

SHRP2 Implementing Eco-Logical Grant

North Central Texas Council of Governments
Lead Adopter Incentives Grant Recipient

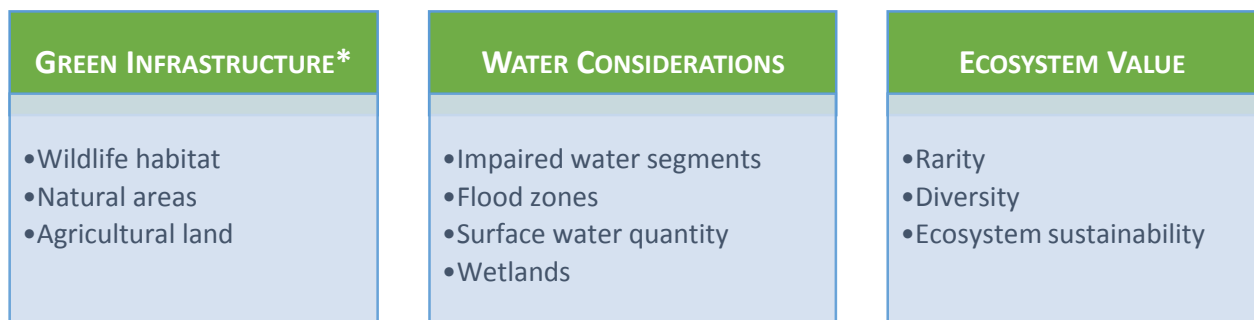
Regional Ecosystem Framework Update and Identification of Regional Focus Areas

Fall 2014
Updated December 2015

Background

The North Central Texas Council of Governments (NCTCOG) serves as the Metropolitan Planning Organization (MPO) for the Dallas-Fort Worth Metropolitan Planning Area (MPA). As the MPO, NCTCOG develops the long-range transportation plan for the 12-county region to identify recommended roadway and transit projects. Mobility 2035, which was adopted in 2011, was the region's first Metropolitan Transportation Plan to incorporate environmental considerations into the transportation planning process.

In 2011, NCTCOG developed the Regional Ecosystem Framework (REF) with funds from the Federal Highway Administration (FHWA). The REF is a geographic information systems (GIS) based tool that can be used to identify ecosystem conservation priorities during development of infrastructure projects in North Central Texas. The REF data is displayed at the subwatershed level and consists of ten layers focused on three central ecological parameters:



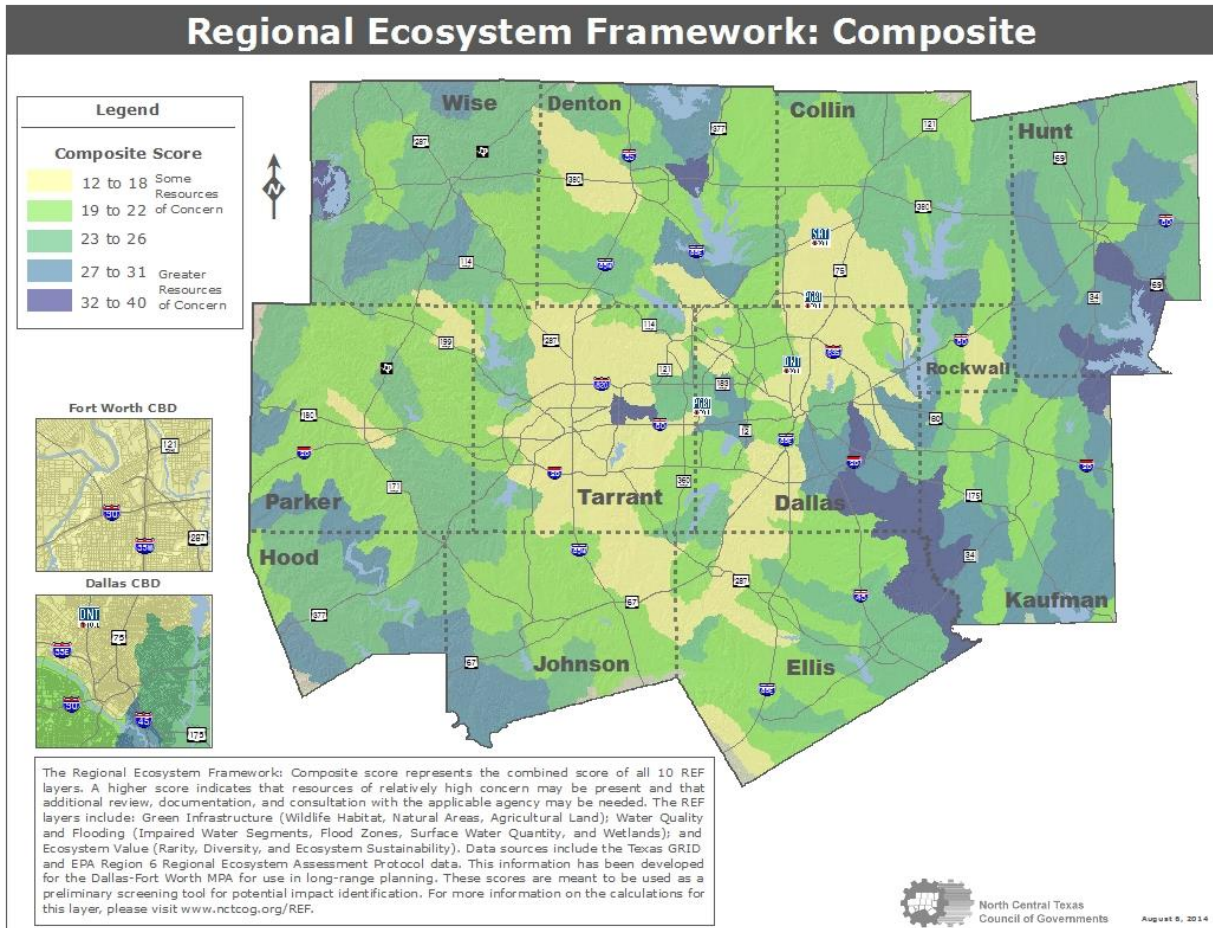
**Green Infrastructure* in this context refers to a “strategically planned and managed network of natural lands, working landscapes, and other open spaces.”¹ Green infrastructure is typically referenced as opposite to ‘gray infrastructure,’ which refers to the urban built environment.

The REF provides a foundation for using the watershed approach when considering conservation and ecosystem based priorities during development of infrastructure projects.

The REF Composite map, shown in Exhibit 1, aggregates the scores of each individual REF layer to identify the overall relative importance of ecosystem attributes.

¹ Benedict and McMahon, 2006.

Exhibit 1: Composite



The foundational concepts for the REF include “Eco-Logical: An Ecosystem Approach to Developing Infrastructure Projects.”² Nine resource and regulatory agencies participated in preparing the Eco-Logical report in 2006. Eco-Logical articulates a vision of how infrastructure development and ecosystem conservation can be integrated to harmonize economic, environmental, and social needs and objectives.

In 2013, NCTCOG received funds from the FHWA Strategic Highways Research Program 2 (SHRP2) to further implement the Eco-Logical approach by updating the REF, applying the tool to a corridor feasibility study, and assessing the feasibility of advance mitigation in the region. This report serves as a summary of the updates that were made to the REF. Accompanying reports will describe the process to apply the REF to a corridor study and efforts to assess the feasibility of an advance mitigation program.

All of the maps included in the REF Update are meant to be used as a preliminary screening tool for potential impact identification and to help prioritize resource conservation and mitigation efforts. Continued consultation with resource agencies is encouraged.

² Eco-Logical: An Ecosystem Approach to Developing Infrastructure Projects, 2006.

Data Updates

The layers that are included in the REF are based on the GIS Screening Tool (GISST) that the US Environmental Protection Agency (EPA) Region VI developed.³ As shown in Table 1 below, the underlying data for the layers are displayed at a 0.25 km² resolution. This grid-level data is then aggregated to the subwatershed level. The ten individual REF layer maps at the subwatershed level and a description of the data methodology are included in the Appendix.

Since the first iteration of the REF was developed in 2011, several of the underlying datasets for the individual REF layers have been updated. The data sources for all of the layers in the REF 2014 Update are listed in Table 1 below.

Table 1: REF Layer Data Source

Vital Ecosystem	Data Methodology Resource	Data Utilized & Date	Data Resolution
Wetlands	Texas GRID, EPA Region 6	US Geological Survey (USGS), National Land Cover Database, 2011	0.25 km ²
Surface Water	Texas GRID, EPA Region 6	USGS, National Hydrological Dataset, 1999	0.25 km ²
Flood Zones	Texas GRID, EPA Region 6	Federal Emergency Management Agency (FEMA), Digital Flood Insurance Rate Maps, 2012	0.25 km ²
Agricultural Lands	Texas GRID, EPA Region 6	USGS, National Land Cover Database, 2011	0.25 km ²
Wildlife Habitats	Texas GRID, EPA Region 6	USGS, National Land Cover Database, 2011	0.25 km ²
Natural Areas	NCTCOG	North Texas 2050, Natural Policy Area, 2010	N/A
Impaired Water Segments	Texas GRID, EPA Region 6	Texas Commission on Environmental Quality (TCEQ), Index of Water Quality Impairments, 2012	0.25 km ²
Diversity	EPA Region 6	EPA Region 6, Regional Ecological Assessment Protocol (REAP), 2011	0.25 km ²
Sustainability	EPA Region 6	EPA Region 6, REAP, 2011	0.25 km ²
Rarity	EPA Region 6	EPA Region 6, REAP, 2011	0.25 km ²

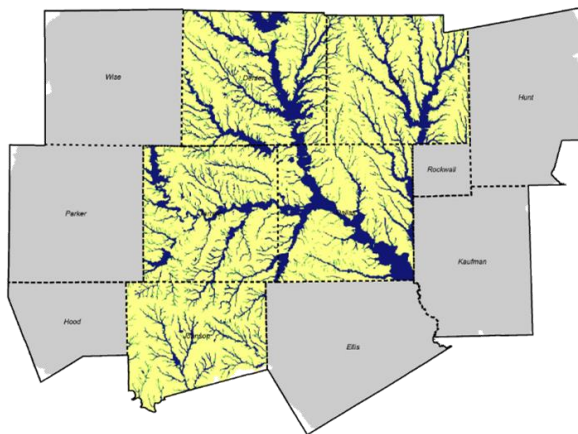
³ EPA Region VI, GIS Screening Tool (GISST), 2005.

The following layers have been updated for the 2014 REF:

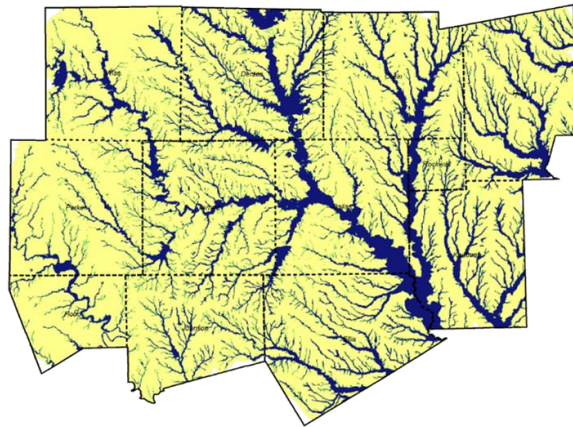
Flood Zone: Data was updated from mid-2000s FEMA data to FEMA Digital Flood Insurance Rate Maps (DFIRM) data.

The flood zone data available in the 2011 REF only covered Collin, Dallas, Denton, Johnson, and Tarrant counties. The updated FEMA DFIRM data used in the 2014 REF covers all 12 of the counties in the MPA. Flood zones are generally present in the same areas of the five counties included in both the 2011 and 2014 REF versions. Minor changes occurred in Collin County.

2011 REF Grid-Level Flood Zone Data



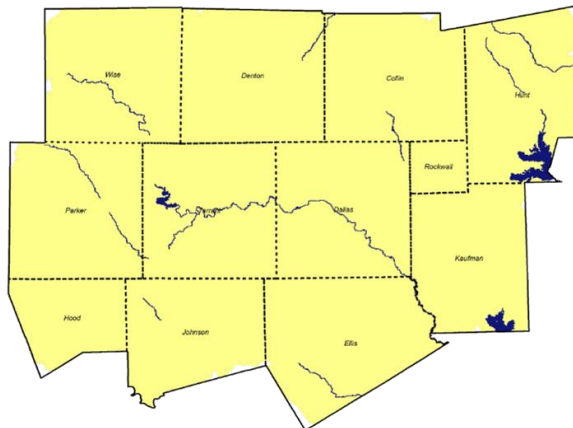
2014 REF Grid-Level Flood Zone Data



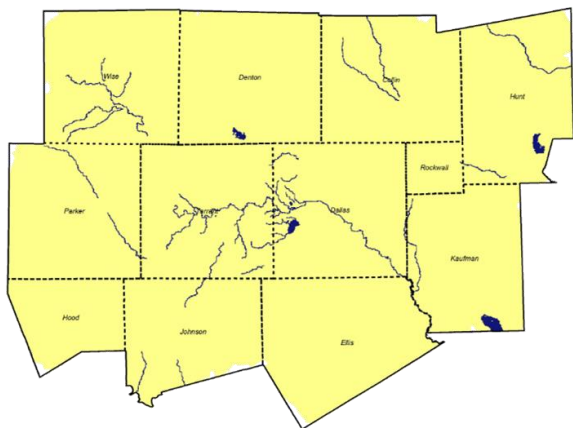
Impaired Water Segments: Data was updated from 2001 to 2012 TCEQ Index of Water Quality Impairments.

The REF published in 2011 references the 2001 TCEQ Index of Water Quality Impairments and the 2014 updated REF references the 2012 TCEQ Index of Water Quality Impairments. Significant changes have occurred since the data was updated. Additional stream segments are now considered segments of concern or impaired in Wise, Tarrant, Dallas, Collin, Hunt, Ellis, and Johnson counties. Additionally, portions of Grapevine Lake and Mountain Creek Lake are now impaired, while Lake Worth is no longer classified as impaired. Several of the stream segments that are now impaired are located in highly urbanized areas in Dallas and Tarrant counties.

2011 REF Grid-Level Impaired Segment Data



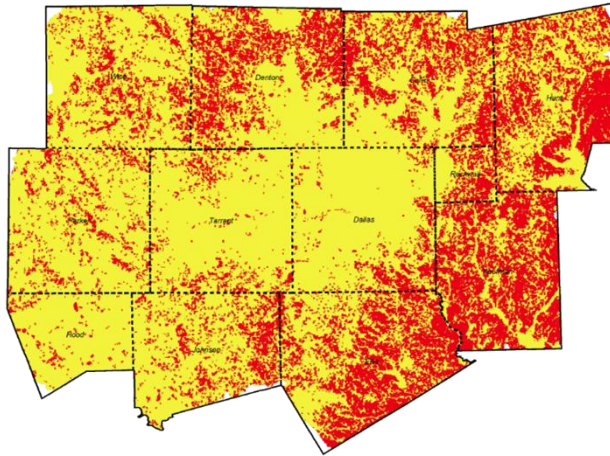
2014 REF Grid-Level Impaired Segment Data



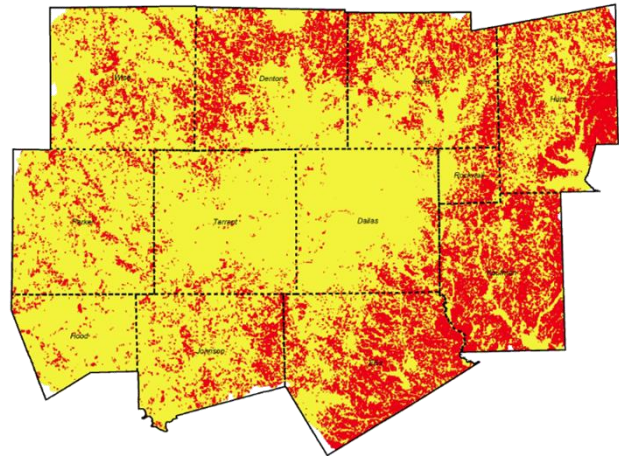
Agricultural Lands: Data was updated from 2006 to 2011 National Land Cover Database data.

Gradual changes have taken place in agricultural lands between 2011 and 2014. The majority of the change has occurred in Collin County, with decreases in agricultural land in the southwest and northwest portions of the county. Southeast Denton County, northeast and southeast Tarrant County, and northeast Johnson County show slight decreases in agricultural lands. This is likely due to increased urbanization in these rapidly growing portions of the region.

2011 REF Grid-Level Agricultural Lands Data



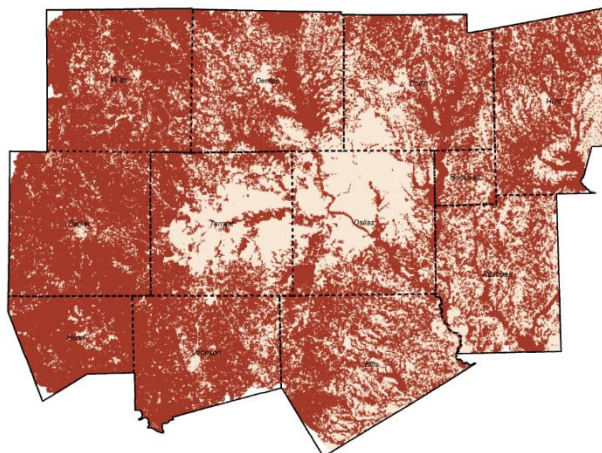
2014 REF Grid-Level Agricultural Lands Data



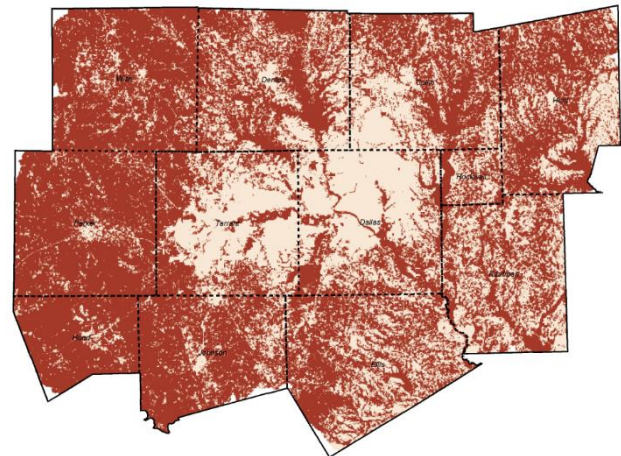
Wildlife Habitat: Data was updated from 2006 to 2011 National Land Cover Database data.

Decreases in wildlife habitat are seen around expanding urban centers in Parker, Hood, and Johnson counties. The greatest decrease is seen in western portions of Collin County. Slight decreases are also present throughout Rockwall County, in eastern Denton County, eastern Tarrant County, and southern Dallas County.

2011 REF Grid-Level Wildlife Habitat Data

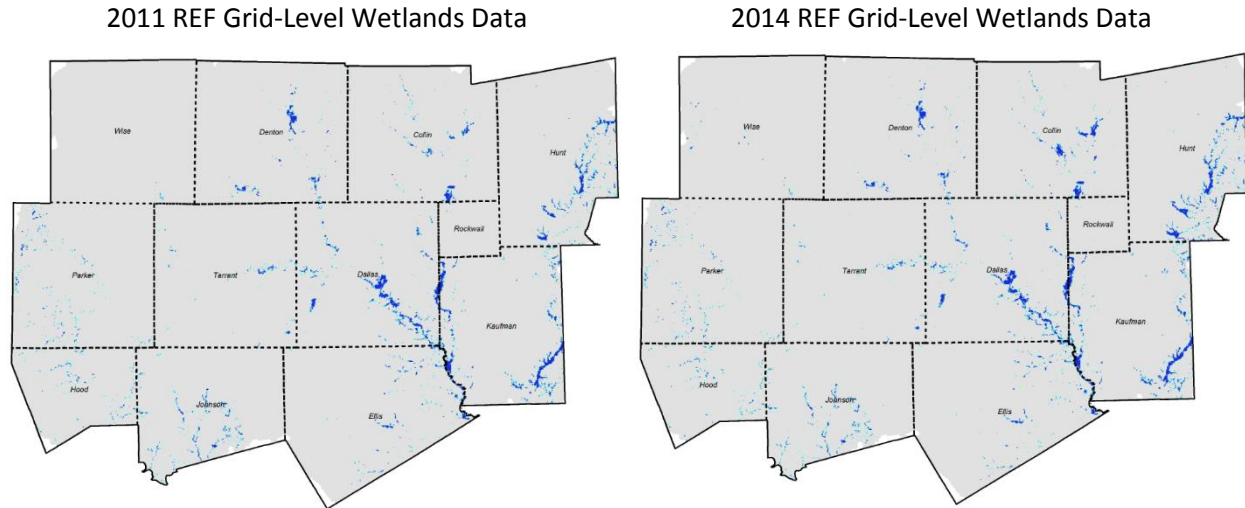


2014 REF Grid-Level Wildlife Habitat Data



Wetlands: Data was updated from 2006 to 2011 National Land Cover Database data.

The amount of wetland areas have increased slightly in western Wise County. Larger increases are seen in Collin County in the vicinity of Lavon Lake and elsewhere in the county. There is no obvious overall decrease in wetlands in the MPA.



Public Involvement

Throughout the update process, NCTCOG staff met with various stakeholders, including resource and regulatory agencies, transportation partners, local governments, and non-governmental organizations to discuss the data included in the REF tool. A large stakeholder meeting was held at the NCTCOG offices on June 4, 2014. The purpose of this meeting was to re-engage partners in the Eco-Logical effort, solicit input on draft REF maps, and request additional environmental data. The partners provided valuable insight related to how known resources are included in the REF, as well as suggestions to incorporate additional data. A meeting summary is included in the Appendix.

Subwatershed Priorities

The natural environment faces a myriad of man-made threats as human population increases and development spreads. To protect terrestrial and aquatic ecosystems for ecological and human use, subwatersheds that are particularly valuable should be identified and targeted for conservation and mitigation efforts.

Unified Subwatershed Maps

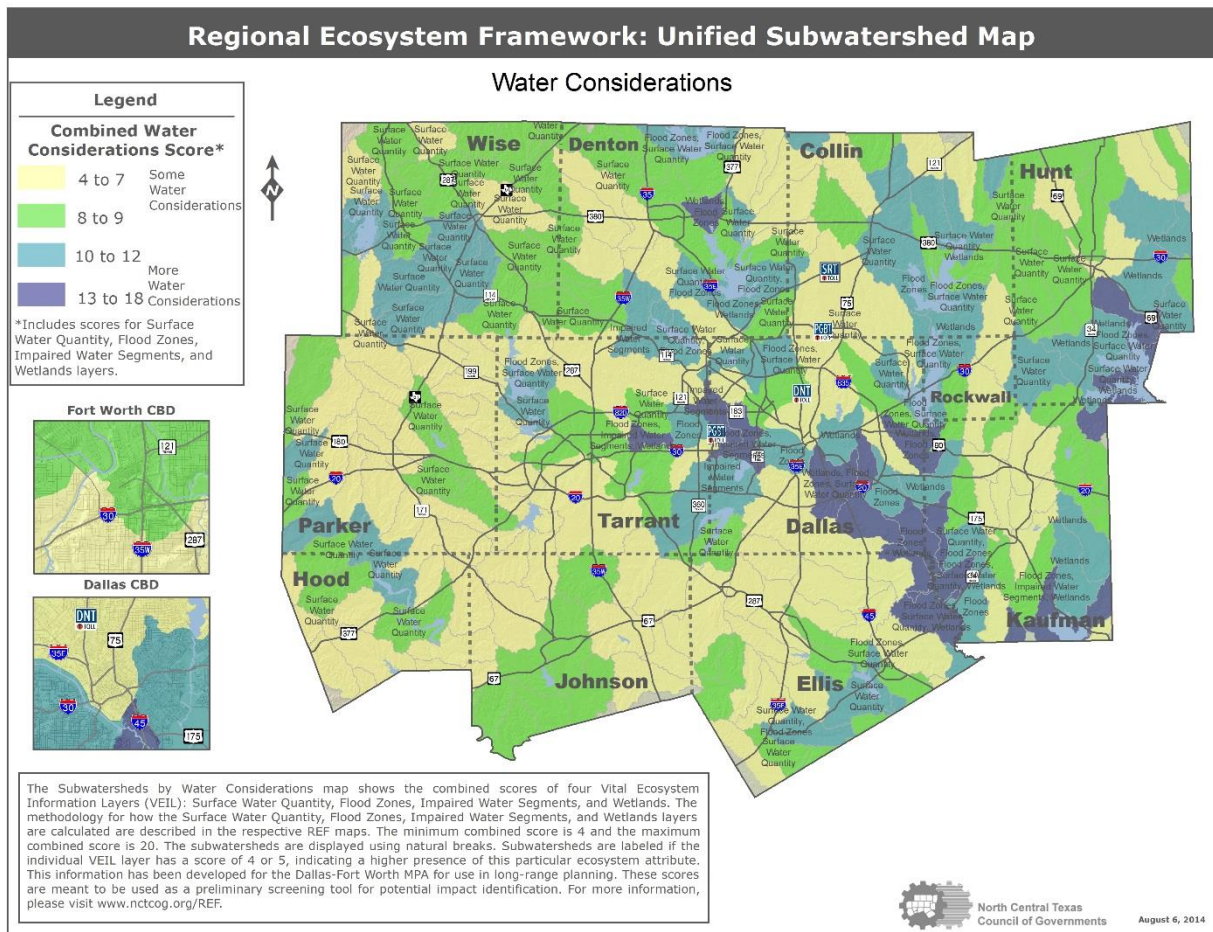
The Composite map geographically identifies the relative ecosystem priorities at the subwatershed level, but does not specify which individual ecosystem attributes are causing the subwatershed to have a high score. Therefore, in order to determine which individual ecosystem layers were of most importance to a

particular subwatershed, a series of maps were created based on the three central ecological categories: Green Infrastructure, Water Considerations, and Ecosystem Value.

The scores for each ecological category's individual REF layers were summed to create a combined score for each subwatershed. These combined scores are displayed by color on the maps. Labels on the maps identify the individual layers where subwatersheds earned a high score of 4 or 5.

In the Subwatersheds by Water Considerations map shown below in Exhibit 2, the dark blue subwatersheds are areas that have more ecological value based on presence of Water Considerations. These maps help further pinpoint what particular resources are of greatest concern in the region and their location within a broader watershed geography. It is important to note that the individual REF layers portray quantity, not quality, of a particular ecosystem attribute. Maps for all three categories are included in the Appendix.

Exhibit 2: Unified Subwatershed Map



Priority Subwatersheds to Enhance

In addition to creating a series of unified subwatershed maps based on the three REF layer categories, a methodology and series of maps were developed to classify subwatersheds based on their overall ecosystem priorities. The intent of these maps was to identify subwatersheds that have experienced an increase or decrease in ecological value from the 2011 to 2014 versions of the REF tool in order to prioritize areas to enhance or maintain. However, after reviewing the methodology, NCTCOG did not feel comfortable including these maps primarily due to the lack of comparable data for the flood zone layer and the lack of updated data for several of the REF layers. In lieu of including these maps, NCTCOG plans to work with resource and regulatory agency partners to identify critical conservation areas in the region that are priorities to enhance or maintain.

Mitigation and Enhancement Areas

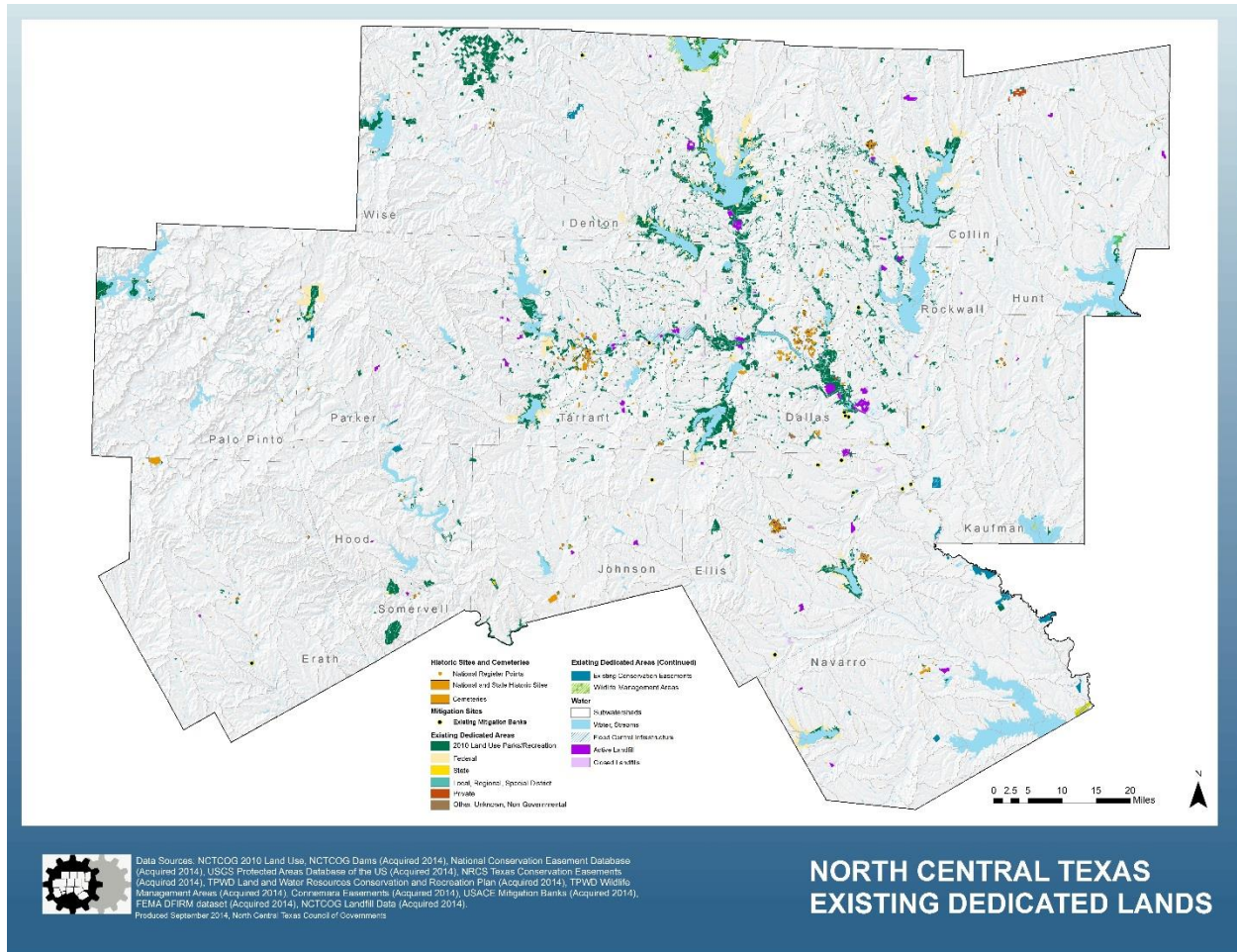
In addition to the data included in the REF, NCTCOG compiled an inventory of existing mitigation sites, mitigation banks, existing conservation sites, parks, local government conservation plans, and other key mitigation and conservation areas that are likely to be maintained in that status in perpetuity. When combined with the REF datasets, NCTCOG intends for this data to help identify potential opportunity sites that could be conserved or enhanced in the future through innovative partnerships with transportation agencies. These future sites could link existing mitigation sites.

Existing Dedicated Lands

The existing dedicated lands provides a framework for the known conservation areas in the North Central Texas region that could be evaluated during the transportation project development process to avoid and/or enhance. These lands are locations of high social, cultural, historic, hydrologic, ecosystem, or conservation value. Transportation planners could consider these areas as opportunities to partner with local governments, non-governmental entities, state, or federal partners to enhance or expand these areas through mitigation plans. Additionally, these lands provide a framework for considering appropriate mitigation and enhancement techniques in a subwatershed; for example, mitigating unavoidable impacts with native species that are consistent with known conservation areas within the same subwatershed.

The existing dedicated lands in the North Central Texas area are shown in Exhibit 3. The map depicts active and closed landfills; known conservation/dedicated areas including conservation easements, federal, state, and local government parks; wildlife management areas; flood control infrastructure; mitigation banks; and historic sites and districts.

Exhibit 3: North Central Texas Dedicated Lands



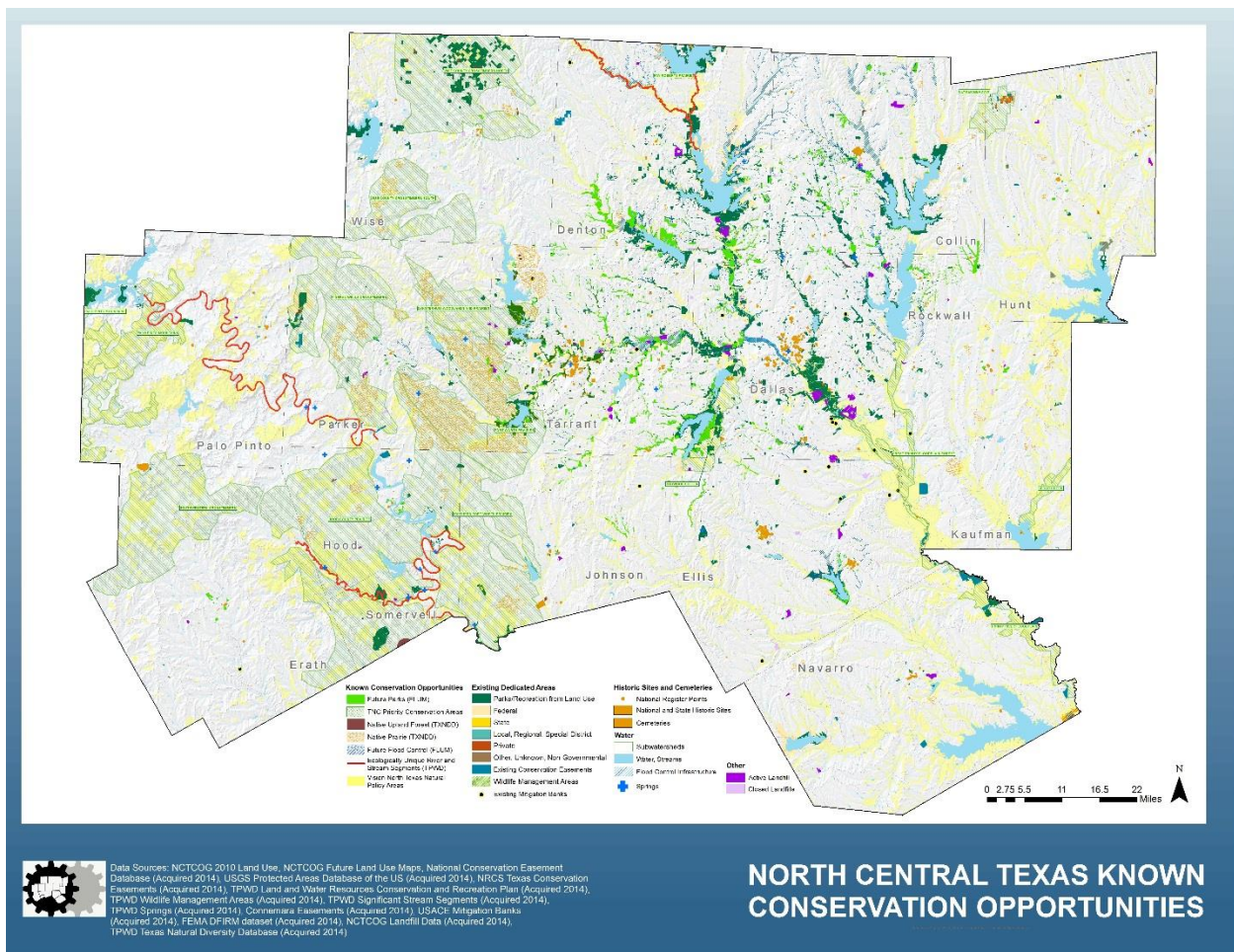
Known Conservation Opportunities

The known conservation opportunities in the North Central Texas area are shown in Exhibit 4. This map depicts the existing conservation areas and the known conservation opportunities gathered from multiple sources. The known conservation opportunities include: The Nature Conservancy Priority Conservation Areas; Texas Natural Diversity Database Native Prairies and Native Upland Forests; Vision North Texas Natural Policy Area layer; and future parks and flood control from future land use plans. All of the known conservation opportunities displayed have different goals and objectives for conservation but provide the user a high-level planning tool to assist in identifying potential areas to avoid and in identifying opportunities for unique mitigation and enhancement projects during the transportation project development process.

It is important to note that the Conservation Opportunities map for the North Central Texas region focuses on natural environment aspects such as native landscapes, floodplains, riparian corridors of significance, and natural areas (floodplains and vegetated areas). Critical agricultural and impaired water bodies are examples of ecosystem components not included in the Conservation Opportunities map that could provide additional opportunities to enhance these lands or locate mitigation projects near these lands for additional conservation value and/or enhancement of these resources.

Additionally, the Known Conservation Opportunities map does not depict potential linkages that could be established between existing and future conservation areas. Defining potential linkages and conservation opportunities for consideration in a transportation mitigation plan is provided in a test case for the Loop 9 Corridor Conservation Vision. The Loop 9 Corridor Conservation Vision is based on ecosystem scores from the REF, existing conservation areas, conservation opportunities, and a review of lands that could be strategically linked through transportation partnership opportunities with local governments, state and federal agencies, non-governmental entities, and landowners. The goal of the Loop 9 Corridor Conservation Vision is to demonstrate that an established conservation vision in a corridor could result in potential projects that could be considered in a transportation project mitigation plan and that would result in projects that are of greater value to the subwatershed and the overall ecosystem and that better meet local government, resource, regulatory, and conservation partner goals.

Exhibit 4: North Central Texas Known Conservation Opportunities



Conclusion

The Regional Ecosystem Framework can help diverse stakeholders incorporate environmental considerations into the transportation project delivery process. The next step of the Eco-Logical Implementation project is to apply the REF in a real-world situation; NCTCOG will be enhancing an existing corridor feasibility study by comparing the REF results in the corridor area to the existing preliminary environmental assessment. The aim of this task is to establish a regional process to use the REF in corridor studies to enhance environmental considerations in the traditional corridor planning process. Finally, the updated version of the REF will be incorporated into the next iteration of the Metropolitan Transportation Plan.