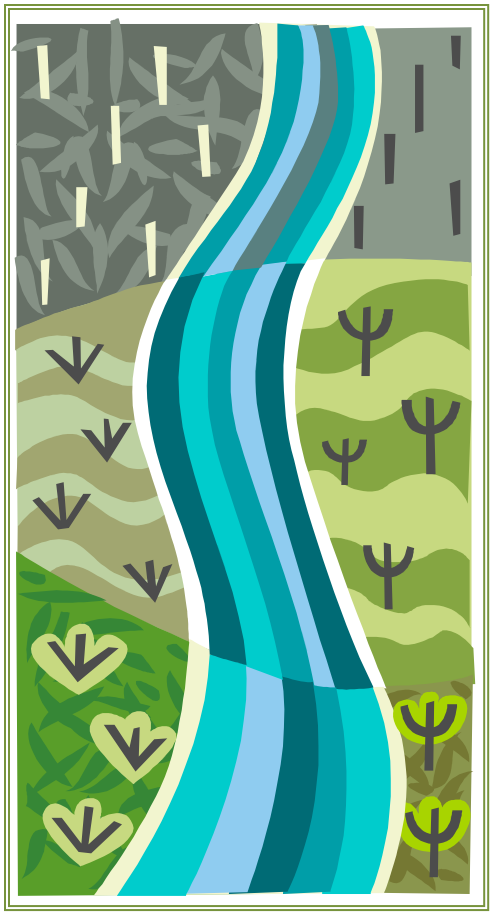

TEXAS CONSERVATION ACTION PLAN

High Plains

DRAFT ECOREGION HANDBOOK

JUNE 2011

Note: text in red in this document will be revised between June 10 Public Comment Draft and the final USFWS-approved document.
THIS IS A SUMMARY of the HANDBOOK; more background information will be added.

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PWD insert number when approved

Citing this document:

Texas Parks and Wildlife Department. 2011. **Texas Conservation Action Plan 2011 – 2016: High Plains Handbook**. Editor, Wendy Connally, Texas Conservation Action Plan Coordinator. PWD insert number when approved. Austin, Texas.

Contents

ECOREGION HANDBOOK FIGURES

ECOREGION HANDBOOK TABLES

See links on Texas Parks and Wildlife Department's Texas Conservation Action Plan 2011 Web Page for additional references and supporting documents cited in 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:

- 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 2011 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.

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 (TPWD 2007).

If you have questions about the TCAP content and cannot find what you need on the TPWD TCAP 2011 website or in one the handbooks, please contact the TCAP Coordinator at the TPWD Headquarters in Austin, Texas:

Phone (512) 389-4800

Email Texas Conservation Action Plan Coordinator

NOTE this email link for questions and implementation participation will be live AFTER the Public Comment period to ensure that we get all public comment through the posted survey on the

Texas Conservation Action Plan website

OVERVIEW

A one-page description of this ecoregion is being developed during the public comment period. For more information about the ecoregion's features during this time, please review Griffith (2010) and Griffith et. al. (2007).[1]

Table 1 crosswalks this ecoregion with other conservation planning units.[2]

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), and Ecologically Significant Stream Segments[3] (ESSS) which occur in this area.

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

[1] 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).

[2] For more information about planning boundaries, see the Overview handbook on the TCAP 2011 website http://www.tpwd.state.tx.us/landwater/land/tcap/

[3] 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 2011 website.

2010 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 JV Shortgrass Prairie BCR	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

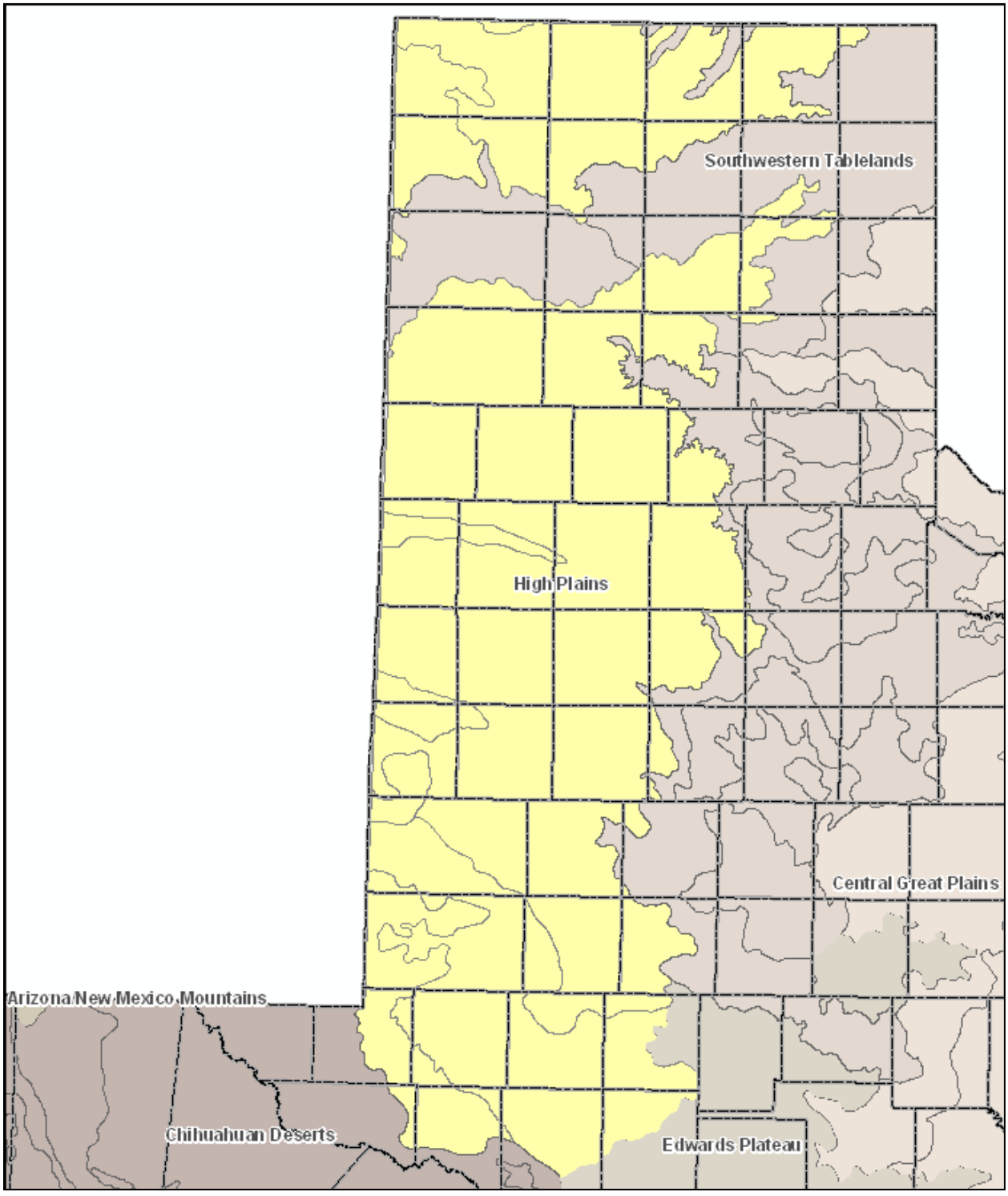


Table 2. HIPL EDUs with Ecologically Signifcant Stream Segments and Reservoirs

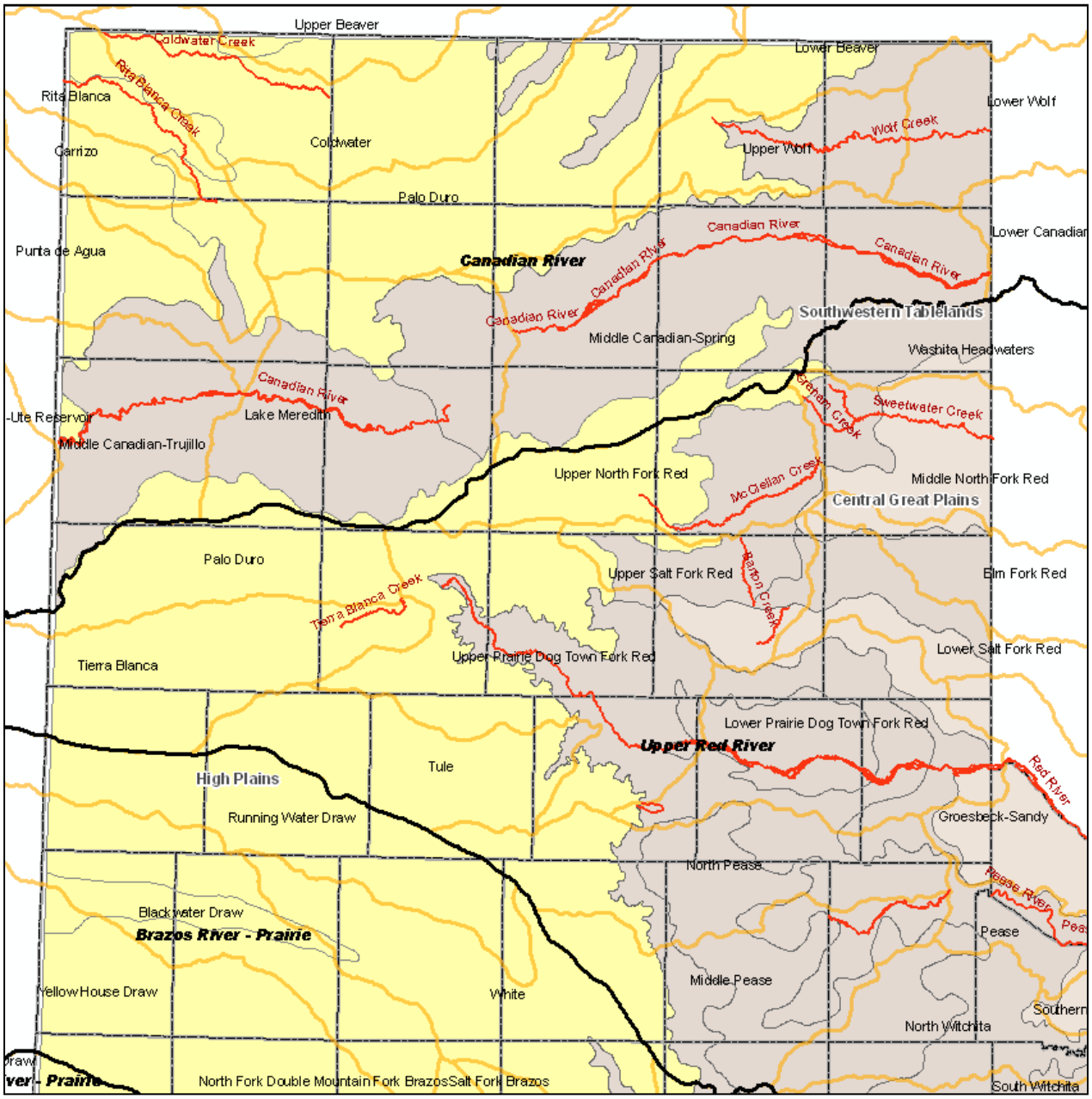
ECOLOGICAL DRAINAGE UNIT SubBasin (HUC 8)	*Ecologically Significant Stream Segment TPWD 2002, w/updates 2005*	**Lakes and Reservoirs**
LOWER PECOS		
Lower Pecos		
Landreth-Monument Draws		
CANADIAN RIVER		
Upper Beaver		
Lower Beaver		
Coldwater	Coldwater Creek	
Carrizo		
Rita Blanca	Rita Blanca Creek	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

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.

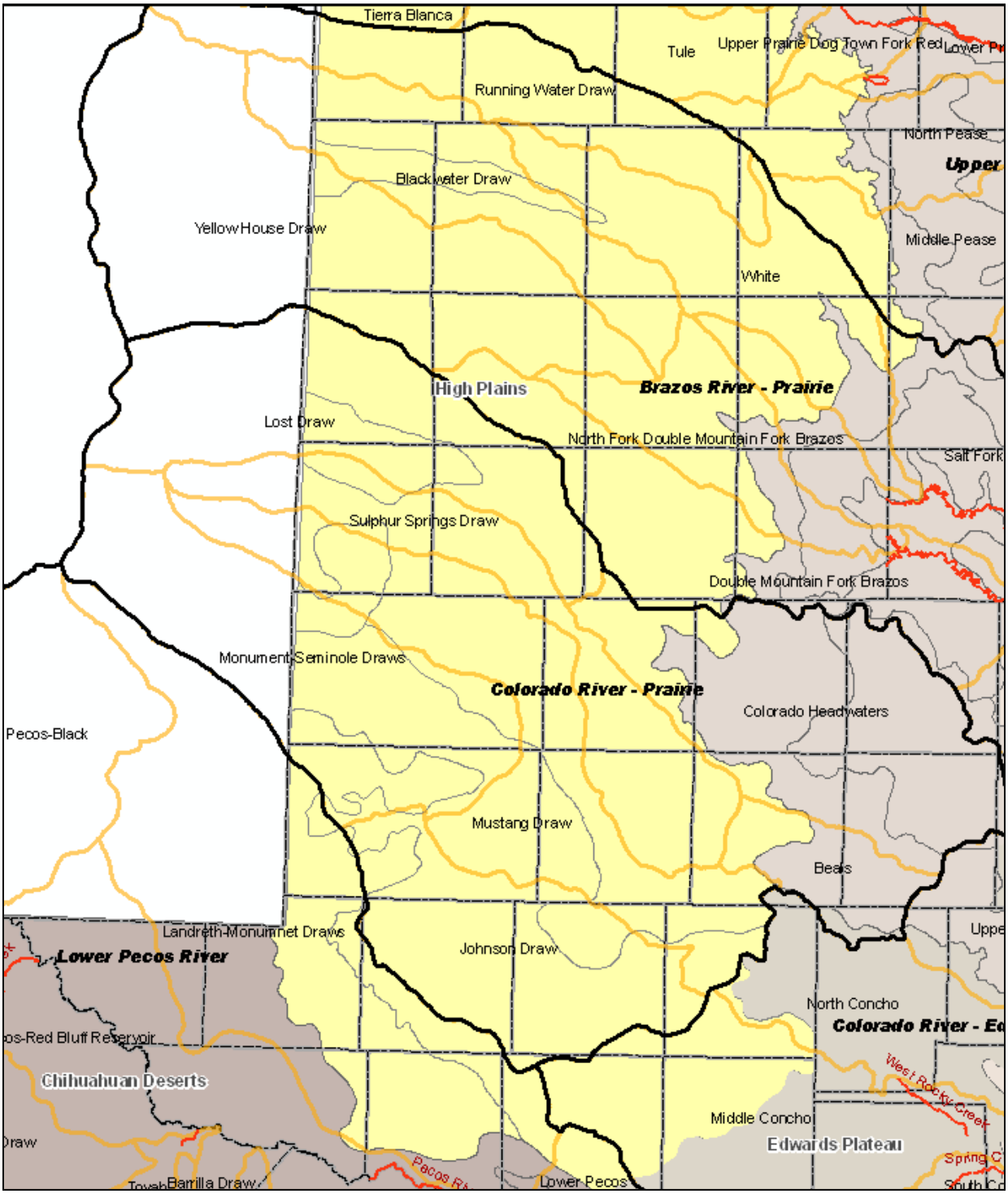
Figure 2. HIPL EDUs, HUC 8s, and ESSS

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. 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. Species and rare communities included in the 2011 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. The revised lists for TCAP 2011 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

Other categories are listed on the full statewide list, but are not applicable in this ecoregion: Bay and Estuary Fishes, Marine Fishes, Marine Reptiles, and Marine Mammals

Each species has a NatureServe calculated state and global conservation rank, which accounts for abundance, stability and threats. Additionally, several species have federal and/or state listing (endangered, threatened, candidate) status. See the key to conservation and listing ranks on the TPWD TCAP 2011 website.

Table 3. HIPL Species of Greatest Conservation Need (SGCN)

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

More information is available in the SGCN table online.

Scientific Name	Common Name	Status		Abundance Ranking	
		Federal	State	Global	State
MAMMALS					
Antilocapra americana	Pronghorn			G5	S3
Antrozous pallidus	Pallid bat			G5	S5
Bison bison	Bison			G4	SH
Conepatus leuconotus	Hog-nosed skunk			G5	S4
Corynorhinus townsendii	Townsend's big-eared bat			G4T4	S3? S4?
Cratogeomys castanops	Yellow-faced pocket gopher			G5	S5
Cynomys ludovicianus	Black-tailed prairie dog			G5T3	S3
Dipodomys spectabilis	Banner-tailed kangaroo rat			G5	S4
Microtus ochrogaster	Prairie vole			G5	S1
Mustela frenata	Long-tailed weasel			G5	S5
Mustela nigripes	Black-footed ferret	LE		G1	SH
Myotis velifer	Cave myotis			G5	S4
Notisorex crawfordii	Desert shrew			G5	S4
Nyctinomops macrotis	Big free-tailed bat			G5	S3
Puma concolor	Mountain lion			G5	S2
Spilogale gracilis	Western spotted skunk			G5	S5
Spilogale putorius	Eastern spotted skunk			G4T	S4
Tadarida brasiliensis	Brazilian free-tailed bat			G5	S5
Taxidea taxus	American badger			G5	S5
Vulpes velox	Swift fox			G3	S3?
BIRDS					
Anas acuta	Northern Pintail			G5	S3B,S5N
Callipepla squamata	Scaled Quail			G5	S4B
Colinus virginianus	Northern Bobwhite			G5	S4B
Tympanuchus pallidicinctus	Lesser Prairie-Chicken	C2		G3	S2B
Ictinia mississippiensis	Mississippi Kite			G5	S4B
Circus cyaneus	Northern Harrier			G5	S2B,S3N
Parabuteo unicinctus	Harris's Hawk			G5	S3B
Buteo swainsoni	Swainson's Hawk			G5	S4B
Buteo regalis	Ferruginous Hawk			G4	S2B,S4N
Charadrius alexandrinus	Snowy Plover			G4	S3B

Scientific Name	Common Name	Status		Abundance Ranking	
		Federal	State	Global	State
Charadrius montanus	Mountain Plover	PT		G3	S2
Numenius americanus	Long-billed Curlew			G5	S3B,S5N
Athene cunicularia	Burrowing Owl			G4	S3B
Asio flammeus	Short-eared Owl			G5	S4N
Tyrannus forficatus	Scissor-tailed Flycatcher			G5	S3B
Lanius ludovicianus	Loggerhead Shrike			G4	S4B
Aimophila cassinii	Cassin's Sparrow			G5	S4B
Spizella pusilla	Field Sparrow			G5	S5B
Ammodramus savannarum	Grasshopper Sparrow			G5	S3B
Chondestes grammacus	Lark Sparrow			G5	S4B
Calcarius mccownii	McCown's Longspur			G4	S4
Spiza americana	Dickcissel			G5	S4B
Sturnella magna	Eastern Meadowlark			G5	S5B
Icterus spurius	Orchard Oriole			G5	S4B
REPTILES and AMPHIBIANS					
Anaxyrus (Bufo) woodhousii	Woodhouse's toad			G5	SU
Apalone mutica	smooth softshell turtle				
Apalone spinifera	spiny softshell turtle				
Cheylydra serpentina	Common snapping turtle				
Crotalus atrox	Western diamondback rattlesnake				S4
Crotalus viridis	Prairie rattlesnake				
Heterodon nasicus	Western hognosed snake				
Phrynosoma cornutum	Texas horned lizard		T	G4G5	S4
Sceloporus arenicolus	Dunes sagebrush lizard	C		G2	S1
Sistrurus catenatus	massasagua				
Terrapene ornata	Ornate box turtle			G5	S3
Trachemys scripta	Red-eared slider				
FRESHWATER FISHES					
None identified for this area					
INVERTEBRATES					
Anomala suavis	A scarab beetle			G1*	S1*
Bombus pensylvanicus	American bumblebee			GU	SU*
Bombus variabilis	Variable cuckoo bumblebee			GU	SU*
Cicindela celeripes	Swift tiger beetle			G1G3	S2?*
Epitragosoma arenaria	A darkling beetle			G2G3*	S2S3*

Scientific Name	Common Name	Status		Abundance Ranking	
		Federal	State	Global	State
Eupseudomorpha brillians	Brilliant forester moth			G1G2*	S1*
Nicagus occultus	A stag beetle			G2*	S2*
Phallocryptus sublettei	Salt playa fairy shrimp			G2	S1*
Polyphylla monahansensis	A scarab beetle			G2*	S1*
Polyphylla pottsorum	A scarab beetle			G2*	S1*
Prionus arenarius	A longhorned beetle			G1*	S1*
Prionus spinipennis	A longhorned beetle			G1*	S1*
Stenopelmatus monahansensis	Monahans Jerusalem cricket			G1*	S1*
Trigonoscutoides texanus	A weevil			G2	S2
PLANTS					
Cyperus onerosus	dune umbrella-sedge			G2	S2
Ephedra coryi	Cory's ephedra			G3	S3
Eriogonum correllii	Correll's wild-buckwheat			G2G3	S2S3
Eriogonum nealleyi	Irion County wild-buckwheat			G2	S2
Euphorbia strictior	tall plains spurge			G3	S3
Eurytaenia hinckleyi	Hinckley's spreadwing			G3	S3
Helianthus neglectus	neglected sunflower			G3	S2
Heteranthera mexicana	Mexican mud-plantain			G2G3	S1
Machaeranthera viscida	sticky tansy aster			G2	S2
Muhlenbergia villiflora var. villosa	villous muhly			G5T3	S2
Proboscidea sabulosa	dune unicorn-plant			G3	S2
Pseudoclappia arenaria	cienega false clappia-bush			G3	S3
Selenia jonesii	Jones' selenia			G3	S3

Table 4. HIPL Rare Communities

Note Table is formatted 11" X 17", more information is available on the Rare Communities table posted on the website.

G_RANK	S_RANK	COMMON_NAME	GLOBAL_NAME	TRANSLATED_NAME	ECOLOGICAL SYSTEM_NAME	KNOWN COUNTIES	Endemic	KNOWN PROTECTED AREAS
G1G2	S1S2	Eastern Great Plains Saline Marsh	Distichlis spicata - Schoenoplectus maritimus - Salicornia rubra Herbaceous Vegetation		Eastern Great Plains Wet Meadow, Prairie and Marsh CES205.687	*Potential in the High Plains and Southwestern Tablelands*	N	No protected areas
G1G2	S1S2	Dalea - Mimosa Dwarf-shrubland	Dalea formosa - Mimosa borealis Dwarf-shrubland	Featherplume - Pink Mimosa Dwarf-shrubland		Gray, Hutchison, Moore, and Potter	Y	Lake Meredith National Recreation Area (USFWS)
G2G3	S1	Bulrush - Spikerush Marsh	Schoenoplectus americanus - Eleocharis spp. Herbaceous Vegetation	Chairmaker's Bulrush - Spikerush species Herbaceous Vegetation	Ecological System: North American Arid West Emergent Marsh System CES300.729	Culberson, Dallam, and Hemphill	N	Gene How WMA and Guadalupe Mts NP (NPS)
G2G3	S1S2	Texas Rocky Mountain Juniper Woodland	Juniperus scopulorum Woodland	Rocky Mountain Juniper Woodland	Ecological System: Western Great Plains Wooded Draw and Ravine CES303.680	Armstrong, Bailey, Briscoe, Randall, Roberts, and Wheeler	N	Muleshoe NWR (USFWS) and Palo Duro Canyon State Park (TPWD)
G2	S2	Torrey's Joint-fir / Black Grama Shrub Herbaceous Vegetation	Ephedra torreyana / Bouteloua eriopoda Shrub Herbaceous Vegetation	Torrey's Joint-fir / Black Grama Shrub Herbaceous Vegetation	Ecological Systems: Chihuahuan Sandy Plains Semi-Desert Grassland System CES302.736 or Colorado Plateau Blackbrush-Mormon-tea Shrubland System CES304.763 or Southern Colorado Plateau Sand Shrubland System CES304.793	Andrews, Armstrong, Briscoe, Brewster, Culberson, Deaf Smith, Howard, Hudspeth, Moore, Oldham, Randall, Reeves, and Ward	N	Guadalupe Mts NP (NPS), Palo Duro Canyon SP (TPWD)
G2	S1	Black Grama - Hairy Grama Shortgrass Prairie [B6]	Bouteloua eriopoda - Bouteloua hirsuta Herbaceous Vegetation	Black Grama - Hairy Grama Herbaceous Vegetation	Ecological System: Apacherian-Chihuahuan Semi-Desert Grassland and Steppe System CES302.735	El Paso, Hudspeth, Cottle	N	Franklin Mts and Hueco Tanks SP (TPWD) Matador WMA (TPWD)
G2G3	S2	Sand Bluestem Prairie [B3]	Andropogon hallii - Calamovilfa gigantea Herbaceous Vegetation	Sand Bluestem - Big Sandreed Herbaceous Vegetation	Western Great Plains Sand Prairie CES303.670	Bailey, Hemphill, Lamb, Lipscomb, Roberts, Terry, Wheeler, and Yoakum	N	Fitzgerald Preserve (TNC) Gene Howe WMA (TPWD) Yoakum Dunes (TNC)
G2	S2	Sand Bluestem - Havard's Panicgrass - Giant Dropseed Herbaceous Vegetation	Andropogon hallii - Panicum havardii - Sporobolus giganteus Herbaceous Vegetation	Sand Bluestem - Havard's Panicgrass - Giant Dropseed Herbaceous Vegetation	Western Great Plains Sand Prairie CES303.670	Crane, Ward, and Winkler	Y	Monahans Sandhills SP (TPWD)
G2G3	S2	Sand Sagebrush / Sand Bluestem Shrubland [B4]	Artemisia filifolia / Andropogon hallii Shrubland	Sand Sagebrush / Sand Bluestem Shrubland	Western Great Plains Sandhill Steppe CES303.671	Bailey, Childress, Collingsworth, Dallam, Deaf Smith, Donley, Hardeman, Hall, Hartley, Hemphill, Hockley, Hutchison, Lipscomb, Oldham, Potter, and Roberts	N	Fitzgerald Preserve (TNC) Gene Howe WMA (TPWD) Buffalo Lake and Muleshoe NWRs (USFWS)
G2	S1	Twisted spikerush - Common threesquare – Smooth cordgrass – Sedges – (Swamp verbena)	Eleocharis tortilis - Schoenoplectus pungens - Spartina pectinata - Carex spp. (emory and pellita) - (Verbena hastata) Sandhill Fen Herbaceous Vegetation			Deaf Smith, Hartley, Hemphill, Hutchison, Lipscomb, Ochiltree, Oldham, and Wheeler,	N	Gene Howe WMA (TPWD) and Lake Meredith NRA (NPS)
G2	S2	Bindweed Heliotrope - Lemon Scurfpea - James' Clammyweed Sparse Vegetation	Heliotropium convolvulaceum - Psoralidium lanceolatum - Polanisia jamesii Sparse Vegetation	Bindweed Heliotrope - Lemon Scurfpea - James' Clammyweed Sparse Vegetation	North American Warm Desert Active and Stabilized Dune System CES302.744	Ector, Ward, and Winkler	Y	Monahans Sandhills SP (TPWD)

G2	S2	Forb Playa Marsh [B7]	Heteranthera limosa - Bacopa rotundifolia - Sagittaria latifolia Herbaceous Vegetation	Blue Mud-plantain - Midwestern Water-hyssop - Broadleaf Arrowhead Herbaceous Vegetation	Western Great Plains Closed Depression Wetland CES303.666	Andrews, Bailey, Carson, Castro, Deaf Smith, Gray, Hale, Lipscomb, Lubbock, Ochiltree, Randall, Sherman, and Swisher	N	Playa Lakes WMA (TPWD) Buffalo Lake NWR, Muleshoe NWR (USFWS)
G2G3	S2S3	Switchgrass - Western Wheatgrass Floodplain Grassland [B8]	Panicum virgatum - Pascopyrum smithii Southern Herbaceous Vegetation	Switchgrass - Western Wheatgrass Southern Herbaceous Vegetation	Western Great Plains Closed Depression Wetland CES303.666	Armstrong, Childress, Collingsworth, Donley, Lipscomb, Gray, Hall, Hemphill, Hutchison, Oldham, Potter, Randall, Roberts, and Wheeler	Y	Gene Howe WMA (TPWD), Lake Meredith National Recreation Area (USFWS), and Palo Duro Canyon State Park (TPWD) locations will be added after field confirmation
G2G3	S1S2	Wheatgrass Playa Grassland [B9]	Pascopyrum smithii - Buchloe dactyloides - (Phyla cuneifolia, Oenothera canescens) Herbaceous Vegetation	Western Wheatgrass - Buffalograss - (Wedgeleaf Frogfruit, Spotted Evening-primrose) Herbaceous Vegetation	Western Great Plains Closed Depression Wetland CES303.666	Deaf Smith, Hansford, Hemphill, Oldham, Potter, Randall, and Roberts, Sherman	N	No documented protected areas locations will be added after field confirmation
G2	S1	Cottonwood / Switchgrass Floodplain Woodland [B10]	Populus deltoides / Panicum virgatum - Schizachyrium scoparium Woodland	Eastern Cottonwood / Switchgrass - Little Bluestem Woodland	Western Great Plains Floodplain CES303.678	Deaf Smith, Hartley, Hemphill, Hutchison, Lipscomb, Ochiltree, Oldham, and Wheeler,	N	Gene Howe WMA (TPWD) and Lake Meredith NRA (NPS) locations will be added after field confirmation
G2G3	S2S3	Cottonwood / Western Wheatgrass - Switchgrass Woodland [B11]	Populus deltoides / Pascopyrum smithii - Panicum virgatum Woodland	Eastern Cottonwood / Western Wheatgrass - Switchgrass Woodland	Western Great Plains Floodplain CES303.678	Armstrong, Childress, Collingsworth, Donley, Lipscomb, Gray, Hall, Hemphill, Hutchison, Oldham, Potter, Randall, Roberts, and Wheeler	Y	Gene Howe WMA (TPWD), Lake Meredith National Recreation Area (USFWS), and Palo Duro Canyon State Park (TPWD) locations will be added after field confirmation
G2	S2	Havard Oak - (Gilia Penstemon, Grassland Croton) / Giant Dropseed Shrubland	Quercus havardii - (Penstemon ambiguus, Croton dioicus) / Sporobolus giganteus Shrubland	Havard Oak - (Gilia Penstemon, Grassland Croton) / Giant Dropseed Shrubland	-	Andrews, Crane, Ector, Ward, and Winkler	Y	Monahans Sandhills SP (TPWD)
G2G3	S2S3	Havard Shin Oak - Little Bluestem Shrubland [B12]	Quercus havardii / Sporobolus cryptandrus - Schizachyrium scoparium Shrubland	Havard Oak / Sand Dropseed - Little Bluestem Shrubland	Western Great Plains Sand Prairie CES303.670	Bailey, Childress, Collingsworth, Dallam, Hansford, Hardeman, Hall, Hemphill, Hockley, Hutchison, Hartley, Lipscomb, Motley, Oldham, Potter, Roberts, Sherman, Terry, Wheeler, and Yoakum	N	Fitzgerald Preserve (TNC) ~~Gene Howe WMA (TPWD)~~ locations will be added after field confirmation
G2	S2	Chihuahuan Desert Willow Dune Depression	Salix exigua / Baccharis salicifolia - Baccharis neglecta / Schoenoplectus spp. Woodland	Coyote Willow / Mulefat - Rooseveltweed / Clubrush species Woodland	North American Warm Desert Interdunal Swale Wetland System CES302.039	Ward and Winkler	Y	Monahans Sandhills SP (TPWD)
G2G3	S2S3	Gypsum Outcrop Grassland [B13]	Sporobolus cryptandrus - Schizachyrium scoparium - Bouteloua curtipendula Herbaceous Vegetation	Sand Dropseed - Little Bluestem - Sideoats Grama Herbaceous Vegetation	-	Bailey, Childress, Collingsworth, Dallam, Deaf Smith, Donley, Hardeman, Hall, Hartley, Hemphill, Hockley, Hutchison, Lipscomb, Oldham, Potter, and Roberts	N	No documented protected areas locations will be added after field confirmation

PRIORITY HABITATS

Nationally, an SGCN list forms a basis for every Action Plan; however, *species* conservation cannot be successful without defining the *lands and waters species need to survive and thrive*. If it was only important to know about individuals or even populations, we could put representatives in zoos or herbaria or other curated collections and that would be enough; but, it's not …. **It's important to conserve populations in the *context* in which they thrive, to the best of *their* abilities, where they can *contribute to and benefit from* the systems in which they live**.

Broad habitat categories were developed to organize all ecoregional handbooks.

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 also Ecoregions of Texas (report is near the bottom of webpage; Griffith et. al. 2007), Ecological Mapping Systems Project (TPWD et. al. *in progress*), and the National Fish Habitat Action Plan

Table 5. HIPL Priority Habitats

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

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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. Please review the habitat types and ensure that the list is complete.*	*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	sagebrush grassland (is this the same as next community?) 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	Instream habitats of the watersheds which intersect this ecoregion (see EDU Workbook) Ecologically Significant Stream Segments - Coldwater Creek, Rita Blanca Creek, Wolf Creek (headwaters), Tierra Blanca Creek, McClellan Creek (headwaters)	NA
Lacustrine *See also* Cultural Aquatic	deeper playa lakes, generally wet year-round	NA
Freshwater Wetland	shallow playa lakes, generally wet most of year or ephemeral, and hydrophylic vegetation subirrigated meadow springs, seeps	Western Great Plains Closed Depression Wetland Western Great Plains Open Freshwater Depression Wetland
Saltwater Wetland	saline lakes and associated perched water table and springs (are any of these also lacustrine, permanent water with some deepwater habitats?)	Western Great Plains Saline Depression Wetland Western Great Plains Closed Depression Wetland Western Great Plains Open Freshwater Depression Wetland

GENERAL HABITAT TYPES	HIGH PLAINS (HIPL)	HIPL Ecological Systems
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		NA
Industrial		NA
Rights of Way	bridges, culverts (bats), abandoned mine tunnels	NA
Cultural Aquatic	Reservoirs: Rita Blanca, Lake Meredith, Bivins, Buffalo, MacKenzie, Buffalo Springs, Natural Dam	NA

Texas shares its border with four states – New Mexico, Oklahoma, Arkansas, and Louisiana. HIPL crosses into the Oklahoma Panhandle and eastern New Mexico. Table 6 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 6. Shared Habitat Priorities with Adjacent State – New Mexico and Oklahoma

Adjacent States	Ecoregions Shared with Texas	Habitat Priorities Shared with Texas[4]
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

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

ISSUES

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

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 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.

Table 7. 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) Giant reed/river cane (*Arundo donax*) 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, monotypic stands, and outcompetes native riparian vegetation (cottonwood, sycamore) at all seral stages and canopy levels; salt cedar and *Arundo* line the banks of the Rio Grande in the Big Bend reach, armoring the banks and contributing significantly to channel incision and narrowing, which reduces the diversity and quality of habitat for aquatic species Non-native grasses either as improved pastures or naturally expansive have established in many Trans-Pecos grasslands, are a substantial threat to grassland-dependent species (e.g. grassland-obligate birds and pronghorn) 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 Toxic algal blooms in Lake Balmorhea may adversely impact Comanche Springs pupfish; also known in Pecos River
Non-native Animal	FERAL HOGS Introduced ungulates for hunting introduced fishes and mollusks - freshwater springs, streams and marshes	Feral hogs also decimate important and fragile habitats (e.g. springs, seeps, riparian areas, swale depressional wetlands), degrade instream water quality, and decrease hardwood seedling viability (rooted up, eaten) Bait fish releases ("minnows") can cause problematic congeneric hybridization (e.g. *Gambusia* sp.)
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)	Invasive native brush/trees into plant communities where they are not naturally found (ravines, cliffs, swale savanna) 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 who need vast open spaces to feel safe from predators and brush-degraded grasslands are no longer suitable for pronghorn foraging. Toxic blooms in what waterbody may adversely impact what SGCN
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 Trans-Pecos.
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.
Solar or photovoltaic (PV) array	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;

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
siting		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 native grassland 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 springs and spring-dependent aquatic systems, wastewater discharges can create unhealthy to intolerable water chemistry for SGCN Because these are not food crops, the application of fertilizer and pesticides is potentially a greater concern, especially adjacent to waterways (runoff and wastewater discharges can create unhealthy to intolerable water chemistry for SGCN) and impact wildland native insect fauna, 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)	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 flaring 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 flaring increases acid deposition which affects http://www.esa.org/education_diversity/pdfDocs/aciddeposition.pdf - not sure how this directly affects SGCN or habitats? Widespread and densely developed extraction operations: clearing, road networks, pad sites, and large mechanical infrastructure(s) which contribute to direct habitat loss, direct and indirect habitat fragmentation, direct mortality from vehicles and operations, and noise/light disturbance (e.g. 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	http://www.energyindustryphotos.com/shale_gas_map_shale_basins.htm this ecoregion is underlain by a portion of the Woodford, Bend, Palo Duro, and Permian Basin shale gas deposits. These deposits are being developed as the technology is available and demand puts pressure for more domestic sources. 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	Groundwater and its surface expression in seeps, springs, and streams are extremely important habitats in this ecoregion; groundwater contamination could cause total loss of isolated aquatic populations, adversely affect vegetation that depends on water quantity and quality in riparian areas and instream. 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 allowed to colonize or are directly planted for soil stabilization) Equipment leaking fluids and unremediated spills contribute to surface and groundwater contamination
Mining		
Sand and Gravel - upland and	sand and gravel mining along and within streams and rivers	http://www.tshaonline.org/handbook/online/articles/gpm01

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
riverine		need map of sand and gravel mines in TX loss of riparian habitats for instream and adjacent mining, sedimentation in streams contributes to loss and degradation of instream habitats
Caliche	caliche - small scale on ranches, large scale for county roads	typically for road base, unreclained sites, complete/permanent loss of surface communities
Gypsum	What issue?	What effects?
Bentonite	What issue?	What effects?
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)	In this region, primarily bridge construction location (through remaining native habitats) and type (incompatible with wildlife crossing or bat roosting) are the concern 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)	directly takes habitat and species during construction (loss), primarily concern with riparian loss degrades adjacent habitat – creates edge, long linear disruption, pollution from runoff into creeks and streams may hinder movement (daily or seasonal) – barrier to wildlife and stream passages Right of Way (ROW) restoration following construction is not native from native seed or plant sources
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	
Lack of soil and water management and conservation practices	chemical-laden irrigation water runoff conversion unsustainable irrigation – groundwater, surface water See also *Groundwater Planning and Distribution*	Contaminated runoff adversely impacts to sensitive aquatic insects and other invertebrates, fishes, and amphibians in all stream courses, playas, springs, groundwater, and all wetland types playas are the most rare habitat type in this ecoregion; playa conversion to agricultural landremoves 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. Playas, other surface waters, and groundwater resources used for agricultural irrigation; 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 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
Landowner/land management incentive programs working at cross-purposes	single-objective management such as all-game, all-livestock, all-recreation incentive programs, technical guidance, and management assistance "menu" is limited based on whichever agency or organization was contacted by the landowner Landowners do not have a one-stop shop to choose best management practices for their site, for their goals Some programs are being phased out or limited due to lack of enrollment or	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.

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
	inability to keep up with market forces	
Fencing	netwire fencing high game fencing	Netwire fencing and most "game" fencing fragments pronghorn daily and seasonal movements, restricts their access to water and food, and increases their vulnerability to predation; their movements are interrupted by fences under which they cannot crawl (they do not jump fences). Issue causes lack of genetic diversity through inbreeding, lack of dispersal into available appropriate habitats (which means that role is unfulfilled or filled by ... instead in the system), 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 surrogate 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
Lack of soil management and conservation practices	inappropriate herbicide application (Spike) lack of soil conservation (vegetation conservation/restortaion) along stream courses and on grazing lands, soil erosion	is this in the right place – what category better?? Hydrology and streamside vegetation are altered, soil and vegetation is lost in upland areas, water quality is degraded through sediment-laden runoff; dealing with historical and contemporary issues, need, in some instances, different approaches for recovery/restoration
Fire suppression and lack of or inappropriate application of Rx fire	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, smallamphibians 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 which can affect water quality in springs, seeps, swale grasslands,
Land & Water Mgmt: Municipal	See also Water Development section	
Lack of Zoning and Planning	Planning efforts are minimal, rarely regional	Water: Outlying areas and rural areas with water are targeted to supply municipal needs in other basins Land: Urban sprawl and little regulation on development type contributes to arid land habitat loss of many types (grasslands, desert shrublands) Little to no stormwater controls contribute chemical runoff into recharge areas, surface waters, adversely impacting groundwater resources and their surface expressions (springs, seeps) and playas, which collect surface runoff 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)
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.

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
		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”, 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 entitie 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 What specific impacts to SGCN from Ogallala and/or Edwards – Trinity disappearance or draw downs?
Other Water Source Developments and Technologies	Interbasin Transfers (Surface and Groundwater)	This is addressed at the statewide level; are there specific SGCN or priority habitats affected in this region??
	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	One response stated this is an issue, but did not provide additional information	
Lack of Data/Information	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 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	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.

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
	GIS analysis of land conversion and change overtime – available opportunities for **conservation corridor**s and focus Climate Change predictive model for habitat impacts affecting SGCN, especially reptiles, amphibians, migratory birds See also Climate Change section in Statewide handbook	
	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 will need to be devised based on a full and accurate accounting of these populations and their effects on the natural systems and ranching communities in which they range. Predator trapping and/or baiting has an adverse effect on non-target species including black bears and smaller mammals such as hooded skunks, foxes
	Lack of Processing *Existing* Data this tied to "Lack of Information (amount, type)	Where census, survey, records and collections are documented, little is done with the data to detect trends and causes for upward or downward shifts. Without this information, it is difficult to focus or prioritize management objectives or share information with private landowners about the importance of some sites, populations or communities. Sharing this information with landowners is crucial as most of Texas is privately owned and conservation must occur with their stewardship help.
	Inadequate understanding of available or widely-accepted conservation Best Management Practices	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		
	Poaching, Permitting Avoidance and Violations insufficient law enforcement for non-game issues (not enough resources to cover all issues all the time)	Need more information – what specifically is the effect on SGCN or priority habitats in this region
	Loss of and impact to "non-jurisdictional" wetlands and other waters	Playas and other wetlands have no protection from agricultural conversion, fill and loss to development, and/or surface water runoff impacts (some are used as stormwater pollution prevention facilities?); this is 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 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 on Working Lands	Landowner incentives cannot compete currently with market forces; market forces in some areas cannot support continued ag or ranch ownership	See Statewide Handbook – Issues and Actions sections

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*.[5]

Actions proposed for the HIPL Ecoregion (Table __) 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 (CMP 2007, Salzer and Salafsky 2006). 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 fish and wildlife agency directors and others. 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 (AFWA TWW, 2011) is **strongly recommended** to define projects, target audiences and partners, identify desired step-wise intermediate results, and collect the "right" data to report our conservation achievements.

[5] 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).

Table 8. 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	Direct Mgmt of Natural Resources	Species Restoration	Creation of New Habitat	Acquisition, Easement, or Lease	Land Use Planning	Training, Technical Assistance	Data Collection, Analysis, Management	Conservation Area Designation	Education, Targeted Outreach	Environm Review	Mgmt Planning
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 See also Statewide Issues handbook recommendation to use data to model likely associations between ecological systems, finer scale vegetation communities, and SGCN. This is needed throughout the state.											
Use appropriate NRCS Farm Bill, USFWS Partners, and other grant programs to incentivize landowners to permanently protect and restore playas with ecologically-determined buffers; map these important conservation efforts as part of a monitoring program for overall playa conservation effectiveness											
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 (LPC, BCR), 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, riparian corridors along Ecologically Significant Stream Segments (and to their headwaters), and/or springs 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 (see Statewide/Multi-region Issues handbook – Information Actions section).											
Form multi-partner working group(s) to establish scientifically sound best management practices for **prescribed fire application** for the ecoregion (timing/season, period/duration, intensity, parameters for RX, 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											

Conservation Action	Direct Mgmt of Natural Resources	Species Restoration	Creation of New Habitat	Acquisition, Easement, or Lease	Land Use Planning	Training, Technical Assistance	Data Collection, Analysis, Management	Conservation Area Designation	Education, Targeted Outreach	Environm Review	Mgmt Planning
Form multi-partner working group(s) to establish 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 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											
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.											
Identify a host website to share ecoregional practitioner (not novice, not landowner, but professional) *cross-training opportunities* for RX fire, stream rehabilitation, reintroductions, brush management, GIS, and wildlife corridor identification, other …											

Conservation Action	Direct Mgmt of Natural Resources	Species Restoration	Creation of New Habitat	Acquisition, Easement, or Lease	Land Use Planning	Training, Technical Assistance	Data Collection, Analysis, Management	Conservation Area Designation	Education, Targeted Outreach	Environm Review	Mgmt Planning
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)											
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											
Many SGCN in this region lack distribution and POPULATION status information. This lack of information can contribute to "false rarity" determinations; more information and cooperation from private landowners may reduce the risk of listing, enhance recovery options, and contribute to conservation of many sensitive habitats just through awareness and documentation.											

Conservation Action	Direct Mgmt of Natural Resources	Species Restoration	Creation of New Habitat	Acquisition, Easement, or Lease	Land Use Planning	Training, Technical Assistance	Data Collection, Analysis, Management	Conservation Area Designation	Education, Targeted Outreach	Environm Review	Mgmt Planning
Information Needs (Specific, can identify more through research item above) ▪ 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 (why these species? Are these particular indicators in their habitats? Are they highly threatened? Are they good monitoring indicators for particular habitat health?): o Dunes Sagebrush Lizard o Lesser Prairie Chicken and related assemblages o Grassland and Riparian Breeding and Wintering Birds 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 levels of impact of groundwater withdrawals on spring habitats that support SGCN											
Conservation Plans for Lesser Prairie Chicken and Dunes Sagebrush Lizard which also cover other related SGCN specifically; include monitoring effectiveness of planned conservation activities.											
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 mandatory trapper education classes to improve trapping techniques that reduce non-target losses											
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											

Conservation Action	Direct Mgmt of Natural Resources	Species Restoration	Creation of New Habitat	Acquisition, Easement, or Lease	Land Use Planning	Training, Technical Assistance	Data Collection, Analysis, Management	Conservation Area Designation	Education, Targeted Outreach	Environm Review	Mgmt Planning
Climate change models and effects on isolated habitats - playas, wetlands, grassland fragments, caprock and other “island” outcroppings Other arid-land wetland and water-dependent features such as riparian and instream habitats Invasive species											
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											
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, other?) 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, See Transportation section of Statewide/Multi-region handbook regarding bridge and culvert design											
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.											

Conservation Action	Direct Mgmt of Natural Resources	Species Restoration	Creation of New Habitat	Acquisition, Easement, or Lease	Land Use Planning	Training, Technical Assistance	Data Collection, Analysis, Management	Conservation Area Designation	Education, Targeted Outreach	Environm Review	Mgmt Planning
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.											
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											
Where wildlife and fisheries management are not the primary objective and where livestock production is the primary objective, refer landowners to partners who can assist them with best management practices for rotational and site-appropriate grazing management											
Species Restoration: ▪ Pronghorn populations (not just individuals) coincidental with habitat improvement, fence replacement, restocking, parasite research and plan to deal with this problem, genetic enhancement (?) ▪ Lesser Prairie Chicken in resilient, redundant populations working with adjacent states (Lesser Prairie Chicken Working Group) ▪ Black-tailed prairie dog – burrowing owl – black-footed ferret ecosystems: introductions, habitat improvement, management recommendations for compatible land uses											
Identify key areas to promote netwire fencing replacement (with strand barbed wire) for pronghorn benefits. Monitor pronghorn use of these areas to determine if this fencing program is an effective conservation technique or whether it should be coupled with other strategies (what other strategies)											

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.

CONSERVATION PARTNERS AND PROGRAMS

This section to be developed following all Actions, prior to USFWS review in August 2011

RESOURCES AND REFERENCES

Resources and References will be finalized after the handbook has been completely drafted. These and other resources will be compiled into one large document on the website after USFWS review.

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