



TEXAS CONSERVATION ACTION PLAN

Central Great Plains

ECOREGION
HANDBOOK
August 2012



Citing this document:

Texas Parks and Wildlife Department. 2012. **Texas Conservation Action Plan 2012 – 2016: Central Great Plains Handbook**. Editor, Wendy Connally, Texas Conservation Action Plan Coordinator. Austin, Texas.

Contents

SUMMARY	1
HOW TO GET INVOLVED	2
OVERVIEW	3
RARE SPECIES and COMMUNITIES	12
Note Regarding Rare Communities	12
PRIORITY HABITATS.....	13
Shared Habitat Priorities with Adjacent States.....	17
ISSUES	18
CONSERVATION ACTIONS	24

ECOREGION HANDBOOK FIGURES

Figure 1. CGPL Ecoregion with County Boundaries	6
Figure 2. CGPL EDU, HUC 8s, and ESSS – 3 maps	9

ECOREGION HANDBOOK TABLES

Table 1. Crosswalk of CGPL Ecoregion with Other Conservation Plan Units	5
Table 2. CGPL EDUs with Ecologically Significant Stream Segments and Reservoirs	7
Table 3. CGPL Priority Habitats	14
Table 4. Shared Habitat Priorities with Adjacent State – Oklahoma	17
Table 5. CGPL Priority Issues Affecting Conservation	19
Table 6. CGPL Conservation Actions	26

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 Central Great Plains (CGPL) 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 other ecoregion handbooks like this one for different areas of Texas with more local information.

This handbook provides insight into specific CGPL 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 CGPL 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 CGPL 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

Extending from central Nebraska to its southmost reaches into Texas, the Central Great Plains (CGPL) were once a vast expanse of mixed grasslands, supporting large herds of bison, pronghorn, and other species dependent on the transitional mix from eastern tallgrass prairie to western shortgrass prairie. Southern extents in Texas supported scattered mottes of oak and mesquite savanna, shrublands, and transitional vegetation communities into the Cross Timbers to the east. In Texas, this ecoregion covers approximately 11,566,646 acres.

The CGPL forms a shallow “trough” of mixed grasslands dependent on precipitation gradients between the High Plains and Southwestern Tablelands to the west, the more rugged topography of the Cross Timbers to the east, and the Edwards Plateau to the south. Erosion by the Brazos and Colorado rivers has removed the overlying Cretaceous limestones to expose 250 million year old Permian sedimentary rocks. These colorful rocks and soils erode easily and tint the rivers red with sediment throughout the prairie regions. Rivers and streams are more intermittent in western extents and frequently braided throughout the region; riparian vegetation is more dense and shrubby. Eastern woodland riparian extents (where intact) support eastern forest and woodland bird species occurrences into their western extents. Today, shrub and woodland increase on uplands has decreased the grassland suitability for a great number of typical Great Plains bird, small mammal, and reptile assemblages.

While open understory, mature mesquite groves (savanna) were prevalent along stream courses and in grassland swales in the early and mid-19th century, mesquite thickets are now widespread in uplands throughout the region and a conservation management issue. Its success in certain areas is attributed to fire suppression, intense grazing pressure, early cattle drives, and the change in land management after the widespread use of barbed wire and water development. Prairie dog “towns” with cohabitation for burrowing owl, black-footed ferret, swift fox, and various prairie snakes and lizards were once ecological drivers in the region, supporting each other, and badgers, mountain plovers, ferruginous and Swainson’s hawks. Schmidly notes that colonies once covered tens of thousands of square miles of prairie throughout Texas and ranged as far east as the Cross Timbers. Prairie dogs were seen as the “colony glue” and ranchers wanting to eliminate competition for grazing livestock began large-scale eradication efforts of prairie dogs in the 20th century. Loss of prairie dogs and their cohorts and the function they serve in the grassland system, along with fire suppression and inappropriate stocking rates, has contributed to the brush invasion.⁴

A satellite view of the CGPL reveals a dense patchwork of dryland and irrigated cotton, wheat, and grain sorghum agricultural lands; dissected shallow canyons or “breaks;” and open livestock range for cattle, sheep and goats. The eastern boundary of the ecoregion marks the eastern limits of the major winter wheat growing area of the United States. Soils in this region are generally deep with shallow soils on ridges and breaks. Oil, gas and coal production along with gypsum mined from the Whitehorse Formation are industrial drivers in the area. Wichita Falls, Abilene, San Angelo, Brownwood and Brady are the largest developed areas in this ecoregion.

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).

Table 1 crosswalks this ecoregion with other conservation planning units.⁵

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

Table 2 documents the Ecological Drainage Units (EDU), Hydrologic Units (“HUC 8”, finer scale watersheds within EDUs), larger mapped reservoirs, and Ecologically Significant Stream Segments (ESSS)⁶

Figure 2 shows EDUs, HUC 8s and ESSS by ecoregion.

⁵ For more information about planning boundaries, see the Overview handbook on the TCAP 2012 website <http://www.tpwd.state.tx.us/landwater/land/tcap/>

⁶ Esselman, P.C., D.M. Infante, L. Wang, D. Wu, A. Cooper, and W.W. Taylor. 2010. An initial assessment of relative landscape disturbance levels for river fish habitats of the conterminous United States. http://www.nbii.gov/far/nfhap/data/NFHAP_Initial_Assessment_Report_Esselman_etal_2010.pdf (accessed 2010 – 2011).

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

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

Table 1. Crosswalk of CGPL 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
Central Great Plains (CGPL)	part of Cross Timbers and Prairies and part of Rolling Plains	Southern Shortgrass Prairie (28) and Central Mixed Grass Prairie (33)	Brazos River – Prairie Colorado River – Ed Plateau Upper Red River Upper Trinity	Playa Lakes JV Central Mixed Grass Prairie BCR	Great Plains	Colorado Upper (5a) Brazos Upper (6a) Plains Rivers (10)	Central Great Plains Winter Wheat and Range Region: <i>Rolling Limestone Prairie (78A), Central Red Rolling Plains Eastern and Western (78C and B), Central Red Rolling Prairies (80A), Texas North Central Prairies(80B)</i> Southwest Plateaus and Plains Range and Cotton Region: <i>Edwards Plateau Central (81B)</i>	Rolling Plains

Figure 1. CGPL Ecoregion with County Boundaries

Central Great Plains ecoregion in yellow

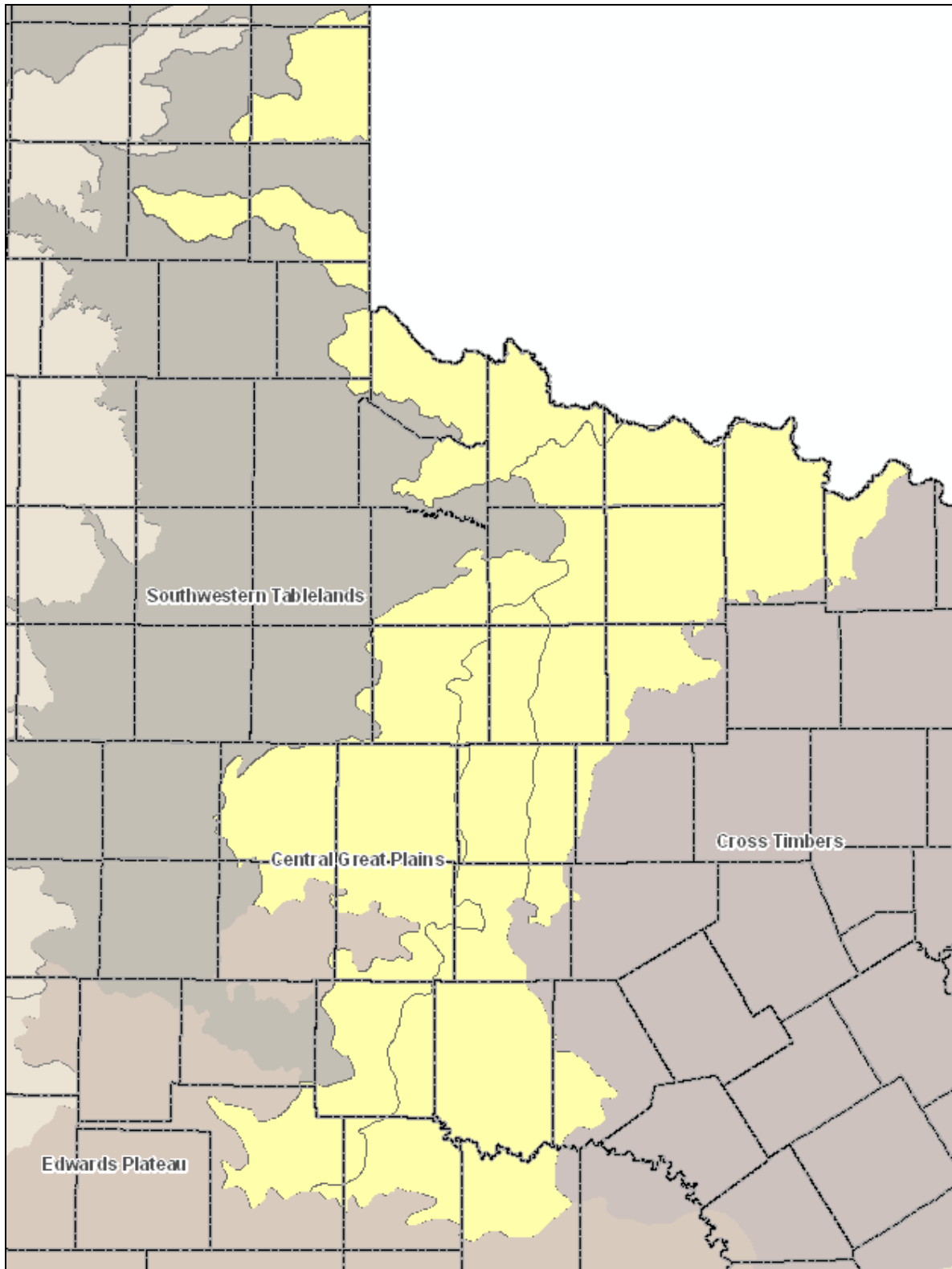


Table 2. CGPL EDUs with Ecologically Significant Stream Segments and Reservoirs

ECOLOGICAL DRAINAGE UNIT SubBasin (HUC 8)	<i>Ecologically Significant Stream Segment TPWD 2002, w/updates 2005</i>	Lakes and Reservoirs
UPPER RED RIVER		
Washita Headwaters		
Middle North Fork Red	Sweetwater Creek	
Upper Salt Fork Red	Leila Lake Creek	Greenbelt Lake
Lower Prairie Dog Town Fork Red	Prairie Dog Town Fork Red River	
Elm Fork Red		
Lower Salt Fork Red		
Groesbeck - Sandy	Red River	Lake Pauline
Pease	Pease River	
Southern Beaver		Santa Rosa Lake, Lake Electra
North Wichita		
South Wichita		
Wichita		Lake Diversion, North Fork Buffalo Creek Reservoir
Blue-China	Red River	
Little Wichita		Lake Kickapoo, Lake Arrowhead, Lake Olney-Cooper
Farmers - Mud		
UPPER TRINITY		
Upper West Fork Trinity		
BRAZOS RIVER - PRAIRIE		
Middle Brazos - Millers	Brazos River	Millers Creek Reservoir
Upper Clear Fork Brazos		Lake Sweetwater, Lake Kirby, Lake Fort Phantom Hill
Double Mountain Fork Brazos	Double Mountain Fork Brazos	
Paint		Lake Stamford
Lower Clear Fork Brazos		
Hubbard		Hubbard Creek Reservoir
Middle Brazos - Palo Pinto		Lake Graham/Lake Eddleman

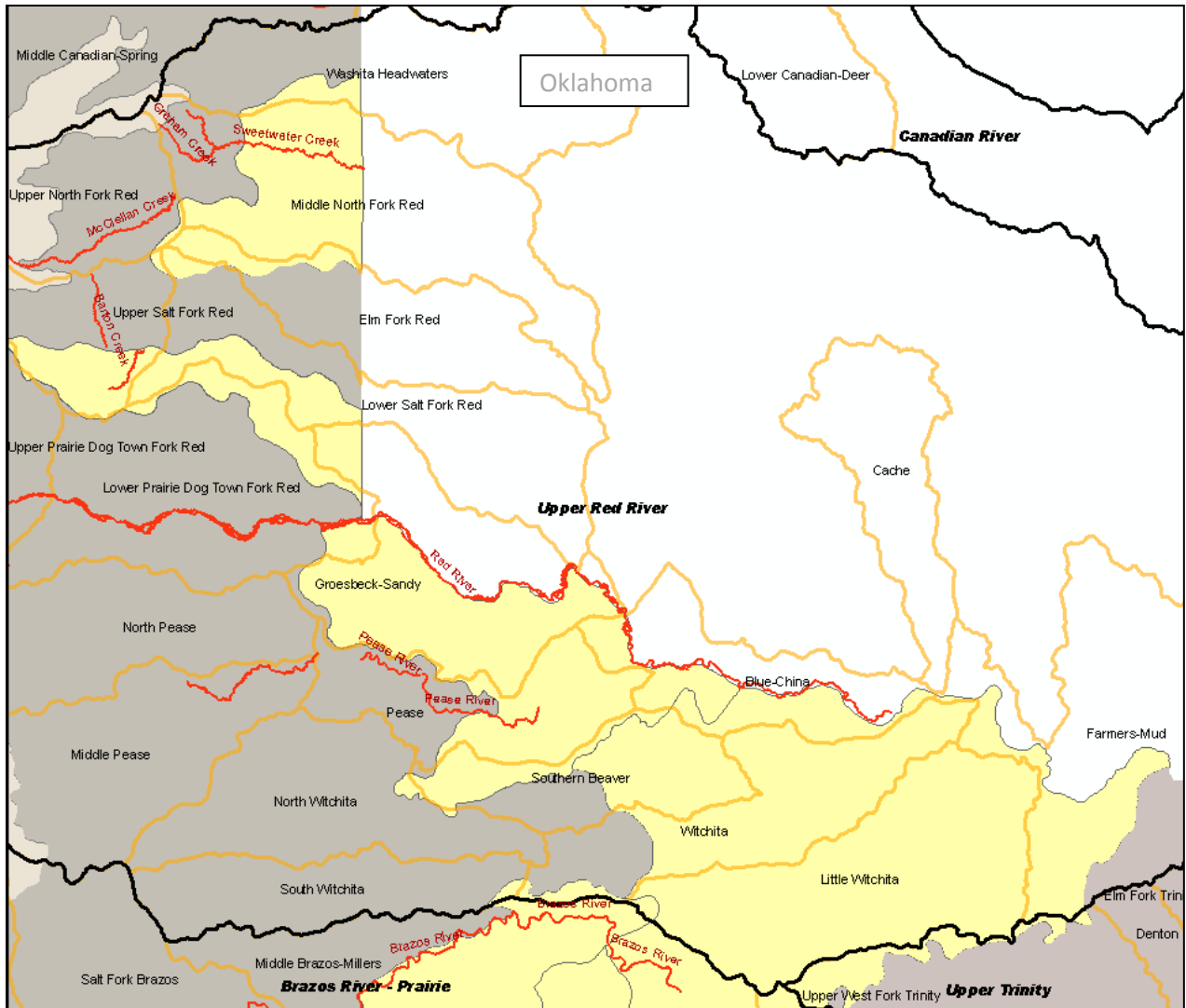
Table 2. *continued*

ECOLOGICAL DRAINAGE UNIT SubBasin (HUC 8)	Ecologically Significant Stream Segment TPWD 2002, w/updates 2005	Lakes and Reservoirs
COLORADO RIVER - EDWARDS PLATEAU		
Middle Colorado - Elm	Elm Creek, Colorado River	Lake Ballinger/Lake Moonen, Lake Winters/New Lake Winters, O.H. Ivie Reservoir
Middle Concho		Twin Buttes Reservoir
North Concho	Concho River	O.C. Fisher Reservoir
Concho	Concho River	O.H. Ivie Reservoir
South Concho	Concho River	Twin Buttes Reservoir, Lake Nasworthy
Middle Colorado	Colorado River	O.H. Ivie Reservoir
Jim Ned		Lake Coleman
Pecan Bayou		Lake Clyde, Lake Brownwood
Brady		Brady Creek Reservoir

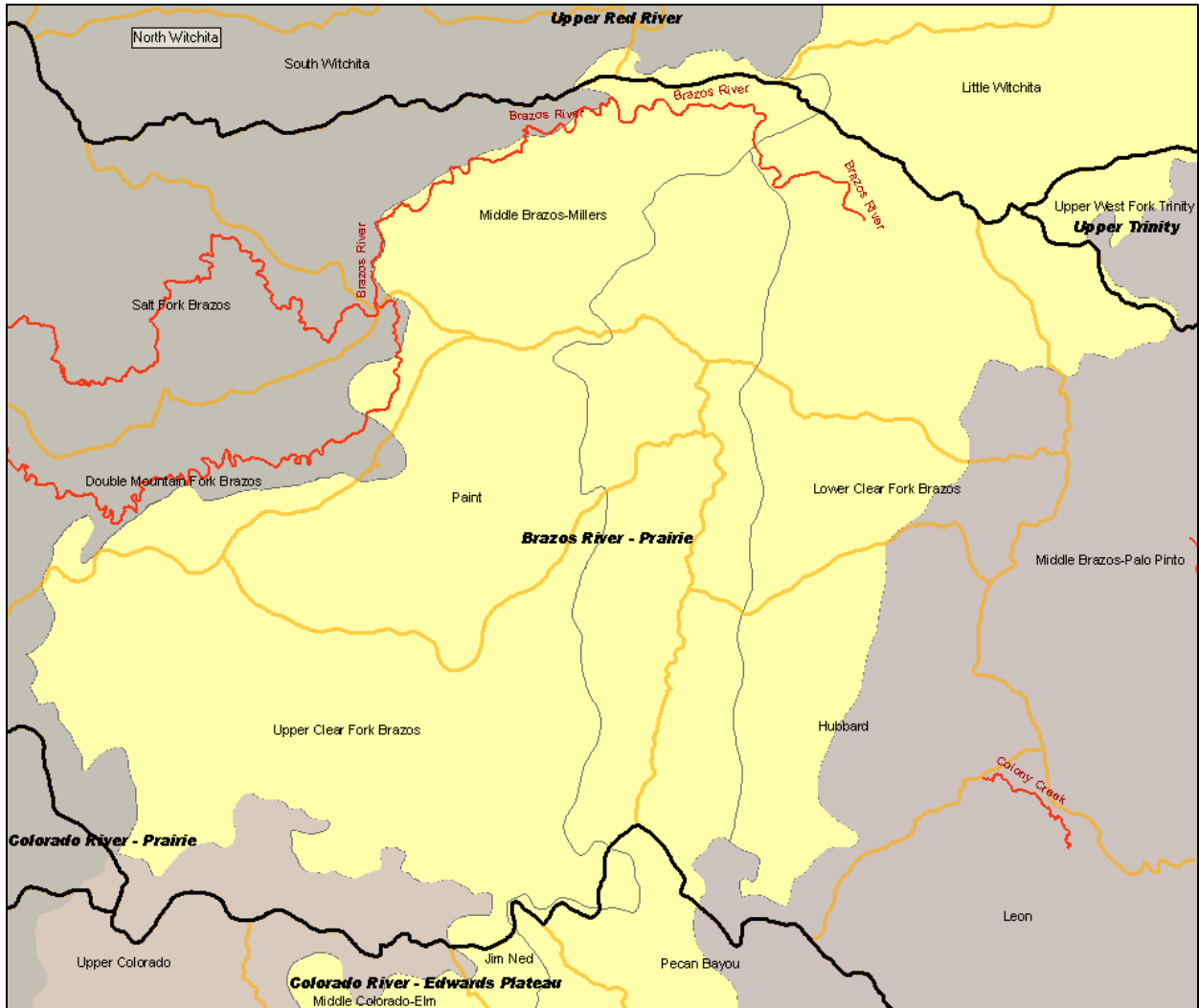
NOTE: Ecologically Significant Stream Segments and Lakes/Reservoirs which occur in the Subbasin (HUC 8, watershed) BUT NOT IN THE ECOREGION, are NOT included in this table.

Figure 2. CGPL EDU, HUC 8s, and ESSS – 3 maps

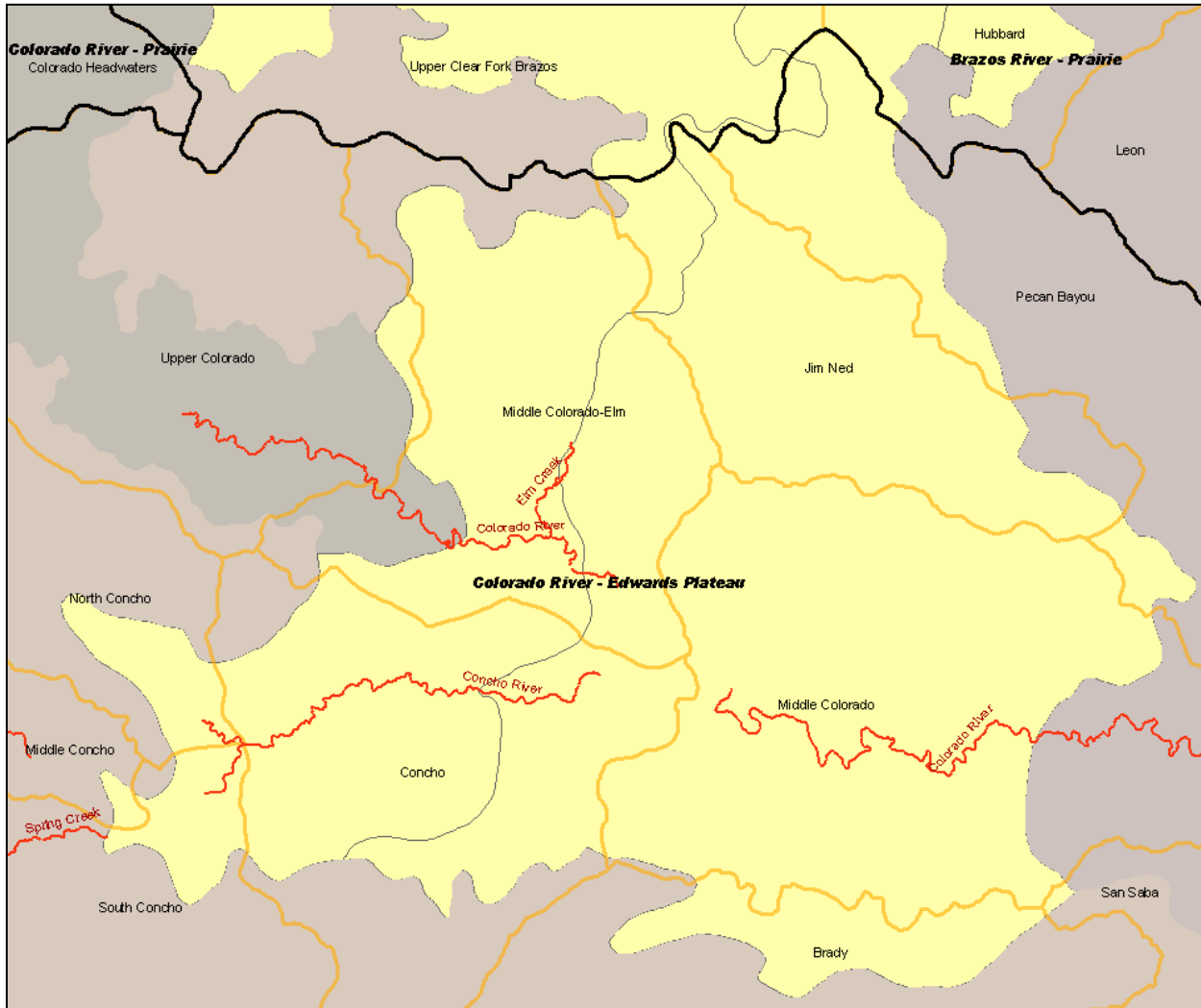
Upper Red River EDU black boundary, HUC 8 orange boundary, and ESSS red lines



Brazos River - Prairie EDU black boundary, HUC 8 orange boundary, ESSS red lines



Colorado River – Edwards Plateau EDU black boundary, HUC 8 orange boundary, ESSS red lines



Note: other important stream segments may be mentioned in the Priority Habitats section

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.⁷ 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.⁸

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.⁹ Each species has a NatureServe calculated state and global conservation rank, which accounts for abundance, stability and threats.¹⁰ Additionally, several species have federal¹¹ and/or state¹² listing (endangered, threatened, candidate) status. See the key to conservation status and listing ranks¹³ 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.**

NOTE REGARDING RARE COMMUNITIES

Only one rare community has been documented or is known to occur in this ecoregion specifically; however, there may be few rare plant communities known from adjacent ecoregions which may be considered rare in this region if found to occur:

- Eastern Great Plains Saline Marsh

⁷ Association of Fish and Wildlife Agencies. 2011. State Wildlife Action Plans. <http://www.wildlifeactionplans.org/>

⁸ TPWD. 2012. Texas Conservation Action Plan: Overview Handbook.

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

⁹ 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>

¹⁰ NatureServe. 2011. A network connecting science and conservation (online resources). <http://www.natureserve.org/explorer> (accessed 2011).

¹¹ USFWS. 2011. Endangered Species List, by state and county.

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

¹² TPWD. 2011. State Listed Species.

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

¹³ 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

- Oklahoma Bladderpod Glade
- Central Great Plains Little Bluestem Prairie
- Western Gypsum and Redbed Clay Prairie
- Vertisol Blackland Prairie
- Eastern Gammagrass - Tall Dropseed Herbaceous Vegetation

More information is needed on this front and a conservation action is defined to address this information gap.

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 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.¹⁴

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*.¹⁵

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.

¹⁴ http://www.tpwd.state.tx.us/landwater/land/tcap/documents/habitat_categories_tcap_2011.pdf

¹⁵ 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. CGPL Priority Habitats

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

GENERAL HABITAT TYPES	CENTRAL GREAT PLAINS (CGPL)	CGPL 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' Central Great Plains. NatureServe Central Databases. Arlington, VA. U.S.A. Data current as of 08 October 2009.</i>
Barren/Sparse Vegetation		Western Great Plains Cliff and Outcrop
Grassland	Midgrass prairie Shortgrass prairie	Central Mixedgrass Prairie Western Great Plains Sand Prairie Western Great Plains Shortgrass Prairie
Shrubland	sandhill shrublands	Edwards Plateau Limestone Shrubland Western Great Plains Mesquite Woodland and Shrubland Western Great Plains Sandhill Steppe
Savanna/Open Woodland	mesquite woodlands	Edwards Plateau Limestone Savanna and Woodland
Woodland	Oak woodlands in southern and eastern extents	Crosstimbers Oak Forest and Woodland Edwards Plateau Dry-Mesic Slope Forest and Woodland
Riparian	periodically flooded or subirrigated floodplain shrublands (mesquite, oak), woodlands (oak, juniper) and forest (oak, elm) associated with Upper Red River and tributaries, upper-middle Brazos River and tributaries, and northeastern-middle Colorado and tributaries midstream gravel bars (periodically scoured clean by floods, periodically vegetated)	Edwards Plateau Floodplain Edwards Plateau Riparian Southeastern Great Plains Floodplain Forest Southeastern Great Plains Riparian Forest Western Great Plains Floodplain Western Great Plains Riparian (mixed upland and wetland)

GENERAL HABITAT TYPES	CENTRAL GREAT PLAINS (CGPL)	CGPL Ecological Systems
Riverine	Instream habitats of the watersheds which intersect this ecoregion (see EDU Workbook) Ecologically Significant Stream Segments - Sweetwater Creek, Leila Lake Creek, Prairie Dog Town Fork Red River, Red River, Pease River, Brazos River, Double Mountain Fork Brazos River, Elm Creek, Colorado River, Concho River	NA
<i>Lacustrine (see Cultural Aquatic)</i>		
Freshwater Wetland	swale grasslands/depressional wetlands	Eastern Great Plains Wet Meadow, Prairie and Marsh Chihuahuan-Sonoran Desert Bottomland and Swale Grassland (mixed upland and wetland)
Saltwater Wetland		NA
Aquifer	Ogalalla (northern section of ecoregion)	NA
Caves/Karst		NA

GENERAL HABITAT TYPES	CENTRAL GREAT PLAINS (CGPL)	CGPL Ecological Systems
CULTURAL TYPES	<i>habitats in this column must support SGCN or rare communities to be considered in this plan</i>	
Agricultural	Open fields, during certain migration periods (for mountain plover)	NA
Developed		NA
<i>Urban, Suburban, Rural</i>	Structures in this ecoregion may support important bat colonies; more information is needed	NA
<i>Industrial</i>	Mines, for bats	NA
<i>Rights of Way</i>	Some pipeline and electrical transmission lines maintained in native grasslands	NA
Cultural Aquatic	Reservoirs: Greenbelt Lake, Lake Pauline, Santa Rosa Lake, Lake Electra, Lake Diversion, North Fork Buffalo Creek Reservoir, Lake Kickapoo, Lake Arrowhead, Lake Olney - Cooper, Millers Creek Reservoir, Lake Sweetwater, Lake Kirby, Lake Fort Phantom Hill, Lake Stamford, Hubbard Creek Reservoir, Lake Graham/Eddleman, Lake Ballinger/Moonen, Lake Winters/New Winters, O.H. Ivie Reservoir, Twin Buttes Reservoir, O.C. Fisher, O.H. Ivie, Twin Buttes, Lake Nasworthy, Lake Coleman, Lake Clyde, Lake Brownwood, Brady Creek Reservoir	NA
ARTIFICIAL REFUGIA		
Created mitigation wetlands	More information is needed	NA

SHARED HABITAT PRIORITIES WITH ADJACENT STATE

Texas shares its border with four states – New Mexico, Oklahoma, Arkansas, and Louisiana. CGPL shares its northern border with Oklahoma. Table 4 identifies habitat priorities which have been identified in the Oklahoma Wildlife Action Plan which may be potentially adjacent to the CGPL. Other habitat types and at-risk watersheds occur in other ecoregions adjacent to Oklahoma. 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 CGPL and are priorities for conservation in this ecoregion. In addition to shared priority with Oklahoma, networked intact native grasslands and prairie pothole wetlands which occur in this ecoregion are also an international priority under the North American Bird Conservation Initiative (NABSCI) Continentally Important Proposals to benefit shared priority bird species on the continent.

Table 4. Shared Habitat Priorities with Adjacent State – Oklahoma

Adjacent States	Ecoregions Shared with Texas	Habitat Priorities Shared with Texas ¹⁶
Oklahoma (OK)	High Plains Southwestern Tablelands Central Great Plain Cross Timbers East Central Texas Plain Western Gulf Coastal Plain	shortgrass prairie playas, springs and other wetlands sand sagebrush/bluestem shrublands mixed grass prairie ephemeral and perennial tributaries and mainstem of the Canadian and Red Rivers, and associated riparian zones and floodplains shinnery oak shrubland tall grass prairie oak woodlands and savanna mesquite savanna TX – OK HUC 8 at moderate risk: Washita Headwaters, Lower North Fork Red, Lower Salt Fork Red, Blue-China, Farmers-Mud

¹⁶ 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.¹⁷

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 CGPL 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.

¹⁷ 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. CGPL Priority Issues Affecting Conservation

Table formatted 11" x 17", landscape orientation

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
Invasive Species		
Non-native Plant	Salt cedar/tamarisk (<i>Tamarix spp.</i>) Cultivated and Old World grasses (e.g. Lehmann's lovegrass, King Ranch (KR) bluestem, Bermuda grass)	Salt cedar affects water use, monotypic stands, and outcompetes native riparian vegetation at all seral stages and canopy levels; armors banks and contributes significantly to channel incision and narrowing, which reduces the diversity and quality of habitat for aquatic species Non-native grasses either as improved pastures or naturally expansive are well-established, a substantial threat to grassland-dependent species (e.g. grassland-obligate birds)
Non-native Animal	FERAL HOGS introduced fishes and mollusks - freshwater springs, streams and marshes	Feral hogs also decimate important and fragile habitats (e.g. springs, seeps, riparian areas, swale depressional wetlands), degrade instream water quality Within streams, nonnative species compete with natives, and are a predation risk (e.g. small mouth bass are voracious non-native predators) Bait fish releases ("minnows") can cause problematic congeneric hybridization (e.g. <i>Gambusia sp.</i>)
Native Problematic	Native shrub (e.g. mesquite, shin oak) or "brush" encroachment into grassland systems; mesquite has displaced grasslands especially in areas with subsurface moisture Golden alga (see also <i>Non-native Invasive Species</i> ; it is not conclusively known whether golden alga is native or non-native)	Invasive native brush/trees are a significant threat to grassland-obligate birds: grassland loss decreases habitat availability and quality for grassland nesting birds, trees provide perches for hunting raptors which also decrease grassland bird, small mammal and reptile success Research is fairly new to relate golden algal blooms to SGCN declines; however, these are anticipated especially in areas where SGCN are dependent on ephemeral water sources and/or water resources with wide oxygen or nutrient ranges throughout the year.
Pests, Parasites, Pathogens		
Parasites	<i>Haemonchus</i> parasite	Deadly and devastating parasite to pronghorn, additional stressor on already stressed populations
Pathogens	White-nose Syndrome (WNS)	WNS affects hibernating bats and is spread through human (we think) and bat vectors, through cave visitation. Mortality is high; prevention and overall cause is unknown.
Power Development and Transmission		
Wind Generation	See also full discussion in Statewide Handbook Competitive Renewable Energy Zones (CREZ) wind generation development priority zones: Panhandle B (not well developed in this ecoregion) and Central (several existing developments)	High ridges typically intersect raptor migration corridors (impacts to Golden Eagle, Ferruginous Hawk, Swainson's Hawk, Whooping Crane) Typically impacts vegetation communities that occur on these ridges - grasslands, shrublands -- which causes habitat loss and contributes to invasive species; additionally, tall structures are not well-accepted by many grassland species migratory birds and bats adversely affected through barotrauma and direct collision
Solar or PV (photovoltaic) array siting	level or nearly level sites with high PV potential occur throughout the region	array siting, with the network of maintenance and access roads, impacts shortgrass mesa and other open lowland grassland communities (direct loss and invasive species competition), blocks sun and rain needed for photosynthesis and recovery of vegetation communities; plant and plant community protections are insufficient to trigger environmental compliance in this industry; deep footings may impact karst in certain areas; some may require large quantities of water
Hydro (Dam and Reservoir)	Existing and proposed reservoirs (e.g. Cedar Ridge) along and adjacent to Ecologically Significant Stream Segments and their river basins	<i>see also Water Development, Management and Distribution</i>
Biofuels	Row Crop, Switchgrass, Herbaceous: native rangeland and open grasslands converted to croplands (monotypic stands of switchgrass and others)	Loss of native and open grassland birds' habitats for foraging, nesting, and shelter -- Cassin's Sparrow, Rufous crowned Sparrow, Lark Sparrow, McCowan's Longspur, Dickcissel
Transmission	New development and expansion of existing lines/corridors construction of new power infrastructure corridors to meet urban user needs, from CREZ generation projects in this region to north and central TX loads maintenance and operations maintaining clear right-of-way for vehicle clearance/access, prevention of line and tower danger	While it's rare for most transmission lines to be strike hazards (most strikes are distribution lines), T-lines are a hazard for Whooping Cranes. Corridor directly takes all habitat types and species during construction (loss), degrades adjacent habitat (fragmentation), and may hinder movement (daily or seasonal)
Distribution	Development to power grid and retail users: construction of new power infrastructure corridors to meet urban user needs	mowing, trimming (permanent fragmentation, erosion) herbicide application

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
		directly takes habitat and species during construction (loss), degrades adjacent habitat (fragmentation), and may hinder movement (daily or seasonal)
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 in arid lands that do not recover quickly; in areas with subsurface irrigation, these areas become prime opportunities for invasive species introductions/colonization, brought in on equipment and through time without adequate or appropriate reclamation. disruption of daily and seasonal activities for fossorial animals (small mammals, reptiles, ground-foraging and ground-nesting birds)
Traditional extraction site development and operation, including pumping and pad sites, gathering stations, transmission/delivery facilities (distribution lines, roadway	on-site spill potential salt water injection wells road networks	limited ground and surface waters (cieneegas, swale wetlands, others) highly sensitive to change/contamination are at risk from chemical, drilling material, and oil spills and groundwater contamination caused by salt water injection Extraction operations cause 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. sand dunes west of Odessa, dunes sagebrush lizard is threatened by these operations and road mortality; nocturnal birds and bats can be adversely impacted by the light and noise pollution; road networks, constant traffic and noise, and mechanical infrastructure interrupts seasonal and daily movements, foraging and mating behaviors of some mammals, reptiles, and birds; small geographically limited populations of desert plants fragmented or lost).
Hydraulic fracturing ("fracking") or "shale gas" extraction	Eastern edge of the Palo Duro basin, northwestern Fort Worth basin and Barnett shale play; some maps depict Woodford gas deposits under the northernmost "finger" of this ecoregion in Texas, coinciding with one of the nation's most fragile aquifers – the Ogalalla http://www.energyindustryphotos.com/shale_gas_map_shale_basins.htm and http://www.eia.gov/oil_gas/rpd/shale_gas.pdf	deeply injected chemical liquid which fractures substrates and releases gas for capture and delivery: potential groundwater risks, potential chemical spill and lingering chemicals in soils, geologic destabilization and recharge capacity changes: groundwater and its surface expression in seeps, springs and cieneegas are extremely important habitats in this ecoregion; groundwater contamination could cause total loss of isolated aquatic populations, adversely affect vegetation that depends on water quantity and quality at springheads, seeps, riparian areas, and instream. Contamination also poses a risk to human and livestock water sources. Fracturing activities may also adversely affect the recharge capacity of porous rock layers and networked karst 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)
Mining		
Sand and Gravel - upland and riverine	sand and gravel mining along and within streams and rivers	loss of riparian habitats for instream and adjacent mining, sedimentation in streams contributes to loss and degradation of instream habitats
Gypsum	<i>Was mentioned in workshop but without details; no documentation provided or online about effects to SGCN – this is not a priority without supporting documentation</i>	
Communications Infrastructure		
Cell and other communication towers	Inappropriate siting and/or lighting influences and can cause impact hazards during night bird migrations	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 and facility repairs)	Primarily related to riparian corridor effects	Soils in this region are highly erodible, river banks are steep and deeply incised in many areas, and riparian habitats are immensely important for erosion control to protect water quality for freshwater mussels and as breeding habitat for resident birds and cover/stopovers for Central Flyway migrants through this area. Road and bridge construction does little to protect intact, native riparian zones and frequently no remediation is done following construction to match previous conditions or prevent the colonization of invasive plant species.
right of way maintenance	maintaining clear right-of-way for vehicle clearance/access, minimizing fire danger, and maintaining driver visibility	mowing, trimming (permanent fragmentation, erosion) herbicide application some rare plants are known only from sites in ROW; these are not always adequately protected as staff changes occur, management plans are filed away, information not passed through entire chain of command - needs better communication in some places
Land & Water Mgmt: FARM	See also Water Development section	

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
Lack of soil and water management and conservation practices	Area is intensely developed for agricultural production: chemical-laden irrigation water runoff is an issue especially for streams already at "carrying capacity" for sediment and salinity	While some of the SGCN freshwater fishes have high tolerances for salinity, many of the species are headwater and spring fed river dependent; excessive chemicals from agricultural practices are known to have adverse impacts to sensitive aquatic insects and other invertebrates, fishes, and amphibians
Unsustainable irrigation	Timing of water use for irrigation does not account for fish and wildlife needs or for instream downstream water quality maintenance See also <i>Groundwater Planning and Distribution</i>	Several aquatic SGCN fishes and freshwater mussels (Texas Fatmucket, Texas Pimpleback) are known from this ecoregion; environmental flows are critical to their maintenance and recovery
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) historic and/or current range-intensive livestock operations out of sync with land capacity	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) Excessive grazing and grazing during drought results in degraded grasslands and bare, erodible soils, which can contribute opportunity for brush encroachment into these areas Grassland SGCN birds affected: Eastern Meadowlark, and Cassin's Sparrows
Landowner/land management incentive programs working at cross-purposes	Conservation Reserve Program, other Farm Bill Conservation Title incentives, Farm Bureau and Farm Service Agency programs, and technical guidance on wildlife issues from private individuals as well as TPWD resource specialists may work at crosspurposes inappropriate herbicide application for mesquite control	Native grasslands are a key ecosystem in this ecoregion; land management and restoration assistance in this region typically centers on brush removal and grass planting. Unfortunately, brush removal is not always recommended on sites where this practice is appropriate (may be too steep, highly erodible, or not enough cover remaining to retain ground) and nonnative grasses are recommended for reseeding, farmland to pasture conversion, and even "restoration." Additionally, certain herbicides recommended may not be appropriate for all sites and may cause more harm to aquatic surface and groundwater resources than benefits to terrestrial systems.
Fencing	netwire fencing high game fencing	Netwire fencing and most "game" fencing fragments pronghorn daily and seasonal movements, restricts their access to water and food, and increases their vulnerability to predation; their movements are interrupted by fences under which they cannot crawl (they do not jump fences). Issue causes lack of genetic diversity through inbreeding, lack of dispersal into available appropriate habitats (which means that role is unfulfilled in the system), and potentially concentrates pathogens (e.g. <i>Haemonchus</i> parasite). In addition to these issues, high game fencing can also further isolate all wide-ranging wildlife, concentrate nonnative exotics like hogs and the destruction they wreak, and place an unduly expensive management burden on the landowner requiring intensive management and restoration to prevent habitat loss.
Clearing and loss of important natural sites/habitats	Springs, swales altered for stock uses	Loss of natural spring and swale wetland habitats for aquatic and grassland species
Lack of soil management and conservation practices	lack of soil conservation (vegetation conservation/restoration) along stream courses and on grazing lands, soil erosion	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
Fire suppression and lack of or inappropriate application of Rx fire	Little to no efficacy of applied fire - scale of application does not match ecological need	Grasslands are fire dependent, as are the SGCN which depend on the grasslands. The lack of fire contributes to excessive fuel loads (meaning Rx fire, when applied is more intense and potentially damaging rather than restorative, can cause community shifts). Fire is needed for short and midgrass prairie health for SGCN ground nesting birds, insects and pollinators, as well as small mammals which forage in these systems.
Land & Water Mgmt: Municipal	See also Water Development section	
Lack of Zoning and Planning	Planning efforts are minimal, rarely regional except for transportation	Land: Urban sprawl and little regulation on development type contributes to arid land habitat loss of many types (grasslands, shrublands) with potential to effect further adversely affect prairie dogs, mountain plover, and other SGCN
Land & Water Mgmt: Conservation & Recreation	<i>It was noted in the workshops and surveys for this area that there are few public or private lands managed primarily for fish and wildlife conservation, grassland conservation, and water quality protection in this area. That seems to be the greatest issue in this category.</i>	
Inadequate/Inappropriate Management	Prescribed Fire application	Public lands which are managing for conservation values have a difficult time applying prescribed fire for grassland restoration either due to the area of land available for management (not cost effective, not ecologically effective in the landscape) or proximity to concerned landowners (agricultural or ranching) or urban areas. Some areas of adequate size also lack ability (staff, training) to apply Rx fire adequately to mimic natural conditions.
Inappropriate Recreational Uses	ORV use in sensitive areas (stream beds, "breaks")	Off road vehicle recreation sites have been proposed in this and adjacent ecoregions. ORV use in streams and on breaks degrades water quality through bank erosion and instability, stream bottom degradation, and direct impact to freshwater mussels, invertebrates, and SGCN fishes. Sites more appropriate to ORV use need to be defined.

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
Not all "public" or "managed" lands are "conservation" lands	While most public lands in this region are managed for recreation compatible with wildlife and fisheries resources, some improvements could be made	Streamside and arroyo trails, camping areas, and recreation zones need to be routed and/or designed to prevent erosion-based damage to rare plant communities, instream and stream-adjacent resources which provide important habitats for SGCN fishes and riparian wildlife. Erosion and vegetation losses do not recover in some instances even in a generation given the arid conditions in this ecoregion.
Lack of long-range conservation planning and cohesive land conservation/management strategies in each ecoregion	This ecoregion is highly fragmented and would benefit from cohesive longrange planning for conservation connectivity;	Playa Lakes Joint Venture Bird Conservation Region 19 covers most of this ecoregion. Their conservation planning work to set population targets, conservation goals, and focal areas is unprecedented in this region; using this model, other SGCN taxa would benefit from analysis and inclusion in these efforts or other efforts at this level (e.g. Landscape Conservation Cooperative role?).
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 are the primary driving force in surface and groundwater planning Overallocation and dewatering of region's principle rivers	Central Great Plains (TX) is not experiencing the sprawling urban/suburban growth that many other areas of Texas are; however, water is a scarce and precious resource. Groundwater withdrawals and surface water diversions deplete the amount of water available for wildlife and the connection between both sources is not prevalent in planning efforts. Both surface water and groundwater use for agriculture and municipalities has reduced the amount of water present in rivers, creeks, and springs. Altered flooding regime (timing, periodicity, amounts) that adversely affects flood-dependent riparian and aquatic systems See also other sections: Other Water Source Developments and Technologies: Interbasin Transfers Reservoir Construction and Operation Groundwater Planning and Distribution
Reservoir Construction and Operation	Timing/Periodicity/Intensity of Water Releases releases are unnaturally intense and short duration in the "wrong" season to mimic natural flooding processes	Unnatural hydrograph scours instream and stream-adjacent habitats, shifts vegetation communities out of sync with other riparian communities where flooding is more "natural", vegetation communities and instream animal (invert, fishes, etc.) cannot "rely" on the seasonal changes under which they evolved.
Groundwater Planning and Distribution	Not all aquifers have groundwater districts which collaborate with fish and wildlife professionals; groundwater districts are political subdivisions, not aligned necessarily with aquifer boundaries Extraction: groundwater pumping without full accounting for natural resources as a "use"	Many of the rivers and their tributaries in this ecoregion support instream species and streamside vegetation which has evolved to tolerate a certain threshold for salinity; changes in groundwater and surface water extraction and methods have changed that salinity in some areas, which can adversely affect species tolerance.
Other Water Source Developments and Technologies	Potential reservoir development, water diversion and chloride removal projects within the Upper Brazos region	Increased salinity and other changes in water chemistry in waterbodies receiveing discharge from these operations; potentially impacting the sharpnose and smalleye shiners appropriate siting, waste discharge, and monitoring will be important to avoid, minimize or mitigate effects
Lack of Information & Resources		
Lack of data, spatial format	Lack of Data (amount, type) needed for making informed conservation decisions, listing and delisting decisions, and recovery recommendations	Information needed on distribution, population stability and threats to small mammals (e.g. Texas kangaroo rat); bird monitoring data for riparian and native grasslandecosystems; freshwater aquatic SGCN (assemblages of fishes, invertebrates and amphibians) tolerances to changes in water quality and quantity; and recovery thresholds for successful shortgrass prairie assemblages (prairie dogs – black footed ferret – burrowing owl – etc.) to craft specific management plans and recommendations Little data is collected in this region, and if it is, it is rarely placed in the TXNDD for conservation practitioners to view or use for monitoring or assessment See also Playa Lakes Joint Venture BCR 19 Recommendations Climate change models, GIS analysis of land conversion and change overtime, species specific information, community-specific information – see CLIMATE CHANGE SECTION in Statewide handbook and below

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
Lack of Processing <i>Existing</i> Data	this tied to "Lack of Information (amount, type)"	Where census, survey, records and collections are documented, data are curated in scattered or personal archives, irretrievable in a coordinated way 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. Activities directly relevant to delisting and preventing listings would be catalyzed by this information.
Data or Information is not Available	Best Management Practices	Primarily related to riparian conservation – need regionally specific riparian BMPs and implementation in a coordinated way to incentivize private landowners to buffer contributing and mainstem water resources
Inadequate Policies, Rules, Enforcement		
Wetland Protection	Loss of and impact to "non-jurisdictional" wetlands and other waters	Playas and other isolated swale grassland wetlands are at risk – unregulated fill and damage to underlying retention substrate from plowing through; these sites are EXTREMELY important to migratory waterfowl, grassland birds (when dry, they function like grassland habitats for breeding birds)
Other Cross-Cutting Issues		
Lack of Conservation Funding		Despite the infusion of resources to JVs, LCCs and NRCS Farm Bill programs, this region (like others in Texas) would benefit from a reliable steady source of conservation funding like that proposed with the Teaming with Wildlife Act.
Climate Change		Climate change models, GIS analysis of land conversion and change overtime, species specific information, community-specific information – see CLIMATE CHANGE SECTION in Statewide handbook and actions below: highly localized and intrinsically rare species will have few options to adapt as habitats shift, change, or disappear with climate change in this region; options for transplanting or translocation are few to none as many of these habitats are edaphically specialized in the region (e.g. playas).

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*.¹⁸

Actions proposed for the CGPL (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.¹⁹ 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

¹⁸ 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.

¹⁹ 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.²⁰ 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*²¹ 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.

²⁰ 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>

²¹ Same as above

Table 6. CGPL Conservation Actions

Note: Table is formatted 11" x 17", landscape orientation – SEE ALL OF THE EFFECTIVENESS MEASURES²² FOR EACH OF THE OVERALL ACTIONS TO ESTABLISH FINER DETAIL IN PROJECT IMPLEMENTATION

Conservation Action
Invasive Species
Document and map golden algal blooms across water bodies in this ecoregion, especially where SGCN fishes are known to occur in connected Ecologically Significant Stream Segments (see Table 3, Riverine habitat) along with conditions which may be related; encourage contribution by citizen scientists to a golden algal bloom tracking network;
Prioritize landowner incentives for restoration of native grasslands, including conversion of non-native grasses to native, where feasible and where landowner can commit to longterm conversion practices and success. Promote the use of site-appropriate native grasses only in landowner incentive programs for livestock or wildlife recommendations.
Target angler education to prevent baitfish releases where they may compete with or hybridize with rare native SGCN fishes in this ecoregion.
Encourage site-appropriate invasive native brush removal with least ecological collateral damage (appropriate slopes, recovery vegetation to natives, wholesale clearing outside of streamside buffers, with followup stabilization natives for streamside removals) to promote healthy native grasslands for grassland-obligate birds and pronghorn and healthy native riparian areas; monitor before and after to determine benefits to target species. Publish best practices for others in the ecoregion to use.
Promote aggressive feral hog and other nonnative ungulate control; add to wildlife management plans to benefit groundnesting birds, small mammals, rare plants and plant communities in this plan.
Intensify outreach and public education efforts especially near boat ramps and high-traffic fishing tournament areas to reduce or eliminate the introduction of aquatic invasives – plants, mollusks (especially zebra 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.
Pests, Parasites, Pathogens
Intensify Master Naturalist and private landowner outreach in areas with abandoned mines or other structures which harbor bats to promote awareness of White-Nose Syndrome and citizen science documentation of this very important threat. Texas needs a documentation protocol and clearinghouse for suspected observances, verification, and reporting structure to the Western Bats Working Group and the USFWS WNS working group.
Sample and monitor <i>Haemonchus</i> distribution in pronghorn populations and determine source of vulnerabilities, spread, and avenues for containment and recovery if needed.
Power Development and Transmission
Encourage voluntary compliance with the USFWS Wind Power Development Guidelines and coordination with TPWD's Habitat Assessment section for environmental review of impacts, potential avoidance strategies, and mitigation opportunities for highest ecological value.
Map sensitive sites within well-identified migratory pathways for whooping cranes, hawks and other raptors, neotropical migrants, and waterfowl in addition to pronghorn herds potentially impacted by wind tower siting and operations. Provide this information to TPWD Habitat Assessment section so that they can better assess wind tower and operational impacts, propose avoidance and mitigation measures. Support the development of an online mapper for developers to use to avoid areas of highest ecological significance.
Provide conservation outreach to power developers and providers, especially those interested in solar and biofuels, to inform them of the importance of native grasslands to regional wildlife and fish resources, areas of highest significance for avoidance, and potential areas to concentrate mitigation dollars and projects in the event avoidance is not feasible or prudent.
Improve Environmental Review and Consultation for voluntary practices (wind, solar): Create mapped zones of sensitive areas (raptor migration corridors, whooping crane sites/corridor, proximity to colonial habitats, and along other migratory flyways) to share with wind developers to encourage better siting Identify timing and intensity of barotraumas and impact hazards from wind turbines and encourage wind generation companies to modify practices
Oil and Natural Gas Production and Delivery
Monitor fracking operations in this ecoregion over the Woodford gas deposits and the Ogallala; review existing literature and documentation related to fracking effects to groundwater resources and geologic destabilization to determine if this is a threat to this resource and, specifically, the SGCN which depend on springs and spring-fed river systems in this region. Work with geologists, natural gas industry and fracking specialists to determine what best management practices could be developed to avoid potential groundwater contamination, appropriate remediation measures, and address reclamation to native conditions post-operations.

²² 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>

Conservation Action
Provide best reclamation practices in written guidance for oil and gas companies operating in this region, posted to the TPWD Habitat Assessment (Environmental Review) website; emphasize containment of potentially hazardous runoff, reclamation of cleared sites to native grasses, and reclamation of wetland and swale areas to natural conditions which could again support wetland communities.
Mining
Provide best reclamation practices in written guidance for mining companies operating in this region, posted to the TPWD Habitat Assessment (Environmental Review) website; emphasize containment of potentially hazardous runoff, reclamation of cleared sites to native grasses, and reclamation of wetland and swale areas to natural conditions which could again support wetland communities.
Develop a short list of best management practices for water quality protection and aquatic feature adjacent vegetation protection for sand and gravel mining operations, especially targeting those operators near or adjacent to Ecologically Significant Stream Segments. Provide conservation outreach to mining company operators to inform them of the new regulations requiring a TCEQ permit for river and stream adjacent sand and gravel operations. Work with TCEQ permitting requirements to include information about the sensitivity and importance of riparian areas, springs, seeps and other water features, including nonjurisdictional wetlands and swales, to encourage best practices (avoidance, stormwater pollution prevention, minimization).
Provide outreach to landowners with bat roosts and colonies in mining structures and incentivize gating and stabilization as these cultural habitats are important in this region.
Communications Infrastructure
Provide conservation outreach to regional communications providers to inform them of areas of highest significance for avoidance – migratory bird pathways (especially nocturnal; also known impacted species such as Yellow-billed Cuckoo, Painted Bunting, Summer Tanager), adjacency to pronghorn herd patterns -- and potential areas to concentrate mitigation dollars and projects in the event avoidance is not feasible or prudent. Identify non-compliant communications towers work collaboratively to bring into compliance (lighting, height); outreach to communications companies about the local hazards of communication towers and recommendations to improve practice to improve conditions for all
Transportation
Most of this area is not targeted for large transportation improvements; however, it would be beneficial to identify and suggest protective measures for water quality at important crossings at and upstream of aquatic SGCN populations; and identify significant riparian corridors for conservation; to document sites and best management practices for rare plants and communities in and adjacent to the right-of-way in this ecoregion; and discourage the creation of stream crossing “rough roads” on private sites through riparian conservation incentives
Land & Water Mgmt: FARM
Provide incentives for water conservation measures and equipment where irrigation is needed, conversion to low water crops, water trust (like land trust) participation; and stormwater/irrigation runoff prevention/containment/treatment to promote better water quality discharge from farm sites.
Identify key areas to promote netwire fencing replacement (with strand barbed wire) for pronghorn benefits. Monitor pronghorn use of these areas to determine if this fencing program is an effective conservation technique or whether it should be coupled with other strategies (what other strategies)
Identify areas in windrows, crop corners and fenceline habitats where management could benefit grassland or shrubland dependent birds, contribute to riparian conservation through streamside buffers and conserve rare plants and communities.
Land & Water Mgmt: RANCH
Promote incentive programs which encourage landowners to protect and/or restore swale wetlands, native grasslands (especially short grass and midgrass prairies), mature native mesquite savanna on appropriate sites; further incentivize data sharing about SGCN to better manage and recover these species to prevent listing.
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 or enhancement project as these are known to be detrimental to native habitats and the wildlife on which they depend. Properly managed native grasses do not require annual fertilization; highly palatable native grasses (i.e. Yellow Indiangrass, Little Bluestem, Big Bluestem, Switchgrass, and Eastern Gammagrass) provide high protein levels required for livestock and hay production. These factors make native grasses a sustainable option for Texas’ rangeland and SGCN benefits. Native grasses have improved drought tolerance and are adapted to Texas’ soils and climates. Economic analysis comparing introduced grass to native grass in a commercial cow-calf production system has estimated greater returns for native grasses when fertilizer costs are \$40- 50 per acre. In addition to terrestrial and aquatic wildlife benefits, pasture conversion back to native grasslands reap public benefits through improved water quality, groundwater recharge, carbon sequestration, erosion control, outdoor education, and recreational opportunities. 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. Incorporate SGCN fish and wildlife habitat values and recommendations in rotational grazing system recommendations (Grazing Lands Conservation Initiative). 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, etc.).

Conservation Action
Work with willing landowners <i>especially adjacent to and in corridors between</i> well-managed public lands to restore and manage prairie grassland and riparian communities in large single-ownership or smaller acreage cooperatives – opportunities to connect/improve historically fragmented management
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.
Identify key areas to promote netwire fencing replacement (with strand barbed wire) for pronghorn benefits. Monitor pronghorn use of these areas to determine if this fencing program is an effective conservation technique or whether it should be coupled with other strategies (what other strategies)
Work with private landowners and conservation partners to minimize feral hog populations through aerial shooting, hunting, and trapping. Provide technical guidance and educational programs about the impact and management of feral hogs to benefit ground nesting birds, small mammals, aquatic species
Identify the barriers to prescribed fire application to significant grassland restoration areas. Make management recommendations (timing, season, periodicity) to overcome barriers AND match more natural fire episode timing. Craft TARGETD outreach plans to overcome these barriers and work with landowners in core grassland restoration and recovery areas to benefit pronghorn, grassland birds, small mammals, reptiles and rare plants and communities. Select a few keystone species for monitoring in these areas. Document and share lessons learned about appropriate periodicity and intensity for restoration, preventing adverse vegetation community shifts and/or nonnative species invasions.
Playa Lakes Joint Venture BCR 19 Area Implementation Plan (2008). Review elements of the Plan to identify mammals, herps, inverts, plants and communities from TCAP to identify specific overlap, monitoring objectives and potential gaps in other species’ or assemblages coverage. If there are additional conservation objectives which are not covered by BCR 19 AIP and promote those to the regional Landscape Conservation Cooperative. Tie these recommendations to the National Fish Habitat Action Plan and ESSS conservation sites to enhance conservation connectivity for all fish and wildlife resources. <ul style="list-style-type: none"> • Convert 744,516 acres of cropland to CRP or CRP-like habitat (Cassin’s and Grasshopper Sparrow); new acres should be planted to native grasses with forbs (Lesser Prairie-Chicken) • Manage 19,115 acres of shinnery so it contributes to large blocks of habitat by targeted placement of CRP-like habitat (Lesser Prairie-Chicken) • Convert 1,000,000 acres of Juniper to mixed grass prairie (Swainson’s Hawk, Loggerhead Shrike) • Convert 3,708,500 acres of Mesquite/Juniper habitat to mixed grass prairie (grassland birds) • Manage 6,581,113 acres of mixed grass with few shrubs (1-3% cover) (grassland birds) • Convert 3,162,817 acres of current mesquite shrubland to savannah (Scissor-tailed Flycatcher, Lark Sparrow) • Increase large native cottonwoods in urban/suburban areas by 137,060 acres (Mississippi Kite) • Increase late successional riparian forest by 234,923 acres (Mississippi Kite) • Increase native riparian shrubland, especially along the Canadian and Red Rivers, by 174,983 acres (Bell’s Vireo) • Manage 28,424 acres of shortgrass prairie for few shrubs and high grass, within the northern third of the Area (Lark Bunting) Restore and employ moist-soil management practices on 36,704 acres of wetlands (waterfowl)
Brush management objectives for species conservation needs to be done in conjunction with the Texas Ecological Systems Mapping Project data for desired ecological condition; brush management is not appropriate on all sites (some areas need other prescriptions to manage understory and promote mature savanna – mesquite, oak). Additionally, some mixed oak – juniper woodlands are appropriate in canyon areas in the southern extent of this ecoregion; not all juniper is “out of place.” Apply Farm Bill programs for brush management with willing landowners to benefit grassland species in sites evaluated for SGCN and desired ecological condition that supports grassland and appropriate savanna types. Monitor to document that these management practices are effective in grassland species conservation (see Effectiveness Measures)
Form multi-partner working group(s) to establish scientifically sound best management practices for chemical/mechanical brush control for the ecoregion and specific watersheds
Conservation easements and landowner incentive programs are the best instruments for landowner participation in this region. Landowners with intact grasslands (especially those within priority grassland areas identified by the Playa Lakes JV, grasslands with restoration potential for little investment, landowners willing to change to pronghorn-sensitive fencing where appropriate, riparian corridors along Ecologically Significant Stream Segments (and to their headwaters), and/or isolated wetlands 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 (see Statewide/Multi-region Issues handbook – Information Actions section).
Work with local landowners, adjacent grassland ecoregions, and planning partners to identify and designate Important Bird Areas , primarily for shortgrass and midgrass
Land & Water Mgmt: Municipal

Conservation Action
Work with city and/or regional planners affecting Wichita Falls, Abilene, and Brownwood to reduce the human-induced pollution risks and increase water conservation in the high to very high risk HUC 12 watersheds identified in the National Fish Habitat Action Plan; identify specific measures that can be implemented and establish monitoring to determine if outreach and coordination with planning entities is effective
Land & Water Mgmt: Conservation & Recreation
Work with willing landowners <i>especially adjacent to and in corridors between</i> well-managed public lands to restore and manage grassland and riparian communities in large single-ownership or smaller acreage cooperatives – opportunities to connect/improve historically fragmented management
Identify suitable sites and best management practices for ORV recreation in this ecoregion to protect stream quality and habitat integrity, prevent erosion and riparian degradation, and conserve certain rare plants which occur on slope or erodible soils. Assist and work with the ORV community to understand suitable site selection and design/maintain sensitive, suitable trails for longterm sustainable use
Desalination, chloride removal, sand and gravel mines, and SGCN fishes need to be mapped in conjunction with the data from the National Fish Habitat Action Plan watershed risk assessment to determine where and to whom targeted outreach efforts for water quality would be most useful.
Species Restoration: <ul style="list-style-type: none"> ▪ Pronghorn populations (not just individuals) coincidental with habitat improvement, fence replacement, restocking, parasite research and plan to deal with this problem, genetic enhancement (?) ▪ Black-tailed prairie dog – burrowing owl – black-footed ferret ecosystems: introductions, habitat improvement, management recommendations for compatible land uses
Lack of Information & Resources
More specific information is needed in this ecoregion related to the historic ranges, remaining intact habitats for SGCN, and reintroduction potential for several SGCN – lesser prairie chicken, many shortgrass and midgrass or grassland-shrubland matrix species (e.g. lesser prairie chicken, black-tailed prairie dog and associated species such as swift fox, black-footed ferret, ferruginous hawk, burrowing owl); simply not much is known in this ecoregion in Texas.
Lack of information about SGCN population status, especially for shortgrass prairie dependent species, aquatics, invertebrates and rare plant communities, is a primary conservation concern. In order to do this strategically, TPWD Wildlife Diversity and Technical Guidance biologists could work with Playa Lakes JV coordinators, NRCS Wildlife Biologists, USFWS Partners Program biologist, data from the Texas Ecological Systems Mapping Project and local land trusts to determine where the highest priority habitats for SGCN are potentially located in this region. Landowner workshops about the importance of this data could promote voluntary participation in this effort. While most of the region is under agricultural production, it is anticipated that some larger well-managed ranches may be able to contribute to conservation of significant resources and gain incentives and protections under Safe Harbor and/or Candidate Conservation Agreements. TXNDD staff would be helpful to attend this/these sessions to train partners on data collection formats/needs. The data gathered through this endeavor should be entered in the TXNDD within 6 months of TXNDD staff receiving all of the data
Only one rare community has been documented or is known to occur in this ecoregion specifically; however, there may be few rare plant communities known from adjacent ecoregions which may be considered rare in this region if found to occur: <ul style="list-style-type: none"> ▪ Eastern Great Plains Saline Marsh ▪ Oklahoma Bladderpod Glade ▪ Central Great Plains Little Bluestem Prairie ▪ Western Gypsum and Redbed Clay Prairie ▪ Vertisol Blackland Prairie ▪ Eastern Gammagrass - Tall Dropseed Herbaceous Vegetation More information is needed on this front and a conservation action is defined to address this information gap.
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 rare species experts to identify concerns, barriers, and solutions. Monitor (select keystone suite of grassland species – all taxa) to determine effectiveness of the applied practices
Form multi-partner working group(s) to establish scientifically sound best management practices for riparian restoration (cottonwood, sycamore), 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)

Conservation Action

Create a multi-disciplinary ecology committee to identify three to five years of highest priority research projects (actual projects, not just concepts) **specific to this ecoregion** 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 for SGCN and rare communities (not just charismatic fauna, threatened and endangered species – choose keystone species for priority habitat types).

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, **other ...**

Inadequate Policies, Rules, Enforcement

Review TPWD policies and regulations on trapping of furbearers and non-game species to reduce unintentional loss of non-target SGCN including (badger, skunks, and swift fox). Increasing trap inspection intervals from every 36 hours to every 24 hours for furbearers and requiring 24 hour trap checks for non-furbearing target species would potentially reduce the number of non-target losses. Consider implementing trapper education classes to improve trapping techniques that reduce non-target losses

Other Cross-Cutting Issues

Instream and riparian area rehabilitation and conservation measures in/adjacent to identified stretches of all Ecologically Significant Stream Segments: recommendations for instream flow, quality and intensity management; riparian restoration; and specific work to increase resiliency to climate change

Climate change models and effects on isolated wetlands and playas, riparian areas, native grasslands, and springs/groundwater resources

Determine market values that are driving row crop production and land sales 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 in that document). This will go a long way toward landscape-level planning and shared priorities.

