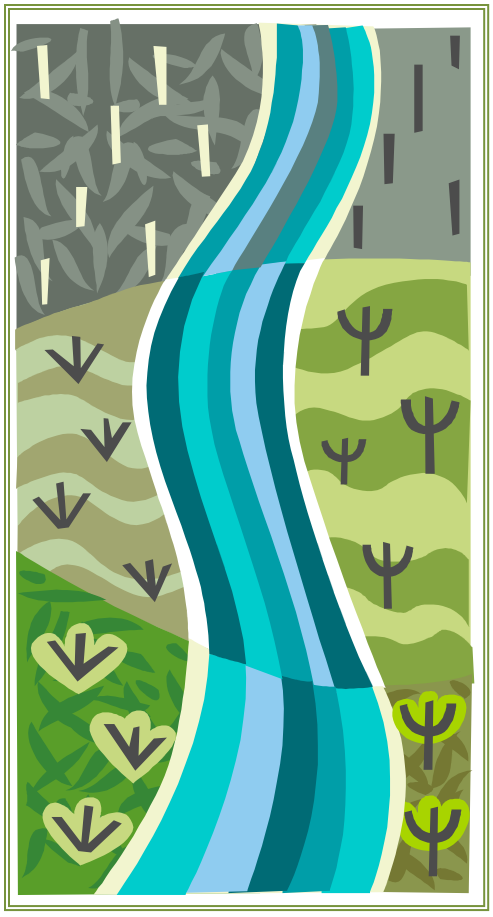


TEXAS CONSERVATION ACTION PLAN

High Plains ECOREGION HANDBOOK

August 2012

Citing this document:

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

Contents

ECOREGION HANDBOOK FIGURES

ECOREGION HANDBOOK TABLES

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 High Plains (HIPL) 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 website[1]:

- 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 HIPL 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 HIPL 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 HIPL 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] For more information, check the Natural Resource Conservation Programs and Services for Texas Landowners. [3] 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 the handbooks,[4] 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. 2007 Natural Resource Conservation Programs and Services for Texas Landowners. http://www.tpwd.state.tx.us/publications/pwdpubs/media/pwd_bk_w7000_1198.pdf

[4] 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

Miles and miles and miles of sky and plowed fields greet the casual observer living in or driving through the High Plains … a subsection of the North American south-central semi-arid prairies that stretch from southeastern Wyoming, western Nebraska, eastern Colorado, western Kansas, through the panhandles of Oklahoma and Texas, and into eastern New Mexico. Drier than the Central Great Plains to the east, this ecoregion is known for its hot summers, cold winters and very little precipitation.

Major ecological characteristics of the High Plains have been forever changed under the plow for agriculture (primarily cotton, corn, winter wheat, grain sorghum), barbed wire fencing to control grazing animals and contain cattle feedlots, and by prevention of natural fires during the past century.[5] Oil and gas exploration and the recent development boom in wind power generation is also a factor which has shaped this landscape. Urban impacts, compared to other ecoregions, are less intense, although several of Texas' larger towns lie in this area: Amarillo, Lubbock, Midland, and Odessa. Nonetheless, some fragile and unique habitats such as sand shinnery oak-sand sage dunes survive in areas southwest of Lubbock and northeast of Amarillo. Historically, the region supported short and midgrass prairies; approximately16 million acres of native short and mixed-grass prairie currently exist in the Texas panhandle in the High Plains and Southwestern Tablelands (part of the "Rolling Plains"). While this number may seem like a lot, most of the existing native prairie is extremely fragmented and much of it is degraded, but restorable. Only one site in the North American Grasslands Priority Conservation Areas is in this region of Texas: the Rita Blanca National Grasslands.[6]

Native shortgrass prairie features blue grama, buffalograss, and fringed sage, and mixed grass areas had sideoats grama, western wheatgrass, and little bluestem. Sandsage prairies support sand sagebrush, sand bluestem, prairie sandreed, little bluestem, Indian ricegrass, and sand dropseed. Shinnery sands areas in the south feature Havard shin oak, fourwing saltbush, sand sagebrush, yucca, and mid- and shortgrasses. While charismatic megafauna like bison no longer roam freely and black-footed ferrets were eradicated in these systems long ago, shortgrass and midgrass prairies are very important for black-tailed prairie dogs, pronghorns, swift fox, burrowing owls, mountain plover, lesser prairie-chicken and many invertebrates. That said, the diversity (both over time and space) of remaining uncultivated habitats has been reduced by conversion to nonnative grasses, some intensive grazing practices and fire suppression; in short, quantity and quality of habitat for many grassland species has declined.

One of the most remarkable ecological features in this region is playas – ephemeral freshwater shallow circular-shaped wetlands, most more than 15 acres in size, that are primarily filled by rainfall, although some playas found in cropland may also receive water from irrigation runoff. While incredibly significant to wildlife, these features cover only 2 percent of the region's landscape. Larger playas may exceed 800 acres; however, most (around 87 percent) are smaller than 30 acres. Approximately 19,300 playas are found in the Texas High Plains, giving us the highest density of playas in North America. Compared to other wetlands, playas go through frequent, unpredictable, wet/dry cycles. In wet years they support the production of annual plants, such as smartweeds and millets. These plants produce a tremendous crop of seeds that are favored by dabbling ducks (in wet years, numerous waterfowl on the Central Flyway of the continent depend on our playa wetland habitats)and other seed eating birds. The wet/dry nature of playas, along with their high plant production, means they produce an abundance of

[5] TPWD. 2007. Endangered Species of the Panhandle Ecoregions. http://www.tpwd.state.tx.us/landwater/land/habitats/high_plains/endangered_species/ (accessed 2011).

[6] Pool, D. and A. Panjabi. 2011. Assessment and Revisions of North American Grassland Priority Conservation Areas. Background Paper, Commission for Environmental Cooperation. 66 pgs. http://www.cec.org/Storage/102/10095_Grassland_PCAs_Assessment-RMBO2010_en.pdf

invertebrates. This productivity makes playas havens for birds and other wildlife throughout the year. Playas also serve as recharge sites for the important Ogallala Aquifer. Aside from playas, the ecoregion does not support much in the way of freshwater streams or rivers; mostly intermittent and ephemeral streams prevail here.[7]

Table 1 crosswalks this ecoregion with other conservation planning units.[8]

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 Segments[9] (ESSS) which occur in this area.

Figure 2 shows those EDUs, HUC8s and ESSS by ecoregion.

[7] 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).

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

[9] TPWD. 2002/2005. *Ecologically Significant Stream Segments*. http://www.tpwd.state.tx.us/landwater/water/environconcerns/water_quality/sigsegs/

Table 1. Crosswalk of HIPL 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*) From the **National Fish Habitat Action Plan** *TX = Southeast Aquatic Resources Partnership and Desert Fish Habitat Partnership* (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)
High Plains (**HIPL**)	High Plains	Southern Shortgrass Prairie (28), Central Shortgrass Prairie (27), Chihuahuan Desert (24)	Upper Red River Brazos River – Prairie Canadian River Colorado River – Prairie Colorado River – Ed Plateau Lower Pecos River	Playa Lakes Joint Venture Shortgrass Prairie Bird Conservation Region	Great Plains	Trans Pecos – Rio Grande (1) Colorado Upper (5a) Brazos Upper (6a) Plains Rivers (10)	Central Great Plains Winter Wheat and Range Region: *Southern High Plains, North (77A), Southern High Plains Northwest (77B), Southern High Plains South (77C), Southern High Plains Southwest (77D)* Western Great Plains Range and Irrigated Region: *Upper Pecos River Valley (70B)* Southwest Plateaus and Plains Range and Cotton Region: *Edwards Plateau Western (81A)*	High Plains

Figure 1. HIPL Ecoregion with County Boundaries

High Plains ecoregion in yellow

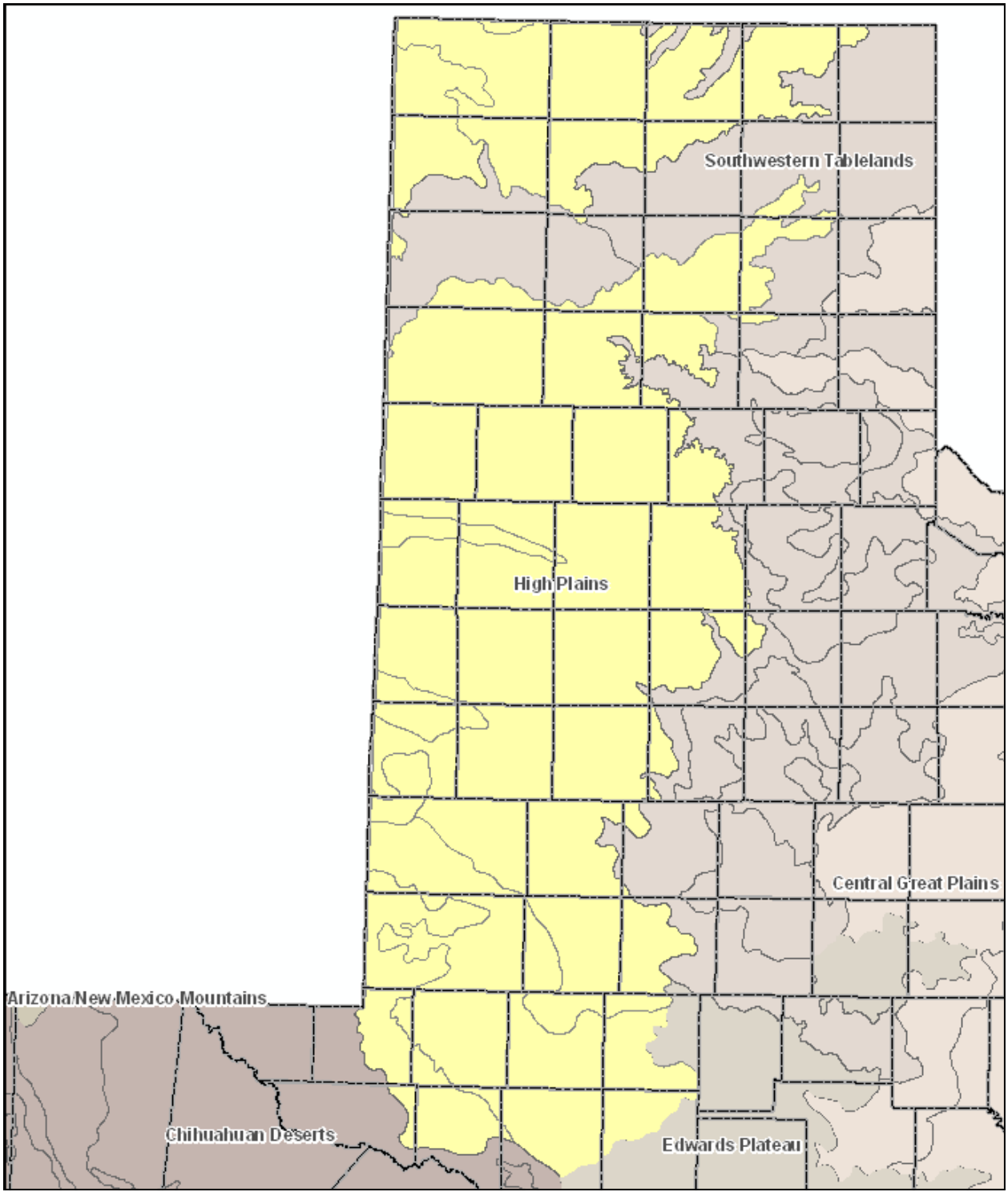


Table 2. HIPL EDUs with Ecologically Signifcant Stream Segments and Reservoirs

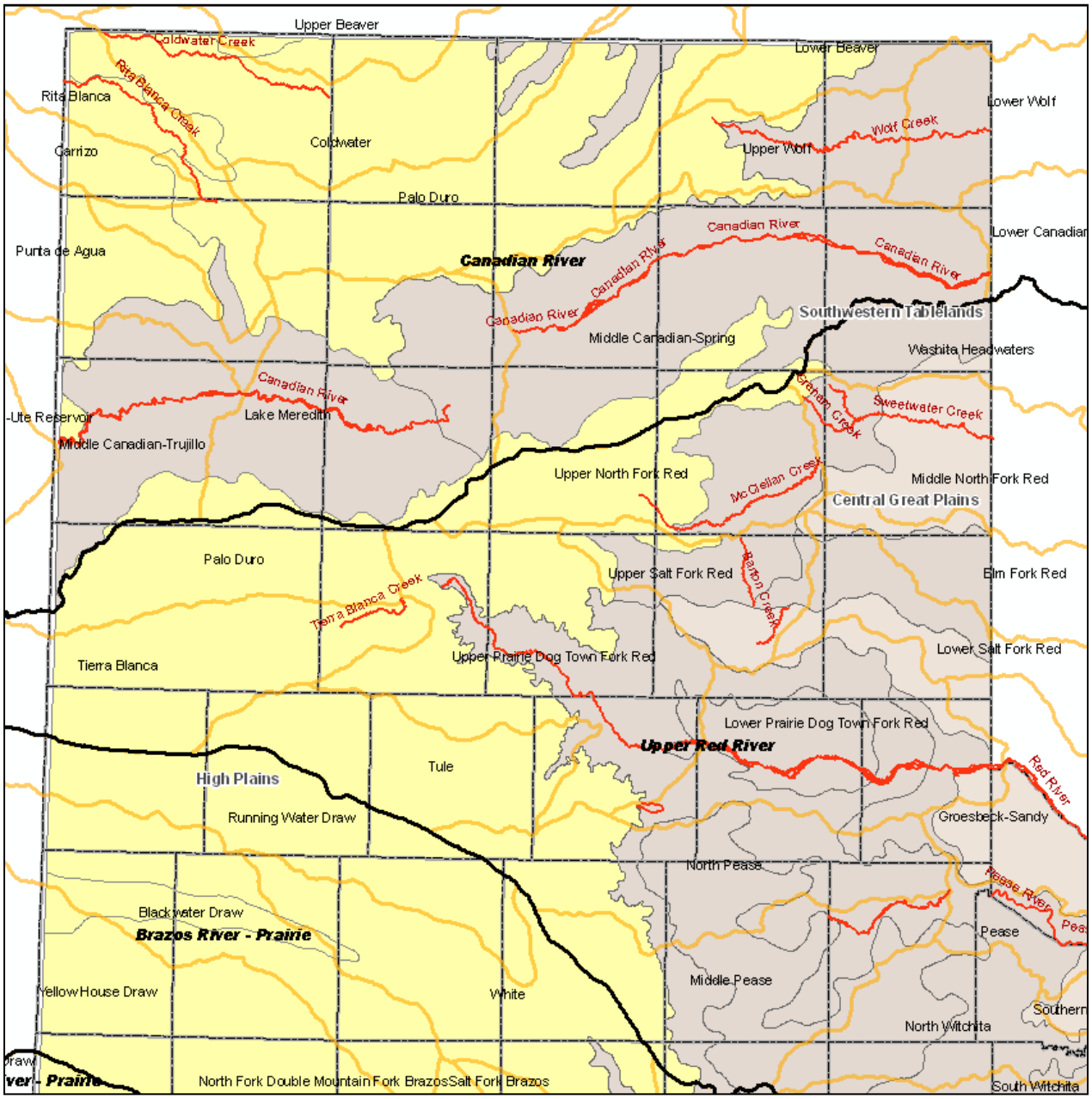
ECOLOGICAL DRAINAGE UNIT SubBasin (HUC 8)	*Ecologically Significant Stream Segment TPWD 2002, w/updates 2005*	**Lakes and Reservoirs**
LOWER PECOS		
Lower Pecos		
Landreth-Monument Draws		
CANADIAN RIVER		
Upper Beaver		
Lower Beaver		
Coldwater	Coldwater Creek	
Carrizo		
Rita Blanca	Rita Blanca Creek	Rita Blanca Reservoir
Punta de Aqua		
Middle Canadian - Trujillo		Lake Meredith
Upper Canadian - Ute Reservoir		
Palo Duro		
Upper Wolf	Wolf Creek (headwaters)	
Lake Meredith		
Middle Canadian - Spring		
UPPER RED RIVER		
Palo Duro		Bivins Lake
Tierra Blanca	Tierra Blanca Creek	Buffalo Lake
Upper North Fork Red	McClellan Creek (headwaters)	
Tule		Mackenzie Reservoir
Washita Headwaters		
Middle North Fork Red		
Upper Salt Fork Red		
Upper Prairie Dog Town Fork Red		
Lower Prairie Dog Town Fork Red		
North Pease		
Middle Pease		
BRAZOS RIVER - PRAIRIE		
Running Water Draw		
Black Water Draw		
Yellow House Draw		
White		
Salt Fork Brazos		
North Fork Double Mountain Fork Brazos		Buffalo Springs Lake

ECOLOGICAL DRAINAGE UNIT SubBasin (HUC 8)	*Ecologically Significant Stream Segment TPWD 2002, w/updates 2005*	**Lakes and Reservoirs**
Double Mountain Fork Brazos		
COLORADO RIVER - PRAIRIE		
Lost Draw		
Sulphur Springs Draw		Natural Dam Lake
Mustang Draw		
Monument - Seminole Draws		
Johnson Draw		
Colorado Headwaters		
Beals		
COLORADO RIVER - EDWARDS		
Middle Concho		
North Concho		

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.

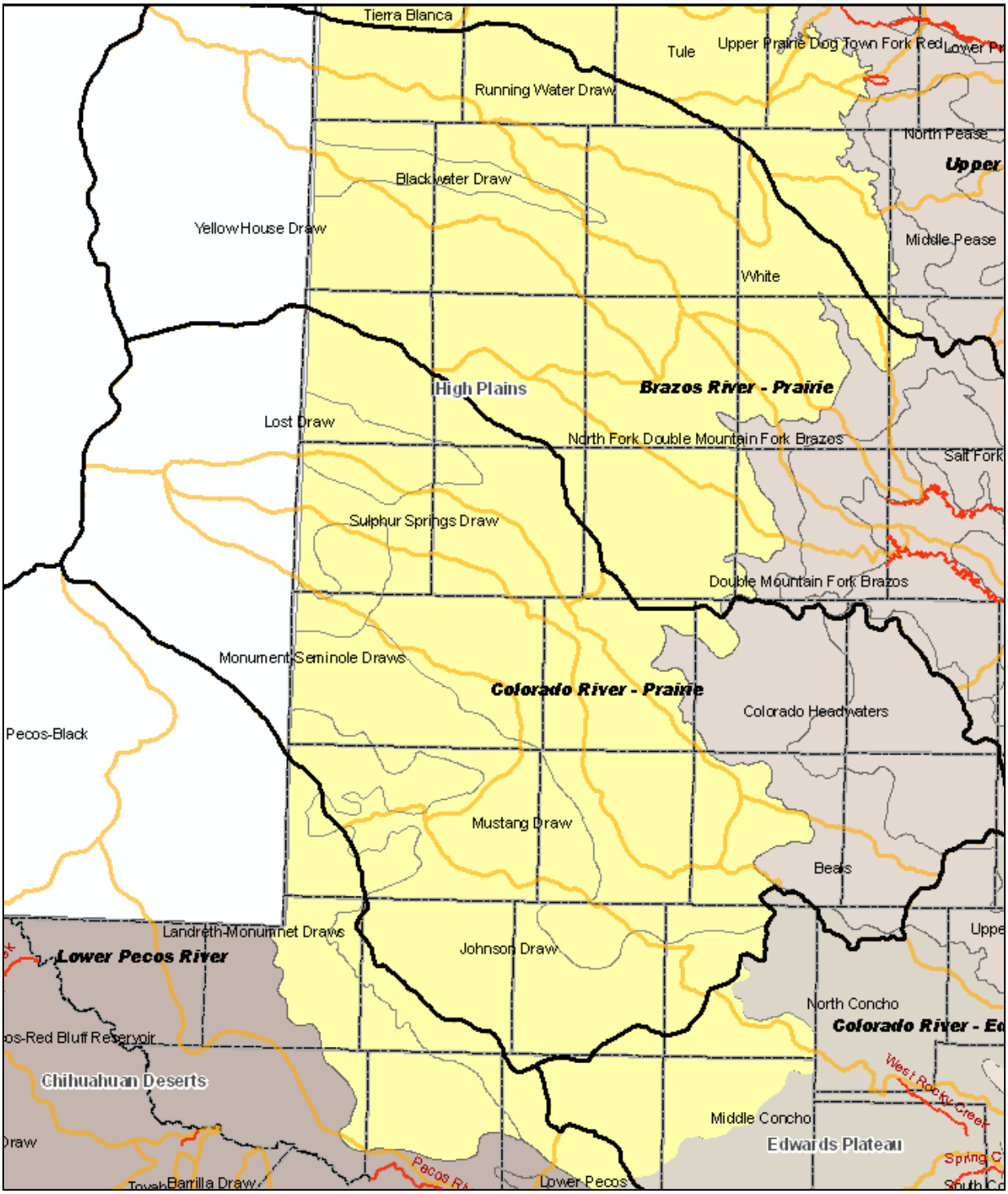
Figure 2. HIPL EDUs, HUC 8s, and ESSS

Canadian River, Upper Red River, and Brazos River – Prairie EDU black outline, HUC 8s orange outline, ESSS red lines



Brazos River-Prairie, Colorado River – Prairie, Lower Pecos River and Colorado River – Edwards Plateau EDUs black outline

HUC 8s orange outline, ESSS red lines



Note: other important stream segments are 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.[10] 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.[11]

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.[12] Each species has a NatureServe calculated state and global conservation rank, which accounts for abundance, stability and threats.[13] Additionally, several species have federal[14] and/or state[15] listing (endangered, threatened, candidate) status. See the key to conservation status and listing ranks[16] 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 herbaria or other curated collections and that would be enough; but, it's not …. **It's important to**

[10] Association of Fish and Wildlife Agencies. 2011. State Wildlife Action Plans. http://www.wildlifeactionplans.org/
[11] TPWD. 2012. Texas Conservation Action Plan: Overview Handbook. http://www.tpwd.state.tx.us/landwater/land/tcap/documents/tcap_draft_overview.pdf
[12] 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
[13] NatureServe. 2011. A network connecting science and conservation (online resources). http://www.natureserve.org/explorer (accessed 2011).
[14] USFWS. 2011. Endangered Species List, by state and county. http://www.fws.gov/southwest/es/EndangeredSpecies/lists/ListSpecies.cfm (accessed 2011).
[15] TPWD. 2011. State Listed Species. http://www.tpwd.state.tx.us/landwater/land/maps/gis/ris/endangered_species (accessed 2011)
[16] 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

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.[17]

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*.[18]

SPECIAL NOTE: PLAYAS AND NATURESERVE DESCRIPTIONS

The NatureServe descriptions found in the supporting documentation on the TCAP website, noted in the last column of Table 3, are *inaccurate in their descriptions of playas and rainwater basins for Texas*. Texas Parks and Wildlife and The Nature Conservancy plant communities' ecologists, USFWS Panhandle Refuges' biologists,and researchers at Texas Tech University need to review the recent work by Loren M. Smith[19] to amend and refine these descriptions to truly represent Texas playas for updates to NatureServe descriptions. A conservation action has been included to address this need.

Playas in the High Plains are not the lacustrine, mostly-wet or even wet-year-round features described; however, our playas go through extremely unpredictable wet/dry cycles and are highly ephemeral. Most are not wet even a percentage of a year unless they receive agricultural or municipal runoff. Ecologists also noted that individual playas are so dynamic and variable that the "closed" or "open" descriptors vary with time of season, rainfall timing, rainfall amount, etc. Playas soils are highly impermeable (but not completely) when saturated, and highly permeable when dry; they are important recharge features for the Ogallala Aquifer.

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.

[17] TPWD. 2011. Texas Conservation Action Plan: Broad Habitat Category Definitions http://www.tpwd.state.tx.us/landwater/land/tcap/documents/habitat_categories_tcap_2011.pdf

[18] 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.

[19] Smith. L.M. 2003. Playas of the Great Plains. UT Press. 275 pgs.

Table 3. HIPL Priority Habitats

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

GENERAL HABITAT TYPES	HIGH PLAINS (HIPL)	HIPL Ecological Systems
NATURAL AND SEMI-NATURAL TYPES	*Habitats in this column were identified in the workshop; additions were made by editor to riverine and cultural aquatic Note: Workshop participants mentioned native-managed Conservation Reserve Program (CRP) as a "habitat" type; however, CRP is a conservation program or method, not a habitat type. CRP can be applied to a broad spectrum of vegetation types which should be listed in these columns.*	*NatureServe. 2009. International Ecological Classification Standard: Terrestrial Ecological Classifications for Ecological Systems of Texas' High Plains. NatureServe Central Databases. Arlington, VA. U.S.A. Data current as of 08 October 2009.*
Barren/Sparse Vegetation *See also Marine/Coastal*	rough breaks Caprock, escarpment, ledges and cliffs	LLano Estacado Caprock Escarpment and Breaks Shrubland and Steppe North American Warm Desert Active and Stabilized Dune Western Great Plains Cliff and Outcrop
Desert Scrub		Chihuahuan Creosotebush Desert Scrub Chihuahuan Mixed Salt Desert Scrub Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub
Grassland	sand sagebrush/bluestem shrublands shortgrass prairie Harvard shin oak	Central Mixedgrass Prairie Chihuahuan Loamy Plains Desert Grassland Chihuahuan Sandy Plains Semi-Desert Grassland Western Great Plains Sand Prairie Western Great Plains Shortgrass Prairie Western Great Plains Tallgrass Prairie Chihuahuan-Sonoran Desert Bottomland and Swale Grassland (mixed upland and wetland)

GENERAL HABITAT TYPES	HIGH PLAINS (HIPL)	HIPL Ecological Systems
Shrubland	mesquite-mixed brush shrubland shinoak shrubland juniper-mixed brush shrubland Harvard oak shinnery	Edwards Plateau Limestone Shrubland Western Great Plains Sandhill Steppe
Savanna/Open Woodland	Mesquite savanna	Western Great Plains Mesquite Woodland and Shrubland
Riparian	cottonwood, soapberry, hackberry riparian periodically flooded or subirrigated floodplain shrublands, woodlands associated with the Canadian River, Red River, upper Brazos River, and upper Colorado River, including tributaries	Western Great Plains Floodplain Western Great Plains Riparian (mixed upland and wetland) Western Great Plains Wooded Draw and Ravine (mixed upland and wetland)
Riverine	Sand/gravel bars Instream habitats of the watersheds which intersect this ecoregion (very few are wet in any given period of the year) Ecologically Significant Stream Segments - Coldwater Creek, Rita Blanca Creek, Wolf Creek (headwaters), Tierra Blanca Creek, McClellan Creek (headwaters)	NA
Lacustrine *See also* Cultural Aquatic	Deep playas, wet in most years ***See the note in the introduction to the habitats section about playas and descriptions**	NA
Freshwater Wetland	shallow playa wetlands, ephemeral and unpredictably wet/dry in any given year* subirrigated meadow springs, seeps ***See the note in the introduction to the habitats section about playas and descriptions**	Western Great Plains Closed Depression Wetland Western Great Plains Open Freshwater Depression Wetland

GENERAL HABITAT TYPES	HIGH PLAINS (HIPL)	HIPL Ecological Systems
Saltwater Wetland	saline *lakes* and associated perched water table springs	Western Great Plains Saline Depression Wetland Western Great Plains Closed Depression Wetland Western Great Plains Open Freshwater Depression Wetland
Aquifer	Ogallala, Edwards Trinity, Pecos Valley	NA
Caves/Karst	gypsum dissolution caves	NA
CULTURAL TYPES	*habitats in this column must support SGCN or rare communities to be considered in this plan*	
Agricultural		NA
Developed		NA
Urban, Suburban, Rural	Shortgrass prairies, vacant lots, and protected areas with prairie dogs Creekside native vegetation	NA
Industrial	abandoned mine tunnels	NA
Rights of Way	bridges, culverts (bats) Transmission line corridors which may harbor prairie dog towns	NA
Cultural Aquatic	Reservoirs: Rita Blanca, Lake Meredith, Bivins, Buffalo, MacKenzie, Buffalo Springs, Natural Dam	NA

SHARED HABITAT PRIORITIES WITH ADJACENT STATES

Texas shares its border with four states – New Mexico, Oklahoma, Arkansas, and Louisiana. HIPL crosses into the Oklahoma Panhandle and eastern New Mexico. Table 4 identifies habitat priorities which have been identified in the Oklahoma and New Mexico Wildlife Action Plans which may be adjacent to the HIPL in Texas. 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 HIPL 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 – New Mexico and Oklahoma

Adjacent States	Ecoregions Shared with Texas	Habitat Priorities Shared with Texas[20]
New Mexico (NM)	Arizona – New Mexico Mountains Chihuahuan Desert Southwestern Tablelands **High Plains**	semi-desert grasslands and scrub/shrublands shortgrass prairie ephemeral and perennial tributaries and mainstem of the upper Canadian, Red and Brazos Rivers and associated riparian zones and floodplains springs and seeps wetlands playas TX – NM HUC 8 watersheds are all mapped at low to very low risk
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 bottomland forests shortleaf pine – oak forests/woodlands/savanna TX – OK HUC 8 at moderate risk: Palo Duro, Lower Beaver

[20] Priorities were determined by reviewing the states' online Action Plans, approved in 2006: New Mexico Comprehensive Wildlife Conservation Strategy http://fws-nmcfwru.nmsu.edu/cwcs/New_Mexico_CWCS.htm and Oklahoma Comprehensive Wildlife Conservation Strategy http://www.wildlifedepartment.com/CWCS.htm)
At-risk HUCs were determined by review of the NBII and USGS National Fish Habitat Risk Assessment Viewer online http://fishhabitat.org/index.php?option=com_content&view=category&layout=blog&id=42&Itemid=61 (2011).

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.[21]

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 HIPL 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.

[21] 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. HIPL Priority Issues Affecting Conservation

Table formatted for 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 (*Tamarix spp*.) Cultivated and Old World grasses (e.g. Lehmann's lovegrass, King Ranch (KR) bluestem) golden alga (see also *Native Problematic Species*; it is not conclusively known whether golden alga is native or non-native)	Salt cedar affects water use, creates monotypic stands, and outcompetes native riparian vegetation at all seral stages and canopy levels; armors banks of dryland rivers contributing significantly to channel incision and narrowing, which reduces the diversity and quality of habitat for aquatic species Non-native grasses either as “improved” rangeland, Conservation Reserve Program incentive, or naturally expansive from other planted areas are established in the region, are a substantial threat to grassland-dependent species (e.g. grassland-obligate birds and pronghorn) especially within or adjacent to shortgrass and midgrass prairie restoration sites. Non-native plant invasion may also 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
Non-native Animal	FERAL HOGS Introduced ungulates for hunting	Feral hogs decimate important and fragile habitats (e.g. seeps, riparian areas, swale depressional wetlands) Introduced ungulates can be disease vectors for native ungulates, are typically more diverse in their foraging ability and therefore compete with more than just their “niche” mates – can adversely affect forage for ground-nesting birds and small mammals as well as degrade all habitats for terrestrial SGCN.
Native Problematic	Mesquite invasion in shortgrass, mixed grass, and shin oak Mesquite has displaced grasslands especially in areas with subsurface moisture Juniper also an encroaching species Golden alga (see also *Non-native Invasive Species*; it is not conclusively known whether golden alga is native or non-native)	While brush is native in certain sites (ravines, crevices and bottoms of “breaks”, swale savannas), invasive native brush/trees in shortgrass and midgrass communities, including playas, are a significant threat to grassland-obligate birds as well as pronghorn and prairie dogs: grassland loss decreases habitat availability and quality, trees provide perches for hunting raptors which also decrease grassland bird, small mammal and reptile success; brush "spooks" pronghorn an dprairie chickens which need vast open spaces to feel safe from predators and brush-degraded grasslands have extremely limited suitability for pronghorn foraging.
Pests, Parasites, Pathogens		
Pests	Cactus moth (*Cactoblastis cactorum*)	*Cactoblastis cactorum* has been used a biological control for prickly pears (*Opuntia* spp.) in areas where prickly pears are non-native; however, introductions to the Caribbean have led to the moth’s appearance along the eastern Gulf Coast of the US and potentially the moths could arrive in Texas and Mexico. The loss of biodiversity, habitat, forage, agricultural products, and the nursery industry could be substantial.
Parasites	*Haemonchus*	pronghorn populations devastated by this parasite; thought to be a major contributing factor to the pronghorn decline across the High Plains.
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	Competitive Renewable Energy Zones (CREZ): Panhandle A, Panhandle B, Central and Central West Turbine siting and operations	See also full discussion in Statewide Handbook. Entire Panhandle is a high potential wind energy area for Texas. High ridges in west Texas are highly desired dense sitings (wind "farms"), which intersect raptor migration corridors. Nocturnal migrating birds and bat mortality through collision with structures; barotrauma in bats and birds causes mortality during operations In this region, tall structures are a deterrent to Lesser Prairie Chicken and Pronghorn habitat use; structures present a threat to species which are adapted to open uninterrupted landscapes (grasslands, shrublands). From their perspective, tall structures provide a predator vantage point (hawks, eagles) and/or are simply a disruption to their normal viewshed. As with the oil and gas industry, the dense network of maintenance and access roads for wind facilities poses a threat to small mammals and reptiles, fragments grassland and shrubland habitats for all species dependent on these types, provides avenues for greater predator access along edges into the interior of these habitats. Lack of reclamation with native seed or plant sources contributes to invasive species problems on these and adjacent sites.

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
Solar or photovoltaic (PV) 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; solar development environmental considerations are voluntary; some may require large quantities of water
Hydro (Dam and Reservoir)		*see also* **Water Development, Management and Distribution**
Biofuels	Row Crop, Switchgrass, Herbaceous: native rangeland and open grasslands converted to biofuel croplands (monotypic stands of switchgrass and others) Algae "farms": High amounts of water used/processed, untreated or minimally treated wastewater discharges, site conversion	Loss of shortgrass and midgrass birds' habitat for foraging, nesting, and shelter -- Baird's Sparrow (winter), Eastern Meadowlark, Long-billed Curlew, and Cassin's Sparrow Lowlying area and "flats" habitat loss from conversion to farming operation, groundwater pumping which contributes to lowered or drying of swale wetlands, plowing through playas creates potentially permanent loss of these features once the substrate can no longer hold water during wet periods. Because these are not food crops, the application of fertilizer and pesticides is potentially a greater concern, especially adjacent to or within playas (direct conduit to the Ogallala Aquifer) and can impact wildland native insect fauna/pollinators, site may favor invasive species
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	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 (grasslands, shrublands) in the same way that oil/gas pipelines and road networks for wind generation sites, causing potential for greater predator and invasive species access. Also not required to reclaim cleared areas with native seed or plant sources. May hinder daily or seasonal movements and behavior for species which avoid open areas or tall structures (e.g. Lesser Prairie Chicken and Pronghorn). Transmission lines can be strike hazards for Whooping Cranes and raptors during migration.
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 vector for invasive species (plant) introductions from equipment and opportunistic colonization in wake of habitat clearing and no 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, roadways)	Widespread and densely developed extraction operations: clearing, road networks, pad sites, and large mechanical infrastructure(s): Panhandle Field (Hartley, Potter, Moore, Hutchinson, Carson, Gray, Wheeler, and Collingsworth counties) is one of the largest oil and gas deposits in Texas; part of the Permian Basin “formation” that produces oil and gas throughout the Panhandle and West Texas. on-site spill potential salt water injection wells road networks	limited ground and surface waters and species which rely on these waters are highly sensitive to change/contamination, are at risk from chemical, drilling material, and oil spill runoff and groundwater contamination caused by drilling mud chemicals and salt water injection direct habitat loss, direct and indirect habitat fragmentation, direct mortality from vehicles and operations, and noise/light disturbance (e.g. Lesser Prairie Chicken and selected areas of sand dune – oak shinnery west of Odessa which are habitat for sagebrush dunes lizard, nocturnal migratory birds and bats can be adversely impacted by the light and noise pollution at night; 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	Ecoregion is underlain by a portion of the Woodford, Bend, Palo Duro, and Permian Basin shale gas deposits, being developed as the technology is available and demand puts pressure for more domestic sources (http://www.energyindustryphotos.com/shale_gas_map_shale_basins.htm) Extraction requires a deeply injected chemical liquid which fractures substrates and releases gas for capture and delivery: potential groundwater risks, potential chemical spill risks, geologic destabilization	The Ogallala Aquifer and its surface connections are extremely important habitats and resources for wildlife and humans alike in this ecoregion; groundwater contamination could cause total loss of isolated aquatic populations, adversely affect vegetation that depends on water quantity and quality in riparian areas. Contamination also poses a risk to human and livestock water sources. Fracturing activities may also destabilize and adversely affect the capacity of porous geologic layers to recharge the underlying aquifers.
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, primarily grasses, allowed to colonize or are directly planted for soil stabilization Equipment leaking fluids and unremediated spills contribute to playa and Ogallala contamination
Mining		
Caliche	caliche - small scale on ranches, large scale for county roads	typically for road base, unreclained sites, complete/permanent loss of surface communities

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
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 noctural 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)	Two National Priority Highway Corridors are proposed to travel through this ecoregion: 38) Ports to Plains and 56) La Entrada al Pacifico See http://www.fhwa.dot.gov/planning/nhs/hipricorridors/index.html Additional impacts occur where larger transportation facilities have been built which do not accommodate wildlife passages or provide stormwater pollution prevent controls (capture and "clean" runoff prior to discharge to waterways)	These significant construction projects have the potential to disconnect intact habitats, contribute to stormwater pollution and provide barriers to wildlife passage (e.g. pronghorn). It will be important to assist TXDOT and FHWA in appropriate siting of these larger facilities and any local connectors to avoid significant features – intact grasslands, playas, public and private conservation lands and rare plant communities. Typically, in most local and state projects in this region, native seed sources are not used in remediation of Right of Way (ROW) following construction ; additionally, because playas are considered "nonjurisdictional wetlands", these features do not have to be protected during construction processes, including stormwater runoff planning and placement. Approximately 10 percent of playas have roads constructed through their basins
right of way maintenance	maintaining clear right-of-way for vehicle clearance/access, minimizing fire danger, and maintaining driver visibility	Mowing schedule not in sync with natural regeneration of native grasses (where they occur) herbicide application – runoff and/or overspray into wildland habitats
Land & Water Mgmt: FARM	See also Water Development section	
Conversion	Complete conversion of playa wetlands through plowing, other modification, or pitting to drain them for agricultural production Taking agricultural land out of production can be a good thing; however, use of nonnative grasses in Conservation Reserve Program projects is detrimental	Estimates suggest approximately 70 percent of playas larger than 10 acres have had pits dug in them to concentrate water for row-water (or furrow) irrigation; while this form of irrigation is declining and modern, more efficient irrigation practices that rely on groundwater do not require these pits. Playas are the most rare habitat type in this ecoregion; playa conversion to agricultural land removes this important habitat from the system and usually the conversion is irreversible (or more expensive to reverse) if the underlaying substrate is "punctured" during plowing/tilling practices. See also comment regarding nonnative grasses in "Invasive" section
Lack of soil and water management and conservation practices	chemical-laden irrigation water runoff unsustainable irrigation – groundwater, surface water See also *Groundwater Planning and Distribution*	Playas in croplands have suffered severe sedimentation as a result of soil erosion in adjacent croplands. Playas affected by sedimentation tend to be shallower and lose their capacity to hold water. Contaminated runoff adversely impacts to sensitive aquatic insects and other invertebrates, fishes, and amphibians in playas and because of playa connection to the Ogallala, groundwater can also be contaminated Surface and groundwater management of all types lacks a full accounting of the withdrawals from these sources and does not sufficiently consider fish and wildlife needs in water planning/extraction processes
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 Insufficient harvest of white-tailed deer	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) Area needs more wildlife-compatible grazing and stocking rates to recover native grasslands Area needs more white-talied deer harvested to recover native shrublands and native grasslands In rangelands, the problem facing playas is over grazing. Livestock allowed access to playa basins during the growing season often remove many of the seed producing plants that are preferred by waterfowl and other birds
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) or brush may be a desired ecological condition on a given site (where sand sagebrush, oak shinnery are native, in ravines or ephemeral streamsides). In some programs, nonnative grasses are recommended for reseeding, farmland to pasture conversion, and even "restoration." See comment under "Invasives" above. 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.

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
Landowner/land management incentive programs working at cross-purposes	single-objective management such as all-game, all-livestock, all-recreation 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 nongamepractices for their site, for their goals Some programs are being phased out or limited due to lack of enrollment or inability to keep up with market forces	Some sites would benefit from multi-species/habitat approach, but will depend on landowner objectives Incentive programs for private landowners need a suite of best management practices specific to the ecoregion to benefit all fish and wildlife species and reasonably support longterm sustainable livestock production or other landowner objectives (hunting, recreation); coordinated technical guidance resources need to be available to all practitioners.
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, and potentially concentrates pathogens (*Haemonchus*) High game fencing also adversely impacts many species of native game and non-game wildlife by limiting genetic flow, availability to access food and water across the landscape (different habitats provide different services at different seasons); management within these facilities must be careful and intense, and can concentrate an onerous financial burden on a private landowner for management of a public resource; depending on the size of the facility and the resources of the landowner, this is not a sustainable practice
Clearing and loss of important natural sites/habitats	Springs, wet swales, playas and riparian zones altered for stock uses	Loss of natural spring, wet swale, and playa habitats for aquatic species, waterfowl, migrating Whooping Cranes, and grassland species (in naturally dry periods, playas are grassland habitats), loss of riparian zones critical for water quality and quantity protection, water temperature maintenance, and riparian dependent species; loss of water, trampling, and poor water quality from fecal-infused runoff changes vegetation community in these areas
Fire suppression and lack of or inappropriate application of Rx fire	reduced or no efficacy of applied fire - scale of application does not match ecological need Prescription is not always written for longterm applications – how often, what season, how to mimic natural *cycles* not just single *episode*	The lack of fire, excessive grazing during drought, and invasive plant species have impacted natural grassland habitats, which could be restored by prescribed fire if applied at a scale, period, and frequency that mimics historically natural fires. Small scale application is insufficient to prevent reinfestation from adjacent lands. Too frequent or too intense application can shift the vegetation community and may cause some species to drop out if the fire is not applied in the season, intensity and timing that natural fires would have occurred.
Trapping, poisoning programs	Gassing, poisoining and flushing rattlesnake dens or prairie dog towns frequently has significant adverse effects on non-target species Trapping programs are indiscriminate and impact several mammal species (skunks, swift fox, badger)	Invertebrates, amphibians and reptiles, small mammals, and some birds (e.g. burrowing owl) are adversely affected directly by the actions, but also over the longterm there are potential impacts to groundwater resources (Ogallala)
Land & Water Mgmt: Municipal	See also Water Development section	
Lack of Zoning and Planning	Planning efforts are minimal, rarely regional, unless related to transportation	Land: Little regulation on development location/intensity contributes to arid land habitat loss of many types (grasslands, desert shrublands) Little to no stormwater controls contribute polluted runoff into recharge areas adversely impacting these surface features and groundwater resources Continued urban expansion around Midland/Odessa have potential to adversely affect prairie dogs and the assemblages of species reliant on these colonies, mountain plover, and other SGCN
Land & Water Mgmt: Conservation & Recreation		
Fire suppression and lack of or inappropriate application of Rx fire	reduced or no efficacy of applied fire - scale of application does not match ecological need Prescription is not always written for longterm applications – how often, what season, how to mimic natural *cycles* not just single *episode*	The lack of fire, excessive grazing during drought, and invasive plant species have impacted natural grassland habitats, which could be restored by prescribed fire if applied at a scale, period, and frequency that mimics historically natural fires. Small scale application is insufficient to prevent reinfestation from adjacent lands. Too frequent or too intense application can shift the vegetation community and may cause some species to drop out if the fire is not applied in the season, intensity and timing that natural fires would have occurred.
Inadequate/Inappropriate Management	Inappropriate stocking rates to recover or maintain natural communities for fish and wildlife resources on public lands	If the primary purpose, according to an agency's or organization's mission, is natural resources management or conservation, then livestock *production* should be considered secondary to the complete recovery and sustainability of natural habitats for SGCN fish and wildlife resources. If stocked, then stocking rate should mimic some missing *species* (e.g. bison) movement and intensity or should act as a surrogate *process* (e.g. replacing fire with grazing or browsing animals)

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
Inappropriate Recreational Uses	ORV use in sensitive areas (stream beds, dunes, breaks) Trail placement and maintenance	ORV use on private and public sites (whether legitimate or trespass) on highly erodable soils, steep slopes, and streambeds can degrade or remove habitat suitability for species in certain niches; ORV community and ecologists need to work together to find suitable sites for public recreation to avoid impacts. 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, vegetation (especially stream and canyon adjacent) loss, and water quality impacts.
Lack of connectivity between public lands managed for conservation	Habitat connectivity is important for many of the SGCN in this region – wide-ranging and migratory species in particular	Connectivity does not have to be directly adjacent lands managed by one entity, but could include “stepping stones” of larger grassland habitats, riparian corridors, and/or voluntary longterm or perpetual participation in management strategies to benefit SGCN between/among public lands in the region.
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 Agricultural uses are the primary driving force in surface and groundwater planning Overallocation and dewatering of region's principle rivers; rivers are not wholly contained with in Texas jurisdiction/management (headwaters of the region’s mainstem rivers lie in New Mexico)	Surface water “accounting” and allocation processes do not provide sufficient protection for fish and wildlife resources’ (especially state-listed threatened or endangered) instream and riparian needs See also **Reservoir Construction and Operation** below
Reservoir Construction and Operation	Timing/Periodicity/Intensity of Water Releases releases are unnaturally intense and short duration, out of season, and do not mimic natural flooding processes Releases from dams typically do not have the same water chemistry from behind the dam into the stream below; aquatic life cannot tolerate extreme shifts in oxygen, temperature, or salinity.	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. Changes to water amount and chemistry no longer support a full complement of the aquatic system’s species or habitats. Riparian habitats also disappear, become more vulnerable to non-native vegetation invasion, and/or shift to a different vegetation community more tolerant of the new water availability and quality (which may or may not be suitable for riparian-dependent species).
Groundwater Planning and Distribution	Not all aquifers have groundwater districts; groundwater districts are political subdivisions, not aligned necessarily with aquifer boundaries Ogallala resources are used by many states and decisions are made by many managing entities Extraction: groundwater pumping without full accounting for natural resources as a "use"	Inconsistency in districting across the landscape creates conflict and natural resources do not fare well. Subirrigated terrestrial habitats (like riparian areas, some wetlands) and instream aquatic habitats which rely on springflow are adversely affected by insufficient water (pumping lowers water table below surface expression) and changes in instream water conditions such as temperature, oxygen availability, and other nutrient and chemical factors (such as the age of water source that comes from the aquifer) can reduce or eliminate habitats which rely on at least seasonally available water and certain water chemistry parameters
Other Water Source Developments and Technologies	Interbasin Transfers (Surface and Groundwater)	This is addressed at the statewide level
	Desalination and Chloride Removal Operations	This is an issue in the Brazos River basin primarily: dewatering surface flows , extract salts/chlorides and discharge disposal brine back to stream – intense shifts in water chemistry out of tolerance levels for many aquatic organisms and riparian vegetation.
Lack of Information & Resources		
Lack of Data/Information	Lack of access to private lands, lack of funding for surveys and monitoring on public land, and lack of complete vegetation coverage mapping and association with SGCN prevents a complete understanding of just how rare or not rare a species may be, and limits cooperative stewardship and best management practices.	SGCN bird *population* trend data for riparian and shrub ecosystems Full effects of prairie dog town contributions to all taxa, including invertebrates Shin oak landcover groundtruthing (most is classified as mesquite) and GIS analysis of land conversion and change overtime Lesser Prairie Chicken lek distribution and quality (habitat suitability within and adjacent to the lek) and success by lek Lack of information on the population/distribution/etc on numerous SGCNs, *especially* small mammals, reptiles, amphibians, and insects in this region Climate Change predictive model for habitat impacts affecting SGCN, especially reptiles, amphibians, migratory birds; see also Statewide handbook

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
Perceived Management Need without Data	Predator control without biological standards or supporting management	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 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. Predator trapping and/or baiting has an adverse effect on non-target species such as smaller mammals skunks, foxes
Lack of processing exiting data	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.	Prairie dog town census according to protocols needs analysis, would contribute to information needs for other species as well (black-footed ferret, burrowing owl) Playa information from PLJV needs consideration in Texas Ecological Systems Mapping models
	Inadequate understanding of available or widely-accepted conservation Best Management Practices	Inconsistent presentation or application or understanding of Best Management Practices for riparian conservation, grassland restoration, and prescribed fire application are detrimental to the coordinated partnerships that advise landowners in this region.
Inadequate Policies, Rules, Enforcement		
Isolated Wetlands	Loss of and impact to "non-jurisdictional" wetlands and other waters	Playas and other wetlands in this ecoregion are typically “isolated” – not connected to a mapped drainage or waterway – and have no protection from agricultural conversion, fill and loss to development, and/or surface water runoff impacts; playas are one of the most threatened and important habitat types in this region.
Other Cross-Cutting Issues		
Lack of Conservation Funding	See Statewide Handbook – Issues and Actions sections	
Climate Change	isolated habitats are more at risk than others: playas, wetlands, dune and other edaphically isolated communities Other arid-land wetland and water-dependent features such as riparian and instream habitats Invasive species	See Statewide Handbook – Issues and Actions sections Climate Change predictive model for *habitat i*mpacts (especially playas and grasslands) affecting SGCN, especially reptiles, amphibians, migratory birds 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.
Economics	Working Lands	Landowner incentives cannot compete currently with market forces; market forces in some areas cannot support continued ag or ranch 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*.[22]

Actions proposed for the HIPL Ecoregion (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.[23] 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

[22] 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 managment.

[23] 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.[24] 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*[25] 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.

[24] 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

[25] Same as above

Table 6. HIPL 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
Begin a coordinated approach with regional conservation service providers, regional Texas Master Naturalist chapters, and local volunteer groups in watersheds which have high ecological significance (see Habitat Table, Riverine Habitats) for invasive riparian species (e.g. *Tamarisk*) removal through targeted landowner incentive programs and priority activities on public lands; document progress with an ecoregional invasive species management team and spatially-explicit website to track the progress of eradication – success and failures, to modify approaches as needed.
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.
Encourage site-appropriate invasive native brush removal with least ecological collateral damage to promote healthy native grasslands for grassland-obligate birds and pronghorn; monitor before and after to determine benefits to target species.
Pests, Parasites, Pathogens
Sample and monitor *Haemonchus* 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 hawks and other raptors, neotropical migrants, and waterfowl in addition to lesser prairie chicken leks, prairie dog colonies and 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, algal farms 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.
Document and publish timing (periodicity, seasonality, frequency) and intensity of barotrauma impacts to regional SGCN migratory and residential birds and bats from wind turbines; share this information with existing and developing wind operations managers, encourage wind generation companies to modify practices to avoid or minimize impacts. Study avoidance and minimization based on practices' modifications and publish results. Adjust management and development recommendations as needed for best practices.
Oil and Natural Gas Production and Delivery
Continue to work with the oil and gas industry to find creative avoidance, minimization and mitigation solutions to industry impacts to listed species while addressing *indirect and cumulative potential effects*. Small fossorial and limited range mammals and reptiles and rare plants are most potentially affected. Review recovery potential of listed species and find intersections for cooperation, high-conservation-value mitigation, and incentives. For non-listed, candidate species potentially affected by this industry, review thresholds and concentrate on Candidate Conservation Agreements and Candidate Conservation Agreements with Assurances incentives for private landowners to prevent listing, where possible.
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 communiation towers and recommendations to improve practice to improve conditions for all
Transportation
Form a multi-disciplinary ecological working group to work directly with TXDOT Regional Engineers and FHWA to identify areas of high ecological significance to avoid or minimize impacts during development of priority highway improvements and connectors. Study, identify, and include areas for focused bridge and culvert design to accommodate migratory and daily movement for wide-ranging species (pronghorn, black bear) and bat roosts; identify and suggest protective measures for water quality at important crossings at and upstream of Ecologically Significant Stream Segments; and identify significant riparian corridors and playas for avoidance.
Land & Water Mgmt: FARM
Use appropriate NRCS Farm Bill, USFWS Partners, Playa Lakes Joint Venture and other technical guidance and grant programs to incentivize landowners to permanently protect and restore playas with ecologically-determined native grassland buffers to slow or halt sedimentation; fill substrate to heal water-holding substrates and dig out playas which have filled with cropland sediment; fence where appropriate to protect sites from ORV use and grazing; map these important conservation efforts as part of a monitoring program. These same programs can be used for NATIVE grassland restoration to benefit most SGCN in this region. Use the direct management (stewardship) effectiveness measures to track progress of these important conservation actions.

Conservation Action
Land & Water Mgmt: RANCH
Use appropriate NRCS Farm Bill, USFWS Partners, Playa Lakes Joint Venture and other technical guidance and grant programs to incentivize landowners to permanently protect and restore playas with ecologically-determined native grassland buffers to slow or halt sedimentation; fill substrate to heal water-holding substrates and dig out playas which have filled with cropland sediment; fence where appropriate to protect sites from ORV use and grazing; map these important conservation efforts as part of a monitoring program. These same programs can be used for NATIVE grassland restoration to benefit most SGCN in this region. Use the direct management (stewardship) effectiveness measures to track progress of these important conservation actions.
Conservation easements and landowner incentive programs are the best instruments to encourage private landowner participation in conservation practices in this region. Landowners with intact priority habitats at a scale that will benefit SGCN population resiliency and implement specific working groups' recommendations (lesser prairie chicken, black-tailed prairie dog, black-footed ferret, pronghorn, and Bird Conservation Regions), larger tracts (or cooperatives of smaller tracts) of priority habitats which could be restored for minimal investment, willing to change to pronghorn- and/or lesser prairie chicken-sensitive fencing/structures, willing to protect or restore riparian corridors along Ecologically Significant Stream Segments (and to their headwaters), and/or buffer and/or restore playas should be first-eligible. Monitoring of key species must be a part of these projects. Information about methods, short and longterm success (or failure) need to be shared through conservation networks – see Effectiveness Measures for conservation easements and direct management/stewardship
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.
Provide landowner incentives and promote netwire fencing replacement (with strand barbed wire) for pronghorn benefits where known herds occur, especially if those herds are within distance of each other to share genetic material. Monitor pronghorn use of newly "opened" areas to determine if this fencing program is an effective conservation tool to enhance genetic diversity, reduce forage pressure, and increase population stability.
Determine market values that are driving agricultural and livestock production, hunting and other recreation, 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.
Identify the barriers to RX 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, and small mammals and reptiles. Select a few keystone species for monitoring in these areas – see above.
Promote the use of native grasses, forbs and shrubs 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 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.).
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
Land & Water Mgmt: Municipal
Promote the conservation of native grasslands at a functional ecological scale, conservation of prairie dog towns, and playas with native buffers within and adjacent to municipal areas through outreach to planning and permitting entities in the larger urban areas. Document progress toward conservation of important habitats and specific SGCN using the Outreach effectiveness measures.
Land & Water Mgmt: Conservation & Recreation
Voluntary conservation easements and landowner incentive programs are the best instruments for landowner participation in conservation solutions in this region. Landowners with intact grasslands (especially those within priority grassland areas identified by the Playa Lakes Joint Venture, adjacent to the North American Grasslands Priority Area (Rita Blanca) in this region, The Nature Conservancy; grasslands with restoration potential for little investment, willing to change to pronghorn-sensitive fencing, sites along Ecologically Significant Stream Segments (and to their headwaters), and/or playas 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.
Work with willing landowners *especially adjacent to and in corridors between* 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. A high priority focal area would be adjacent to Rita Blanca National Grasslands which are a North American Grassland Priority Area. See recommendation above.

Conservation Action
Implement relevant sections of Playa Lakes Joint Venture Bird Conservation Region 18 Recommendations: • Maintain current CRP acres, convert all remaining non-native fields to native grass mixtures, and convert an additional 1,685,271 acres of cropland to native grassland using CRP or other strategies (**Grasshopper Sparrow**, **Cassin's Sparrow, Ring-necked Pheasant, Lesser Prairie-Chicken**). • Convert 472,625 acres of cropland to small grain crops from "other" crop types (**Ring-necked Pheasant**). • Increase shinnery acres contributing to large block configurations (>5,000 acres) by 51,750 acres (**Lesser Prairie-Chicken**). • Restore at least 1,000,000 acres of mesquite savannah back to shortgrass prairie in the northern part of the Area (**Lark Bunting**). • Manage 6,182,881 acres of shortgrass prairie for high grass and few shrubs (**Grasshopper Sparrow**). • Increase shortgrass prairie contributing to large blocks (>1,650 acres) of grassland by 1,112,975 acres (**Long-billed Curlew**). • Increase prairie-dog colonies by 93,825 acres in the northwest portion of the Area or ensure an increase of the same number of acres of shortgrass prairie managed for low grass and few shrubs (**Mountain Plover**). • Employ moist-soil management practices on 28,884 acres of playas (**waterfowl**, shorebirds, Ring-necked Pheasant). Other important actions to preserve the function of existing habitats (e.g., buffering playas) also are needed. These recommendations are intended for implementation over a 30-year timeframe (2007-2037)
Species Restoration: ▪ Pronghorn populations (not just individuals) coincidental with habitat improvement and conservation corridor development, fence replacement, restocking and genetic enhancement, *Haemonchus* research and plan to deal with this problem ▪ Implement Lesser Prairie Chicken working group recommendations (toward resilient, redundant populations working with adjacent states) ▪ Black-tailed prairie dog – burrowing owl – black-footed ferret ecosystems: introductions, habitat improvement, management recommendations for compatible land uses
Water Development, Management and Distribution
River rehabilitation in/adjacent to identified stretches of the Canadian, Red and Brazos River: recommendations for instream flow, quality and intensity management; riparian restoration; and specific work to increase resiliency to climate change; work with adjacent ecoregions
Form a local ecologists' working group to evaluate environmental water flow and TMDL recommendations and craft/deliver specific environmental water flow recommendations and rationale that connect ground and surface water issues for the Regional Water Planning Groups (surface waters: http://www.twdb.state.tx.us/wrpi/rwp/rwp.asp), Groundwater Conservation Districts and Groundwater Management Areas (http://www.twdb.state.tx.us/gwrd/pages/gwrdindex.html)
Lack of Information & Resources
The NatureServe descriptions found in the supporting documentation on the TCAP website, noted in the last column of Table 3 in this document, are *inaccurate in their descriptions of playas and rainwater basins for Texas*. Texas Parks and Wildlife and The Nature Conservancy plant communities' and landscape ecologists, USFWS Panhandle Refuges' biologists, and researchers at Texas Tech University need to review the recent work by Loren M. Smith[26] to amend and refine these descriptions to truly represent Texas playas for updates to NatureServe descriptions. Playas in the High Plains are not the lacustrine, mostly-wet or even wet-year-round features described; however, our playas go through extremely unpredictable wet/dry cycles and are highly ephemeral. Most are not wet even a percentage of a year unless they receive agricultural or municipal runoff. Ecologists also noted that individual playas are so dynamic and variable that the "closed" or "open" descriptors vary with time of season, rainfall timing, rainfall amount, etc. Playas soils are highly impermeable (but not completely) when saturated, and highly permeable when dry; they are important recharge features for the Ogallala Aquifer. See also the http://www.pljv.org/cms/playa-county-maps-data-layer to assist wth groundtruthing the Texas Ecological Mapping Systems project and refining vegetation characterization in these areas.
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 collegest to collect the information most needed at the PRACTICAL level for management and conservation improvement on the ground. Some needs have been identified in this process: ▪ Mapping the most invasive species in the region, to determine priority areas for control and restoration and areas where largescale cooperative treatment might be feasible (and identify limitations to that approach) ▪ Presence and status of the following species o Dunes Sagebrush Lizard o Lesser Prairie Chicken and related assemblages o Shortgrass dependent species – including those not specifically obligate to black-tailed prairie dog (e.g. ferruginous hawk, swift fox) o Grassland birds and playa use at different times of the year – distribution, abundance, seasonal triggers, recommendations for management o Pronghorn o Playa and other Wetland Dependent Species o Riparian Species and Communities • LPC aerial surveys for trend in lek density • Biological standards for predator levels in various ecosystems in this region; monitoring programs with reporting, analysis, stakeholder involvement and recommendations • Specific impact of groundwater withdrawals regional surface water habitats

[26] Smith. L.M. 2003. Playas of the Great Plains. UT Press. 275 pgs.

Conservation Action
Form multi-partner working group(s) to establish and publish scientifically sound best management practices for **prescribed fire application** for the ecoregion (timing/season, period/duration, intensity, parameters for RX, how often to mimic natural fire occurrences) for the restoration of SGCN-specific habitats (longterm health and sustainability of desired ecological conditions); work with Rx fire technical experts, SGCN and rare communities experts to identify concerns, barriers, and solutions. Identify a suite of key species to monitor post-burn to determine effectiveness of the applied practices
Form multi-partner working group(s) to establish and publish scientifically sound best management practices for **chemical/mechanical brush control** for the ecoregion and specific watersheds (slope, aspect, soils, targets, methods, rates, proximity to water features) for the restoration of SGCN-specific habitats (longterm health and sustainability of desired ecological conditions); work with Rx fire technical experts, SGCN and rare communities experts to identify concerns, barriers, and solutions. Identify a suite of key species to monitor post-burn to determine effectiveness of the applied practices
Form multi-partner working group(s) to establish and publish scientifically sound best management practices for **native riparian 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) for the restoration of SGCN-specific habitats (longterm health and sustainability of desired ecological conditions); work with Rx fire technical experts, SGCN and rare communities experts to identify concerns, barriers, and solutions. Identify a suite of key species to monitor post-burn to determine effectiveness of the applied practices
Use a Decision Support System, Texas Ecological Systems Mapping Project data and Texas Natural Diversity Database information, with other data from all conservation practitioners in the region, to craft a priority areas map to **focus outreach and incentive programs to private landowners** and maximize benefits to priority habitats and SGCN, connectivity among perpetual conservation management lands (public and private), functional riparian zones and migration routes
Host landowner workshops on conservation instruments – Safe Harbor Agreements, Candidate Conservation Agreements, others – to dispel myths about regulatory constraints. 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
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, hog-nosed skunk, hooded skunk, western spotted skunk, 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
Promote Texas-based downscaled climate modeling to build on the work done by Katherine Hayhoe and colleagues at Texas Tech. In this region, concentrate climate change models and effects on isolated habitats - playas, wetlands, grassland fragments, caprock and other “island” outcroppings, arid-land wetland and water-dependent features such as riparian and instream habitats, and invasive species responses. Publish findings to use in resiliency management plans for certain habitats and SGCN.
Improve Environmental Review and Consultation for voluntary practices (wind, solar, communications, transportation): Create mapped zones of sensitive areas (raptor migration corridors, proximity to colonial habitats, lesser prairie chicken leks) to share with wind developers to encourage better siting and voluntary mitigation Identify timing and intensity of barotrauma and impact hazards from wind turbines and encourage wind generation companies to modify practices Identify non-compliant communications towers and provide incentives to bring into compliance (lighting, height); outreach to communications companies about the local hazards of communiation towers and recommendations to improve practice to improve conditions for all noctural migrants and Yellow-billed Cuckoo, Painted Bunting, Summer Tanager

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.