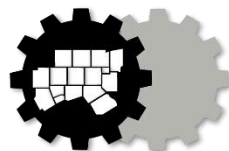
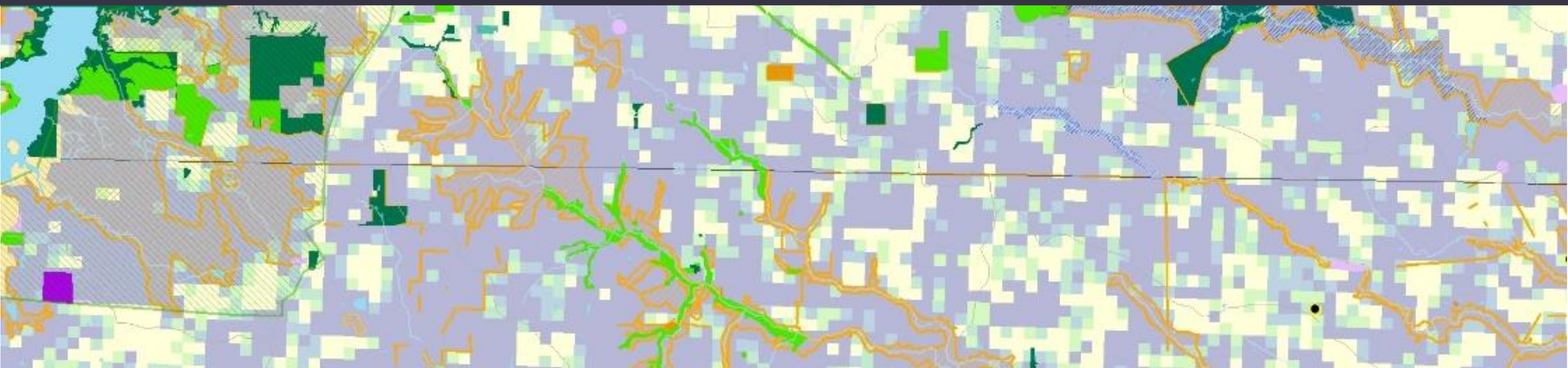




# Loop 9 Conservation Vision and Opportunities



**North Central Texas  
Council of Governments**

Transportation Department

North Central Texas Council of Governments

January 2015

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# Loop 9 Corridor Area Conservation Vision and Opportunities

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## Introduction

The Loop 9 Southeast corridor has been identified in plans as a needed transportation facility for many years. This corridor has undergone several studies and concept plans; the most recent study, the Loop 9 Southeast Corridor Feasibility Study, was completed in March 2014.

In 2012, the Texas Department of Transportation began the Loop 9 Southeast Corridor Feasibility Study for a revised project concept in an area from United State Highway 67 (US 67) to Interstate Highway 20 (IH 20) within Dallas, Ellis, and Kaufman counties. The Corridor Feasibility Study followed the Planning and Environment Linkages (PEL) approach to evaluate environmental issues early in the planning process. The purpose of a PEL study is to perform preliminary analysis and make decisions not completed as a part of traditional regional level planning so National Environmental Policy Act (NEPA) level evaluation and decision making is more transparent to resource agencies and the public.<sup>1</sup>

The Loop 9 Southeast Corridor Feasibility Study documents environmental constraints for 28 smaller segments of the overall corridor. These smaller segments document constraints such as hazardous materials sites, floodplains, land use, community resources, parkland and recreational areas, threatened and endangered species, and several other important cultural and natural resources. While feasibility studies, corridor studies, and NEPA documents traditionally document the potential direct impacts associated with a transportation corridor, often they do not have the necessary data or resources to consider the overall relative importance of natural, cultural, or environmental resources that may be impacted. For example, a study can identify the possible acreage of wetlands that may be impacted, but these studies do not always consider the relative importance of these wetlands in the overall context of the ecosystem in which they are present.

While all wetlands are important and it is ideal to avoid impacts to any wetlands, the value of wetlands might differ based on the ecosystem benefits that are derived from their presence including the quantity present, the type of wetland, or the hydrologic function they serve. These additional elements of evaluating environmental assets and identifying potential impacts are difficult to analyze. Additionally, the importance of one environmental asset over another can be

different based on the ecosystem's existing status (i.e. pristine versus degraded), the function, and overall outside pressures associated with the ecosystem (i.e. development, land use changes, etc.).

Furthermore, traditional transportation corridor studies and NEPA studies document potential mitigation needs associated with unavoidable impacts to environmental resources. Avoiding impacts is the ultimate goal of the planning process, but when impacts are unavoidable, the secondary goal is to minimize impacts and then to mitigate for impacts. According to the Council on Environmental Quality regulations (40 CFR 1508.20), mitigation efforts may be defined as: 1) Avoiding an impact altogether; 2) Minimizing the impact by limiting the degree or magnitude of the action; 3) Rectifying the impact by repairing, rehabilitating, and restoring the resource; 4) Reducing or eliminating the impact over time by presentation and maintenance activities; 5) Compensating for the impact by replacing or providing substitutes to the resource impacted.<sup>2</sup>

The goal of the Loop 9 Transportation Corridor Conservation Vision and Opportunities is to document the potential opportunities to supplement or enhance existing natural ecosystem assets by identifying key areas where conservation potential exist. The goal would be to use this vision for the corridor to develop a proactive approach to mitigating unavoidable impacts due to planned transportation infrastructure.

The Vision focuses on potential projects and opportunities that could be considered for mitigation or enhancement of the landscape and natural resources in the Loop 9 corridor area and identifies the potential partnerships that could be established. The goal would be that as the individual transportation corridor projects move through the project development phases and as mitigation plans are developed, these conservation opportunities could be considered as potential mitigation for unavoidable project impacts.

The Conservation Vision process is probably best suited for a transportation corridor feasibility level analysis to inform the process of determining general corridor alignments, potential environmental impacts, and identifying important existing conservation and future conservation areas. Additionally, the Vision could be used to support the required Indirect and Cumulative Impacts analyses that are documented as part of the environmental project delivery process outlined in

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<sup>1</sup> Loop 9 Southeast Corridor Study, 2014. Accessed July 2014. <http://www.loop9.org/>

<sup>2</sup> Loop 9 Southeast Corridor Study, 2014. Accessed July 2014. <http://www.loop9.org/>

NEPA. The Texas Department of Transportation outlines five steps to complete an indirect induced growth and/or cumulative impact analysis.

## Regional Ecosystem Framework

The North Central Texas Council of Governments (NCTCOG) has undergone a process to develop and recently update a Regional Ecosystem Framework (REF) for North Central Texas. The REF is a geographic information systems based tool that can be used during development of infrastructure projects in North Central Texas. The REF consists of ten Vital Ecosystem Information Layers focused on three central ecological parameters: Green Infrastructure, Water Considerations, and Ecosystem Value.

### *A Watershed Approach – An Ecosystem Approach*

The REF provides a foundation for using the watershed approach when considering the conservation and ecosystem-based priorities during development of infrastructure projects. A watershed is the area of land that drains to a common waterway, such as a stream, lake, estuary, wetland, aquifer, or the ocean. Protecting water quality, reducing flooding, and reducing other risks is important to the overall quality of life for residents. Strategic conservation of important open spaces within our watersheds through a cooperative, watershed-based approach will help meet these goals and protect, restore, and sustain vital ecosystems that provide recreational and mobility opportunities in communities.

Watersheds also correspond well to what federal agencies and other organizations are doing to protect water resources and the environment. This approach is supported by agencies such as the US Environmental Protection Agency, US Fish and Wildlife Service, and the US Army Corps of Engineers in efforts such as preventing pollution, protecting fish habitats, and/or protecting wetlands.

The Dallas-Fort Worth Metropolitan Planning Area is used as the defining geography as the development of the REF was initiated and defined originally for use in transportation planning and project development. There are 302 subwatersheds (HUC-12<sup>3</sup>) in the Metropolitan Planning Area. Each subwatershed has a corresponding score for ten Vital Ecosystem Information Layers (VEIL). The data processes used to determine the scores for each subwatershed are described in the A User's Guide to a North Central Texas Regional Ecosystem Framework published in 2011 and the corresponding update to the User's Guide published in 2014. These reports can be viewed at [www.nctcog.org/REF](http://www.nctcog.org/REF).

It is critical to note that the REF scores and composite datasets are indicative of the quantity of a certain natural resource, not the quality of that resource. While the REF does not place a value on a resource (measure quality of that resource), the quantity of a resource is important to consider when evaluating potential impacts, avoidance alternatives, and conservation opportunities. The REF subwatershed geography lends itself to a planning level indication of the relative importance (quantity) of a natural resource with respect to other subwatersheds in the region. As shown in the conservation vision analysis for Loop 9, this provides opportunity to define important characteristics for each subwatershed that inform potential mitigation and conservation opportunities suited to each subwatershed.

### *Existing Conservation and Dedicated Areas in the Loop 9 Area*

During the 2014 REF update, NCTCOG collected conservation data to develop a map that displays the existing conservation and dedicated areas in North Central Texas. This map can be used to determine where dedicated lands such as parks, reserves, conservation easements, flood control infrastructure, historic, or cultural districts are located. These existing conservation areas and dedicated lands provide opportunities to link environmental sensitive lands, identify partnerships, and apply innovative approaches to avoiding, enhancing, or conserving complementary areas. This map is displayed as Figure 1.

### *Future Conservation and Dedicated Areas in the Loop 9 Area*

During the 2014 REF update, NCTCOG collected data that depicts areas that are conservation priorities such as The Nature Conservancy's Priority Conservation Areas, provide areas of high priority value such as native prairies and upland forests, or future parks identified in local government future land use plans. The resultant map, Figure 2, displays potential future conservation opportunity areas in North Central Texas. This map can be used to determine where dedicated lands such as parks, reserves, conservation easements, floodplains, priority natural landscapes, and significant stream segments are located or could benefit from future conservation projects. When mapped with the existing conservation areas, the future conservation areas provide additional information on where potential opportunities to leverage landscape linkages, identify partnerships, and apply ecosystem based approaches to avoiding, enhancing, or conserving complementary areas exist.

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<sup>3</sup> Hydrological Unit Code (HUC) is a watershed boundary classification. HUC-12 refers to the smallest geography boundary in the system.

Figure 1. North Central Texas Existing Dedicated Lands

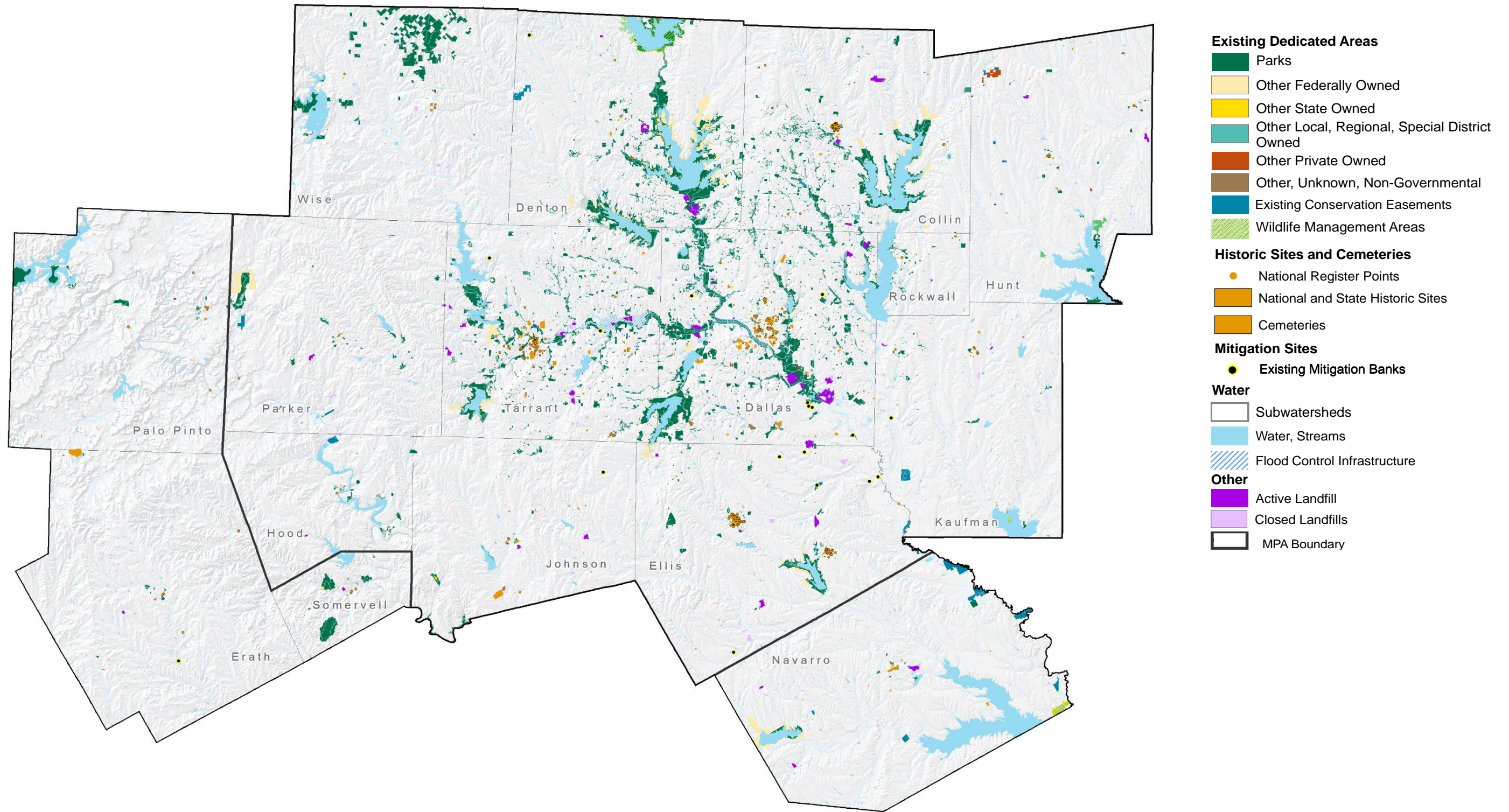
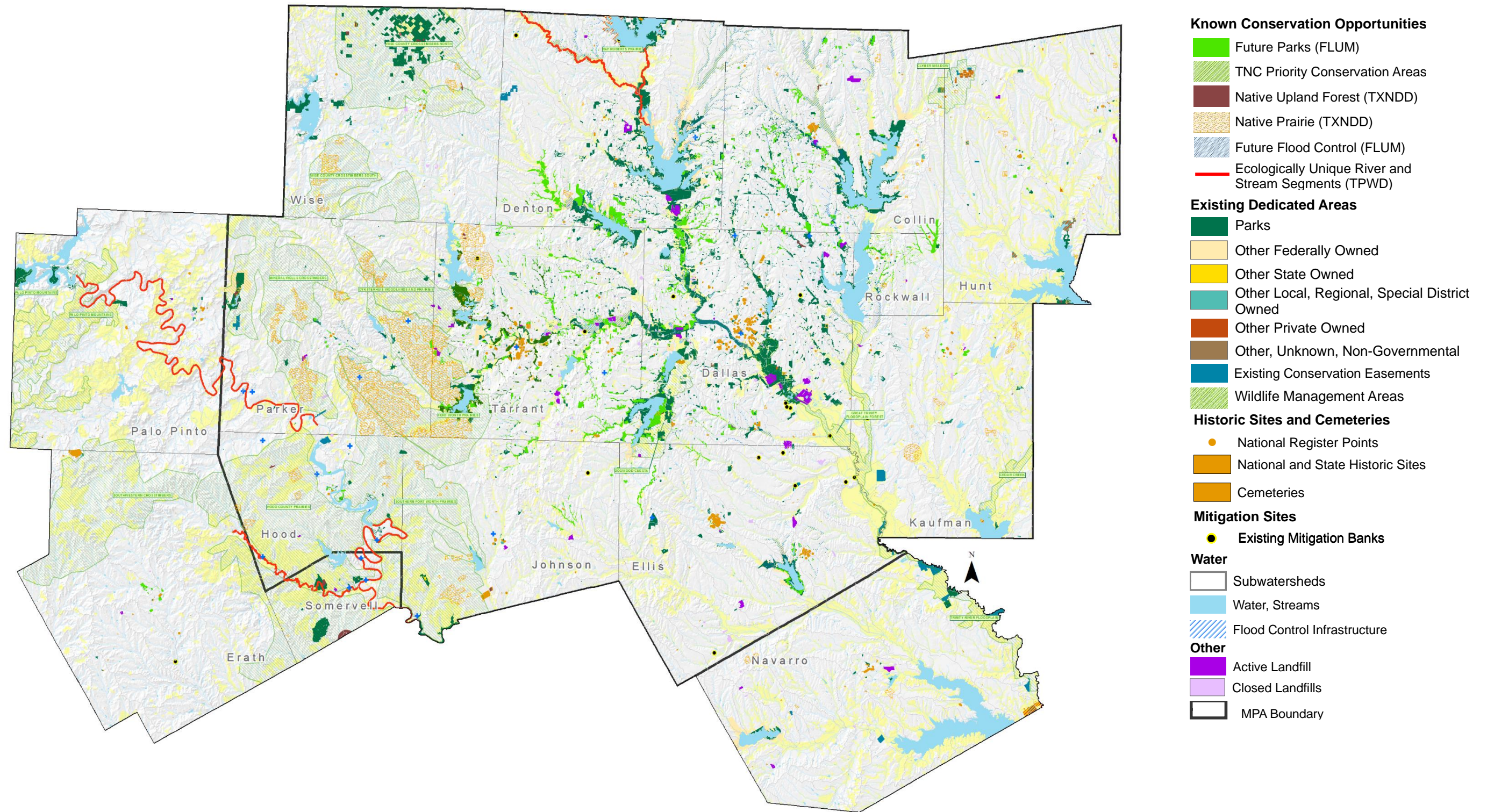


Figure 2. North Central Texas Known Conservation Opportunities



## Loop 9 Corridor Area Conservation Vision and Opportunities

The Loop 9 Corridor Area consists of land between United State Highway 67 (US 67) and Interstate Highway 20 (IH 20) within Dallas, Ellis, and Kaufman counties. This area is based on the radius used in the Loop 9 Southeast Corridor Feasibility Study conducted by the Texas Department of Transportation. The Loop 9 Corridor Area Conservation Vision is a compilation of existing and future conservation areas, as well as the REF VEIL layers. A vision map was developed that links dedicated lands with other key environmental attributes to establish a vision of a green infrastructure network in the corridor.

Through this process, it was determined that several questions can assist with defining a conservation vision for an area:

- 1) *What are the natural resources currently existing in the area?*
- 2) *What constraints or pressures are associated with the resources?*
- 3) *What priorities are established for conservation, preservation, or enhancement for the resource?*
- 4) *What are the opportunities and potential enhancement or mitigation projects with regards to the natural environment?*
- 5) *Who are the partners that play a role in identifying, conserving, and managing resources?*

The conservation vision for the Loop 9 corridor area is developed through the series of questions that involve evaluation of the Regional Ecosystem Framework data, existing and future dedicated lands, and other priority ecosystem information from resource and regulatory agencies.

The following questions guided the development of the Loop 9 Corridor Area Conservation Vision and Opportunities map.

- 1) *What are the natural resources currently existing in the area?*

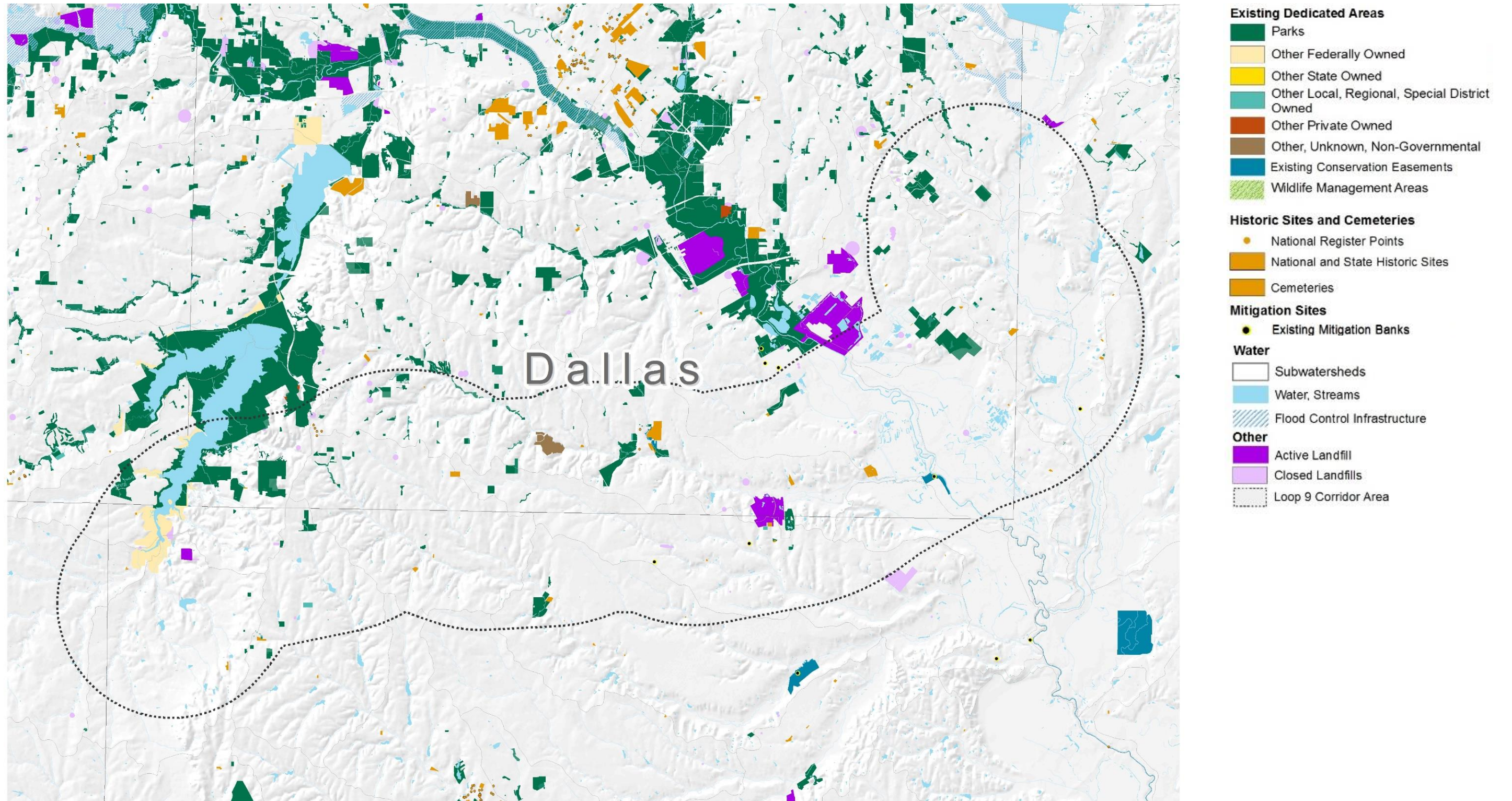
In the context of the Dallas-Fort Worth region, the Loop 9 corridor area can be characterized as suburban to rural. Large agricultural uses and low-to-mid density residential uses are the predominant land uses in the area; however, large swaths of open space and floodplain for the Trinity River and tributaries do exist.

The existing land use, historic resources, parkland, and recreational areas are documented at a broad level in the Loop 9 Corridor Feasibility Study. The Feasibility Study also documents water resources, including wetlands, streams, ponds, and waters of the US in a broad manner. Additionally, biological resources including vegetation, habitat, and threatened and endangered species are included as a discussion. Floodplains and drainage patterns are also documented at a high level. The Feasibility Study does note that all of the social, biological, and water resources would require further habitat, vegetation, species, historic, and archaeological field surveys to determine more potential direct impacts.

The Feasibility Study and the subsequent environmental documents capture a great deal of detailed information on biological, water, social (land use, community, cultural), and other resource information that is important in the context of understanding the ecosystem and important cultural resources in the area. The known existing dedicated lands in the Loop 9 area are also documented. It was found though that through this process of establishing a Corridor Vision, important dedicated lands such as mitigation banks and conservation easements could be included in this discussion to better inform potential dedicated land impacts. As a result of this exercise, existing dedicated lands in the Loop 9 area are shown in Figure 3. Table 1 depicts the name and acreage of the existing dedicated lands in the Loop 9 corridor area.

In broad terms, the Loop 9 corridor area includes statewide, regional, and local ecosystems and cultural assets of importance. The following are important resources existing in or near the Loop 9 corridor area that serve important biological, hydrological, economic, or cultural significance.

Figure 3. Loop 9 Corridor Area Existing Dedicated Lands



**Table 1. Existing Dedicated Land in Loop 9 Corridor Area (No Historical Properties Included)**

Owner/Manager	Acres in Loop 9 Corridor Area
<b>Connemara Easements</b>	
Strain Family Farm Easement	172
South Fork Trinity River Mitigation Bank - Ten Mile Creek	177
<b>Land and Water Resources Conservation and Recreation Plan - City Parks</b>	
Balch Springs	39
Cedar Hill	373
Dallas	46
DeSoto	276
Farmersville	12
Glenn Heights	49
Lancaster	437
Mesquite	682
Midlothian	93
Red Oak	10
Seagoville	44
<b>Land and Water Resources Conservation and Recreation Plan - County</b>	
Dallas County (Lester Lorch Nature Preserve)	54
<b>Land and Water Resources Conservation and Recreation Plan - Federal</b>	
Grand Prairie, City of (Joe Pool)	494
US Army Corps of Engineers (Joe Pool)	2,681
<b>Land and Water Resources Conservation and Recreation Plan - Other</b>	
Cedar Hill ISD (Highlands Recreational Area)	7
<b>Land and Water Resources Conservation and Recreation Plan - Private</b>	
City of Cedar Hill, Manager (Dot Thomas Trail)	1
<b>Mitigation Banks, US Army Corps of Engineers</b>	
Bunker Sands Mitigation Bank	1201
South Fork Trinity River Mitigation Bank Ten Mile Creek Tract	486
Big Woods on the Trinity Mitigation Bank Primary	423
Red Oak Umbrella Mitigation Bank - Palmer Tract (TXRAM Bank) Tertiary	348
<b>Texas Land Conservancy</b>	
Veda Farrington Preserve	314

## High Priority Ecosystems

### Blackland Prairie Ecoregion

The Texas Blackland Prairie ecosystem extends north to south along the IH 35 corridor, from the Oklahoma border nearly to San Antonio, intersecting three of the most populated metropolitan areas in Texas. The Blackland Prairie is desirable for both farming and urban development due to its relatively flat terrain and few native trees. Its easily eroded shales and marls produce the rich black soil for which the region is named. Lands that were first developed as cropland or pasture have been increasingly converted to urban, suburban, and industrial uses. Because of these characteristics, it is also extremely fragmented and has been reduced in area from nearly 12 million acres to an estimated 5,000 acres today.<sup>4</sup> Almost all of the surviving Blackland Prairie is privately owned, although a small portion is under the protection of The Nature Conservancy of Texas.

Watershed prioritization within the Loop 9 corridor area begins with preservation of remnants of “wet prairie.” The loss of almost all of these features within the Blackland Prairie, along with the fragmentation due to first agricultural and then urban development, has impacted a variety of indigenous species. The Texas Parks and Wildlife Department's *Species of Greatest Conservation Need*, part of the Conservation Action Plan, identifies 121 plant and animal species native to the Blackland Prairie.

Wetlands in the Blackland Prairie ecosystem are primarily oxbows and ephemeral wetland areas adjacent to the Trinity River. Several subwatersheds crossing the Loop 9 corridor area have REF scores indicating their importance for maintaining Ecosystem Value, Green Infrastructure, and scoring high in the overall VEIL classification. These subwatersheds include or are adjacent to the Lower Trinity River, and also Red Oak Creek, which are included in The Nature Conservancy's “Aquatic Portfolio” and “Provisional Aquatic Portfolio” respectively.<sup>5</sup>

### Cross Timbers and Prairie Ecoregion

The Cross Timbers and Prairie Ecoregion includes the western portion of the Loop 9 corridor area. Woodland, prairie, and escarpment areas provide a variety of habitats within a relatively small region. Although the vegetation in the region is highly modified due to agriculture and urban development, areas of the Cross Timbers are among the least disturbed forest ecosystems in the eastern United States. However, the outcropping of the Austin Chalk Cuesta in southwestern Dallas County, with slopes sometimes exceeding 20 percent, has prevented development and provided opportunities for conservation east of Joe Pool Lake. Federal, state, and municipal governments, as well as local and national non-governmental organizations, have set aside lands in this ecosystem for conservation.

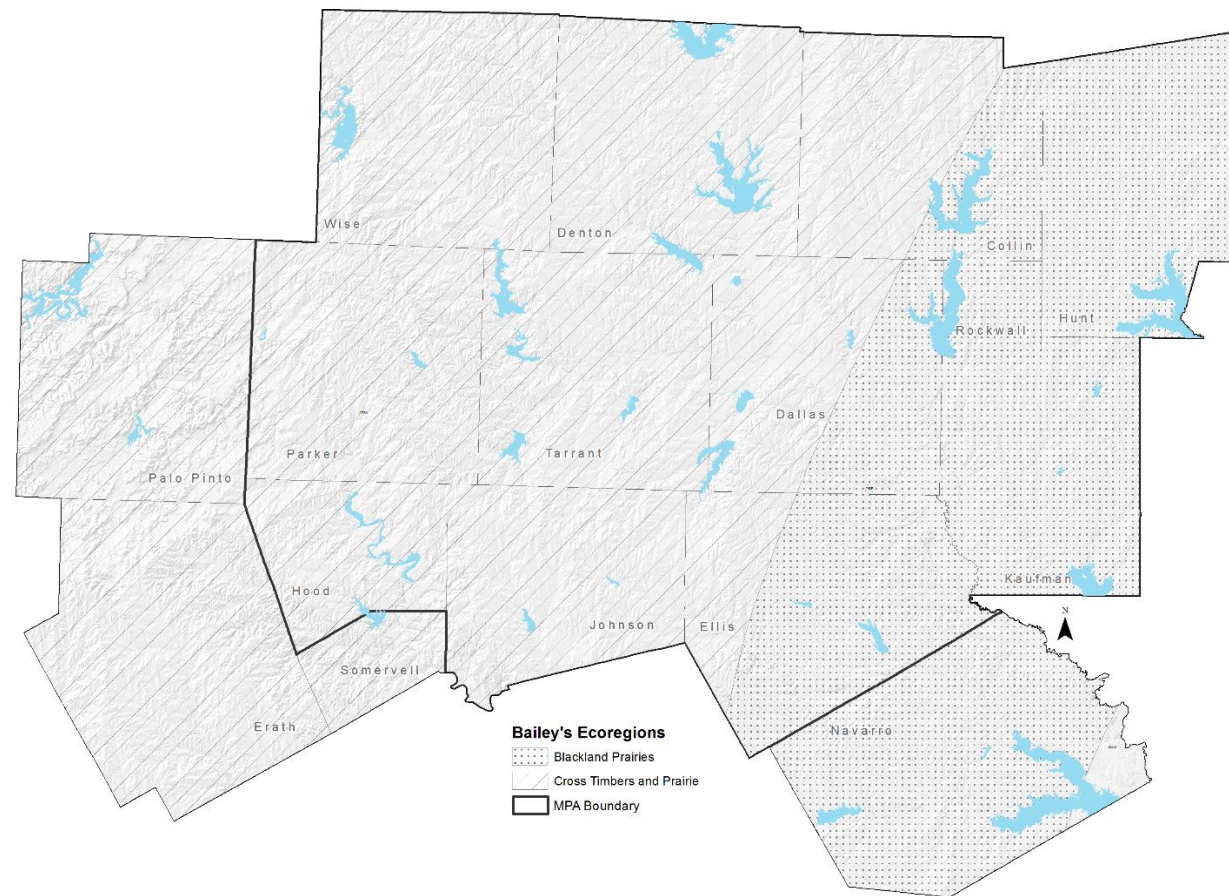
<sup>4</sup> Texas Parks and Wildlife Department (TPWD), 2012 Texas Conservation Action Plan 2012 - 2016

<sup>5</sup> “Conservation Blueprint for the Crosstimbers & Southern Tallgrass Prairie Ecoregion”, Pg. 14



Sandy soils in the Cross Timbers and Prairie ecoregions support old-growth post oak and blackjack oak savanna, with some understory shrubs and vines, along with prairie grasses. Along streams and rivers grow pecan, cottonwood, and sycamore trees. Both row crops and grazing agricultural uses are fragmented by rapidly growing suburban and exurban development. The Texas Parks and Wildlife Department's (TPWD) "Species of Greatest Conservation Need" identifies 111 plant and animal species of concern in the Cross Timbers and Prairie. Figure 4 depicts the Blackland Prairie and Cross Timbers and Prairie ecoregions for the Dallas-Fort Worth 16-county region.

**Figure 4. Bailey's Ecoregions Displaying Blackland Prairie and Cross Timbers and Prairie Ecoregions**



### Great Trinity Forest and Wetlands

The Great Trinity Forest is one of the largest urban bottomland hardwood forests in America. The city of Dallas owns the majority of the land and has developed a 100-year Great Trinity Forest Management Plan. This management plan addresses the wildlife habitat, recreational, and forest

management needs of the urban hardwood forest. This forest is the last old-growth bottomland hardwood forest in North Central Texas. The forest also houses a large chain of wetlands that provide flood protection and habitat creation, as well as economic stimulus for South Dallas. The Lower Chain of Wetlands is a system of four wetland cells located off of IH 45 South and Loop 12 East. When constructed, the Upper Chain of Wetlands will be located at Cedar Crest Bridge and connected to the Lower Chain of Wetlands.<sup>6</sup>

### Preserves, Parks, and Open Space

Several existing open space assets, other than the Great Trinity Forest, are located within the Loop 9 corridor area including city parks, preserves, easements, and mitigation banks. The existing parks provide recreational and open space opportunities for residents in the area. These existing preserves, parks, and open space are shown in Table 1.

### Native Prairies

The Loop 9 corridor area does include several native prairie remnants identified in the Texas Natural Diversity Database. These include several small areas of Blackland Prairie and other grass prairie areas in South Dallas County.

### Agricultural Lands

Ellis County has historically been an important agricultural producer in the state. Today, this industry has dwindled, yet it remains an important contributor to the local and statewide economy when compared to the urbanized area due north (Dallas). Table 2 demonstrates that for 2013, Ellis County planted thousands of acres of wheat, corn, cotton, sorghum, and winter wheat. Additionally, the county produced thousands of head of cattle, goats, and other meat. Much of this same information is not available in Dallas County due to the limited agricultural productivity and the high intensity (urbanized) developed area. As demonstrated by the 2013 US Department of Agriculture Cropland, the Loop 9 corridor area has a demonstrable portion of the area that is covered by crops. There is a significant contrast between the developed area just north of the Loop 9 corridor and the agricultural land that is predominant just outside of the urbanized area.

Figure 5 shows the USDA Cropland Data for the Loop 9 corridor area. This map demonstrates that much of the corridor is productive agricultural land as compared to the urbanized area to the north of the corridor area. There are also some pockets of forested areas grass/pasture lands.

<sup>6</sup> Trinity River Corridor Project: <http://www.trinityrivercorridor.com/flood-control/chain-wet-lands.html>

**Table 2. 2013 Agricultural Statistics for Dallas and Ellis Counties**

(Presented in 000's, Source: 2013 USDA National Agricultural Statistics)

	Wheat (Planted Acres)	Corn (Planted Acres)	Cotton (Planted Acres)	Sorghum (Planted Acres)	Winter Wheat (Planted Acres)	All Cattle & Calves (Head)	Meat & Other Goats (Head)
Dallas	Not Available	Not Available	Not Available	Not Available	Not Available	2 – 28	Not Available
Ellis	36 – 71	10 – 27	10 – 22	8 – 25	36 – 71	28 – 62	2 – 4

Specifically for the Loop 9 corridor area, understanding the land uses that exist is important to understanding the overall importance of a particular resource. This information for the Loop 9 corridor area is provided in Table 3 and echos the importance of agricultural lands and woodlands as indicated in this summary of existing natural resources.

**Table 3. Land Use in Loop 9 Corridor Area** (Source: 2011 NLCD)

Land Use	Acres	Percentage
Agriculture	142,107	58.0%
High Development	2,948	1.2%
Medium Development	9,861	4.0%
Low Development	20,818	8.5%
Developed Open Space	17,449	7.1%
Woodland	37,929	15.6%
Wetland	5,600	2.3%
Barren	665	0.3%
Shrubland	34	0.01%
Open Water	5,743	2.4%
Total Area	243,161	99.4%

The summaries of natural resources in the Loop 9 corridor area provided here are not all inclusive. Many other natural resources exist that were not discussed in detail in this section including wetlands, habitat, and water resources. These additional resources are important natural resources in the Loop 9 corridor area and contribute to the health of the ecosystem and are important to consider in the transportation planning process. The summary provided in this document of the important ecoregions, agricultural lands, and dedicated lands is provided as an example of the information that could be gathered to help support the development of a corridor conservation vision.

Figure 5. USDA 2013 Cropland Data for Loop 9 Corridor Area



2) *What constraints or pressures are associated with the resource?*

It is important to understand what pressures or constraints exist that may impact natural resources in an area in the future or that exist in an area currently. This information informs the user of the relative importance of certain natural resources at any given time, can enable one to understand how these pressures and constraints may change over time, and are important in determining future paths to conservation, preservation, and enhancement of the most burdened ecosystems and natural resources.

**Population Growth and Development Pressures**

The Loop 9 corridor area is a mix of rural, agricultural, and suburban land uses. Several cities in the area are growing due to suburban residential land uses. Growth in the area, including residential and commercial development, will require additional land to meet the needs of expanding populations. The 2014 population estimates and 2040 projected populations for the largest cities located in the Loop 9 corridor area are displayed in Table 4. Additionally, economic development trends in the area such as the establishment and growth of the International Inland Port of Dallas (IIPOD). The IIPOD is located in southern Dallas County and covers 234,000 acres and encompasses 12 cities.<sup>7</sup> As economic development continues to occur in the southern Dallas County and northern Ellis County areas, increases in jobs and the residential and commercial development that will occur to support the job growth, will bring additional challenges in the relationship between development and the natural resources present in these areas.

**Land Use Changes**

As the population continues to grow in this area, in some cases doubling in a 25-year period for some cities, development pressures and infrastructure needs could be associated with reduction in natural resources over time. These changes have already begun as populations have shifted south and southeast of the traditional urban core of the city of Dallas and Dallas County. Table 5 demonstrates the changes in land uses over a decade (from 2001 to 2011) for the Dallas-Fort Worth region and the Loop 9 corridor area.

As demonstrated in the land use changes in Table 5, the Loop 9 corridor does follow some of the same land use change trends that the region is experiencing, although some unique changes in terms of open water, high intensity development, and emergent herbaceous wetlands were some of the more significant differences in terms of growth in these land uses when compared to the region.

<sup>7</sup> Dallas Economic Development, <http://www.dallas-ecodev.org/redevelopment/iipod/>

**Table 4. 2014 Population Estimates and 2040 Projected Population for Largest Loop 9 Corridor Area Cities** (Source: NCTCOG)

City	2014 Population	2040 Projected Population	Percent Change – 2014 to 2040
Cedar Hill	45,820	72,314	57.8%
Combine	1,960	3,268	66.7%
Crandall	3,030	Not projected	N/A
Dallas	1,232,360	1,713,662	39.1%
DeSoto	50,520	63,983	26.7%
Ferris	2,440	3,619	48.3%
Glenn Heights	11,440	16,152	41.2%
Grand Prairie	181,230	247,005	36.3%
Lancaster	37,150	64,985	74.9%
Mansfield	59,410	126,681	113.2%
Mesquite	142,210	182,185	28.1%
Midlothian	20,540	48,807	137.6%
Red Oak	11,530	12,352	7.1%
Seagoville	15,130	25,638	69.5%
Wilmer	4,120	9,077	120.3%

3) *What priorities are established for conservation, preservation, or enhancement for the resource?*

In both the Texas Blackland Prairie and Cross Timbers ecoregions, preservation of habitat is of primary concern. TPWD's "Texas Conservation Action Plan 2012-2016: Statewide/Multi-Region Handbook" includes native grasslands, surface waters and adjacent riparian zones, and breeding areas for birds as priority habitats. Largely because of urbanization and fragmentation, the Loop 9 corridor area contains at least 120 plants and animals listed in the TPWD Species of Greatest Conservation Need. The greatest opportunities to conserve these species is to assemble contiguous lands to provide buffered, extended areas of suitable habitat. The coordination of conservation priorities and cooperation of conservation partners is essential to the success of Loop 9 corridor conservation efforts.

**Table 5. Percent Change in Land Cover from 2001 and 2011 for the Dallas-Fort Worth Region and Loop 9 Corridor** (Source: National Land Cover Data)

12 County Region		Loop 9 Corridor	
Land Cover Category	Percent Change	Land Cover Category	Percent Change
Open Water	-4%	Open Water	21%
Developed, Open Space	25%	Developed, Open Space	15%
Developed, Low Intensity	1%	Developed, Low Intensity	14%
Developed, Medium Intensity	35%	Developed, Medium Intensity	78%
Developed, High Intensity	15%	Developed, High Intensity	58%
Barren Land	75%	Barren Land	1%
Deciduous Forest	-4%	Deciduous Forest	-5%
Evergreen Forest	-7%	Evergreen Forest	-13%
Mixed Forest	16%	Mixed Forest	0%
Shrub/Scrub	-2%	Shrub/Scrub	5%
Herbaceous	-3%	Herbaceous	-9%
Hay/Pasture	-2%	Hay/Pasture	-7%
Cultivated Crops	0%	Cultivated Crops	-6%
Woody Wetlands	3%	Woody Wetlands	-2%
Emergent Herbaceous Wetlands	44%	Emergent Herbaceous Wetlands	16%

### The Nature Conservancy Conservation Priorities

In 2009, The Nature Conservancy published *A Conservation Blueprint for the Crosstimbers and Southern Tallgrass Prairie Ecoregion*. This document identified priority conservation areas within the Ecoregion which includes the Loop 9 corridor. Two features extending into the corridor were described in the Nature Conservancy Plan, the Great Trinity Floodplain Forest, and the Dogwood Cuesta.

- The **Great Trinity Forest Conservation Area** extends along the Trinity River below Dallas into western Kaufman County. Currently the development of the Trinity River corridor by the city of Dallas and the US Army Corps of Engineers poses a potential challenge for the Great Trinity Forest downstream. However, opportunities to improve and conserve additional natural portions of the Trinity River and the Trinity Forest could be identified and improving recreational access provides additional opportunities to educate residents on the value of these natural assets.

Although most of the Great Trinity Forest Conservation Area was farmed during the nineteenth century, it has regrown into mature hardwood forest. In addition to the challenges of upstream development and growing Southern Sector suburbs, the development of the 234,000 acre Inland Port public-private partnership along IH 20 between IH 35E and IH 45 will impact growth in the region.

The city of Dallas owns tracts of the forest which were purchased in cooperation with the Trust for Public Land, and has developed the Audubon Center with the Audubon Society as a partner. The city is also developing a Trinity Forest golf course, and plans to open the Texas Horse Park in 2015: both facilities will be operated by private partners. Care must be taken that the conservation priorities downstream are not compromised by upstream development.

- The **Dogwood Cuesta Conservation Area** crosses the portion of the Loop 9 corridor just east of Joe Pool Lake. This feature, described above in the Cross Timbers and Prairie section, is an outcropping of the Austin Chalk extending from the Red River to South Texas. Southwestern Dallas County contains the largest exposure of Cuesta throughout this range.

Although portions are threatened by subdivision and invasive species, the Dogwood Cuesta offers opportunities to coordinate existing conservation assets in the area. The Audubon Society operates the 600 acre Cedar Ridge Preserve and the 270 acre Dogwood Canyon Audubon Center. Texas Parks and Wildlife owns the 1,826 acre Cedar Hill State Park, and the US Army Corps of Engineers manages Joe Pool Lake and its shoreline.

### Vision North Texas Natural Areas

Vision North Texas (VNT) is a public-private partnership organized by the Urban Land Institute, the North Central Texas Council of Governments, and the University of Texas at Arlington. VNT seeks to facilitate long range, regional planning for a 16-county area that preserves and enhances current assets while guiding development to accommodate nearly 12 million people by 2050. The "North Texas 2050" document identifies five characteristic features of the region and explores development alternatives for each.

Natural Areas are defined as "places where the natural and environmental features should be the focus." These areas are often floodplains, major open spaces, and shorelines of lakes, rivers, and streams. Development in or adjacent to these features should take advantage of their amenities, and should take fully into account the economic benefit that these amenities can provide. The Loop 9 corridor includes portions of VNT designated "Natural Area" in the eastern portion along the Trinity River, and in the west in an area roughly contiguous with the Dogwood Cuesta.

VNT established policy recommendations for the Natural Areas which include portions of the Loop 9 corridor. These point out the importance of maintaining mapped information identifying these

natural assets, and encourage property owners, local governments and the TPWD to collaborate in preserving and enhancing them. Local entities should provide opportunities for North Texans to learn about and contribute to the preservation of these natural assets and, along with private landowners and conservancies, should collaborate to identify and acquire land for preservation.

#### Future Land Use – Parkland

Each year, NCTCOG collects data from a rotating list of cities in the 12-county Metropolitan Planning Area. These Future Land Use Plans show the planned future growth for each city and are often incorporated into a city's comprehensive plan. Several cities have included conservation of additional parkland within the Loop 9 corridor in their Future Land Use Plans. Dedication of this land is not certain, but expresses the desired future outcome for each city. These future dedicated lands present an opportunity for collaboration with local governments and conservation organizations during the transportation planning process to identify potential mitigation projects, conservation projects, or enhancement opportunities.

The future parks and open spaces anticipated by these four cities, as shown in Table 6, could add up to 1771 acres of additional unbuilt area for conservation and/or linkages.

**Table 6. Parkland Identified in Future Land Use Plans** (Source: NCTCOG)

City	Acres
DeSoto	219
Lancaster	26
Midlothian	911
Ovilla	615

#### Wetlands Conservation Priorities

Wetlands perform a variety of functions in the environment. Water flowing into a wetland contains the remains of plant and animal life from the surrounding land, and the wetland facilitates the breakdown of this detritus into nutrients available for uptake by plants. They capture excess water from flooding or the landscape and retain it temporarily, reducing flooding. Water flowing into a wetland is slowed and clears suspended sediment from the water column. Finally, the wet and dry cycles of many wetlands provide a varied and sheltered plant and animal habitat.

Texas has the fourth largest wetland acreage in the lower 48 states, even though wetlands comprise less than five percent of its area. Many migratory bird species either winter in Texas or depend on Texas' wetlands during their migration. In the Loop 9 corridor, the primary wetland feature is the Great Trinity Forest, a bottomland hardwood forest.

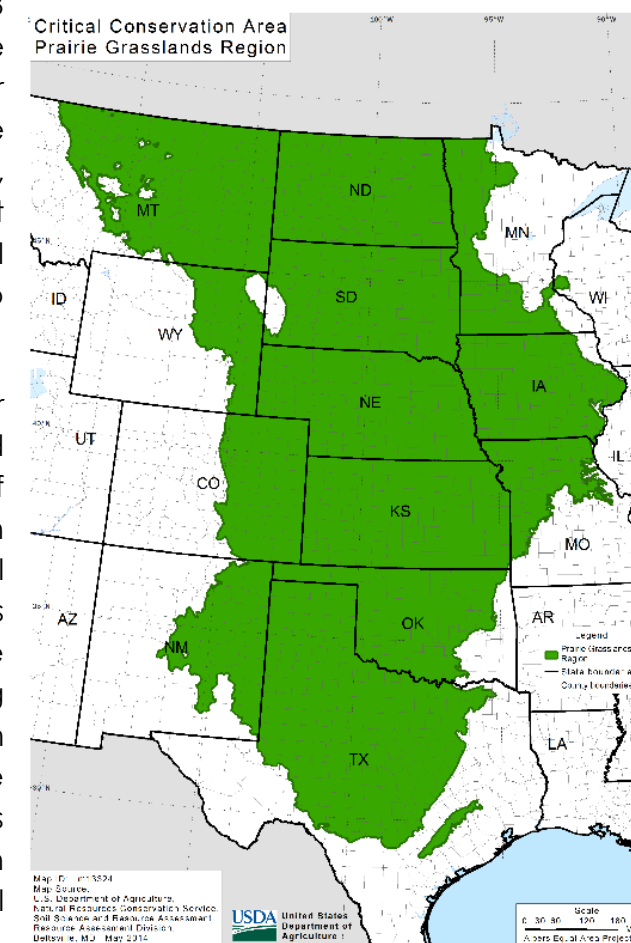
The TPWD established a Texas Wetlands Conservation Plan in 1994, which outlines and promotes non-regulatory, voluntary actions to conserve Texas' wetlands. Because 97 percent of Texas land is privately owned, the plan emphasizes education of land owners concerning wetland conservation options, developing economic incentives for wetland conservation, and coordinating wetland conservation regionally. Many private landowners have a misunderstanding of the limits imposed on them by voluntary wetland conservation. Their concerns about future regulation, limited future land use options, restricted use of adjacent farmland, and public access to their land are largely unfounded. Education about the incentives available, and clarification of the misperceptions about increased regulation should encourage additional public-private partnerships for wetland conservation.

#### Agricultural Lands

The Loop 9 corridor occupies an area in which suburban and other developed uses predominating to the north meet mainly agricultural land uses to the south. Overall, the corridor is approximately 58 percent agricultural land. While many of the conservation efforts preserve wetland and other wildlife habitat, there are others that help to preserve farmlands from sprawling suburban, commercial, and industrial uses. Preserving croplands that support some indigenous species, or that provide transitional habitat linking natural areas are important to conservation.

Alongside programs to protect wetlands and other natural environmental features, both state and federal programs encourage the preservation of farmlands. The Farm and Ranch Lands Protection Program (FRPP) is administered by the USDA Natural Resources Conservation Service. This program offers assistance to landowners wishing to preserve the agricultural use of their land by purchasing development rights in order to prevent non-farm development of the land in the future. With the passage of the Farm Act of 2014, the FRPP was superseded by the Agricultural Conservation Easement Program (ACEP), which provides financial assistance to state and local governments, non-

**Figure 6. Agricultural Critical Conservation Areas in Prairie Grasslands Region**



governmental organizations, and Indian tribes to preserve agricultural lands. Additionally, the USDA has deemed portions of the Dallas-Fort Worth region (including portions of the Loop 9 corridor area counties) as critical agricultural conservation areas in their defined Prairie Grasslands Region as shown in Figure 6.

### Texas Blackland Prairie

The Texas Blackland Prairie ecoregion is considered to be one of the most threatened ecoregions in the state because of threats from intensive development and the introduction of non-native grasses for agriculture, according to TPWD's "Texas Conservation Action Plan 2012-2016: Texas Blackland Prairies Handbook." The remaining prairie exists as small tracts that are widely fragmented from one another.

In this ecoregion, TPWD considers tallgrass prairie and wetlands to be "highly imperiled habitat" types that must be conserved to protect grassland- or wetland-reliant species, some of which are on federal and state endangered species lists or are TPWD Species of Greatest Conservation Need. The amount of natural habitat that has been conserved in this ecoregion is not enough to ensure the long-term sustainability of these habitats. Five rare plant communities are found in the MPA counties of the Texas Blackland Prairie; one of those communities is known to be endemic to the area.

### Riparian Waterways

The areas adjacent to flowing water, whether perennial or intermittent, are disproportionately important to the ecosystem in which they occur. Along the margins of rivers and streams grows vegetation that is adapted to the presence of water, and which differs from that of the surrounding area. Many of the terrestrial species in the ecosystem are dependent upon the riparian margins during some stage of life, and upon the nutrients carried into the system

### Texas Parks and Wildlife Department

TPWD's 2013 "Land and Water Resources Conservation and Recreation Plan" establishes a list of conservation goals for the management of Texas' natural resources. The document emphasizes science-based stewardship 'for the promotion and protection of healthy aquatic ecosystems'.

The goals with the highest priority are habitat protection in partnership with public and private entities; to conduct strategic research and establish protocols to combat invasive species and other threats to wildlife; and to manage waters for sustainable use and enjoyment while maintaining a high level of compliance.

### REF Identified Priorities

The REF Composite map geographically identifies the relative ecosystem priorities at the subwatershed level, but does not specify which individual ecosystem attributes are causing the

subwatershed to have a high score. In order to establish some priority levels for subwatersheds in the Dallas-Fort Worth region, a series of maps were developed to classify subwatersheds based on their overall ecosystem priorities. The method identifies subwatersheds based on their ecological value and whether that value has increased or decreased over time. Each subwatershed receives scores in four REF categories:

- **Water Considerations**, including individual VEIL layers for risk of flood, surface water density, and presence of impaired water segments or wetlands
- **Green Infrastructure**, including individual VEIL layers for presence of agricultural lands, natural areas, and wildlife habitat
- **Ecosystem Value**, including individual VEIL layers for diversity, ecosystem sustainability, and rarity
- **REF Composite**, incorporating all components of the previous categories into a composite score

Table 7 demonstrates the REF Combined Categories and the layers/scores that make up the category. Additionally, the highest value for the Loop 9 corridor area is displayed.

**Table 7. REF Combined VEIL Categories and Highest Values for Loop 9 Corridor**

Combined Category	Scores/Layers that Make up the Combined Category	Highest Value for Loop 9 Area
Ecosystem Value	Diversity Ecosystem Sustainability Rarity	Rarity Diversity
Water Considerations	Surface Water Quantity Flood Zones Impaired Water Segments Wetlands	Flood Zones Wetlands
Green Infrastructure	Wildlife Habitat Agricultural Lands Natural Areas	Wildlife Habitat Agricultural Lands Natural Areas

The highest scoring VEIL layers in these three categories for the Loop 9 area subwatersheds include: Rarity, Diversity, Flood Zones, Wetlands, Wildlife Habitat, Agricultural Lands, and Natural Areas. Several subwatersheds in the Loop 9 area have more than one important/high value layers as shown in Table 1. It is important to note that the individual VEIL layers portray quantity, not quality, of a particular ecosystem attribute. Maps for all three categories are included in the Appendix.

4) *What are the opportunities and potential enhancement or mitigation projects with regards to natural environment?*

Many opportunities exist to enhance, preserve, and conserve natural features in the Loop 9 corridor. As demonstrated through the establishment of the existing natural resource and priority resource discussions, the Loop 9 area is home to several resources that are important to the future health and long-term sustainability of the region, state, and national ecosystems.

Opportunities exist to link land through strategic conservation, enhancement, and restoration projects in the Loop 9 area. As the first step in determining the potential opportunities for enhancement or mitigation projects, a map was developed that shows known potential conservation opportunities in the Loop 9 area. There may be additional opportunities and data that is not known or that was not available at this time that could enhance this map. Figure 7 demonstrates that many opportunities exist for potential conservation when evaluating future land use maps, The Nature Conservancy priority conservation areas, Vision North Texas Natural Areas, and existing dedicated lands.

To establish a conservation vision for the Loop 9 corridor area, the Conservation Opportunities map was used in conjunction with the REF grid level data for each of the ten VEIL layers. Figure 8 depicts the Loop 9 Corridor Area Conservation Vision with the yellow areas being the opportunity sites for future coordination or conservation consideration. These areas were drawn based on the underlying REF grid for each of the ten Vital Ecosystem Information Layers and corresponding existing conservation/dedicated lands and known future conservation opportunities (future parks, The Nature Conservancy (TNC) Priority Conservation areas, VNT Natural Areas, etc.). The goal was to identify dedicated lands such as parks that have important resources such as agricultural lands

between them that could be used to link the parks as a long-term conservation and ecosystem enhancement strategy. The resulting map was developed using the following criteria as a rough guideline, with 1 being the first priority in drawing the vision areas.

- 1) Link existing parks and conservation areas
- 2) Link existing parks and conservation areas with future opportunities (natural areas, TNC Priority Conservation Areas, future parks, etc.)
- 3) Link future opportunities (natural areas, TNC Priority Conservation Areas, future parks, etc.) with other future opportunities

It should be noted that the Conservation Vision should be used as a guide and has not been peer reviewed by resource or regulatory agencies. It is also based heavily on the linkages that the Regional Ecosystem Framework grid level data could provide between existing and future conservation/dedicated land sites and is inherently based on several older data sets that have not been updated to include more recent development trends and land use changes. The map should be used to represent an approach that could be used in future transportation corridor development processes to establish a conservation vision that lays a foundation for using the ecosystem approach to establishing mitigation projects in coordination with regulatory and resource agency representatives. ***Refinement of this map with regulatory and resource agency representatives would be critical to identify the most vulnerable, high priority areas that could provide the greatest potential for real ecosystem benefits when and if mitigation projects were required by a transportation agency.***



Figure 7. Loop 9 Corridor Area Known Conservation Opportunities

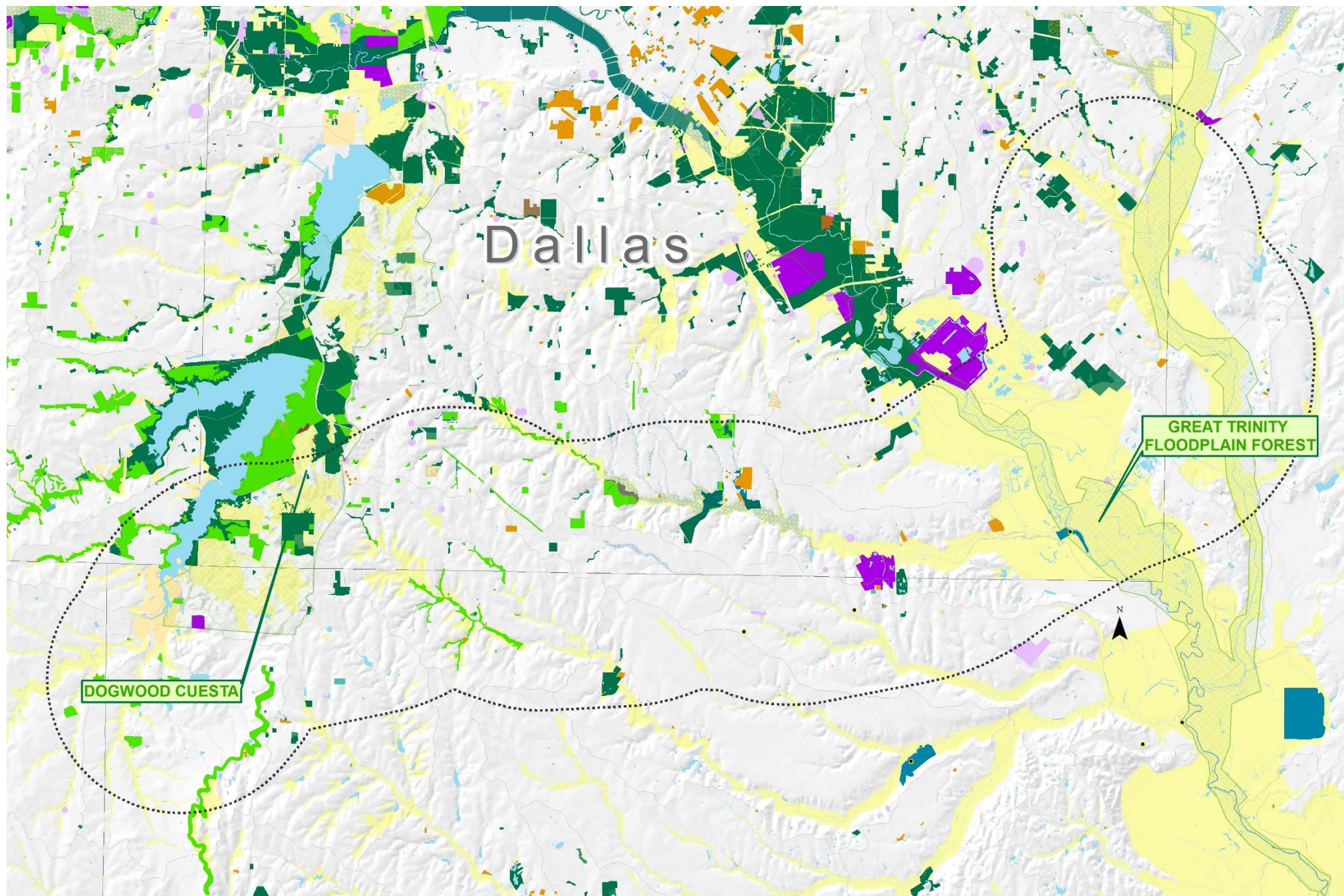
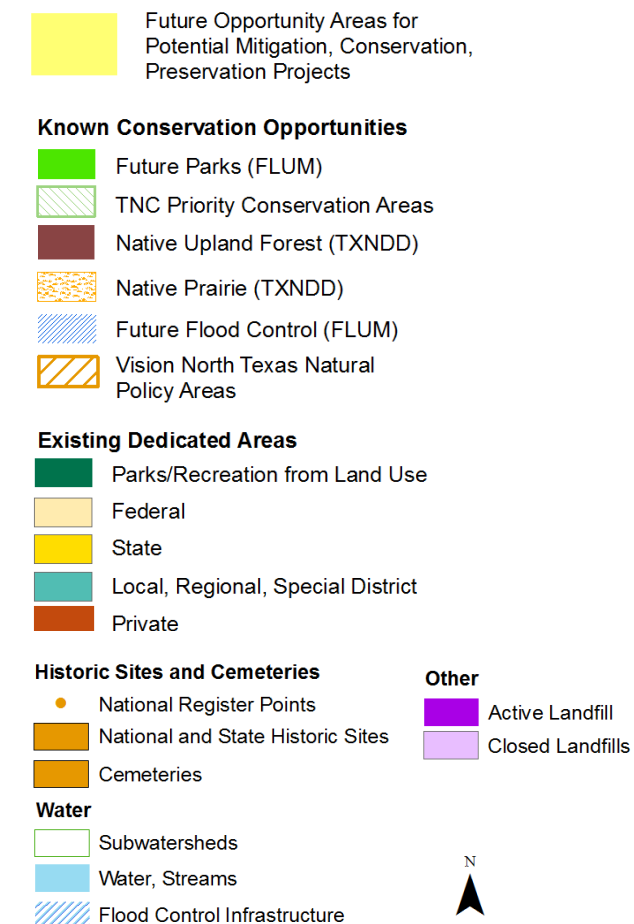
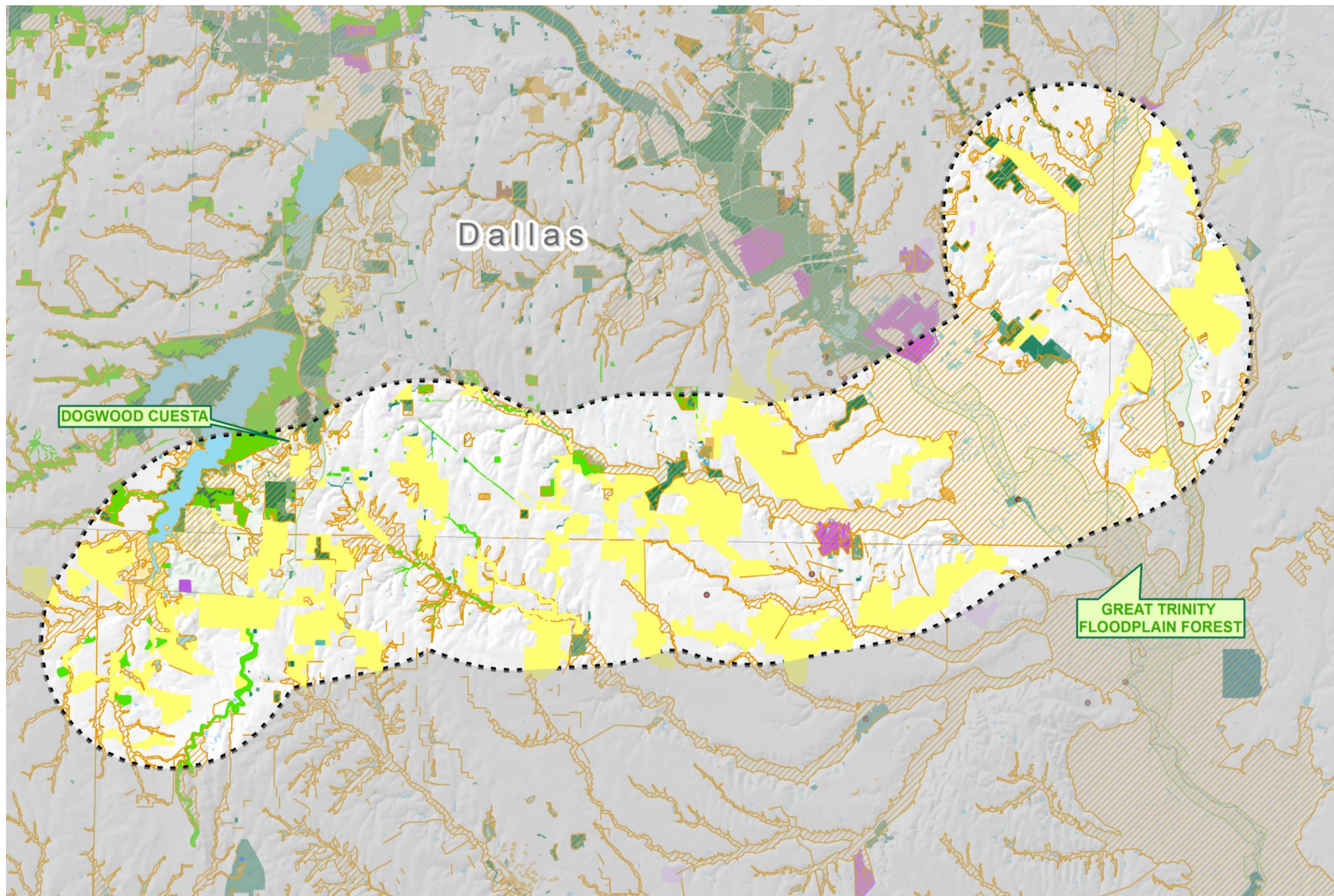


Figure 8. Loop 9 Corridor Area Conservation Vision



5) *Who are the partners that play a role in identifying, conserving, and managing resources?*

Partnerships between transportation and conservation planning groups, regulatory, resource agencies, counties, and local governments could assist with further defining and implementing a conservation vision in the Loop 9 corridor area. The areas identified on the map as potential conservation/linkage areas could and should be further developed through partnerships with numerous parties that manage and conserve land. As individual transportation corridor projects move through the project development phase and as mitigation plans are developed, the conservation opportunities and vision areas could be considered as potential mitigation for unavoidable project impacts.

Defining who the partners would be for any one particular resource could be challenging due to the overlap of federal, state, and regional agencies. Involving a wide array of stakeholders is important to establishing an ultimate vision or project. Roles will differ between organizations depending on their focus – project level implementation, conservation site management, policy, and data development, as a few examples.

Potential partners in the Loop 9 corridor area that are actively pursuing conservation, restoration, and enhancement projects for a number of natural resources include:

- Connemara
- Texas Land Conservancy
- Trust for Public Land
- Texas Land Trust Council
- Native Prairies Association of Texas
- Texas Trees Foundation
- Texas A&M AgriLife Extension Service
- Trinity Waters
- Texas Watershed Steward Program
- Trinity River Audubon Center
- North Texas Municipal Water District
- Tarrant Regional Water District
- Trinity River Authority
- Texas State Soil and Water Conservation Board
- Texas Parks and Wildlife Department
- Texas Commission on Environmental Quality
- Texas Agriculture Department
- Texas Water Development Board
- Texas Historical Commission
- Local governments

- Counties
- US Army Corps of Engineers

These organizations often have projects with private landowners and conservation partners they are actively working on that are not publicly known or are working on plans to conserve or enhance land for complementary environmental benefits such as water quality or water quantity. Transportation agencies should include these groups and others like them in the transportation planning process and during development of mitigation plans and conservation visions.

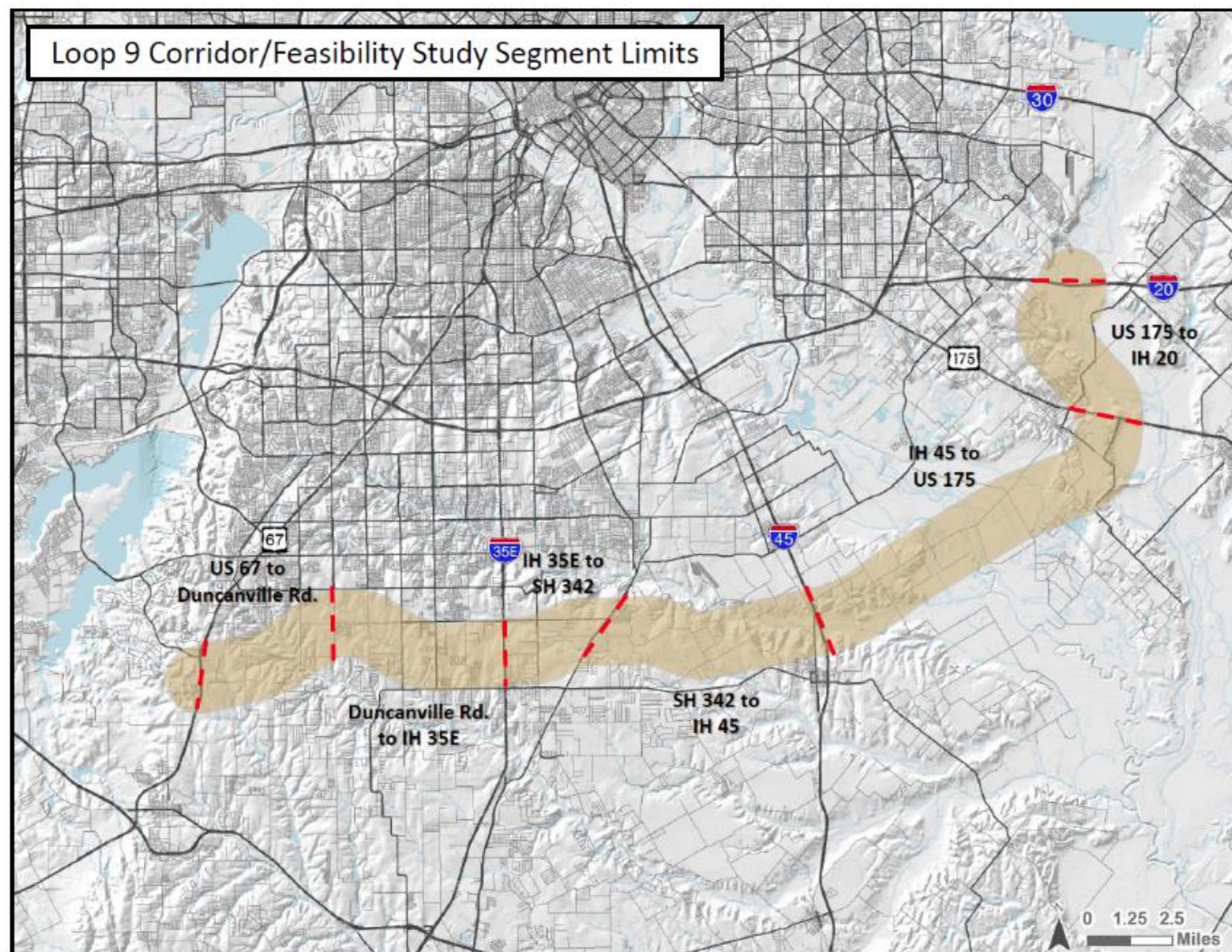
Additionally, inclusion of the federal and state agencies responsible for defining natural resource conservation priorities such as the Texas Parks and Wildlife Department, Texas Department of Agriculture, Natural Resources Conservation Service, US Department of Agriculture, US Fish and Wildlife Service, US Environmental Protection Agency, and many others is important when identifying key conservation priorities and potential resources that agencies may have to assist in defining the most suitable projects for local conservation or enhancement.

### **Application of REF to Loop 9 Corridor**

In order to determine the feasibility of incorporating the REF data into a corridor study at a pre-NEPA stage, a detailed comparison was made between the data collected in the Loop 9 Southeast Corridor Feasibility Study prepared for the Texas Department of Transportation to the grid level REF database created by NCTCOG. This involved analyzing environmental data from the REF and the Corridor Feasibility Study for nine corridor segments. The segment limits are shown in Figure 9; some of the segments contain more than one potential alignment, for a total of nine segments.

The REF scores (ranging from 1 to 5) were weighted by the number of acres in each grid cell within the proposed right-of-way for the Loop 9 Southeast Corridor alternatives. The result was an average REF category score for each of the nine segment options that was evaluated in the corridor feasibility study. Additionally, a “weighted average” score was compiled for each segment assigning each a +1 for every REF category score that was greater than the average across all segments, a 0 if the number was the same as the average, and a -1 for all numbers below that average. These +1, 0, -1 results were totaled to give a general “weighted” score for each segment.

**Figure 9. Loop 9 Corridor/Feasibility Study Segment Limits**



This methodology allowed for a comparison of the REF data for each segment to the natural resource findings in the feasibility study. The feasibility study covered number of stream crossings, number of ponds impacted, and acres of wetlands. Finally, each of the three major corridor segments (US 67 to IH 35E, IH 35E to IH 45, and IH 45 to IH 20) were given qualitative ranks (low, medium, or high) based on their natural impacts. It is not clear from the feasibility study how these values were assigned.

Comparison of the data gathered from the REF and feasibility study was somewhat challenging due to the following issues:

- The segment from SH 342 to IH 45 was partially modified after the feasibility study and the results from the REF could not be directly compared to the feasibility study due to the change.

- The feasibility study only provided quantitative data for water resources and no data for other natural impacts.
- The data collected in the feasibility study does not directly relate to the REF data. Streams and ponds are only counts of crossings and wetlands are measured in acres. REF scores are based on resource density by grid cell.

The results of the comparison between the Regional Ecosystem Framework data and the feasibility study are compiled in the Appendix. Table A.1 shows the average score for each REF category, the overall average, and the overall weighted score average for each corridor segment. In addition, data for each segment from the feasibility study was added: number of stream crossings, number of pond crossings, acres of wetlands, and the natural impact. Table A.2 tabulates how many REF values of 1 through 5 were present in each segment to show that the overall REF average may not be representative of the density of values.

### Example Segment Description

A description of the results for the US 67 to Duncanville Road A+B (North Option) segment is provided as an example to compare the data gathered for the REF and feasibility study. Table 8 details the results of the REF and corridor feasibility study analysis for this segment of the corridor.

**Table 8. Example Segment Results: US 67 to Duncanville Road A+B (North Option)**

Environmental Measures		Segment Score	Corridor Average Score
REF Data	Agricultural Lands	2.22	2.56
	Diversity	1	1.49
	Ecosystem Sustainability	1	1.01
	Flood Zones	1.13	1.95
	Impaired Water Segments	1	1.00
	Rarity	3.33	2.37
	Surface Water Quantity	1.26	1.37
	Wetlands	1	1.14
	Wildlife Habitat	4.11	3.60
	Weighted Score	-4	N/A
	Average	1.83	1.78
Corridor Feasibility Study Data	Stream Crossings	3	N/A
	Ponds	3	N/A
	Wetland Acres	0.55	N/A
	Natural Impact Rating	Medium	N/A

Each individual REF category score was evaluated against the average score across each REF category and graded if it was greater, even, or less than the average which also totals to the "weighted" score described previously. The weighted score for all of the REF categories for this

segment is -4, which is one of the lower scores for the entire Loop 9 Southeast corridor. Additionally, the entire average of all the REF values gives a score of 1.78, which is a medium score for the Loop 9 Southeast corridor. Despite the overall lower natural score, both wildlife habitat and rarity scored greater than other segments. This coincides with the segment containing potential habitat for two federally threatened and endangered species: black-capped vireo and the golden cheeeked warbler.

Moreover, the feasibility study supplied four values for comparison. This corridor contained 3 stream crossings, 3 pond crossings, 0.55 acres of wetlands, and a natural impact rating of medium. While these numbers are not substantial compared to the highest natural areas (the three eastern segments), they do fall within the middle median of values for all segments. In comparison, the REF scores for water features were relatively low values. The resulting final qualitative impact for this segment was "medium" (which generally seems supported by the aggregate data from the REF).

### **Value of Incorporating REF Data into a Feasibility Study**

The Regional Ecosystem Framework data provides invaluable information that should be included in future feasibility studies. The REF provides more quantifiable data for natural resources such as wildlife habitat, agricultural land, and sustainability of resources. Using the REF data provides a broader picture of the existing natural resources within a given project area and provides more accuracy in assessing potential impacts to those resources. This culminated in the final recommendation of potential natural impacts to the Loop 9 Southeast corridor. The feasibility study listed the central segments (corridor II) from IH 35E to IH 45 as having the "highest" potential natural impact. But the data, organized in multiple ways, shows that the segment with the highest potential natural impact is the eastern end of the project from IH 45 to IH 20.

Since the REF database includes more categories for natural resources, a more comprehensive environmental analysis of project alternatives can be conducted and potential mitigation opportunities can be considered at a pre-NEPA stage. An example is the segment analyzed previously. If it was not known that potential threatened and endangered habitat was in this segment, the high wildlife habitat score and rarity score would signify to the project team that more in-depth analysis for impacts may be needed or the areas surrounding these segments could provide mitigation for potential wildlife impacts.

The results of this study coincide with another study that utilized the underlying data that the REF is based upon. Geographic Information System Screen Tool (GISST) and Texas Ecological Assessment Protocol (TEAP) data was used in the analysis of the IH 69 corridor through Texas. The final results concluded that the GISST and TEAP data was an invaluable resource and was given a high priority to apply to other feasibility and planning studies in Texas.

### **Recommended Improvements to the REF**

Through the application of the REF datasets to the Loop 9 corridor, improvements have been identified that would further enhance the tool. These improvements can be made in conjunction with future updates to the REF tool.

First, since the REF is data-intensive and pulls from several different sources, data updates should be coordinated to reflect the most current resources available. Instead of undergoing piecemeal updates whenever a new dataset is released, updates should be incorporated in conjunction with the development of the region's metropolitan transportation plan.

Second, an additional improvement to consider would be to incorporate the quality of ecosystem attributes into the REF scoring evaluation. Currently, the REF scores are assigned based on quantity of ecological resources, not quality. This additional information would help further prioritize areas of ecological value in the region. Incorporating data on resource quality would add complexity to the REF process and would therefore require extensive coordination with resource and regulatory agencies.

Finally, the current REF tool considers only ten of the ecological criteria outlined in the Environmental Protection Agency Region VI GISST report. There are additional considerations related to the built environment, development, and social factors that would enrich the environmental considerations currently included. Evaluation of how these factors could be included in the REF scores would require coordination with external partners.

### **Process for Using REF in Future Studies**

The comparison of the REF data with the Loop 9 feasibility study environmental measures highlights the value of using the REF data to enrich current pre-NEPA analyses. There are several scenarios in which the REF could be used to signify the importance of environmental considerations in the project delivery process. NCTCOG should work with transportation, as well as resource and regulatory agency partners, to integrate the REF tool into the following scenarios.

First, for future new capacity projects in which an alignment isn't finalized, the REF can be used as a preliminary screening tool to identify critical areas that should be avoided, as well as areas that could serve as mitigation areas to offset project impacts. Although the number of new highways planned for the Dallas-Fort Worth region is limited, continued population growth may necessitate the evaluation of additional limited access roadways. The REF should be used by the agency conducting the initial environmental study (Texas Department of Transportation, North Texas Tollway Authority, etc.) in addition to the required environmental analysis. The additional ecological data will help identify less obstructive routes, as well as to identify areas for potential mitigation.

Second, for future projects that will require environmental clearance in which a limited number of alternatives are already selected, the REF can be used to initiate or facilitate discussions with resource or regulatory agencies about mitigation of potential impacts. This scenario is more likely to occur in the region due to the current status of planned major roadways. In this instance, the REF can be used to augment the available environmental information on each of the corridor alternatives to help make a more informed decision.

Third, for future projects that will require environmental clearance, identifying a Corridor Area Conservation Vision built on the REF and additional data analysis as discussed previously, could serve an important role in discussions with resource and regulatory agencies on identification of potential mitigation and enhancement projects for unavoidable impacts or other mitigation requirements. This approach could further local, county, regional, and state goals to preserve and enhance existing and planned dedicated areas and link dedicated lands to each other to provide a network of green infrastructure in a corridor area.

Finally, for non-roadway transportation projects, the Regional Ecosystem Framework could be incorporated into the planning process to ensure the existing ecological environment is preserved. The original intent of the REF in the NCTCOG region was to use it to evaluate roadway projects, but there is potential applicability to use it for other modes transportation as well. For example, the REF could be utilized in siting a new bicycle/pedestrian trail. This would ensure that environmental considerations are included in the project delivery process for smaller-scale projects that may not require NEPA clearance.

In each of the project development scenarios, coordination among stakeholders is key. The results of the REF analysis for a particular project should help inform which resource or regulatory agencies

to engage based on the resources that are prevalent in a given area. The use of the REF in corridor studies can also help identify areas to preserve in order to mitigate project impacts in closer proximity than what typically occurs.

## Conclusion

The Loop 9 Corridor Conservation Vision and the application of the REF to the Loop 9 corridor have demonstrated that there is value in incorporating similar approaches and processes into existing and future transportation corridor feasibility studies. The information gathered and documented through these processes is available for use by transportation agencies and would augment existing data collection, analysis, and survey information that is gathered during studies and throughout the NEPA process. The unique perspective that applying the REF to a corridor and documenting the existing dedicated and known conservation opportunities provided during initial planning of a transportation corridor, could be valuable in identifying alignments, identifying priority resources, identifying potential mitigation projects, and improving or enhancing the ecosystem before, during, and after construction of the infrastructure project.

Furthermore, this pilot demonstrated that there is potential to repeat this corridor vision and REF application process in future corridors that have not been in planning stages for as long as the Loop 9 corridor. This process provides a foundation to build partnerships and relationships with entities interested in protecting and enhancing natural resources, and identify opportunities early in the development of a project to improve environmental outcomes of transportation infrastructure.