wildlife Refuge between late October and mid-November. Spring migration occurs during March and April. Whooping cranes prefer isolated areas away from human activity for feeding and roosting, with vegetated wetlands and wetlands adjacent to cropland being utilized along the migration route. Foods consumed usually include frogs, fish, plant tubers, crayfish, insects, and waste grains in harvested fields. This information as well as additional information on this species may be accessed on the Service's ECOS website at http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B003.

It is possible that whooping cranes may temporarily utilize habitats present within the study area during their annual migration but an encounter would be a rare occurrence. It is unlikely that any of the current activities or proposed modifications to the floodplain would have an adverse impact on this species.

The interior least tern nests in colonies on bare to sparsely vegetated sandbars along rivers and streams in Texas from May through August. Nesting areas are ephemeral, changing as sandbars form, move and become vegetated. Because natural nesting sites have become sparse, interior least terns have nested in atypical/non-natural areas, which provide similar habitat requirements. For example, one colony has been nesting for several years at the Southside Wastewater Treatment Plant in Dallas. Non-natural nesting sites include sandpits, exposed areas near reservoirs, gravel levee roads, dredged islands, gravel rooftops, and dike-fields. In recent years, terns have been utilizing artificial habitat more frequently within the Dallas area with small colonies being established in highly developed areas. Ground disturbance related to construction activities near the Trinity River may incidentally create areas that are attractive to least terns for use as potential nesting sites. Should least terns arrive at any of the project areas during the breeding season, the Service should be notified to discuss alternative development plans or the need for consultation under Section 7 of the Endangered Species Act.

The golden-cheeked warbler's habitat is generally described as mature (at least 12 feet tall) oak-juniper woodlands, with 50 percent or greater canopy cover, although warblers have been found in habitat with as little as 30 percent canopy cover. Steep, narrow canyons, with deciduous trees located along the drainage bottoms and juniper on the side slopes, provide an ideal mix of vegetation for this species. However, suitable habitat may also occur on hilltops or other relatively flat areas. Ideal habitat areas have a diverse mixture of juniper and hardwood trees, including oaks, hackberry, sycamore, and cedar elm.

The black-capped vireo is a habitat specialist, nesting in mid-successional brushy areas (i.e., before the area develops into a mature woodland) where the dominant woody species are oaks, sumacs, persimmon, and other broad-leaved shrubs. Juniper may be common in vireo habitat, but juniper prominence is not essential or even preferred by the birds. Typical nesting habitat is composed of a shrub layer extending from the ground to about six feet covering about 35-55% of the total area, combined with a tree layer that may reach to 30 feet or more. Open, sometimes grassy spaces separate clumps of trees and shrubs. The vireo also depends on broad-leaved shrubs and trees, especially oaks, which provide insects on which the vireo feeds.

The habitat evaluation team did not encounter any habitats that appeared suitable for nesting golden-cheeked warblers or black-capped vireos. Therefore, it is unlikely that either species would be present within the study area.

The piping plover is considered to be a statewide migrant in Texas. Current information indicates that this species may stop-over during migration in Grayson County, especially near Lake Texoma and the Red River. Winters are spent along the Gulf Coast. Habitat requirements include bare to sparsely vegetated river sandbars for nesting and foraging. Its diet consists mainly of marine worms, mollusks, crustaceans, and insects. Although piping plovers have been seen in Dallas County, an encounter would be expected to be a rare event. Should piping plovers arrive at any of the project areas during the breeding season, the Service should be notified to discuss alternative development plans or the need for consultation under Section 7 of the Endangered Species Act.

The bald eagle (*Haliaeetus leucocephalus*) was listed under the Endangered Species Act in Dallas County but was removed from the list effective August 8, 2007. However, bald eagles are still afforded safeguards under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. We recommend all activities be conducted in accordance with the Service's National Bald Eagle Management Guidelines which may be accessed at http://www.fws.gov/migratorybirds/currentbirdissues/management/baldeagle/nationalbaldeaglemanagementguidelines.pdf

6. CONSIDERATION OF PROJECT ALTERNATIVES

Ongoing NEPA compliance review by the USACE for the Trinity Parkway includes a review of several alternative alignments, as well as the No-Action Alternative. The City of Dallas has initiated preliminary design of two different versions of the BVP Study Ecosystem and Recreation features for Dallas Floodway, each addressing possible alternatives for the Trinity Parkway. Alternative 1 is a No-Action Alternative also undergoing obligatory consideration. Alternative 2 considers the implementation of the BVP/IDP if the Trinity Parkway is constructed within the Dallas Floodway Project. Alternative 3 considers the implementation of the BVP/IDP if the Trinity Parkway is not constructed within the Dallas Floodway Project. Descriptions of the No-Action Alternative and each Action Alternative follow.

6.1 Alternative 1: The No-Action Alternative

The No-Action Alternative, or "Future Without Project Condition," is an alternative that assumes the BVP/IDP is not constructed. An analysis of the No-Action Alternative is included as required by the NEPA process to establish baseline conditions against which potential impacts can be evaluated.

6.1.1 Alternative 2: Proposed Action with the Trinity Parkway

Under Alternative 2, the Trinity Parkway would be constructed within the Dallas Floodway Project using the preferred alternative identified in the Trinity Parkway Draft EIS. The Trinity Parkway proposed action includes excavation of fill material for support and berm building. To maximize construction efficiency, NTTA, the City of Dallas, and the USACE would coordinate to determine if the Trinity Parkway can take their fill material from the proposed Dallas Floodway lake sites. Thus, the excavation needs of the BVP would be decreased, because the Trinity Parkway project would excavate a portion of the lakes for use in the parkway berm, thereby resulting in "double-use" for the lakes. All mitigation associated with impacts from construction of the Trinity Parkway would occur outside of the Floodway (M. Hackett, USACE, personal communication, 2014).

6.1.2 Alternative 3: Proposed Action without the Trinity Parkway

The Trinity Parkway is an approved "reasonably foreseeable" project which may be constructed within *or* outside the Dallas Floodway levee system. Accordingly, the USACE and City of Dallas developed alternatives that would provide NEPA flexibility for either outcome. Under Alternative 3, the BVP/IDP would be implemented with the Trinity Parkway project constructed outside the Dallas Floodway Project. Because Alternative 3 assumes that the Trinity Parkway is not in-place in the Dallas Floodway Project, certain BVP Study Ecosystem and Recreation features identified in Alternative 2 would be different under Alternative 3. Under Alternative 3, there would be no change to the FRM elements or IDP improvements described under Alternative 2 (M. Hackett, USACE, personal communication, 2014).

6.2 Alternative Impacts Analysis and Discussion

It is difficult to predict what will happen within the project area in the future. However, using historic land use trends and the calculated HSIs, predictions of habitat conditions with or without the project can be expressed in terms of HUs. The two action alternatives were compared with the impact predictions associated with the Future Without the Project analysis for the 50 year project period

6.2.1 Alternative 1 – Future without project impact analysis

6.2.1.1 Confluence

Table 6-1 displays Alternative 1 - Future Without Project HSIs, acres, and HUs for the Confluence for bottomland hardwood, emergent wetland, grassland, aquatic riverine, and open water habitat over the next 50 years. It is an extension of the Mainstem group and expected to change little in 50 years. The quality of bottomland hardwoods and open water is expected to remain the same over the next 50 years while emergent wetlands, grassland, and aquatic riverine would increase only slightly. For aquatic riverine, the HSI is expected to remain the same between years 0 and 10, but it expected to increase by year 50 due to increased regulations and improved technology related to water quality. Quality of open water is not expected to change over the next 50 years.

Table 6-1. Estimated HSIs, Acreages, and HUs for Habitat Types in the Confluence Group over the Next 50 Years under Alternative 1 - Future Without Project Condition

Metric	*Existing Conditions*	*Year*			
		0	*5*	*10*	*50*
Bottomland Hardwood					
HSI	0.24	0.24	0.24	0.24	0.24
Acres	966.49	963.41	963.41	973.13	1,011.20
HUs	231.96	231.22	231.22	233.55	242.69
Emergent Wetland					
HSI	0.30	0.30	0.30	0.30	0.31
Acres	67.95	67.95	67.95	67.95	67.27
HUs	20.39	20.39	20.39	20.39	20.85
Grassland					
HSI	0.43	0.43	0.43	0.43	0.45
Acres	1,573.16	1,501.04	1,501.04	1,471.02	1,412.86
HUs	676.46	645.45	645.45	632.54	635.79
Aquatic Riverine					
HSI	0.9	0.9	0.9	0.9	0.93
Acres	132.42	132.36	132.36	131.04	124.49
HUs	119.18	119.12	119.12	117.94	115.78
Open Water					
HSI	0.71	0.71	0.71	0.71	0.71
Acres	150.93	150.93	150.93	147.91	136.08
HUs	107.16	107.16	107.16	105.02	96.62

6.2.1.2 Mainstem

Habitats in the Mainstem area are believed to have changed little if any in the past 50 years. Bottomland hardwoods consist of a narrow fringe along the river's edge which does not expand due to mowing. Table 6-2 presents estimated HSIs, acreages, and HUs for habitat types in the Mainstem group over the next 50 years under Alternative 2 - future without project condition. Acreage of bottomland hardwoods are expected to increase between years 10 and 50 from the conversion of aquatic riverine to bottomland hardwood.

Emergent wetlands are typically mowed when dry and are of low habitat quality. Due to ongoing maintenance, no changes are expected to emergent wetlands habitats until year 50, when a one percent decrease in acreage due to siltation and warmer, drier conditions associated with climate change.

Grassland habitats are regularly mowed and maintained and are not expected to change until approximately year 50, when a one percent increase may occur due to the conversion of emergent wetland to grassland.

Aquatic riverine habitat is the main channel of the Trinity River while the only open water present is Crow Park Lake. Aquatic riverine acreage is expected to decrease by one percent and covert to bottomland hardwood due to less water reaching the mainstem. By year 50, five percent is also expected to covert to bottomland hardwood associated with and warmer, drier conditions expected from climate change.

Table 6-2. Estimated HSIs, Acreages, and HUs for Habitat Types in the Mainstem Group over the Next 50 Years under Alternative 2 - Future Without Project Condition

Metric	*Existing Conditions*	*Year*			
		0	*5*	*10*	*50*
Bottomland Hardwood					
HSI	0.21	0.22	0.21	0.21	0.21
Acres	94.64	87.35	87.35	88.50	94.19
HUs	19.87	19.22	18.34	18.59	19.78
Emergent Wetland					
HSI	0.22	0.22	0.22	0.22	0.22
Acres	262.91	260.41	260.41	260.41	257.81
HUs	57.84	57.29	57.29	57.29	56.72
Grassland					
HSI	0.62	0.62	0.62	0.62	0.64
Acres	1,752.15	1,669.64	1,669.64	1,669.64	1,672.24
HUs	1,086.33	1,035.18	1,035.18	1,035.18	1,070.23
Aquatic Riverine					
HSI	0.83	0.83	0.83	0.83	0.86
Acres	123.73	114.95	114.95	113.80	108.11
HUs	102.7	95.41	95.41	94.45	92.97
Open Water					
HSI	0.71	0.71	0.71	0.71	0.71
Acres	6.41	6.41	6.41	6.41	6.41
HUs	4.55	4.55	4.55	4.55	4.55

6.2.1.3 Interior Drainage System

The Interior Drainage System is a largely urban area with small amounts of habitat adjacent to the existing pumps, sumps, and drainage channels. Table 6-3 represents estimated HSIs, acreages, and HUs for habitat types in the Interior Drainage System group over the next 50 years under Alternative 3 - future without project condition. At year 5, one percent of bottomland hardwood habitat is expected to be developed while at year 10, three percent of bottomland hardwood habitat is expected to be developed. At year 50, seven percent of bottomland hardwood habitat is expected to be lost to urban development.

The emergent wetlands are part of the sump pump areas and would remain. No change to acreage is expected over the next 50 years. The primary purpose of the emergent wetland areas is flood control, not to provide habitat.

At year 5, one percent of grassland habitat is expected to be developed. At year 10, three percent of grassland habitat is expected to be developed. At year 50, seven percent of grassland habitat is expected to be lost to urban development.

The aquatic riverine acreage is expected to remain at 165 acres from year 0 to 5. At year 10, one percent of the aquatic habitat is expected to convert to bottomland hardwoods due to less water from the urban area reaching the IDS. This could be due to warmer and drier conditions and/or residents and businesses retaining more water on their properties so less water reaches the storm drains. By year 50, five percent of the aquatic riverine habitat is expected to convert to bottomland hardwoods, primarily due to warmer and drier conditions from climate change. Open water acreage is expected to remain the same from year 0 to 5. At year 10, two percent of open water is expected to convert to bottomland hardwood (1 percent) and urban (1 percent). The habitat conversion is expected to occur from the open water filling in due to siltation and as a result of less rainfall and more evaporation from warmer temperatures. It is anticipated that half the area would grow into bottomland hardwood and the other half would become disturbed (urban). At year 50, conditions are expected to be warmer and drier from changes in global climate conditions, thus more habitat would convert to bottomland hardwoods and disturbed (urban) areas.

Table 6-3. Estimated HSIs, Acreages, and HUs for Habitat Types in the Interior Drainage System Group over the Next 50 Years under the Future Without Project Condition

Metric	*Existing Conditions*	*Year*			
		0	*5*	*10*	*50*
Bottomland Hardwood					
HIS	0.39	0.39	0.39	0.39	0.39
Acres	351.50	351.47	347.96	339.66	325.97
HUs	137.09	137.07	135.7	132.47	127.13
Emergent Wetland					
HIS	0.22	0.23	0.22	0.22	0.19
Acres	87.72	89.00	89.00	89.00	89.00
HUs	19.3	20.47	19.58	19.58	16.91
Grassland					

HIS	0.57	0.57	0.57	0.57	0.62
Acres	958.26	941.32	931.91	903.95	840.67
HUs	546.21	536.55	531.19	515.25	521.22
Aquatic Riverine					
HSI	0.75	0.7	0.7	0.75	0.8
Acres	165.18	164.92	164.92	163.27	155.11
HUs	123.89	115.44	115.44	122.45	124.09
Open Water					
HSI	0.65	0.65	0.65	0.65	0.65
Acres	49.30	49.02	49.02	48.04	44.20
HUs	32.05	31.86	31.86	31.23	28.73

Within the entire study area (Confluence, Mainstem, and Interior Drainage System), changes to HUs under Alternative 1 at year 50 are depicted in Table 6-4:

Table 6-4. Habitat Units per Habitat Type Within the Study Area under the Future Without Project Condition

Habitat Types	*HUs*		
	Baseline	*FW/OPC (Year 50)*	*Change*
Bottomland Hardwood	388.92	389.6	0.68
Emergent Wetland	97.53	94.48	-3.05
Grassland	2,309.00	2,227.24	-81.76
Aquatic Riverine	345.77	332.84	-12.93
Open Water	143.76	129.9	-13.86
Total	**3,284.98**	**3,174.06**	**-110.92**

6.2.2 Alternative 2: Proposed Action with the Trinity Parkway impact analysis

Ninety-nine acres of existing habitat would become urban from the implementation of Alternative 2. Open water habitat would increase under Alternative 2 from the creation of the Urban, Natural, and West lakes. Bottomland hardwood acreage would also increase with hardwoods planted along the Trinity River; the largest amount of hardwoods would be planted at the southeastern end of the project area. Aquatic riverine acreage would increase from the realignment of the river. The greatest decrease of habitat would be to grassland habitat.

6.2.2.1 Confluence

The Confluence Group includes the Elm Fork and West Fork of the Trinity River and the associated emergent wetland and upland habitat in the area. The Alternative 2 actions in the Confluence consist of the FRM Elements and the IDP Trinity-Portland Pumping Plant and Eagle Ford and Trinity-Portland sump improvements.

Table 6-5 presents estimated HSIs, acreages, and HUs for habitat types in the Confluence Group over the next 50 Years under alternative 2. Progressions of these metrics are predicted to be the same as that presented for Alternative 1.

Table 6-5. Estimated HSIs, Acreages, and HUs for Habitat Types in the Confluence Group over the Next 50 Years under Alternative 2

Metric	*Existing Conditions*	*Year*			
		0	*5*	*10*	*50*
Bottomland Hardwood					
HIS	0.24	0.24	0.24	0.24	0.24
Acres	966.49	966	966	976	1016
HUs	231.96	231.84	231.84	234.24	243.84
Emergent Wetland					
HIS	0.30	0.30	0.30	0.30	0.31
Acres	67.95	68	68	68	67
HUs	20.39	20.40	20.40	20.40	20.77
Grassland					
HIS	0.43	0.43	0.43	0.43	0.45
Acres	1,573.16	1574	1574	1543	1482
HUs	676.46	676.82	676.82	663.49	666.90
Aquatic Riverine					
HIS	0.90	0.90	0.90	0.90	0.93
Acres	132.42	133	133	132	125
HUs	119.18	119.7	119.7	118.8	116.25
Open Water					
HIS	0.71	0.71	0.71	0.71	0.71
Acres	150.93	151	151	148	136
HUs	107.16	107.21	107.21	105.08	96.56

6.2.2.2 Mainstem

Table 6-6 presents estimated HSIs, Acreages, and HUs for habitat types in the Mainstem Group over the next 50 years under Alternative 2. Most of the habitats within mainstem area would be temporarily impacted by the construction of the BVP Study features. HSIs within bottomland hardwood, emergent wetland, and grassland-urban forest would be low at years 0, 1, and 5 because they would not have had enough time to establish and function. HSI values for bottomland hardwoods and emergent wetlands would be expected to increase over time as these habitats mature.

Mainstem grasslands will consist of 3 types: native meadow, turf, and urban forest. Native meadow would be expected to have the highest eventual HSI value with its planned native species diversity when compared with turf (mowed and managed) and urban forest (composed largely of non-native ornamental trees).

Open water and riverine HSIs are not expected to change much over time until approximately year 50, when aquatic riverine may improve due to increase regulations and technology related to water quality.

Table 6-6. Estimated HSIs, Acreages, and HUs for Habitat Types in the Mainstem Group over the Next 50 Years under Alternative 2

Metric	*Existing Conditions*	*Year*					
		0	*1*	*5*	*10*	*25*	*50*
Bottomland Hardwood							
HSI	0.21	0.09	0.09	0.09	0.13	0.21	0.43
Acres	94.64	195	195	195	198	203	215
HUs	19.87	17.55	17.55	17.55	25.74	42.63	92.45
Emergent Wetland							
Existing							
HSI	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Acres	262.91	32	32	32	32	32	32
HUs	57.84	7.04	7.04	7.04	7.04	7.04	7.04
Proposed							
HSI	-	0.13	0.13	0.34	0.42	0.47	0.52
Acres	-	152	152	152	152	152	150
HUs	0.00	19.76	19.76	51.68	63.84	71.44	78
Total Wetland HU	***57.84***	***26.8***	***26.8***	***58.72***	***70.88***	***78.48***	***85.04***
Grassland							
Existing Maintenance Levels							
HSI	0.62	0.4	0.4	0.4	0.4	0.4	0.4

Acres	1,752.15	192	192	192	192	192	194
HUs	1,086.33	76.8	76.8	76.8	76.8	76.8	77.6
Meadow							
HSI	-	0.50	0.60	0.70	0.65	0.70	0.85
Acres	-	887	887	887	887	887	887
HUs	0.00	443.50	532.20	620.90	576.55	620.90	753.95
Landscaping: Turf							
HSI	-	0	0	0.4	0.4	0.4	0.4
Acres	-	158	158	158	158	158	158
HUs	0.00	0.00	0.00	63.20	63.20	63.20	63.20
Landscaping: Urban Forest							
HSI	-	0.50	0.50	0.40	0.40	0.40	0.40
Acres	-	5	5	5	5	5	5
HUs	0.00	2.50	2.50	2.00	2.00	2.00	2.00
Total Grassland HU	***1,086.33***	***522.8***	***611.5***	***762.9***	***718.55***	***762.9***	***896.75***
Aquatic Riverine							
HSI	0.83	0.83	0.75	0.83	0.85	0.87	0.90
Acres	123.73	250	250	250	247	242	230
HUs	102.70	207.50	187.50	207.50	209.95	210.54	207.00
Open Water							
Crow Lake							
HUs	4.55	4.55	4.55	4.55	4.55	4.55	4.55
Urban Lake & West Dallas Lake							
HSI	-	0.00	0.00	0.43	0.77	0.77	0.77
Acres	-	207	207	207	207	207	207
HUs	-	0.00	0.00	89.01	159.39	159.39	159.39
Natural Lake							
HSI	-	0.00	0.00	0.60	0.77	0.77	0.77
Acres	-	50	50	50	50	50	50
HUs	-	0.00	0.00	30.00	38.50	38.50	38.50
Total Open Water HU	***4.55***	***4.55***	***4.55***	***123.56***	***202.44***	***202.44***	***202.44***

6.2.2.3 Interior Drainage System

Table 6-7 presents estimated HSIs, Acreages, and HUs for habitat types in the Interior Drainage System over the next 50 years under Alternative 2. Within this area, bottomland hardwoods are typically found along existing drainage channels. Bottomland hardwoods have no protection from development, and would be expected to decrease within this continually developing area.

Grassland area would likely be decrease due to development while grassland HSIs would likely increase over time as trees in the urban forest provide increase foraging opportunities for grassland species.

Emergent wetlands would be expected to decrease somewhat in acreage, HU and HSI value over the next 50 years due to anticipated effects of climate change.

Aquatic riverine habitat conditions would be expected to decrease in HSI value between years 0 and 5 due to the adverse effects associated with construction of Alternative 2. By year 50, HSIs are expected to have increased due to increased regulations and technology related to water quality. Open water acreage would increase somewhat, but HSI values are expected to remain the same over the next 50 years under Alternative 2.

Table 6-7. Estimated HSIs, Acreages, and HUs for Habitat Types in the Interior Drainage System Group over the Next 50 Years under Alternative 2

Metric	*Existing Conditions*	*Year*			
		0	*5*	*10*	*50*
Bottomland Hardwood					
HSI	0.39	0.39	0.39	0.39	0.39
Acres	351.50	350	347	339	326
HUs	137.09	136.50	135.33	132.21	127.14
Emergent Wetland					
HSI	0.22	0.23	0.22	0.22	0.19
Acres	87.72	67	67	67	67
HUs	19.3	15.41	14.74	14.74	12.73
Grassland					
Existing Maintenance Levels					
HSI	0.57	0.57	0.57	0.57	0.62
Acres	958.26	945	936	908	844
HUs	546.21	538.65	533.52	517.56	523.28
Landscaping: Urban Forest					
HSI		0.50	0.40	0.40	0.40
Acres		22	22	22	22
HUs	0	11	8.8	8.8	8.8
Total Grassland HU	***546.21***	***549.65***	***542.32***	***526.36***	***532.08***
Aquatic Riverine					
HSI	0.75	0.70	0.70	0.75	0.80
Acres	165.18	162	162	160	152

HUs	123.89	113.40	113.40	120.00	121.60
Open Water					
HSI	0.65	0.65	0.65	0.65	0.65
Acres	49.30	72	72	71	65
HUs	32.05	46.80	46.80	46.15	42.25

Within the entire study area (Confluence, Mainstem, and Interior Drainage System), changes to HUs under Alternative 2 at year 50 are depicted in Table 6-8:

Table 6-8. HUs per Habitat Type Within the Study Area under Alternative 2

Habitat Types	*HUs*		
	Baseline	*Year 50*	*Change*
Bottomland Hardwood	388.92	463.43	74.51
Emergent Wetland	97.53	118.54	21.01
Grassland	2,309.00	2,095.73	-213.27
Aquatic Riverine	345.77	444.85	99.08
Open Water	143.76	341.25	197.49
Total	**3,284.98**	**3,463.80**	**178.82**

6.2.3 Alternative 3: Proposed Action without the Trinity Parkway impact analysis

Under Alternative 3, five more acres of existing habitats would be converted to urban developments. The greatest decrease of habitat would be loss of grassland while the greatest increase would be to open water from the construction of the BVP Study lakes. Bottomland hardwood acreage would increase along with aquatic riverine habitat acreage from the realignment of the river.

6.2.3.1 Confluence

Within the Confluence area, all activities proposed by Alternative 3 would be the same as those proposed by Alternative 2. Therefore, changes to habitat acreages within the Confluence would not be expected to differ from the results presented prior regarding Alternative 2.

6.2.3.2 Mainstem

Table 6-9. Estimated HSIs, Acreages, and HUs for Habitat Types in the Mainstem Group over the Next 50 Years under Alternative 3

Metric	*Existing Conditions*	*Year*					
		0	*1*	*5*	*10*	*25*	*50*
Bottomland Hardwood							
HSI	0.21	0.09	0.09	0.09	0.13	0.21	0.43
Acres	94.64	194	194	194	197	202	214
HUs	19.87	17.46	17.46	17.46	25.61	42.42	92.02
Emergent Wetland							
Existing/Continuing							
HSI	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Acres	262.91	32	32	32	32	32	32
HUs	57.84	7.04	7.04	7.04	7.04	7.04	7.04
Proposed							
HSI	-	0.13	0.13	0.34	0.42	0.47	0.52
Acres	-	154	154	154	154	154	152
HUs	0	20.02	20.02	52.36	64.68	72.38	79.04
Emergent Wetland HU	***57.84***	***27.06***	***27.06***	***59.4***	***71.72***	***79.42***	***86.08***
Grassland							
Existing Maintenance Levels							
HSI	0.62	0.40	0.40	0.40	0.40	0.40	0.40
Acres	1,752.15	191	191	191	191	191	193
HUs	1,086.33	76.40	76.40	76.40	76.40	76.40	77.20
Landscaping: Meadow							
HSI	-	0.50	0.60	0.70	0.65	0.70	0.85
Acres	-	844	844	844	844	844	844
HUs	0.00	422.00	506.40	590.80	548.60	590.80	717.40
Landscaping: Turf							
HSI	-	0.00	0.00	0.40	0.40	0.40	0.40
Acres	-	186	186	186	186	186	186
HUs	0.00	0.00	0.00	74.40	74.40	74.40	74.40
Landscaping: Urban Forest							
HSI	-	0.50	0.50	0.40	0.40	0.40	0.40
Acres	-	15	15	15	15	15	15
HUs	0.00	7.50	7.50	6.00	6.00	6.00	6.00

Grassland HU	***1,086.33***	***505.90***	***590.30***	***747.60***	***705.40***	***747.60***	***875.00***
Aquatic Riverine							
HSI	0.83	0.83	0.75	0.83	0.85	0.87	0.90
Acres	123.73	250	250	250	247	242	230
HUs	102.70	207.50	187.50	207.50	209.95	210.54	207.00
Open Water							
Crow Lake							
HUs	4.55	4.55	4.55	4.55	4.55	4.55	4.55
Urban Lake & West Dallas Lake							
HSI		0.00	0.00	0.43	0.77	0.77	0.77
Acres		207	207	207	207	207	207
HUs		0.00	0.00	89.01	159.39	159.39	159.39
Natural Lake							
HSI		0.00	0.00	0.60	0.77	0.77	0.77
Acres		50	50	50	50	50	50
HUs		0.00	0.00	30.00	38.50	38.50	38.50
Open Water HU	***4.55***	***4.55***	***4.55***	***123.56***	***202.44***	***202.44***	***202.44***

Under Alternative 3, most of the existing bottomland hardwoods (94.64 acres) would be removed during the realignment and modification of the Trinity River under the BVP Study features. During the implementation of the BVP Study features, 194 acres of bottomland hardwood would be planted in the Mainstem adjacent to the levee but kept from expanding further toward the levee. After the initial 194 acres are established, a gradual increase of bottomland habitat is expected from the conversion of aquatic riverine to bottomland hardwood between years 10 and 50.

Emergent wetlands within the Mainstem under Alternative 3 would include approximately 186 acres consisting of approximately 32 acres of existing wetlands and approximately 154 of wetlands created from the implementation of the BVP Study features. The created wetlands would include Corinth, Cypress, and fringe marsh wetlands along the edge of the lakes.
Due to the proposed maintenance of the BVP Study features in the Mainstem, the acreage of emergent wetlands in the Mainstem is expected to stay the same over the next 10 years. At year 50, one percent of the emergent wetlands are expected to convert to grassland due to siltation and warmer and drier climate conditions.

Due to the proposed maintenance of the BVP Study features in the Mainstem, no changes to grassland acreage is expected over the next 50 years. At year 50, the acreage is expected to increase by one percent, due to the emergent wetland converting to grassland.

The aquatic riverine habitat value and acreage in the Mainstem would change significantly under Alternative 3. BVP Study features include realignment of the Trinity River to increase both sinuosity and habitat value along with planting of riparian fringe vegetation. Acreage is expected to remain at 250 acres from year 0 to 5. By year 50, five percent of the aquatic riverine habitat is expected to convert to bottomland hardwoods, due to anticipated warmer and drier climate conditions.

Existing acreages of open water habitat along with the BVP Study feature lakes (263 acres) would not be expected to change over the next 50 years due to ongoing maintenance.

6.2.3.3 Interior Drainage System:

Within the Interior Drainage System area, all activities proposed by Alternative 3 would be the same as those proposed by Alternative 2. Therefore, changes to habitat acreages within the Interior Drainage System would not be expected to differ from the results presented prior regarding Alternative 2.

Within the entire study area (Confluence, Mainstem, and Interior Drainage System), changes to HUs under Alternative 3 at year 50 are depicted in Table 6-11:

Table 6-11. Habitat Units per Habitat Type Within the Study Area under Alternative 3

Habitat Types	*HUs*		
	Baseline	*Year 50*	*Change*
Bottomland Hardwood	388.92	463.00	74.08
Emergent Wetland	97.53	119.58	22.05
Grassland	2,309.00	2,073.98	-235.02
Aquatic Riverine	345.77	444.85	99.08
Open Water	143.76	341.25	197.49
Total	**3,284.98**	**3,442.66**	**157.68**

7. Comparison of Habitat Units at year 50 for all alternatives

Perhaps the most effective method to compare project alternative effects on wildlife habitat over time is in comparison of changes to Habitat Units (HU). As stated prior, HUs are calculated by multiplying the numeric HSI values by the amount of acres of habitat available. This comparative analysis accounts for both changes to habitat acreage as well as habitat suitability. Table 6-12 illustrates a comparison of HUs for all project alternatives at year 50.

Table 6-12. Comparison of Habitat Units (HU) at Year 50 for All Alternatives with Cumulative Projects as Compared to Existing Conditions

Habitat Type	*Existing Conditions*	*Alternative 1 Future W/out Project*		*Alternative 2 Cumulative*		*Alternative 3 Cumulative*	
	HU	*HU*	*Difference*	*HU*	*Difference*	*HU*	*Difference*
Bottomland Hardwood	388.92	389.60	0.68	449.67	60.75	458.89	69.97
Emergent Wetland	97.53	94.48	-3.05	145.55	48.02	147.66	50.13
Grassland	2,309.00	2,227.24	-81.76	1,952.33	-356.67	1,982.68	-326.32
Aquatic Riverine	345.77	332.84	-12.93	445.75	99.98	445.75	99.98
Open Water	143.76	129.90	-13.86	341.25	197.49	341.25	197.49
Total	**3,285**	**3,174.06**	**-110.92**	**3,334.55**	**49.57**	**3,376.23**	**91.25**

Results suggest that under both Alternative 2 and Alternative 3, habitat quality would increase over time as compared with the No Action Alternative 1. The greatest increases would be to open water habitats from the construction of the BVP Study lakes and to aquatic riverine habitats from the realignment of the Trinity River. The BVP Study along with other project components of Alternatives 2 and 3 would also have substantial positive effects to the current habitat quality of bottomland hardwoods, emergent wetlands, and aquatic riverine habitats. The only decrease in habitat quality would be to grasslands primarily due to loss of acreage. Existing grasslands within the study area are possibly the least ecologically valuable habitats present due to their continual mowing disturbances and invasion of non-native species, circumstances expected to continue under all project alternatives.

7.1 Evaluation and Comparison of the Alternatives

The following is a comparison of Alternative 1 - No Action, Alternative 2 - Proposed Action with the Trinity Parkway, and Alternative 3 - Proposed Action without the Trinity Parkway in regards to how they will impact fish and wildlife resources over the 50 year project analysis period.

7.1.1 Alternative 1 - No Action: Through the course of normal urban development within the project area over a period of 50 years, the greatest losses to fish and wildlife resources in all habitats except grasslands are expected to occur under this alternative.

7.1.2 Alternative 2 - Proposed Action with the Trinity Parkway: Temporary adverse impacts to all habitats within the project area are expected to occur with this alternative.

However, adverse impacts to fish and wildlife resources associated with this alternative would be compensated for through in-kind and out-of-kind mitigation. In-kind mitigation would be in the form of an increase of open water habitat acreage and quality from the construction of the BVP Study lakes as well as an increase in aquatic riverine habitat acreage and quality through the realignment of the Trinity River. Temporary impacts to the bottomland hardwood habitat would be adequately compensated for by in-kind compensation with an increase of approximately 73.83 HUs over future without project conditions (at year 50). Grassland habitat would decrease by 131.51 HUs, but the overage of bottomland hardwood habitat, which is considered more valuable due to greater biodiversity and habitat rarity, would compensate for this loss as out-of-kind mitigation. Emergent wetland habitats would also be substantially increased by an additional 21.01 HUs over future without project conditions.

7.1.3 Alternative 3 - Proposed Action without the Trinity Parkway: Temporary and long term impacts resulting from this Alternative would differ little from Alternative 2. Specifically, the implementation of Alternative 3 would yield 1.4 emergent wetland HUs more than Alternative 2, but would also result in 21.75 Grassland HUs less than Alternative 2. All other in-kind and out-of-kind mitigation expected from Alternative 2 would also result from the implementation of Alternative 3 due to their similarities.

7.2 Alternatives Summary - Both alternatives 2 and 3 would result in the improvement of existing bottomland hardwood, emergent wetland, open water, and aquatic riverine habitats, while offsetting impacts to grasslands through gains in higher value habitats. Because of these actions, it is expected that both alternatives would fully meet the ecosystem preservation and restoration objectives within the project area. Unavoidable impacts to habitat within the project area associated with these alternatives are relatively minimal. The small amount of habitat that would temporarily be lost through construction activities would be fully compensated for through in-kind and out-of-kind mitigation. High quality riparian and wetland habitats would be established in lieu of grasslands which are of limited ecological value. Consequently, the losses to fish and wildlife resources associated with Alternatives 2 and 3 are expected to be self-mitigating and would be acceptable from a fish and wildlife resource perspective.

8. Recommended Fish and Wildlife Conservation Measures

The Service has evaluated this project in accordance with the guidelines and directives contained in the Fish and Wildlife Mitigation Policy (Federal Register 46(15):7644-7663; January 23, 1981). The Mitigation Policy is the basis by which the Service makes recommendations, in order of priority, to avoid, minimize, rectify, reduce or eliminate the loss over time, or compensate project-related impacts to fish and wildlife resources. Our recommendations are based on the value and relative abundance of the affected habitats to the evaluation species. The Policy includes four Resource Categories (1-4) to provide a consistent value rating for wildlife habitats.

Based on the HSI values and IBI evaluations, the Service has designated a Resource Category for each terrestrial habitat in each area assessed and aquatic habitat in each segment studied.

8.1 Aquatic Habitat

The Service has designated the aquatic habitats within the study area as Resource Category 3. Category 3 habitat is of high to medium value for the evaluation species and is relatively abundant on a national basis. The mitigation goal for this category is no net loss of habitat value while minimizing loss of in-kind values. As noted in our Trinity River Basin IBI, the Elm Fork (Reach 3) support exceptional fisheries, and therefore, impacts to this system should be avoided and/or minimized before any enhancement of these resources might occur.

As indicated prior, Alternatives 2 and 3 would result in substantial net gains of aquatic habitat quality and acreage. Any temporary construction impacts to aquatic habitats would be self-mitigating and the Service concludes that no additional mitigation efforts would be necessary.

Although the degree and extent of contamination in sediments within the portion of the Trinity River that would be impacted by the proposed actions are unknown, the Service is concerned that contaminated sediments could be re-suspended into the water column from the excavation activities, which would allow these contaminants to become more readily available to the aquatic biota inhabiting the river. Therefore, the Service recommends that the degree and extent of sediment disturbance be minimized to the extent practicable and that best management practices be used to further reduce the potential for sediment contamination to migrate downstream. The Service also recommends that best management practices be implemented to control the increased pollutant loading in storm water runoff associated with construction activities and the projected increase in traffic usage within this area.

8.2 Terrestrial Habitat

All terrestrial habitats within the project area have medium to low habitat value for the evaluation species and have been designated as Resource Category 4. The mitigation planning goal for Category 4 habitat is to minimize loss of habitat value. Out-of-kind habitat values may be used for mitigation. Habitat improvements and restoration measures proposed for the project may be used for the mitigation of adverse impacts associated with the construction of the preferred plan of development.

As stated prior, alternatives 2 and 3 would result in the improvement of existing bottomland hardwood and emergent wetland habitats, while offsetting impacts to grasslands through gains in higher value habitats. The small amount of habitat that would temporarily be lost through construction activities would be fully compensated for through in-kind and out-of-kind mitigation. High quality riparian and wetland habitats would be established in lieu of grasslands which are, in comparison, of lesser ecological value. Consequently, the losses to fish and wildlife resources associated with Alternatives 2 and 3 are expected to be self-mitigating and would be acceptable from a fish and wildlife resource perspective.

Alternatives 2 and 3 would result in substantial net gains of terrestrial habitat quality and acreage. Any temporary construction impacts to terrestrial habitats would be self-mitigating and the Service concludes that no additional mitigation efforts would be necessary.

Executive Order 11990 requires all Federal agencies to "take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities." Wetlands are of national importance and have been documented as one of the most productive and important habitats for a variety of fish and wildlife species. At year 50, Alternative 2 would result in a net increase of 21.01 emergent wetland HUs and Alternative 3 would result in an increase of 22.05 HUs. Either of these scenarios would fully mitigate for temporary wetland impacts associated with project construction.

9. Summary of Findings and Fish and Wildlife Service's Position

Due to the lack of suitable habitat and the urbanized character of the project area, it is unlikely that any federally listed threatened or endangered species would become established in any of the study areas. The Trinity River has a high diversity of bird species, and the area is likely to become more popular as an urban park. The interior least tern is the only listed species likely to be found in the area with any regularity. However, given the urban area, breeding populations are not likely to be established. Therefore, adverse effects to federally listed species are not anticipated with implementation of any of the proposed alternatives.

No permanent detrimental effects to aquatic or terrestrial communities within the project area would be expected to occur from the implementation of any of the project alternatives. Long term effects of Alternatives 2 and 3 would result in net benefits to fish and wildlife resources. Therefore, no additional mitigation efforts are recommended.

The Service commends the Corps and the sponsor for incorporating habitat creation/restoration plans into the action alternatives. These efforts would fully compensate for the impacts caused by initial project construction. The Service recommends that future plans for the project area incorporate more aspects of the conceptual Ecosystem Restoration Plan throughout the project area. These actions would provide additional benefits to fish and wildlife resources, and the public's enjoyment of these resources, throughout the entire project area.

Both Alternatives 2 and 3 would result gains to fish and wildlife resources and both would support the Dallas Floodway Project objectives of flood protection, habitat creation/restoration, and public recreation. However, Alternative 3 would likely be the least environmentally damaging. Locating a portion of the Trinity Parkway within the levee system (Alternative 2) could potentially introduce more runoff contaminants and litter from vehicles passing through this area. While both Alternatives 2 and 3 would support substantial gains to fish and wildlife resources, the Service recommends Alternative 3. If Alternative 2 is selected, the Service recommends that efforts be made to fully manage pollutants and litter that the Trinity Parkway might introduce into the study area.

In summary, we believe the implementation of these recommended measures would serve to minimize the adverse impacts associated with the proposed project. We appreciate the opportunity to provide our evaluation and recommendations on this project. Please contact Sean Edwards of my staff at (817) 277-1100 if you have any questions or require additional assistance.

Sincerely,

Debra Bills
Field Supervisor

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