



TEXAS CONSERVATION ACTION PLAN

East Central Texas Plains (Post Oak Savanna)

ECOREGION
HANDBOOK
August 2012



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See links on Texas Parks and Wildlife Department’s Texas Conservation Action Plan 2012 website

<http://www.tpwd.state.tx.us/landwater/land/tcap/>

or the Wildlife Diversity Program website

http://www.tpwd.state.tx.us/huntwild/wild/wildlife_diversity/

for additional references and supporting documents related to this handbook.

“Action that grows out of urgency, frustration, or even determination is missing a critical ingredient. For action to be effective, for action to be meaningful, it must also grow out of respect and a deep sense of connection to the things and people that surround us.” – Orion Magazine Editors, March/April 2011

SUMMARY

The East Central Texas Plains (ECP) Handbook is one of the Texas Conservation Action Plan (TCAP) thirteen handbooks available on the Texas Parks and Wildlife Department’s Texas Conservation Action Plan website¹:

- an **Overview** – background information about how this Plan came about and was revised;
- a **Statewide/Multi-region handbook** – broad resource concerns and opportunities; and
- 10 ecoregion handbooks like this one for different areas of Texas with more local information.

This handbook provides insight into specific ECP resources and conservation issues, including a list of Species of Greatest Conservation Need (SGCN), rare communities, and important habitats that support these unique features. The ECP handbook also presents a compiled list of issues – things that prevent us from doing our best conservation work here – and proposed solutions or actions. Throughout this document, there are resources – web links, programs, incentives, and contacts – to help you participate in implementation and learn more about the natural resources this region of Texas has to offer.

The TCAP ECP Ecoregion Handbook takes advantage of many different perspectives to understand local changes and identify actions that will reduce threats to specific natural resources: SGCN, rare communities and the habitats on which they rely. The Plan aims to ensure that we are able to share our natural heritage with future generations of Texans and that they understand what we did to make *progress* toward that goal.

It’s important to prioritize where we need to work to the degree that we can: human and financial resources are limited, certain issues demand more immediate resolution, and some species and habitats are simply more in need. The TCAP 2012 taps into a broad network of conservation service providers, natural resources managers, alliances and working groups, policy makers, stakeholders and the public to define **what’s at risk, what issues are most important, where we need to work, how to best engage the right partners to solve the problems, and what to do.**

This handbook is divided into sections to guide priority setting and actions:

- resources at risk - SGCN, rare communities, and the habitats on which they rely;
- issues that are most important, which could benefit from targeted stakeholder involvement; and
- conservation actions to benefit resources and make progress toward solving issues.

Certain resources also have a statewide context – riparian areas, grasslands – and additional actions at that level are proposed in the Statewide/Multi-region handbook. For more information about how content was developed for all handbooks of the Action Plan, please see the Overview handbook.

¹ TPWD. 2012. Texas Conservation Action Plan – all handbooks and supporting documents can be found online at <http://www.tpwd.state.tx.us/landwater/land/tcap/>

HOW TO GET INVOLVED

This handbook contains a list of partners and programs that provide conservation services and/or information in this area. Additionally, certain conservation actions at the end of this handbook may help you connect with partners working on specific issues.

There are many wonderful, energetic public and private conservation providers in Texas who have active volunteer networks, strategic needs, and programs. For more information, check the Natural Resource Conservation Programs and Services for Texas Landowners.² In addition, work with the Texas Land Trust Council to find a local lands and waters conservation organization near you:
<http://www.texaslandtrustcouncil.org/>

If you have questions about the TCAP content and cannot find what you need on the TPWD Texas Conservation Action Plan website or in one of the handbooks,³ please contact the TCAP Coordinator at the TPWD Headquarters in Austin, Texas:

Phone (512) 389-4800

Email tcap@tpwd.state.tx.us

² TPWD. 2007 Natural Resource Conservation Programs and Services for Texas Landowners.
http://www.tpwd.state.tx.us/publications/pwdpubs/media/pwd_bk_w7000_1198.pdf

³ TPWD. 2012. Texas Conservation Action Plan – all handbooks and supporting documents can be found at this website: <http://www.tpwd.state.tx.us/landwater/land/tcap/>

OVERVIEW

The East Central Texas Plains (ECPL, also known as the Post Oak Savannah) is an interesting transition zone between the east Texas pine forests and the blackland prairies, changing in small ways in soils, vegetation, plant communities, fish and wildlife.⁴ The ECPL topography is gently rolling to hilly, a beautiful mosaic of woodlands, pockets of prairies, cross-cutting streams and rivers on their way to the Gulf, and some very interesting wetland features found nowhere else on the planet. The ecoregion stretches from the Texas border at the Red River as far south as Calhoun County, almost to the Gulf coast. The distinctive sandy inclusion of the Lost Pines (Bastrop area) harbors one of the last refuges for the endangered Houston toad.

The oak woodlands and savannas of the region are primarily post and blackjack oaks, with locally abundant black hickory and widespread cedar elm, sugarberry, eastern red cedar and common persimmon, southern red oak, sassafras, flowering dogwood, yaupon and winged elm. Some ecologists believe that this region was once predominantly a tall-grass prairie, but trees, mostly oaks and brushy shrubs proliferated with the suppression of fires and the conversion of the land to homesites, farming and grazing. When fires were frequent, wide vistas of tallgrasses such as little bluestem, Indiangrass, switchgrass and a myriad of wildflowers, were broken only by the occasional motte of mature oaks. Land today in the region is predominately nonnative pasture, with vast acreages seeded to introduce grasses such as Bahia grass or Bermuda grass.

The region supports rare species and endemics, usually associated with highly localized soils, wetland features (peat bogs, seeps, forested swamps), and/or geology, such as blowout sandhills, clay-pan savannahs, pitcher plant bogs, Catahoula and Oakville sandstone outcrops, chalk glades and limestone prairies. Soils are usually acidic, with sands and sandy loams occurring on the uplands, clay to clay loams on the bottomlands and with dense clay pan underlying all soil types. The region is sometimes referred to as the "Clay Pan Savannah;" clay pan soils are nearly impervious to water and underlie the surface layers of soil at depths of only a few feet. As a consequence, the moisture available for plant growth is limited making the habitat surprisingly arid at times. Exceptions to the clay pan soils include the Carrizo Sands, a sandy moist-soil area that harbors a unique community of loblolly pine, post oak and blackjack oak, and sphagnum bogs with ferns and pitcher plants; and, in south Texas post oak woodlands, Eocene sand barrens which consists of deep, isolated sand dunes that occur on Eocene sandstone outcrops and are known to support endangered plants such as the large-fruited sand verbena. Throughout this region and the adjacent Western Gulf Coastal Plain (Pineywoods), unique boggy areas seep into streams which in turn fill forested swamps. These complex systems create very unique habitats for endemic plants, interesting communities, and fish and wildlife. Bogs and seeps and their associated plant communities are usually quite small and scattered; impacts to these features can eliminate a key piece of the regional system, affecting other communities. . It is estimated that less than 1,000 acres of these features are protected for conservation.⁵

Primarily issues affecting conservation in this region include hardwood conversion to crop, pasture, or faster-growing pine timber; invasive nonnative pasture grasses; and fast-emerging development around many communities previously considered "bedroom" communities for larger urban areas.

⁴ Griffith, G. 2010. Level III North American Terrestrial Ecoregions: United States Descriptions. Prepared for the North American Commission for Environmental Cooperation (www.cec.org), version May 11, 2010. Corvallis, Oregon.

Griffith, G.E., S.A. Bryce, J.M. Omernik, J.A. Comstock, A.C. Rogers, B. Harrison, S.L. Hatch and D. Bezanson. 2007. Ecoregions of Texas. R.S. Geological Survey, Reston VA. http://www.epa.gov/wed/pages/ecoregions/tx_eco.htm (accessed May 2009).

⁵ Bezanson and Wolfe 2001

Table 1 crosswalks this ecoregion with other conservation planning units.⁶

Figure 1 illustrates the location and extent of this ecoregion in Texas.

Table 2 documents the Ecological Drainage Units (EDU) and Hydrologic Units (“HUC 8”, finer scale watersheds within EDUs), Reservoirs and Ecologically Significant Stream Segments⁷ (ESSS) which occur in this area.

Figure 2 shows EDUs, HUC8s and ESSS by ecoregion.

⁶ For more information about planning boundaries, see the Overview handbook on the TCAP 2012 website <http://www.tpwd.state.tx.us/landwater/land/tcap/>

⁷ TPWD. 2002/2005. *Ecologically Significant Stream Segments*.

http://www.tpwd.state.tx.us/landwater/water/environconcerns/water_quality/sigsegs/

Table 1. Crosswalk of ECPL Ecoregion with Other Conservation Plan Units

Note Table is formatted 8-1/2" x 11" landscape orientation; see also Ecoregions map on TCAP 2012 website.

2012 TCAP	2005 TXWAP Gould 1960	The Nature Conservancy Terrestrial Ecoregions 1999	Ecological Drainage Units (Watersheds) National Fish Habitat Action Plan <i>TX = Southeast Aquatic Resources Partnership and Desert Fish Habitat Partnership</i> AFWA 2006 Fish Habitat Partnership 2009 Esselman et.al. 2010	All Bird Joint Ventures (JV) and Bird Conservation Regions (BCR) NABSCI-US 2004, USFWS 2009a	Landscape Conservation Cooperatives (LCC) USFWS 2009b	2010 TPWD Land & Water Plan Strategic Regions TPWD 2010	Major Land Resource Regions and Areas (MLRA) NRCS 2006	Natural Regions of Texas LBJ School of Public Policy 1978
East Central Texas Plains (ECPL)	Post Oak Savanna	Cross Timbers and Southern Tallgrass Prairie (32)	Corpus Christi – Frio – Nueces Guadalupe – San Antonio Lower Brazos Lower Colorado Lower Red Lower Trinity Sabine – Neches Upper Red	Oaks and Prairies JV Oaks and Prairies BCR	Gulf Coast Prairie	Nueces Coastal Bend (3) Guadalupe – San Antonio (4) Colorado Lower (5b) Brazos Lower (6b) Trinity – San Jacinto (7) Deep East Texas (8) Northeast Texas (9) Plains Rivers (10)	Southwest Plateaus and Plains Range and Cotton Region: <i>Northern Rio Grande Plain (83A)</i> Southwestern Prairies Forage and Cotton Region: <i>Texas Claypan Area Southern (87A), Texas Claypan Area Northern Part (87B)</i> South Atlantic and Gulf Coast Cash Crops, Forest, and Livestock Region: <i>Western Coastal Plain (133B)</i>	Oak Woods and Prairies

Figure 1. ECPL Ecoregion with County Boundaries

East Central Texas Plains in yellow

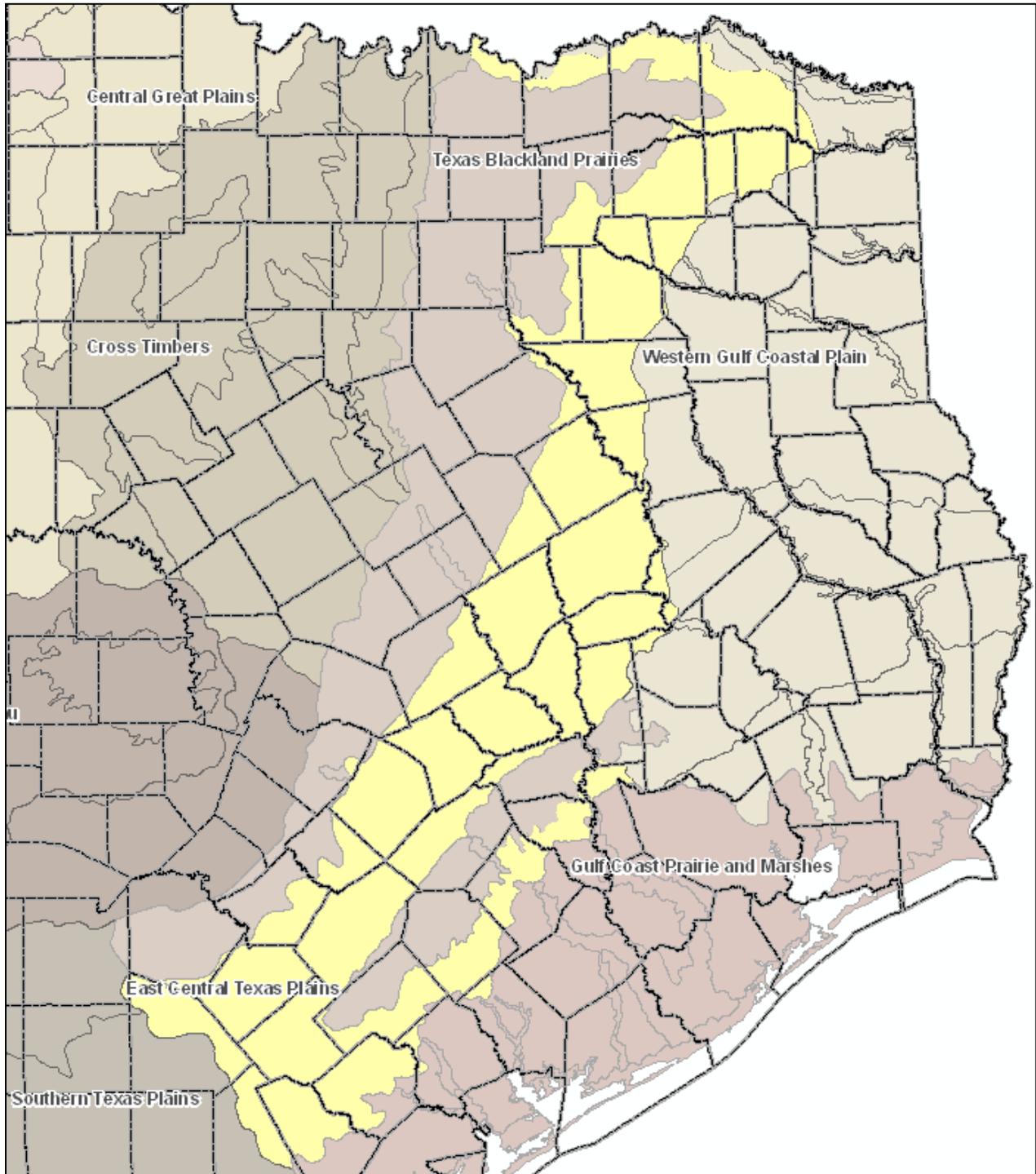


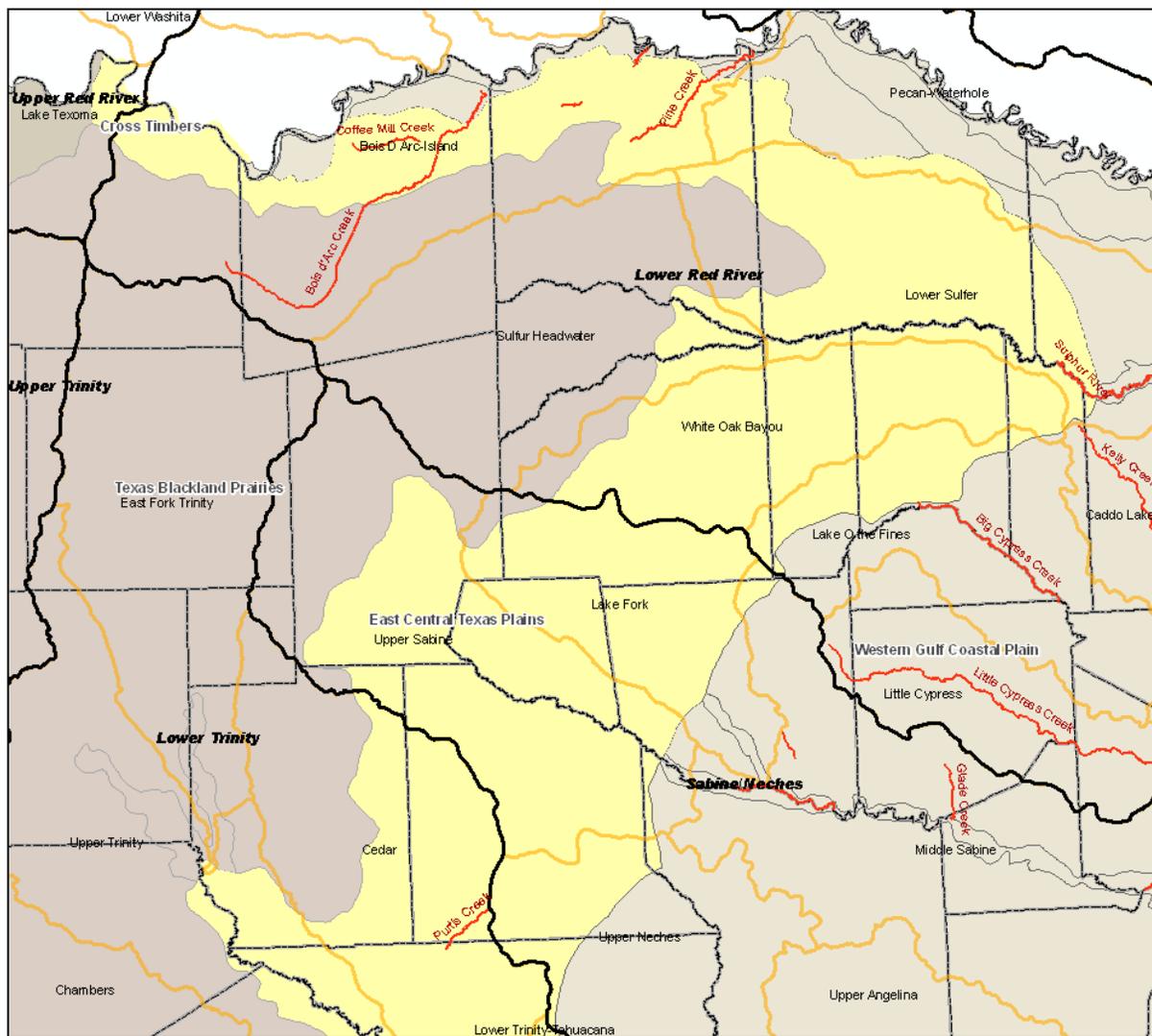
Table 2. ECPL EDUs with ESSS and Reservoirs

ECOLOGICAL DRAINAGE UNIT SubBasin (HUC 8)	<i>Ecologically Significant Stream Segment TPWD 2002, w/updates 2005</i>	Lakes and Reservoirs
UPPER RED RIVER		
Lake Texoma		Lake Texoma
LOWER RED RIVER		
Bois d'Arc - Island	Coffee Mill Creek, Sanders Creek, Pine Creek	Rendell Lake, Valley Lake, Lake Bonham, Coffee Mill Lake, Pat Mayse Lake, Lake Crook
Sulphur Headwater		
Lower Sulphur	Sulphur Creek	River Crest Lake, Wright Patman Lake
Pecan - Waterhole		
White Oak Bayou		Lake Sulphur Springs, Wright Patman Lake
Lake O' the Pines		Lake Cypress Springs, Lake Bob Sandlin, Lake Monticello
SABINE - NECHES		
Upper Neches		
Upper Sabine		Lake Tawakoni, Lake Holbrook
Lake Fork		Lake Fork Reservoir, Lake Quitman
LOWER TRINITY		
Cedar	Purtis Creek	Cedar Creek Reservoir (Henderson), Forest Grove Reservoir
Chambers		Richland - Chambers Reservoir
Upper Trinity	Trinity River	Trinidad Lake
Richland		Richland - Chambers Reservoir
Lower Trinity - Tehuacana	Catfish Creek, Trinity River, Upper Keechi Creek, Wheelock Creek, Linn Creek, Buffalo Creek	Fairfield Lake
West Fork San Jacinto	Lake Creek	
Lower Trinity - Kickapoo	Trinity River	
Spring		
LOWER BRAZOS		
San Gabriel		
Navasota		Lake Limestone, Twin Oak Reservoir, Camp Creek Reservoir, Gibbons Creek Reservoir

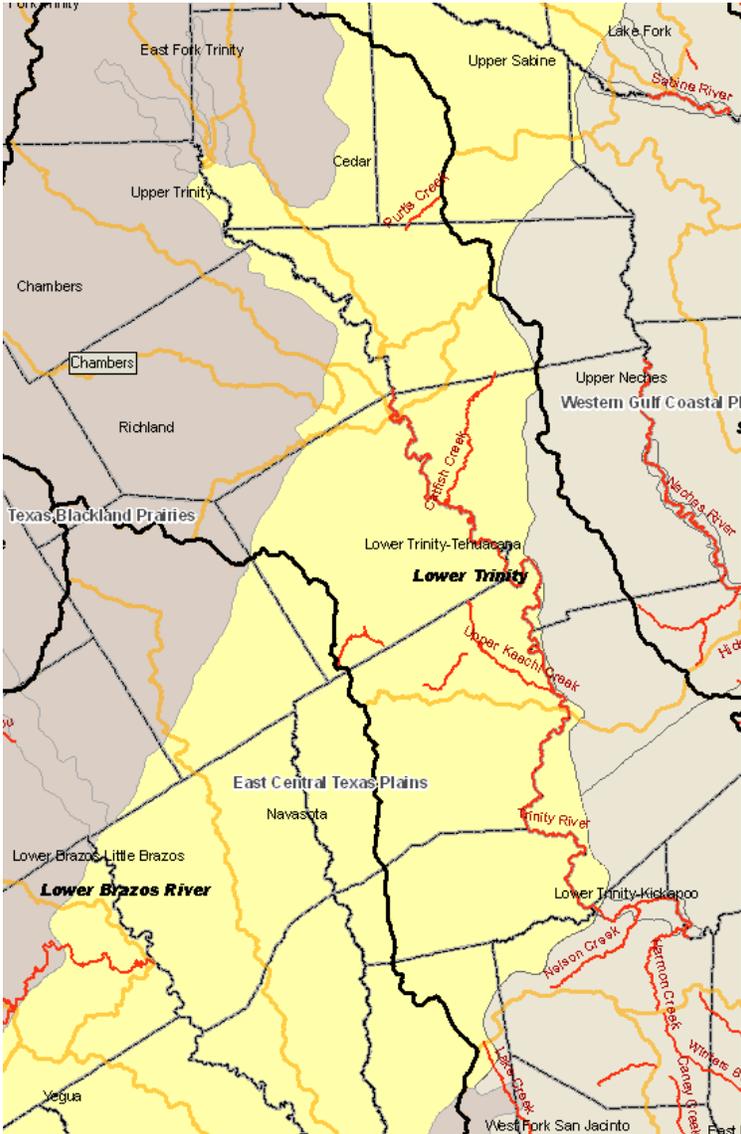
ECOLOGICAL DRAINAGE UNIT SubBasin (HUC 8)	<i>Ecologically Significant Stream Segment TPWD 2002, w/updates 2005</i>	Lakes and Reservoirs
Lower Brazos - Little Brazos		Bryan Utilities Reservoir
Little	Little River	
Lower Brazos	Clear Creek, Mill Creek	
Yegua		Alcoa Lake, Somerville Lake
San Bernard		
LOWER COLORADO RIVER		
Lower Colorado - Cummins	Colorado River, Cummins Creek	Lake Bastrop
Lower Colorado	Colorado River	
GUADALUPE - SAN ANTONIO		
Medina		
San Marcos	San Marcos River	
Upper San Antonio		
Cibolo		
Middle Guadalupe	Guadalupe River	Lake Gonzales
Lower San Antonio		Coletto Creek
Navidad		
Lavaca		
CORPUS CHRISTI - FRIO - NUECES		
Atascosa		
Lower Nueces		
Aransas		
Mission		

Note: Ecologically Significant Stream Segments and Reservoirs which occur in the Subbasin (HUC 8) but not in the ECOREGION are not included in this table. There may be other significant stream resources mentioned in the Priority Habitats section

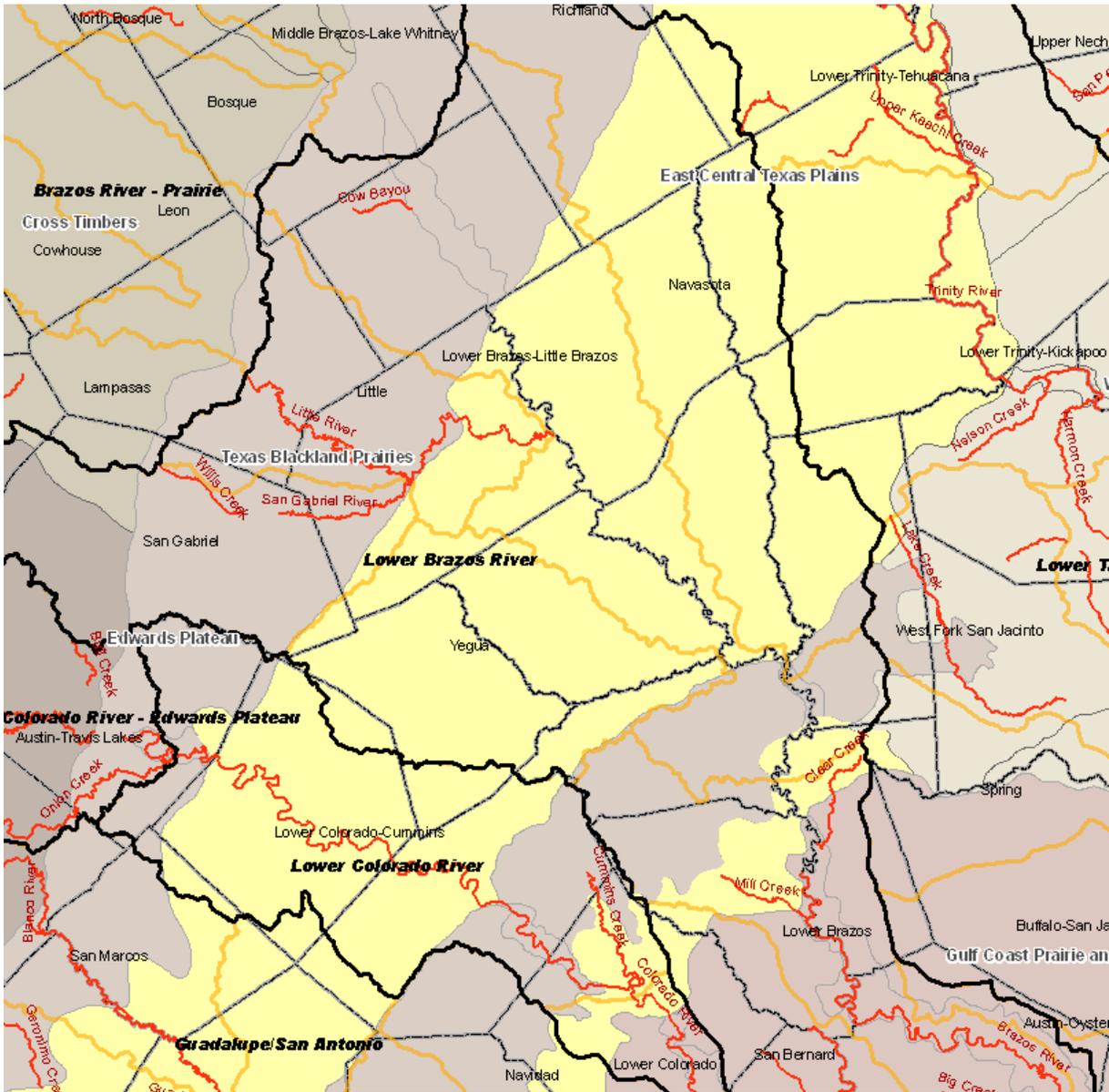
Figure 2. ECPL EDUs, HUC 8s, and Ecologically Significant Stream Segments – 4 maps
 Lower Red River and Sabine Neches EDU black outline, HUC 8s orange outline, ESSS red lines



Lower Trinity EDU black outline, HUC 8s orange outline, ESSS red lines

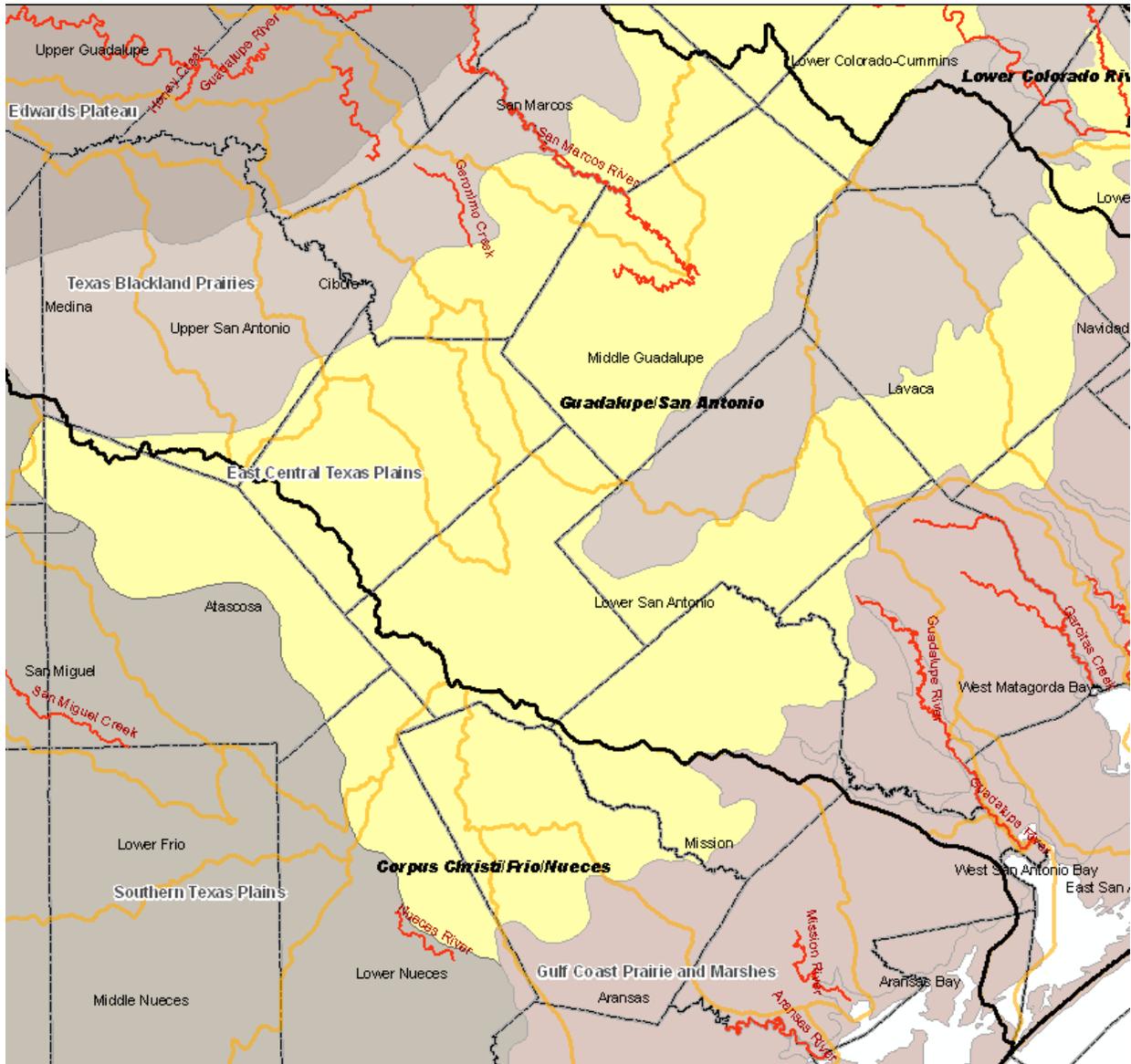


Lower Brazos River and Lower Colorado River EDUs black outline, HUC 8s orange outline, ESSS red lines



Editor's Note: Pecan Bayou may also be ecologically significant stream segment; digital files need update

Guadalupe/San Antonio and Corpus Christi/Frio/Nueces EDUs black outline,
HUC 8s orange outline, ESSS red lines



RARE SPECIES AND COMMUNITIES

While most conservation work is done at the habitat level to address issues and threats, Action Plans' stated primary purpose is to improve and sustain *species'* populations and prevent the need to list species as federally or state threatened or endangered.⁸ The Species of Greatest Conservation Need (SGCN) list, one of the Eight Required Elements in all states' Action Plans, is the foundation for the habitat- and issues- based actions in the Plan. In Texas, we've also identified Rare Communities for this planning process. For more information about how the SGCN and Rare Communities lists were developed, including the changes from the 2005 list, see the Overview Handbook.⁹

Species and rare communities included in the 2012 TCAP Final SGCN and Rare Communities lists are supported by current science, peer-reviewed references and/or other dependable, accessible source documentation, and expert opinion.¹⁰ Each species has a NatureServe calculated state and global conservation rank, which accounts for abundance, stability and threats.¹¹ Additionally, several species have federal¹² and/or state¹³ listing (endangered, threatened, candidate) status. See the key to conservation status and listing ranks¹⁴ on the TPWD TCAP 2012 website.

The revised lists for TCAP 2012 are substantial and representative of conservation targets needing attention in this Plan and are sorted into the following categories:

Mammals	Birds
Reptiles and Amphibians	Freshwater Fishes
Invertebrates	Plants
Plant Communities	

Both the SGCN and Rare Communities Lists are on the TCAP 2012 website as large-but-sortable Microsoft Excel files: <http://www.tpwd.state.tx.us/landwater/land/tcap/sgcn.phtml>

Once you open this webpage, you can choose to look at the SGCN or Rare Communities lists. In each workbook, the first bottom tab is the complete final statewide compiled list, with habitat information and additional references where available; **each ecoregion tab in the workbook provides an excerpt of the statewide list, sorted to contain just the ecoregion's species or communities.**

PRIORITY HABITATS

Nationally, an SGCN list forms a basis for every Action Plan; however, *species* conservation cannot be successful without defining the *lands and waters species need to survive and thrive*. If it was only important to know about individuals or even populations, we could put representatives in zoos or

⁸ Association of Fish and Wildlife Agencies. 2011. State Wildlife Action Plans. <http://www.wildlifeactionplans.org/>

⁹ TPWD. 2012. Texas Conservation Action Plan: Overview Handbook.

http://www.tpwd.state.tx.us/landwater/land/tcap/documents/tcap_draft_overview.pdf

¹⁰ TPWD. 2012. Texas Conservation Action Plan: Species of Greatest Conservation Need List and Rare Communities Lists. <http://www.tpwd.state.tx.us/landwater/land/tcap/sgcn.phtml>

¹¹ NatureServe. 2011. A network connecting science and conservation (online resources). <http://www.natureserve.org/explorer> (accessed 2011).

¹² USFWS. 2011. Endangered Species List, by state and county.

<http://www.fws.gov/southwest/es/EndangeredSpecies/lists/ListSpecies.cfm> (accessed 2011).

¹³ TPWD. 2011. State Listed Species.

http://www.tpwd.state.tx.us/landwater/land/maps/gis/ris/endangered_species (accessed 2011)

¹⁴ TPWD. 2011. Texas Conservation Action Plan: Key to Conservation Status and Listing Ranks.

http://www.tpwd.state.tx.us/landwater/land/tcap/documents/species_key_tcap_2011.pdf

herbaria or other curated collections and that would be enough; but, it's not **It's important to conserve populations in the context in which they thrive, to the best of their abilities, where they can contribute to and benefit from the systems in which they live.**

Broad habitat categories were developed to organize all ecoregional handbooks.¹⁵

See also the Statewide/Multi-region handbook for habitats that are of broader importance – shared with many other regions and/or other states or nations (e.g. riparian or migratory species' habitats as a general category).

See documentation for *Ecoregions of Texas* and the *Texas Ecological Mapping Systems Project*.¹⁶

Priority habitats in these ecoregions which support SGCN were identified through workshops, surveys and other ecologists' and/or literature and are listed in Table 3.

¹⁵ http://www.tpwd.state.tx.us/landwater/land/tcap/documents/habitat_categories_tcap_2011.pdf

¹⁶ Griffith, G. 2010. Level III North American Terrestrial Ecoregions: United States Descriptions. Prepared for the North American Commission for Environmental Cooperation (www.cec.org), version May 11, 2010. Corvallis, Oregon.

Griffith, G.E., S.A. Bryce, J.M. Omernik, J.A. Comstock, A.C. Rogers, B. Harrison, S.L. Hatch and D. Bezanson. 2007. *Ecoregions of Texas*. R.S. Geological Survey, Reston VA. http://www.epa.gov/wed/pages/ecoregions/tx_eco.htm (accessed May 2009).

TPWD, Missouri Resources Assessment Partnership, and Texas Natural Resources Information Service. In progress, 2005 – 2012. *Ecological Systems Classification and Mapping Project* <http://www.tpwd.state.tx.us/landwater/land/maps/gis/tescp/index.phtml> (accessed 2010). Austin TX.

Table 3. ECPL Priority Habitats

Note Table is formatted 8-1/2" x 11" landscape orientation

GENERAL HABITAT TYPES	EAST CENTRAL PLAINS (ECPL) also called Post Oak Savanna	ECPL Ecological Systems
NATURAL AND SEMI-NATURAL TYPES	<i>Habitats in this column were identified in the workshop; additions were made by editor to riverine and cultural aquatic</i>	<i>NatureServe. 2009. International Ecological Classification Standard: Terrestrial Ecological Classifications for Ecological Systems of Texas' East Central Plains. NatureServe Central Databases. Arlington, VA. U.S.A. Data current as of 08 October 2009.</i>
Barren/Sparse Vegetation	Sandstone outcrops supporting Eocene dune plant communities	Southeastern Coastal Plain Cliff
Desert Scrub		Tamaulipan Mixed Deciduous Thornscrub
Grassland	Saline prairies midgrass prairies blackland tall grass prairies within the oak savanna mosaic	East-Central Texas Plains Xeric Sandyland Tamaulipan Savanna Grassland Texas Blackland Tallgrass Prairie
Shrubland	Mesquite shrublands Yaupon upland shrublands	Edwards Plateau Limestone Shrubland
Savanna/Open Woodland	northern sandhills: <i>post oak savanna - sandjack oak, sand post oak</i> southern sandhills: <i>bluejack oak not present, south of Caldwell Co, yaupon holly drops out</i> sandstone glades limestone/chalk glades	East-Central Texas Plains Post Oak Savanna and Woodland
Woodland	Pine-Oak Woodland	West Gulf Coastal Plain Sandhill Oak and Shortleaf Pine Forest and Woodland
Forest <i>See also Riparian and Wetlands</i>	Mesic slope forest pine-oak forest/savanna (e.g. Lost Pines)	East-Central Texas Plains Pine Forest and Woodland (e.g. "Lost" or Bastrop Pines) West Gulf Coastal Plain Pine-Hardwood Forest

GENERAL HABITAT TYPES	EAST CENTRAL PLAINS (ECPL) also called Post Oak Savanna	ECPL Ecological Systems
Riparian	periodically flooded or subirrigated intact floodplain of Lower Red, Sabine-Neches (incl headwaters), Lower Trinity, Lower Brazos, Lavaca, Guadalupe-San Antonio, and Corpus Christi - Frio - Nueces rivers and tributaries stream valley bogs and marshes along stream courses, sandhills on both sides late successional bottomland hardwood forests	Southeastern Great Plains Floodplain Forest Southeastern Great Plains Riparian Forest West Gulf Coastal Plain Large River Floodplain Forest West Gulf Coastal Plain Small Stream and River Forest West Gulf Coastal Plain Pine-Hardwood Flatwoods (mixed upland and wetland)
Riverine	Instream habitats of the watersheds which intersect this ecoregion Ecologically Significant Stream Segments - Coffee Mill Creek, Sanders Creek, Pine Creek, Sulphur Creek, Purdis Creek, Trinity River, Catfish Creek, Upper Keechi Creek, Wheelock Creek, Linn Creek, Buffalo Creek, Lake Creek, Little River, Clear Creek, Mill Creek, Colorado River, Cummins Creek, San Marcos River, Guadalupe River, Pecan Bayou <i>*unchannelized streams are particularly important</i>	NA
Lacustrine <i>See also Cultural Aquatic</i>	Oxbow lakes	NA
Freshwater Wetland	hillside or "hanging" bogs seeps springs quaking bogs swamps	West Gulf Coastal Plain Herbaceous Seep and Bog
Aquifer	Carrizo – Wilcox (outcrop, subcrop) Edwards – Trinity Plateau (subcrop)	

GENERAL HABITAT TYPES	EAST CENTRAL PLAINS (ECPL) also called Post Oak Savanna	ECPL Ecological Systems
CULTURAL TYPES	<i>habitats in this column must support SGCN or rare communities to be considered in this plan</i>	
Agricultural	Fallow agricultural row crop fields	NA
Developed		NA
<i>Urban/Suburban/Rural</i>	Restored prairies on public parklands	NA
<i>Industrial</i>		NA
<i>Rights of Way</i>	Through some forested areas, ROWs can provide (or, more often, the potential for) native prairie openings	NA
Cultural Aquatic	Reservoirs: Texoma, Randell, Valley, Bonham, Coffee Mill, Pat Mayse, Crook, River Crest, Wright Patman, Sulphur Springs, Bob Sandlin, Monticello, Tawakoni, Holbrook, Lake Fork, Quitman, Cedar Creek (Henderson), Forest Grove, Richland - Chambers, Trinidad, Fairfield, Limestone, Twin Oak, Camp Creek, Gibbons Creek, Bryan Utilities, Alcoa, Somerville, Bastrop, Gonzales, Coletto Creek	NA

Texas shares its border with four states – New Mexico, Oklahoma, Arkansas, and Louisiana. The ECPL ecoregion in Texas extends a short distance into Oklahoma, over the Red River boundary. Table 4 identifies habitat priorities which have been identified in the Oklahoma Wildlife Action Plan which may be shared with the ECPL. Every adjacent state’s Action Plan mentions the importance of **intact native riparian zones** and **floodplains, high quality instream habitats, wetlands** of all types, and **native grasslands**. These habitat types are also found in the ECPL and are priorities for conservation in this ecoregion. See Statewide/Multi-region handbook for broadscale Conservation Actions for these priorities.

Table 4. Shared Habitat Priorities with Adjacent State – Oklahoma

Adjacent States	Ecoregions Shared with Texas	Habitat Priorities Shared with Texas ¹⁷
Oklahoma (OK)	High Plains Southwestern Tablelands Central Great Plain Cross Timbers East Central Texas Plain Western Gulf Coastal Plain	wetlands mixed grass prairie ephemeral and perennial tributaries and mainstem of the Red River, and associated riparian zones and floodplains tall grass prairie oak woodlands and savanna bottomland forests shortleaf pine – oak forests/woodlands/savanna TX – OK HUC 8 at very high risk: Lake Texoma, Bois d’Arc Island, Pecan Waterhole

¹⁷ Priorities were determined by reviewing the state’s Action Plan online (Oklahoma Comprehensive Wildlife Conservation Strategy. 2006. <http://www.wildlifedepartment.com/CWCS.htm>) and the National Fish Habitat Risk Assessment Viewer online (NBII and USGS. 2011. http://fishhabitat.org/index.php?option=com_content&view=category&layout=blog&id=42&Itemid=61).

ISSUES

There are **activities and conditions** which may negatively affect the SGCN populations, rare communities, and the habitats on which they depend in this region. These issues can include **direct or indirect harm** (e.g. inappropriate mining reclamation which uses non-native vegetation or indirectly provides an opportunity for non-native invasive vegetation, streambed gravel mining that directly removes spawning habitat and/or indirectly creates poor water quality downstream) **plus basic “gaps” that prevent us from acting most effectively** (e.g. lack of information, lack of coordination to share current data, incompatible practices among land managers, lack of funding). For information about how this list was developed, see the Overview Handbook and the descriptions of the broad issue categories.¹⁸

Habitat fragmentation and habitat loss, including open-space land conversion, are always going to be broad issues that need to be addressed, at various scales – local, regional, statewide, interstate, and international. These are such broad categories and, depending on the scale of the problem, these three issues can be symptoms or causes of many other issues. These three issues are not specifically included in the Issues list, although they may be implied in many of the categories presented.

The issues covered in the ECPL Ecoregion Handbook in Table 5 attempt to present more of the specific causes of SGCN, rare communities, and habitats’ decline, providing appropriate context to help target our actions, identified later in this handbook. Several of the habitat types in this handbook are also considered priority habitats in the Statewide/Multi-region handbook.

¹⁸ TPWD. 2012. Texas Conservation Action Plan: Broad Issues Categories
http://www.tpwd.state.tx.us/landwater/land/tcap/documents/broad_issues_categories.pdf

Table 5. ECPL Priority Issues Affecting Conservation

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
Invasive and Non-Native Species		
Non-native Plant	<p>Bahia Grass, Bermuda Grass</p> <p>Non-native invasive plants sold in nursery trade (e.g. ligustrum, chinaberry, nandina); Chinese tallow and tree of heaven</p> <p>Aquatic invasives – giant salvinia, water hyacinth</p>	<p>Non-native grasses in this ecoregion are typically installed deliberately as improved pastures for livestock production, roadside right-of-way erosion control or remediation after construction, and as part of landowner incentive programs or even restoration/stabilization projects. These aggressive grasses have established in potential native prairie sites within the woodlands’ matrix and (especially sodforming invasives) are a substantial threat to pocket-prairie-dependent SGCN</p> <p>Establishment of nonnative grasses for production typically requires excessive fertilizer and water inputs until established, then these species are very aggressive colonizers</p> <p>Non-native woody nursery plants which “escape” out of managed urban areas via waterways, are distributed by bird and animal droppings and/or are deliberately placed in suburban and rural-suburban developments quickly can invade riparian areas, any wet swale or depression, and/or native grassland. These species displace native plant communities with which native wildlife have evolved; can smother or choke out small isolated bog, seep or spring communities; and contribute to loss of native pollinators (e.g. honey bee, moths, hummingbirds, others) and the animals which rely on insect fauna now changed by these invasions</p>
Non-native Animal	<p>feral and/or free-ranging "pets"</p> <p>FERAL HOGS</p> <p>Red Imported Fire Ants (RIFA)</p> <p>introduced fishes and mollusks - freshwater springs, streams and marshes</p> <p>Baitfish released by anglers and “aquarium dumping” by hobbyists</p>	<p>Free ranging pets (cats, dogs as individuals and as packs) are introduced predators which primarily adversely affect small mammals, small reptiles, and birds; in packs, can also adversely affect larger mammals and ground-nesting birds; also contribute pathogens and diseases. It is estimated that 60-100 million feral cats reside in the US and another 60 million pet cats are allowed to roam outside. “Neuter and release” programs only address fecundity in a limited way, and do not address the impact to natural resources. The number of birds predated by feral cats in the U.S. is annually is more than 1 Billion; numerous SGCN are affected. The IUCN ranks feral cats as one of the world’s worst invasive species. (see The Wildlife Society, Wildlife Professional publication, Spring (March) 2011, Vol. 5 No. 1).</p> <p>Feral hogs decimate important and fragile habitats (e.g. springs, seeps, riparian areas, wetlands, swales, bogs), degrade instream water quality, and decrease hardwood seedling viability (rooted up, eaten) in woodland areas</p> <p>RIFA are swarming indiscriminate predator to ground-nesting and some shrub-nesting birds, larvae and adults of many other insects, small mammals, reptiles and amphibians, and even the young of mid-sized mammals.</p> <p>Within streams, zebra mussels compete with native freshwater mussels, many of which are listed as state threatened. May also be gill parasites on certain fishes, unknown if they adversely affect any SGCN freshwater fishes. Smallmouth bass are voracious non-native predators taking a toll on smaller fishes in these systems. Non-native baitfish and aquarium species releases compete with native fishes in many habitats and can be very detrimental if they are predacious.</p>
Native Problematic	<p>Native shrub (e.g. mesquite, whitebrush, yaupon, juniper) or "brush" encroachment into prairie and woodland systems</p> <p>Brown-headed cowbird (BHCB)</p>	<p>Mesquite and juniper invasion of prairies/grasslands throughout ecoregion, yaupon invasion in pine-oak woodlands, whitebrush invasion in woodlands and grasslands to the south</p> <p>Native brush invasion, where these species should not naturally occur or in abundances that are out of balance within the native communities, degrades grassland suitability and hardwood regeneration potential.</p> <p>BHCB are overabundant and are particular issues for shrubland, grassland and woodland nesting birds</p>
Pests, Parasites, Pathogens		
Pathogens	<p>Oak wilt, Oak decline</p> <p>Chinquapin wilt</p> <p>Red Bay Infection</p>	<p>The key woody plant communities in this ecoregion are hardwood dependent – oak pine savanna, oak woodlands, and bottomland hardwoods – all potentially affected by the wilt and decline pathogens. Redbay is part of a declining and rare plant community also.</p>
Power Development and Transmission		
Wind Power	<p>Wind generation tower siting (“wind farms”) is not an issue in this ecoregion; however, many of the migrants that pass through this ecoregion encounter wind turbines in central and north Texas – it is a concern that needs to be addressed</p>	<p><i>See north and central Texas ecoregion handbooks and the Statewide Handbook</i></p>
Hydro (Dam and Reservoir)	<p>There are many dams and hydropower facilities in this and adjacent</p>	<p><i>See also Water Development, Management and Distribution below</i></p>

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
	ecoregions, from the Red River to the Coast; operations impact downstream aquatic and riparian communities	
Coal-fired plants	Texas has 40 coal-fired generators at 20 locations, totaling 21,240 megawatts (MW) of capacity. Nine new coal fired plants proposed in Texas, three online since this Plan was last updated; several in this ecoregion	Primary concern with coal fired plants in any location, including this ecoregion, is surface and/or groundwater consumption. Footprint of power plant and adjacent reservoir is direct loss of terrestrial habitat. If the water cooling pond is a dammed natural waterway, then it contributes to loss of instream flows for aquatic SGCN and riparian communities; if cooling pond is a stand-alone feature, water must still be drawn from existing water budgets which currently do not adequately account for fish and wildlife needs. Coal fired plants are also a source of evaporative loss from the water system – towers and open ponds
Transmission	New development and expansion of existing lines/corridors construction of new power infrastructure corridors to meet urban user needs, maintenance and operations maintaining clear right-of-way for vehicle clearance/access, prevention of line and tower danger	Broad, long, linear fragmentation of all habitat types. During route selection, environmental considerations are given secondary consideration to agricultural and developed areas. Contributes to edge through interior habitats (woodlands, forest) in the same way as oil/gas pipelines, causing potential for greater predator and invasive species access. While some of these facilities are compatible with grassland and prairie communities in this ecoregion (few species have aversion to tall structures in this region, unlike High Plains or Coastal Prairies), these pathways are not required to reclaim or maintain cleared areas with native seed or plant sources and become pathways for invasive species. Mowing and trimming activities during bird breeding seasons or migratory events adversely impact species success; inappropriate seasonal oak trimming can contribute to oak wilt, oak decline; “brushhogging” borders leaves splintered, jagged cuts and adjacent vegetation communities vulnerable to disease and infestations (oak wilt, oak decline, Red Bay disease). Broad open space maintained in a grassland condition hinders daily or seasonal movements and behavior for woodland or forest species which avoid open areas. Transmission lines can be strike hazards for Whooping Cranes and raptors during migration.
Distribution	Development to power grid and retail users: construction of new power infrastructure corridors to meet urban user needs	Mowing and trimming activities during bird breeding seasons or migratory events adversely impact species success; inappropriate seasonal oak trimming can contribute to oak wilt, oak decline; “brushhogging” borders leaves splintered, jagged cuts and adjacent vegetation communities vulnerable to disease and infestations (oak wilt, oak decline, Red Bay disease). directly takes habitat and species during construction (loss), degrades adjacent habitat (fragmentation), and may hinder movement (daily or seasonal) Migratory bird strikes are more prevalent with distribution facilities than transmission facilities; more careful site selection is important to avoid or minimize impacts when near the coast, along waterways, adjacent to wetlands and throughout the flyway.
Oil and Natural Gas Production and Delivery		
Seismic exploration	surface and subsurface impacts - linear networked vegetation clearing and soil disturbance, vibration and "explosive" disturbance	habitat loss and fragmentation (somewhat temporary impacts due to temperate climate; however, is pathway for invasive species – Chinese tallow, chinaberry, ligustrum, and KR bluestem) seismic testing in woodlands creates the same vectors for predator and invasive species access as discussed above in “Transmission Line” section disruption of daily and seasonal activities for fossorial animals (small mammals, reptiles, ground-foraging and ground-nesting birds) and potential collapse for karst features, many of which harbor rare invertebrates Typically, no reclamation is required in cleared areas
Traditional extraction site development and operation, including pumping and pad sites, road networks	The eastern edge of the Fort Worth gas production basin and the Barnett Shale play just barely edge into the northern extents of this ecoregion; southern extent of ecoregion is in the Western Gulf gas production basin and Eagle Ford Shale play; and the TX-LA-MS Salt gas production basin extends west just to this ecoregion (http://www.eia.gov/oil_gas/rpd/shale_gas.pdf) This and the adjacent ecoregion, Blackland Prairie: one of the top 100 oil fields in the US (2009, http://www.eia.gov/oil_gas/rpd/topfields_oil.pdf) More maps are available at http://www.eia.gov/pub/oil_gas/natural_gas/analysis_publications/maps/m_map.htm	Surface waters – springs, bogs, isolated wetlands, creeks, rivers – highly sensitive to change/contamination are at risk from chemical, drilling material, and oil spills and groundwater contamination caused by water/chemical injection Extraction operations: clearing, road networks, pad sites, and large mechanical infrastructure(s) which contribute to direct habitat loss, direct and indirect habitat fragmentation, direct mortality from vehicles and operations, and noise/light disturbance (e.g. nocturnal migratory birds and bats adversely impacted by the light and noise pollution); road networks, constant traffic and noise, and mechanical infrastructure interrupt seasonal and daily movements, foraging and mating behaviors of some mammals, reptiles, and birds; small geographically limited populations of aridland plants fragmented or lost. Hydraulic fracturing process requires large amounts of water and deeply injects chemical-laced liquid to fractures substrates and releases gas for capture and delivery: groundwater amounts, groundwater contamination, chemical spills, geologic destabilization are concerns. Groundwater and surface expressions in seeps, springs, bogs and other subirrigated wetlands and riparian zones are potentially vulnerable to shale gas extraction and hydraulic fracturing – chemical impacts as well as unmanaged groundwater withdrawal and post-drilling discharges related to effects on surface water features is also a concern.

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Delivery: transmission/delivery facilities (pipelines, gathering stations, distribution lines, roadways)	Pipelines for oil and natural gas delivery cross the area; long, linear cleared swaths through rangelands, native habitats	Similar to electrical transmission lines, communications lines, and transportation corridors, oil and gas pipelines create edge through woodland and bottomland habitats, impact wetlands which are not jurisdictionally protected (isolated bogs, seeps, springs); little to no native reclamation is required. These openings create opportunity for enhanced predator access to interior woodlands, invasive species (many thrive in disturbed sites), and microclimate or substrate changes that dry out important isolated wetland (bog, seep, spring) features.
Lack of Reclamation	reclamation standards vary, requirements limited unmonitored/unregulated decay of obsolete production sites - toxic chemicals in soils and leftover equipment, decaying equipment	Reclamation not required back to native vegetation (invasive species allowed to colonize or are directly planted for soil stabilization); typically some equipment left on site (pads); no reclamation required to remove roadways or impervious cover Sites are also not required to restore lost wetland features if these were determined to be nonjurisdictional or isolated wetlands Sites not required to restore the full complement of desired ecological condition that was removed during construction or operations.
Mining		
Sand and Gravel - upland and riverine	Occurs in upland sites as well as along and within streams and rivers	lack of reclamation; mining off of water courses do not go through TPWD review for potential natural resources impacts. Not all are required to have stormwater pollution prevention facilities or plans (acreage threshold)
Lignite	Upland sites and drainages affected	loss of vegetation and water resources (dewatering, stream diversion, ponding, wetland fill) during construction and operation over large landscape and long periods of time; complete loss of soil microorganism integrity Environmental review late in process to avoid or minimize impacts, no input into reclamation review or evaluation Reclamation not back to desired ecological conditions (tied to productivity levels in a certain time frame, short, 5-year window for "recovery"), so companies use fast-growing species, not necessarily native seed or plant source materials, usually monotypic instead of diverse natural community
Communications Infrastructure		
Cell and other communication towers	towers need to be limited in height and lit to minimize bird strikes (bird-friendly)	Species impacted by towers include all nocturnal migrants including Yellow-billed Cuckoo, Painted Bunting, Summer Tanager, and other species. In rare instances kills totalling thousands of Longspurs have been found around towers.
Transportation		
road and bridge construction (new)	I-69/Hwy 59 – while no longer Trans Texas Corridor (TTC), area highways are going to be upgraded to accommodate interstate levels of traffic through the area, from the Valley and Corpus Christi to Texarkana; while most routes take these improvements close to developed and impacted areas then north, route alternatives cross some sensitive areas; and, there will be adjacent capacity developed for urban connections, including new toll roads which are usually developed for larger future capacity	Texas Department of Transportation coordinates with TPWD regarding potential natural resources impacts to listed species; however, there is little accommodation for sensitive habitats unless those features are federally protected (federally listed species habitat, critical habitat, jurisdictional wetlands). State-listed species habitats, SGCN, rare communities and the habitats on which they rely are unprotected. The transportation improvements proposed under the I-69 upgrade of existing and new construction may create barriers to fish and wildlife resources' daily and seasonal movements, water quality impacts through stormwater runoff; loss of nonjurisdictional wetlands, and important riparian, bottomland, prairie and savanna habitats that are not protected under regulation. In addition to these larger facilities, local connection transportation projects may also contribute to the same kinds of losses and may require even less coordination regarding environmental impacts from planning to implementation if no federal money is used. Mitigation of mature hardwoods and wetlands is typically insufficient to address ecological functional losses. Remediation efforts following construction are allowed to use nonnative grasses which contribute to prairie loss and degradation.
right of way maintenance	maintaining clear right-of-way for vehicle clearance/access, minimizing fire danger, and maintaining driver visibility	Mowing and trimming activities during bird breeding seasons or migratory events adversely impact species success; inappropriate seasonal oak trimming can contribute to oak wilt, oak decline; "brushhogging" borders leaves splintered, jagged cuts and adjacent vegetation communities vulnerable to disease and infestations (oak wilt, oak decline, Red Bay disease). Some rare plants are known only from sites in ROW; these are not always adequately protected as staff changes occur, management plans and information may not be passed along with changes in staff Adjacent landowners are allowed to clear within TXDOT right of way which can adversely impact any conservation measures that agency has put in place in ROW.
Timber Production & Management		
Hardwood Harvest Best Management Practices	Small operation production Conversion	Mature bottomland hardwoods are a very rare community type and even dead snags in this community are important to many regional SGCN and in the adjacent Western Gulf Coastal Plain and the Gulf Coast Prairies and Marshes (chenier). Hardwoods in pine-oak savanna community also serve to diversify the forage and roosting habitats in these systems. Hardwoods are a key component of the post oak savanna/prairie matrix – this region's

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	Streamside Buffers Fire	primary habitat type – which provides the basis for the system that supports many types of rare bogs, seeps, springs, and other wetlands. Bogs in particular are very tiny, isolated and scattered throughout East Texas; significant change and loss of these independent sites can cause the loss of entire population of rare plants, communities, and the fauna which rely on them. <i>Bogs, baygalls and forested seeps</i> are threatened by unsuitable logging practices which can alter the vegetation, temperature, and water quality of these sites, adversely affecting the plant communities. Important hardwood community losses are incurred due to conversion to faster pine production, clearing for recreational access to bottomlands, fire suppression (overgrowth of brushy species can smother bog species), and commercial (all operators) timber harvest without adequate protections for streamside buffers and wetlands. Streamside buffers retained may also be insufficient even using current BMPs.
Land & Water Mgmt: FARM	See also Water Development section	
Lack of soil and water management/conservation practices	Indiscriminate pesticide use, especially adjacent to or within overspray area of native grasslands, rangelands, woodlands Chemical-laden (pesticide, herbicide, fertilizer) irrigation water runoff Border – to – Border farming (no fallow areas at edges/fencelines) Lack of streamside management zones Overhaying	Overspray can decrease or completely wipe out native insect fauna, important pollinators in native grassland and prairie systems Insufficient stormwater controls between agricultural production and waterways (or dry drainages that lead to waterways during rain events) adverse lead to chemical impacts to sensitive aquatic insects, freshwater mussels, riparian invertebrates, freshwater fishes, amphibians, and eventually bay and estuary systems – invertebrates, fishes, and birds. Streamside Management Zones are important buffers between agricultural practices and aquatic impacts, and these riparian areas serve as important habitats in their own right for many forest and woodland dependent SGCN. Riparian and floodplains are frequently cleared for agricultural production because they are relatively flat, have access to water, and soils are productive. “Clean farming” – removing brushy, grassy, or irregular borders around fields and clearing into swales, ravines, and depressions – decrease suitable habitat available for many grassland/woodland matrix species, which benefit from a bit of cover adjacent to open areas. These “clean” areas also can contribute to invasive species, erosion, and faster runoff rather than infiltration of rain events. Over-frequent haying of native prairie decreases grassland diversity (certain seed sources are not allowed to naturally develop and reseed the area; without diverse natural reseeding, certain species become more dominant and the entire prairie loses diversity over time) and contributes to invasion of non-native grasses Haying during bird breeding season also contributes to decline in several ground-nesting SGCN birds (<i>Northern Bobwhite, Dickcissel, Eastern Meadowlark, LeConte’s Sparrow, Henslow’s Sparrow</i>).
Clearing and loss of important natural sites/habitats	Local surface water development: small impoundments on tributary creeks, streams, springs, seeps to form stock tanks, ponds, private lakes	Similar to reservoir development on mainstem rivers, negative impacts caused by impoundments on creeks and springs are just at a smaller scale: loss of instream habitats, loss of wetlands, loss of riparian habitats and natural floodways. The replacement value – still deeper water for flowing waters, pond for stream – is not ecologically synonymous. This may be more of an issue in the emerging communities experiencing unprecedented growth with people buying small “hobby farms” and “ranchettes.” There is some recent evidence that too many ponds in a given area may encourage individuals of certain seasonal amphibian populations (e.g. Houston Toad) to disperse too widely across the landscape, making it more difficult to find a mate and adversely affecting recovery. This may also be true for other localized, wetland-dependent species.
Landowner/land management incentive programs working at cross-purposes	Farm Bill programs not competitive (conservation vs. production) enough to keep lands in conservation state Farm Bill penalty insufficient to deter short term conversion Land management recommendations may be working at crosspurposes even from year to year, site to site – e.g. native grasslands, clearing woodlands	Using Farm Bill programs can be one of the best tools to engage private landowners in conservation practices; however, must be market-competitive and contract-savvy to be effective as a conservation tool. Typically, terms are not long enough to be able to see consistent longterm benefits or well-funded enough to encourage lands to remain in conservation uses or compatible production uses. Additionally, some programs actually recommend using nonnative grasses and/or clearing ravines, woodlands, and fencerows.
Land & Water Mgmt: RANCH	See also Water Development section	
Incompatible stocking practices	In some areas, working lands are still recovering from historic uses, out-of-date stocking and grazing practices (prior to soil, native vegetation, and water conservation knowledge we have today) on the advice of county tax appraisers rather than range scientists or ecologists historic and/or current range-intensive livestock operations “continuous” even if rotational; out of sync with land capacity landowners may not be aware of potential benefits of wildlife valuation for recovery, rest, or native habitat conversion	Stocking practices incompatible with native range can encourage conversion of native woodlands (which may harbor bogs and other wetlands) and prairie grassland to non-native (Bermuda, other sod-forming grasses) which is very detrimental to an entire suite of wildlife. Intensive grazing degrades native plant communities and contributes to the need to supplemental feed livestock, which then introduces exotics into remaining native plant communities. Concentrated feeding of livestock herds attract large numbers of brown-headed cowbirds which are parasitic nesters to a number of SGCN birds.

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
	non-native hoofstock for hunting operations	
Landowner/land management incentive programs working at cross-purposes	<p>Farm Bill programs not competitive (conservation vs. production) enough to keep lands in conservation state</p> <p>Farm Bill penalty insufficient to deter short term conversion</p> <p>Land management recommendations may be working at crosspurposes even from year to year, site to site – e.g. native grasslands, clearing woodlands</p> <p>single-objective management such as all-game, all-livestock, all-recreation</p> <p>Landowners do not have a one-stop shop to choose best management practices for their site, for their goals; and, occasionally, the incentive programs, technical guidance, and management assistance "menu" is limited typically by the perception that landowners are interested primarily in livestock production and are not open to other beneficial management practices for nongame</p>	<p>Using Farm Bill programs can be one of the best tools to engage private landowners in conservation practices; however, must be market-competitive and contract-savvy to be effective as a conservation tool. Typically, terms are not long enough to be able to see consistent longterm benefits or well-funded enough to encourage lands to remain in conservation uses or compatible production uses. Additionally, some programs actually recommend using nonnative grasses and/or clearing ravines, woodlands, and fencerows. Landowners need to be able to have a full menu in front of them to understand the benefits and drawbacks of certain management strategies from the complete picture of livestock production, game and nongame management, and water quality and quantity protection.</p>
Clearing and loss of important natural sites/habitats	<p>conversion of woodland to pasture</p> <p>riparian and floodplain clearing for livestock watering access</p> <p>Small impoundments on tributary creeks, streams, springs, seeps to form stock tanks, ponds, private lakes.</p>	<p>Hardwood clearing for rangeland production contributes to the loss of this very important community</p> <p>Impoundments: similar to reservoir development on mainstem rivers, negative impacts caused by impoundments on creeks and springs are just at a smaller scale: loss of instream habitats, loss of wetlands, loss of riparian habitats and natural floodways. The replacement value – still deeper water for flowing waters, pond for stream – is not ecologically synonymous.</p> <p>Woodland and forest clearing can also contribute to the loss of important isolated wetlands.</p>
Lack of soil management and conservation practices	<p>lack of soil conservation (vegetation conservation/restoration) along stream courses (Streamside Management Zones, Streamside Best Management Practices/Buffers)</p> <p>Overgrazing (see above)</p>	<p>Riparian areas to floodplain extents are not conserved or fenced off from livestock access; hydrology and streamside vegetation are altered, soil and vegetation is lost in upland areas, water quality is degraded through sediment-laden runoff; dealing with historical and contemporary issues, need, in some instances, different approaches for recovery/restoration</p>
Subdivision of larger lands into smaller parcels ("ranchettes")	<p>Ownership changes in values, approaches to management (not always a detriment to conservation practices)</p> <p>Subdivided lands create many more land management philosophies, approaches in one area</p>	<p>While not all land subdivision is necessarily a negative event for conservation, subdivision typically brings with it very diverse land ownership styles and objectives, increased potential for feral animal and escaped landscaping, additional surface and groundwater demands on regional resources, and loss of habitat for homesite development and "ponds"</p> <p>Similar to reservoir development on mainstem rivers, negative impacts caused by impoundments on creeks and springs are just at a smaller scale: loss of instream habitats, loss of wetlands, loss of riparian habitats and natural floodways. The replacement value – still deeper water for flowing waters, pond for stream – is not ecologically synonymous. There is some recent evidence that too many ponds in a given area may encourage individuals of certain seasonal amphibian populations (e.g. Houston Toad) to disperse too widely across the landscape, making it more difficult to find a mate and adversely affecting recovery. This may also be true for other localized, wetland-dependent species.</p> <p>Outreach, technical guidance and incentive programs have a more difficult time serving this constituency because the effort and resources required are multiplied, but no more service resources (people, time, money) are available. Additionally, it is difficult to provide conservation services that are of value to the ecological needs of the area with many fractured landscapes and objectives. Some tools (e.g. RX fire) and incentive programs are not available for use at smaller scales or cannot be effective to improve conservation values.</p>
Land & Water Mgmt: Municipal	See also Water Development section	
Lack of Zoning and Planning	<p>Throughout this and adjacent ecoregions, urban expansion, sprawl, and suburban development into the outlying counties to escape city jurisdictions is an evergrowing issue. Most of this area is part of many of the emerging communities, identified in the Texas State Forest Resources Strategy</p>	<p>Metropolitan Planning Organizations, Councils of Government, Regional Transportation authorities, and other planning entities which encompass emerging and outlying communities would benefit from greater consideration of fish and wildlife resources, rare communities and habitats as part of their first-round constraints process in development, zoning, and permitting. Counties rarely have authority to require stormwater pollution prevention, flood control projects, appropriate road development, conservation of nonjurisdictional wetlands, open space planning, or water or other conservation measures from developers. Urban sprawl, bedroom communities, suburban commuter communities all continue to contribute to prairie loss, woodland clearing, filling non-jurisdictional wetlands, and degradation of instream and stream-adjacent habitats from water quality and quantity impacts. This is not just an issue for fish and wildlife resources, but also for prime farmland and ranchland in this ecoregion.</p> <p>Authorities who exercise their ability to protect sensitive features, water quality, and open space (including floodplains and riparian areas, mature woodlands and tall grass prairies, jurisdictional and nonjurisdictional wetlands of all kinds, natural floodways) can benefit their local water planning</p>

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		processes, recreation opportunities, future food production and quality of life.
Out of Region Water Demands	Dallas – Fort Worth and emerging areas (Tyler, Temple, Waco) San Antonio and emerging areas Houston	These growing metropolitan areas and their outlying emerging communities continue to seek water resources outside of their basins: reservoir development, interbasin transfers, groundwater development and pipelines. Water costs are related to what ratepayers will pay and not related to the water development impacts – mitigation for resource loss under reservoirs, to groundwater, and to estuaries, is insufficient and rates do not replace ecological values.
Land & Water Mgmt: Conservation & Recreation		
Restoration Barriers	Lack of locally adapted seed/cultivar sources	Lack of native seed and plant material sources for blackland prairie restoration within the savanna: species adapted to low pH sandier soils need to be made available commercially at affordable prices (e.g. broomsedge where forage is not a consideration, as it is the backbone of good quail and grassland bird habitat in the southeast); species such as splitbeard bluestem, pinehill bluestem or cultivars of the big 4 prairie grasses that are adapted to local ecotypes need to be collected and increased at plant material centers.
Inadequate/Inappropriate Management	Prescribed fire	Difficult to apply prescribed fire in urban-wildland interface for prairie restoration Many landowners are unfamiliar with their potential to use RX fire for brush control or grassland improvement Regional conservation service providers do not have enough RX fire certified leaders and teams to provide this as a landowner incentive service, even if the demand could be enhanced
Inappropriate Recreational Uses	ORV use in sensitive areas (stream beds, sand hills, wet soils of all types, bottomlands)	Water quality degradation, instream habitat loss (substrates disrupted or lost), riparian loss, slope vegetation loss or impact, human disturbance in nesting or roosting areas
Paucity of Conservation Lands	Lack of conservation lands – public or private – for certain habitat types at a meaningful scale, longterm	In this ecoregion, and in the Blackland Prairie adjacent, lack of lands managed for conservation of key habitat types – oak woodland/blackland prairie matrix, riparian corridors and bottomland hardwoods, wetlands with rare communities – at scale/duration that is meaningful for longterm sustainability and resiliency of these community types
Not all "public" or "managed" lands are "conservation" lands	Recreation at cross purposes with conservation needs	While most public lands in this region are managed for recreation compatible with wildlife and fisheries resources, some improvements could be made to trails and recreation facilities to prevent soil erosion and water quality impacts, vegetation loss (especially near water resources), reduce human disturbance in roosting or breeding areas
Lack of long-range conservation planning and cohesive land conservation/management strategies in each ecoregion	Lack of ecological connectivity between/among existing public and private conservation lands: land and water trusts, NGO preserves and conservation easements, Habitat Conservation Plan lands, wildlife managed lands for conservation, parks and wildlife management areas	Conservation benefits could be realized by mapping existing conservation lands and practices, reviewing opportunities to share resources and improve land management through shared guidance, and identifying landowners and sites which could benefit landscape and conservation management connectivity in the long term through landowner incentive programs – riparian, prairie, mature oak woodlands, shortleaf pine savanna, bottomland hardwoods.
Water Development, Management and Distribution	SEE ALSO STATEWIDE HANDBOOK	
Surface Water Planning	Natural resources not well-defined or required as a "constraint" in Regional Water Planning (RWP) processes	Natural resource professionals are not consistently involved in RWP processes Large municipalities' demands, especially out of the region, are the primary driving force in surface and groundwater planning TMDL recommendations need to consider fish and wildlife resources needs as well Instream flow recommendations need to be stepped out from headwaters to estuaries to influence regional water planning processes Overallocation/dewatering and damming of region's principle rivers

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
Reservoir Construction and Operation (ties in with Surface Water Planning above)	<p>Creation of new and modification (expansion) of existing reservoirs; t least three large reservoir sites in this region proposed in the 2007 State Water Plan, all on important regional resource streams</p> <p>Unregulated small stream impoundments on private lands</p> <p>Timing/Periodicity/Intensity of Water Releases releases are unnaturally intense, in the "wrong" season to mimic natural flooding processes, and change water chemistry and sediment load in all areas downstream, to the estuaries</p> <p>Shoreline development - vegetation removal to water's edge for viewshed, recreational access; hardening and armoring banks (bulkheading), on-site septic leakage or non-compliance, development on steep sites.</p> <p>Invasive species</p>	<p>Reservoir construction: Several streams in this region are of high quality (Ecologically Significant); riparian zones (some are ancient gallery forests, rare communities) are important to instream aquatic and stream-adjacent SGCN habitats; ES and high quality riparian are rarely considered during site selection for new reservoirs or operations. These areas support SGCN and rare communities, contribute high quality water to reservoirs and downstream segments. Reservoir construction and operation creates a barrier to SGCN movement, completely inundates important and irreplaceable riparian zones, spring systems, and instream habitats.</p> <p>Impoundments: similar to reservoir development on mainstem rivers, negative impacts caused by impoundments on creeks and springs are just at a smaller scale: loss of instream habitats, loss of wetlands, loss of riparian habitats and natural floodways. The replacement value – still deeper water for flowing waters, pond for stream – is not ecologically synonymous. This may be more of an issue in the emerging “urban/suburban” areas.</p> <p>Unnatural hydrograph from reservoir operations/dam releases scours instream and stream-adjacent habitats, shifts vegetation communities out of sync with other riparian communities where flooding is more "natural", rare communities and instream SGCN (invertebrates and fishes) cannot "rely" on the seasonal changes under which they evolved and decline</p> <p>Shoreline Development: In addition to the loss of instream and riparian habitat following inundation, the now-“riparian” and upland habitats surrounding the lake edge is at risk from development. In this region, these habitats were usually cliff edges, recharge features, upland shrubland, canyonlands – many of these sites support SGCN and rare communities. Regional reservoir managers do not reserve much in the way of “setback” from the inundation pool level in their easements. This allows residential development (water withdrawals and septic installation), bulkheading shorelines, clearing and “landscaping” to the water’s edge. These lakeside activities contribute fertilizers and other chemicals (e.g. boat gas/oil), untreated or poorly treated human waste (some lake authorities actually have permitting programs to manage/reduce this factor, but not all), and sedimentation to the lake, which eventually impacts in-lake and downstream habitats. Typically, residential development in these areas is also a vector for invasive aquatic and terrestrial plants and feral pets. See Invasive species section above.</p>
Flood Control	Changes to natural stream courses to block or convey floodwaters through urban areas	Levees, bank armoring, culverts all remove instream and stream adjacent habitats, contribute to unnatural sediment and nutrient loading downstream and to estuaries
Groundwater Planning and Distribution	<p>Several areas in east Texas lack groundwater conservation districts</p> <p>Groundwater districts are political subdivisions, typically by county, not aligned necessarily with aquifer boundaries; Groundwater Management Areas are based on Groundwater Districts</p> <p>Rule of first capture is the “management plan,” and in many areas, groundwater pumping occurs without full accounting and does not include water for fish and wildlife as a "use"</p>	<p>Groundwater conservation districts would allow management for conservation, preservation, recharging, and prevention of waste of groundwater resources. Aquifers of concern include Carrizo-Wilcox, Trinity, Nacatoch, and Woodbine.</p> <p>Subirrigated, instream and stream-adjacent and isolated habitats such as bogs, baygalls and forest seeps, which rely on groundwater are adversely affected by dry conditions, some of which are permanently impacted after drought periods; overpumping lowers water table and and changes instream and wetland conditions such as temperature, oxygen availability, and other nutrient and chemical factors on which aquatic life relies</p> <p>In some instances, a significantly low water level can decrease and degrade aquifer recharge capacity ("drying out the sponge " at certain levels within the aquifer can affect the flow quantity and quality into the aquifer from future recharge events)</p>
Other Water Source Developments and Technologies	<p>Interbasin Transfers (Surface and Groundwater)</p> <p>Reuse</p> <p>Water Treatment Wetlands</p>	<p>Most of this is addressed at the statewide level</p> <p>Water Reuse reduces available water at any particular time (needs to account for instream flows) and can change the chemistry (temperature, oxygen, and other characteristics) from the discharge.</p> <p>While a useful tool and potentially a benefit to some wildlife and fish resources, Water Treatment Wetlands are not typically managed as natural systems (e.g. vegetation homogenous, not natural habitats for local wetland dependent SGCN)</p>
Lack of Information & Resources	One response stated this is an issue, but did not provide additional information	
Many SGCN in this region lack updated status or any information from which to determine status, recovery, or management	Without full accounting of species distributions, habitat needs, and range, it is difficult to make accurate management recommendations, apply landowner incentive programs for best conservation benefit	<p><i>Information and Research Needs by SGCN</i></p> <ul style="list-style-type: none"> ▪ <i>Black Bear</i> see Black Bear Management Plan 2005-2015 http://www.tpwd.state.tx.us/publications/pwdpubs/media/pwd_pl_w7000_1046.pdf ▪ <i>Rafinesque’s big-eared bat</i> and <i>Southeastern myotis</i>– determine potential for new roost locations ▪ <i>Eastern spotted skunk</i> – survey to determine status ▪ <i>Houston Toad</i> – more information needed in historic range, research needed re pond proliferation and breeding success dilution ▪ <i>Texas Horned Lizards</i> – identify areas of suitable habitat and survey to determine status in these areas; coordinate with RIFA evaluation/survey to determine impact ▪ <i>Amphibian and Reptiles</i>: need status update on all SGCN, primarily Timber Rattlesnake, Alligator Snapping Turtle, Softshell turtles. ▪ <i>eastern gamagrass-switchgrass-yellow Indiangrass-Maximilian sunflower (G1/G2) and little bluestem-Indiangrass-big bluestem (G1/G2) prairie types</i> – survey and revisit database accounts to ensure data is relevant and up to date.

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
		<ul style="list-style-type: none"> ▪ <i>Painted Bunting, Scissor-tailed Flycatcher</i> – large % of global breeding population, need to identify and publish Best Management Practices; also evaluate STF use of urban areas (sink populations? Reasons for expansion into these areas? Management needs?) ▪ <i>Bachman's Sparrow</i> – Increase survey efforts along western edge of range to identify boundary and suitable occupied habitat, such as within Red River County ▪ Freshwater Mussels – Continue documentation of distribution and status for all SGCN mussels, identify areas where most impacted and by what, craft management plans
Perception of Management Needs More Information	Predator control without biological standards or supporting management	<p>It is unknown whether predator control activities are affecting the stability of SGCN populations or their contribution to natural system function. Predator control efforts cannot be declared "insufficiently regulated" or "underreported" as limited information is available to assess the stability of these populations. Community-based solutions will need to be devised based on a full and accurate accounting of these populations and their effects on the natural systems and ranching communities in which they range.</p> <p>Predator trapping and/or baiting has an adverse effect on non-target species including black bears and smaller mammals such as hooded skunks, foxes</p>
	Lack of Processing <i>Existing</i> Data this tied to "Lack of Information (amount, type)	Where census, survey, records and collections are documented, little is done with the data to detect trends and causes for upward or downward shifts. Without this information, it is difficult to focus or prioritize management objectives or share information with private landowners about the importance of some sites, populations or communities. Sharing this information with landowners is crucial as most of Texas is privately owned and conservation must occur with their stewardship help.
	Inadequate understanding of available or widely-accepted conservation Best Management Practices	In this region, primarily riparian and streamside buffer zones, wetland and wetsoil, and stormwater pollution prevention BMPs need more attention and distribution
Inadequate Policies, Rules, Enforcement		
Non-jurisdictional Wetlands	Loss of and impact to "non-jurisdictional" wetlands and jurisdictional wetlands on non-federal, non-state lands and projects (lack of awareness, no regulatory nexus or enforcement opportunity for protection on these sites)	private lake/stock pond construction, control structures, fill and conversion for agriculture and other development, mining: bogs, seeps, marshes, forested wetlands, and other intermittent and perennial waterways affected;
Sand and gravel mining	Lack of stormwater pollution prevention Lack of reclamation	<p>Reclamation back to native vegetation community consistent with what was taken is not required.</p> <p>Although new TCEQ rules now require water quality permitting for stream and river adjacent mining, none of the sand and gravel permitting review processes require a site assessment to avoid or mitigate impacts to habitats (riparian, sand hills, wetlands, and uplands)</p> <p>Mining off of water courses do not go through TPWD review for potential natural resources impacts. Not all are required to have stormwater pollution prevention facilities or plans (acreage threshold)</p>
Lignite and other surface mining in the region	Lack of Reclamation appropriate to the desired ecological condition of the site	lack of reclamation or reclamation that does not require native seed and plant materials in context with desired ecological condition; permitting process does not adequately allow environmental review to require avoidance, minimization or mitigation of impacts to instream and stream-adjacent habitats (riparian, sand hills, and uplands); Not all are required to have stormwater pollution prevention facilities or plans (acreage threshold)
Other Cross-Cutting Issues		
Climate Change	See also CLIMATE CHANGE SECTION in Statewide handbook	<p>Based on current information, isolated and water-dependent habitats may be more at-risk than others: wetlands, pockets of prairie grasslands, instream aquatic, bottomland hardwoods</p> <p>Climate change models, GIS analysis of land conversion and change overtime, species specific information, community-specific information all needed</p>
Economics Working Lands	Ranches in livestock production with greatest potential to contribute to conservation efforts in this region may not be able to continue to operate without timber conversion, subdivision or development	Landowner incentives cannot compete currently with market forces; market forces in some areas cannot support continued large ranch or timberland ownership

CONSERVATION ACTIONS

“Like the resource it seeks to protect, wildlife conservation must be dynamic, changing as conditions change, seeking always to become more effective.” – Rachel Carson

To make conservation progress, we need to work with the information we have, document our progress, share lessons learned, and adapt our approach when necessary. Conservation actions in this handbook are aimed at reducing the negative effects of issues that affect SGCN, rare communities and their habitats at various scales. Broad actions categories are defined to help organize handbooks. For information about how the Actions framework was developed and for definitions of Action categories, see the *Overview Handbook*.¹⁹

Actions proposed for the ECPL (Table 6) state what we need to work on, where, and why (what problem we can solve with that action). Actions lay out how that work contributes to a specific desired effect – progress and success.

It is important to acknowledge that one conservation action typically does not solve one conservation problem. There may be several actions employed over time to achieve a conservation goal. In some instances, defining the conservation goal *is* the action – for some things, we don’t yet know enough to define what successful conservation looks like for that SGCN population, rare community, or habitat.

It has become increasingly important to determine if the work we do is actually leading to the overall conservation outcomes we desire – **restoration, recovery, sustainability, and resiliency**. As conservation practitioners, we can use milestones (or intermediate results) and reporting to communicate our progress and leverage future conservation action, partnerships, policy changes, and funding.

From project inception, well-crafted monitoring and evaluation (cost effective, answers key questions) informs management and allows conservation practitioners to “course-correct” as necessary for effective conservation.²⁰ With the need for Action Plans to take advantage of several “pots of conservation money,” the people we serve and those who govern private and public conservation funds demand reporting, transparency, and *demonstration* that projects are *positively impacting the conservation of species and habitats*. To get beyond reporting that money was spent and projects were done, AFWA TWW convened a committee in 2009 to craft “effectiveness measures” for the conservation actions across all Plans. A toolkit for classifying and measuring conservation action effectiveness was produced in 2011, approved by AFWA TWW Executive Committee comprised of state

¹⁹ TPWD. 2011. Texas Conservation Action Plan: Broad Action Category Definitions.

http://www.tpwd.state.tx.us/landwater/land/tcap/documents/action_categories_tcap_2011.pdf

The category “*Data Collection, Analysis, and Management*” meets Action Plan Required Element 3 – “priority research and survey”. Many of the proposed actions include a monitoring component (Action Plan Required Element 5) and all actions are encouraged to follow the Effectiveness Measures to assist with adaptive management.

²⁰ Conservation Measures Partnership. 2010. http://www.conservationmeasures.org/wp-content/uploads/2010/04/CMP_Open_Standards_Version_2.0.pdf

Salzer, D. and N. Salafsky. 2006. Allocating resources between taking action, assessing status, and measuring effectiveness of conservation actions. *Natural Areas Journal* 26(3): 310-316.

fish and wildlife agency directors and others.²¹ These measures will be an important part of moving the plans and conservation forward.

With this revision, the TCAP becomes more involved in a national movement to track conservation actions and progress across local, state, regional and national levels. As with the 2005 Plan, actions presented in this edition vary in detail, scale, and duration; however, this edition encourages the use of the incremental measures of success for conservation projects' development, implementation, and tracking. To that end, the toolkit in *Measuring the Effectiveness of State Wildlife Grants*²² is **strongly recommended** to define conservation projects, target audiences and partners, identify desired step-wise intermediate results, and collect the "right" data to report our conservation achievements.

²¹ Association of Fish and Wildlife Agencies Teaming with Wildlife. Measuring the Effectiveness of State Wildlife Grants (conservation actions). 2011. <http://www.fishwildlife.org/files/TWW-Effectiveness-Measures-FULL-Report-Appendices.pdf>

²² Same as above

Table 6. ECPL Conservation Actions

Note: Table is formatted 11" x 17", landscape orientation – SEE ALL OF THE [EFFECTIVENESS MEASURES](#) FOR EACH OF THE OVERALL ACTIONS TO ESTABLISH FINER DETAIL IN PROJECT IMPLEMENTATION

Conservation Action
Invasive Species
Work with private landowners and conservation partners to minimize feral hog populations through hunting and trapping (aerial shooting is not a good technique in this area given the amount of closed canopy). Provide technical guidance and educational programs about the impact and management of feral hogs to benefit ground nesting birds, small mammals, aquatic species. Evaluate technical guidance programs with effectiveness measures.
Promote the use of native grasses in landowner incentive programs for wildlife and fish resource improvement (e.g. Farm Bill, SWG, LIP, and others). Sod-forming exotic grasses and cultivars should not be used in any restoration project, much less those with state or federal dollars, as these are known to be detrimental to native habitats and the wildlife on which they depend. A restoration guide to suitable native grasses for this ecoregion, local sources for native seed and stock, and techniques would be immensely useful to a wide variety of conservation service providers, landowners, and recreation land operators. Promote conversion of nonnative grasses to site appropriate desired ecological conditions especially on lands adjacent to sites already managing for conservation objectives (land trust properties, WMAs, State Parks, some Wildlife Cooperatives and Wildlife Management Plan holders, preserves, sanctuaries, etc.).
Conservation practice providers need to identify a suite of plant species for each priority habitat type which can be promoted with one voice to plant materials centers and commercial distributors. Engage Master Naturalists, Native Plants Society of Texas, Native Prairies Association, land trust and NGO volunteers in coordinated/targeted seed and material collection. Assess success of these programs and the use and success of the materials over time to determine if this is an effective approach or whether on-site or nearby collection on a project-by-project basis is more effective (conservation and costs).
Provide workshops for landscape design and installation service providers, local and "big box" nurseries' producers and buyers, city planning boards for landscaping, managers for urban parks and recreation sites, Home Owners Associations, Texas Master Gardener classes, and garden clubs: <i>in areas upstream and adjacent to high priority streams and water courses, conservation projects and wildlands</i> to deter the promotion or use of Chinese tallow, Chinaberry, Tree of heaven, Japanese honeysuckle, and state-prohibited species. Encourage these plant users to adopt a stream segment for nonnative plant removal and restoration under the guidance of a local ecologist. Follow the outreach effectiveness measures to determine if the workshops are successful in targeted areas to slow or prevent the spread of these very detrimental invaders <i>in areas with a high concentration of oak wilt or oak decline vulnerable species and a lot of tree trimming activity</i> (urban areas, parklands) to deter the inappropriate timing or disposal of oak trimming to slow/prevent the spread of this disease. Document areas of oak wilt or oak decline with the Texas Forest Service to help them concentrate their outreach and incentive programs on this front (see also <i>Power Development</i> below)
Continue golden alga monitoring, but concentrate in areas where aquatic SGCN may be most at risk (freshwater fishes, mollusks and other invertebrates, waterfowl). Use the citizen science networks of the area, catalyzed by the Texas Master Naturalist chapters and local fishing clubs, to document findings in the online invasive species tracking tool sponsored by TexasInvasives.org. Use this information to create eradication and management plans in areas of most direct impact to SGCN.
Intensify outreach and public education efforts especially near boat ramps and high-traffic fishing tournament areas to reduce or prevent the introduction of aquatic invasives – plants, mollusks and baitfishes. Highly isolated and vulnerable aquatic SGCN in this region would be severely threatened (more so than they are currently) by such introductions. Identify effectiveness measures for this outreach effort and document progress.
Target outreach for red imported fire ant (RIFA) proper identification (not confused with other beneficial ant species) and control in conjunction with other habitat restoration recommendations, especially where grassland bird, native prairie, amphibians and smaller ground-dwelling SGCN are the conservation targets.
Pests, Parasites, Pathogens
See oak wilt actions in Invasive Species, Power Development and Transmission, and Transportation sections
Power Development and Transmission
In areas with a high concentration of oak wilt or oak decline, vulnerable species and/or a lot of tree trimming activity (e.g. ROW) deter the inappropriate timing or disposal of oak trimmings to slow/prevent the spread of this disease. Follow Texas Forest Service Guidelines for tree trimming timing, cut treatment, equipment protocols and trimming disposal. Avoid the use of brush-hogging vertically to trim back ROW edges. Document areas of oak wilt or oak decline with the Texas Forest Service to help them concentrate their outreach and incentive programs on this front
Work with Transmission Line and Distribution Line ROW developers and maintenance plans to promote: <ul style="list-style-type: none"> • use of native grasses and avoidance of all wet areas • stream and wetland buffers of existing native vegetation • active eradication of non-native species • conservation of riparian areas, all wetlands and wet areas • seasonally-sensitive maintenance to avoid impacts to ground-nesting and migratory birds Where possible, emphasize restoration of the desired ecological condition after construction.
Oil and Natural Gas Production and Delivery
Work with oil and gas ROW developers and maintenance plans to promote: <ul style="list-style-type: none"> • use of native grasses and avoidance of all wet areas

Conservation Action
<ul style="list-style-type: none"> • stream and wetland buffers of existing native vegetation • active eradication of non-native species • conservation of riparian areas, all wetlands and wet areas • seasonally-sensitive maintenance to avoid impacts to ground-nesting and migratory birds <p>Where possible, emphasize restoration of the desired ecological condition after construction.</p>
Mining
<p>Work with mining operations developers, maintenance plans, and remediation contractors to promote:</p> <ul style="list-style-type: none"> • use of native grasses and avoidance of all wet areas • stream and wetland buffers of existing native vegetation • active eradication of non-native species • conservation of riparian areas, all wetlands and wet areas • seasonally-sensitive maintenance to avoid impacts to ground-nesting and migratory birds <p>Emphasize restoration of the desired ecological condition in remediation efforts.</p>
Transportation
<p>In areas with a high concentration of oak wilt or oak decline, vulnerable species and/or a lot of tree trimming activity (e.g. ROW) deter the inappropriate timing or disposal of oak trimmings to slow/prevent the spread of this disease. Follow Texas Forest Service Guidelines for tree trimming timing, cut treatment, equipment protocols and trimming disposal. Avoid the use of brush-hogging vertically to trim back ROW edges. Document areas of oak wilt or oak decline with the Texas Forest Service to help them concentrate their outreach and incentive programs on this front</p>
<p>Provide outreach to landowners adjacent to TXDOT ROW in areas where TXDOT has implemented native restoration (native grasses used) or conservation (rare plant protection plans, maintenance plans to protect rare communities or features) to support SGCN recovery or protection to further understanding of these important resources and their site-appropriate management, reduce landowner maintenance in these areas, and promote SGCN recovery. Use outreach effectiveness measures to document progress.</p>
Land & Water Mgmt: FARM
<p>A North Carolina State University study of linear and block field borders on 24 farms found that quail populations almost doubled on farms where 2-3 percent of the cropland edge was allowed to go fallow. It also found that blocks of fallow habitat (one quarter acre to 6 acres in size) produced twice the number of quail as narrow (10-foot) linear field borders. While this study targeted quail production, other SGCN grassland birds, small mammals, reptiles, some plants and insects would also benefit from these practices:</p> <ul style="list-style-type: none"> • Leave brushy or grassy borders around fields. These borders can help with erosion and if left un-mowed can provide nesting areas • Leave jagged edges on fields. Fields with straight edges appear to provide less habitat • Preserve or restore woody draws (cover in draws will re-establish naturally if left unplowed or un-mowed; invasive nonnative plants should be removed). • Alternating crops in the same field is an excellent way to reduce erosion and build soil fertility. Planting row crops followed by wheat or other small grains the next year provides habitat diversity for quail. Planting legumes or grass every third or fourth year is a good rotation for soil conservation and SGCN. • Remove dense sod-forming monoculture grasses. Thick mats of grass hinder movement and make feeding difficult. Native warm-season grasses, properly managed, provide cover and food. Mixing legumes with grasses improves habitat for young quail.
Land & Water Mgmt: RANCH
<p>Promote the use of native grasses in landowner incentive programs for wildlife and fish resource improvement (e.g. Farm Bill, SWG, LIP, and others). Sod-forming exotic grasses and cultivars should not be used in any restoration project, much less those with state or federal dollars, as these are known to be detrimental to native habitats and the wildlife on which they depend. A restoration guide to suitable native grasses for this ecoregion, local sources for native seed and stock, and techniques would be immensely useful to a wide variety of conservation service providers, landowners, and recreation land operators. Promote conversion of nonnative grasses to site appropriate desired ecological conditions especially on lands adjacent to sites already managing for conservation objectives (land trust properties, WMAs, State Parks, some Wildlife Cooperatives and Wildlife Management Plan holders, preserves, sanctuaries, etc.).</p>
<p>Provide site appropriate brush removal advice and project implementation to restore native grasslands and savanna, retain intact riparian areas, and protect wetlands and outcrop features. Promote use of site-appropriate methods – herbicides or mechanical – to preserve water quality and prevent soil erosion and invasive grass colonization. Document and share site-appropriate restoration and maintenance plans for the benefit of other conservation practitioners – document what works and what does not in specific site types. In some instances, prairie restoration to control brush is more economical than non-native pasture conversion back to native grasses. Use the effectiveness measures for Direct Management (Stewardship) to assess the efficacy and benefits to SGCN and rare communities.</p>

Conservation Action
<p>Conservation easements and landowner incentive programs are good instruments for landowner participation in this region. Landowners with intact grasslands or grasslands with restoration potential for little investment (especially those contiguous to NGO and Land Trust preserves for prairie preservation, public lands employing prairie conservation practices, sites mapped by the Native Prairies Association as intact and restored remnants), willing to manage for prairie and grassland species conservation, willing to manage streamside vegetation as riparian buffer along Ecologically Significant Stream Segments (and to their headwaters), and/or with any of the rare wetland communities should be first-eligible. Monitoring of key species (to be identified) must be a part of these projects. Information about methods, short and longterm success (or failure) need to be shared through conservation networks.</p> <p>Streamside management zones need to be mandated for anyone receiving government subsidies for agriculture. Previously removed streamside vegetation should be restored and buffered. Promote SMZs on all cooperator lands. Identify areas to improve.</p> <p>See also Statewide/Multi-region handbook – Actions section)</p>
Land & Water Mgmt: Municipal
<p>Focus outreach to Metropolitan Planning Organizations, Councils of Government, Regional Transportation authorities, and other planning entities which encompass emerging and outlying communities to address consideration of SGCN, rare communities and habitats (primarily mature oak woodlands and savanna, native tallgrass prairies, riparian areas to floodplain extents and all wetland features) as part of their first-round constraints process in development, zoning, and permitting. Support counties authority to require stormwater pollution prevention, floodplain buyouts, appropriate road development, conservation of nonjurisdictional wetlands, open space planning, or water or other conservation measures from developers.</p>
Land & Water Mgmt: Conservation & Recreation
<p>Initiate a short-leaf pine savanna restoration initiative similar to long leaf pine alliance to identify suitable ecologically functional areas for restoration efforts, project partners, and potential plant resources. Create a longterm implementation plan with multiple partners – USFWS Partners Program, NRCS Farm Bill programs, The Nature Cnservancy, local land trusts. Include a monitoring plan in the implementation to determine effectiveness of the efforts and any adaptive management avenues for the future</p>
<p>Provide site appropriate brush removal advice and project implementation to restore native grasslands and savanna, retain intact riparian areas, and protect wetlands and outcrop features. Promote use of site-appropriate methods – herbicides or mechanical – to preserve water quality and prevent soil erosion and invasive grass colonization. Document and share site-appropriate restoration and maintenance plans for the benefit of other conservation practitioners – document what works and what does not in specific site types. In some instances, prairie restoration to control brush is more economical than non-native pasture conversion back to native grasses. Use the effectiveness measures for Direct Management (Stewardship) to assess the efficacy and benefits to SGCN and rare communities.</p>
Water Development, Management and Distribution
<p>See http://www.twdb.state.tx.us/wrpi/rwp/map.asp for a current map of Regional Water Planning Groups that intersect this ecoregion.</p> <p>Water management is a key issue in this ecoregion. Identify a coalition or natural resources advisory group to take available science-based information about impacts and instream flow needs to craft specific recommendations (where to avoid inundation, where to improve water quality, what technologies are incompatible with natural resources goals for the region) to conserve SGCN and rare communities and priority habitats related to surface water management. Given small budgets for time and travel, elect a spokesperson (or rotating spokesperson) to attend and participate in Regional Surface Water Planning meetings and convey the group's recommendations.</p>
<p>Study current water use and rates paid in large urban areas, versus the cost of longterm ecological loss from reservoirs or other water development projects. Convey the findings to regional surface water planning groups and make recommendations for changes to accommodate realistic mitigation.</p>
<p>Support the establishment of east Texas groundwater conservation district(s) that align most closely with the aquifer boundaries [Carrizo-Wilcox, Trinity, Nacatoch, and Woodbine] and use areas in and out of these basins to support management for conservation, preservation, recharging, and prevention of waste of groundwater resources.</p> <p>Form a regional natural resources advisory group to identify key concepts and actions to incorporate fish, wildlife and recreation needs into the ground water conservation district planning process. Evaluate the effectiveness of this activity and share lessons learned in other regions which could benefit from this experience.</p> <p>Support the conversion or transfer of existing unused water rights to the Texas Water Trust to protect instream uses. Develop a means to aid in funding the transfer of unused water rights to TWT.</p>
Lack of Information & Resources
<p>Prescribed fire is a useful tool in grassland and savanna restoration and maintenance. A study of rangelands in south Florida, conducted by the Tall Timbers Research Station in cooperation with the University of Georgia, and University of Florida found that quail populations could be doubled in as little as 2 years with improved management. Specifically, it found the use of summer fire rather than winter fire and roller drum chopping in summer offered both improved forage for cattle and improved quail habitat. Summer fire is not often used in Texas as a tool; where it has been used (or where natural wildfires have occurred in the summer), little has been documented about the vegetation community (including invasives) and SGCN response following summer fire.</p> <p>Initiate and publish post wild fire studies to document vegetation community and target SGCN responses. Review current literature and provide recommendations for overcoming barriers to summer fire application, best management and conservation practices for followup and monitoring, and resources for applying this information. Review the effectiveness measures for stewardship (direct management) activities and determine what information would be required to demonstrate progress in summer fire use for conservation in Texas.</p> <p>Form multi-partner working group(s) to establish scientifically sound best management practices for prescribed fire application for the ecoregion (timing/season, period/duration, intensity, parameters for RX) for the restoration of sites and heterogeneity in grasslands, but also the longterm health and sustainability of desired ecological conditions (plant communities); work with Rx fire technical experts and SGCN/rare communities experts to identify concerns, barriers, and solutions. Explore the barriers to applying this tool on private lands and make recommendations to overcome these barriers (policy? Targeted outreach? Technical workshops?). Identify <u>key</u> SGCN from a variety of taxa and rare communities to monitor to determine effectiveness of the applied practices.</p>

Conservation Action

Black bear observation trends are on the rise in the northern post oak along the Red River and Sulphur River basins so increased outreach/education efforts, monitoring and research of movements is necessary. Also, minimizing conflicts through the development of conflict management protocols would be beneficial. Identify key gaps in landscape scale habitats that can be restored and use long term conservation tools to retain large, contiguous blocks of black bear habitat. Black bears serve as an excellent umbrella species for many hardwood forest / riparian dependent SGCN. Conservation efforts for black bear in this region should include monitoring for other represented SGCN taxa in this type of habitat. See also Black Bear Management Plan 2005-2015 http://www.tpwd.state.tx.us/publications/pwdpubs/media/pwd_pl_w7000_1046.pdf

Host local and absentee landowner workshop series related to SGCN and habitat "target areas" (see Effectiveness Measures for training and technical guidance), add a focus module on conservation instruments – Safe Harbor Agreements, Candidate Conservation Agreements, conservation easements – to dispel myths about regulatory constraints and promote benefits in preventing the need to list and promoting recovery. Showcase specific studies and examples from the region (or adjacent ecoregions) for better relationship building. Document through conservation practice and partner surveys over the course of three to five years whether the workshops increase opportunities for these tools to be used and the SPECIFIC barriers to their use. Share lessons learned in an annual conference through the Land Trust community.

In the predominately prairie areas of this ecoregion, form multi-partner working group(s) to establish scientifically sound best management practices for **chemical/mechanical brush control** for the ecoregion and specific watersheds. Work with brush control technical experts and SGCN/rare communities experts to identify concerns, barriers, and solutions. Identify key SGCN from a variety of taxa and rare communities to monitor to determine effectiveness of the applied practices.

Form multi-partner working group(s) to establish scientifically sound best management practices for **riparian conservation and restoration**, including identifying floodplain extent, best timing for restoration work, relationship by basin to environmental water flows, reasonable recommendations for initial planting diversity, ways to encourage full complement of desired ecological condition of community, how to prevent or control specific invasives without negatively impacting restoration, locally sourced seed and plant materials for the ecoregion (and finer scales if needed). Work with riparian restoration technical experts and SGCN/rare communities experts to identify concerns, barriers, and solutions. Apply practices and identify key SGCN from a variety of taxa and rare communities to monitor to determine effectiveness of the applied practices. Apply practices to the revision of Streamside Buffer BMPs.

Work with the Native Prairies Association's ongoing current effort to identify scientifically sound best management practices for **different types of prairie restoration**, including timing, water needs, reasonable recommendations for initial planting diversity, ways to encourage full complement of desired ecological condition of community, how to prevent or control specific invasives without negatively impacting restoration, locally sourced seed and plant materials for the ecoregion (and finer scales if needed). Work with prairie restoration technical experts and SGCN/rare communities experts to identify concerns, barriers, and solutions. Identify key SGCN from a variety of taxa and rare communities to monitor to determine effectiveness of the applied practices

Identify a host website to share ecoregional practitioner (not novice, not landowner, but professional) cross-training opportunities for RX fire, stream rehabilitation, reintroductions, brush management, GIS and corridor identification

Using the Texas Ecological Systems data and local conservation service provider knowledge, identify at the ecoregion level priority habitats which are relatively connected of high enough value to develop conservation initiatives to keep them connected and productive. Include an assessment of existing public lands to determine ecological and conservation function needs (buffer, management changes, adjacent land use threats).

Work with willing landowners and land trusts *especially adjacent to and in corridors between* well-managed public lands to restore and manage oak – prairie matrix, bottomland hardwood, shortleaf pine savanna, and riparian communities in large single-ownership or smaller acreage cooperatives – opportunities to connect/improve historically fragmented management

Create a multi-disciplinary ecology committee to identify three to five years of highest priority research projects (actual projects, not just concepts) that can be rolled out to universities and colleges to collect the information most needed at the PRACTICAL level for management and conservation improvement on the ground. Many SGCN in this region lack distribution and POPULATION status information; more information and cooperation from private landowners may reduce the risk of listing, enhance recovery options, and contribute to conservation of many sensitive habitats just through awareness and documentation. Priorities identified in the TCAP process to date include:

- *Black Bear* see Black Bear Management Plan 2005-2015 http://www.tpwd.state.tx.us/publications/pwdpubs/media/pwd_pl_w7000_1046.pdf
- *Rafinesque's big-eared bat* and *Southeastern myotis*– continue monitoring roosts and identify new roosts. Support long-term conservation of bottomland hardwoods. Increase awareness among forest managers and owners. Promote BMPs for species among stakeholders. Retain large hollow trees, such as blackgum and water tupelos, with native habitat/woodland 100 – 200 ft buffers which could be expanded to include the full extent (and contributing area) of wetlands intersecting that buffer. Identify protect roosts in artificial structures. Support WRP and similar programs. Perform hardwood restoration. Conduct hibernacula surveys for presence of *Geomyces destructans* and/or White Nose Syndrome using current USFWS protocols.
- *Eastern spotted skunk* – determine status
- *Houston Toad* – Finalize a Safe Harbor Agreement for the full range extent to promote conservation and reintroduction efforts with regulatory assurances for private landowners. Implement rangewide monitoring plan for reintroduction sites, using Effectiveness Measures. Work with conservation community to raise Houston toads which do not exceed the 5-year capacity for reintroduction. Annually document and revise the habitat, dispersal area, reintroduction area, and landowner incentive network to enhance connectivity among sites. Work with Farm Bill and Partners Program to implement beneficial land management practices on suitable lands using current HT guidelines. Promote a published update of the HT Recovery Plan.
- *Texas Horned Lizards* – raise awareness of beneficial native ants. Combat indiscriminate use of pesticides and buildup within ecosystems. Support native prairie restoration and long-term conservation efforts in areas of suitable habitat. Identify existing populations. Identify expansive suitable habitats under conservation for release and on landowner cooperators.
- *Amphibian and Reptiles*: Survey private landowner cooperators to update data SGCN sets and monitor populations. Work with TPWD Law Enforcement to track and document the effectiveness of commercial turtle harvest regulations.
- *Timber Rattlesnake*: Limit road construction near and within suitable habitats. Utilize strategies similar to black bear and bottomland hardwood bat spp. for habitat conservation. Implement awareness campaign to landowners and public lands in occupied habitat. Limit human related mortality. Increase data gathering.
- *Alligator Snapping Turtle* – Status determination and key locations. Raise awareness among outdoor users.
- *eastern gamagrass-switchgrass-yellow Indiangrass-Maximilian sunflower (G1/G2)* and *little bluestem-Indiangrass-big bluestem (G1/G2)* prairie types – Monitor and update sightings. Revisit database accounts to ensure data is relevant and up to date. Promote long-term conservation. Harvest seeds and utilize for local restorations and/or send to plant materials centers for field trials and increasing production.
- *Painted Buntings* – large % of global breeding population. I feel that most of breeding habitat has either too much brush or not enough brush. Individuals are found within dense growth along drainages and edges, but appear to prefer diverse woody mottes made of multiple woody vines, shrubs, trees that offer structural diversity from the ground up. A snag for a singing perch in the middle is the cherry on top. Intensive farming and grazing. Pesticide use around ag areas. Increase SMZs within pasturelands.
- *Scissor-tailed Flycatcher* – large % of global breeding population. I have concern about these birds utilizing commercial and residential lands. I commonly observe individuals foraging around gas stations and other areas where toxins or pesticide use is common. Individuals could be in sink habitats. Pesticide use around ag areas. Increase fencerows, SMZs, scattered brush within pasturelands.

Conservation Action

- *Bachman's Sparrow* – short-leaf pine savanna restoration in northeast Texas could increase suitable habitat. Start initiative similar to longleaf alliance. Build off Lennox woods project area. Increase use of prescribed burns on private lands. Increase survey efforts along western edge of range to identify boundary and suitable occupied habitat, such as within Red River County. Promote BMPs within forest management agencies and industries.
- *Northern Bobwhite, Dickcissel, Eastern Meadowlark, LeConte's Sparrow, Short-eared Owl, Loggerhead Shrike, Northern Harrier, Swainson's Hawk, Henslows Sparrow* – Time is of the essence. Prairie restoration, conservation and mangement. Promote rotational grazing, fallow fields, delay haying on some fields until after breeding season.
- *Interior Least Tern* – new reservoirs could be engineered to provide small island habitat at varying reservoirs levels. The islands would surface during lower water levels in the summer so that they would be devoid of vegetation.
- *Swainson's Warbler, Kentucky Warbler, Louisiana Waterthrush, Prothonotary Warbler* – Reduce water consumption in the urban areas that leads to destruction of bottomland hardwoods for reservoir development. Identify high priority conservation areas for bottomland hardwoods. More conservation lands protecting intact bottomland hardwoods are needed in northeast Texas. Promote BMPs for this habitat among agencies and cooperators.
- Freshwater Mussels – Additional distribution and habitat requirements in specific stream segments and watersheds are needed to identify instream flow standards, recommendations for water conservation areas, sites to protect from reservoir development, outreach and activities to prevent zebra mussel spread, greater water quality protections in mussel watersheds to prevent pollution and sedimentation

Form a working group with adjacent Texas Blackland Prairie and Gulf Coastal Prairies and Marshes aquatic and terrestrial ecologists to identify river rehabilitation goals in/adjacent to undammed stretches below last impoundment to the estuaries to evaluate/implement instream flow recommendations; improve the quality, timing, and seasonality of releases, improve riparian restoration, and increase connectivity to improve resilience to climate

Other Cross-Cutting Issues

Determine market values that are driving agricultural conversion (biofuels? crop prices?), livestock production, hunting and other recreation, and land subdivision in this region. Craft a recommendation to landowner incentive program providers that can be used to index conservation practice incentives in ecoregions. Monitor whether this approach was effective to change the conservation program values AND landowner participation in those programs before & after the change.

NOTE: Almost all of these actions would benefit from more regular cooperation among conservation practitioners in the region. A share-site for conservation practice would be a useful tool. See Statewide/Multi-region handbook AND the Effectiveness Measures report's evaluation of existing conservation practice sharing tools (Appendix IV). This will go a long way toward landscape-level planning and shared priorities.

