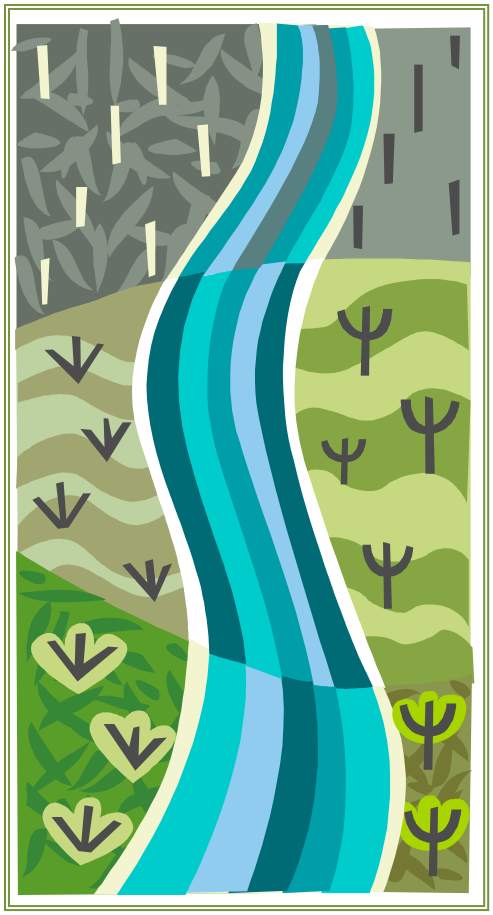

TEXAS CONSERVATION ACTION PLAN

South Texas Plains ECOREGION HANDBOOK

August 2012

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

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

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

or the Wildlife Diversity Program website

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

for additional references and supporting documents related to this handbook.

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

SUMMARY

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

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

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

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

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

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

HOW TO GET INVOLVED

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

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

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

Phone (512) 389-4800

Email tcap@tpwd.state.tx.us

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

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

OVERVIEW

Legendary in Texas and beyond for its hunting and birdwatching opportunities, dense brush thickets, and mythic creatures (think "*chupacabra*"), the South Texas Plains (STPL)ecoregion – also known as the Brush Country – shares wildlife, fish, and human diversity with our international neighbor, Mexico. The Rio Grande/Rio Bravo and many ecologically significant streams whose waters originate in the aquifers and springs of the Edwards Plateau to the north are the primary water resources of this region, all eventually flowing to feed the southern portions of the Texas Gulf of Mexico. Lakes are not prevalent, but two large reservoirs – Amistad and Falcon – along the Rio Grande definitely influence the ecology and economy of this border region.

This rolling to moderately dissected plain is thought to have was once been dominated by vast grasslands and savanna. Historically significant as a wild, fluctuating border with Mexico and important to the cattle and goat industries' beginnings in Texas, this region has been shaped by the the effects of international commerce, continuous grazing, livestock water development, fencing, fire suppression and rowcrop agriculture. Rangeland practices have influenced the vegetation and many rare plants and animals are now adapted to and rely on the thick, thorny brush. Also known as the Tamualipan Thornscrub, the region has its greatest extent in northeast Coahuila, northern Nuevo León, and northern Tamaulipas, Mexico.

Honey mesquite, brasil, colima, lotebush, granjeño, kidneywood, coyotillo, blackbrush, guajillo, cenizo, Texas paloverde, anaqua, tall and mid grasses, and various cactus species occur in the region. Mottes or islands of live oak and post oak occur in the northern extents of this ecoregion. Rio Grande/Rio Bravo riparian plants include sugar hackberry, Mexican ash, cedar elm, black willow, black mimosa, and common reed. Riparian zones of tributaries and rivers originating in the Edwards Plateau have more in common with that ecoregion – sycamore, cypress, elm, hackberry.[4]

Alluvial soils from the ancient Rio Grande plains, unique outcrops and geology, hot summers and warmer winters than the adjacent Chihuahuan Desert, and cyclic intense precipitation influenced by tropical storms and hurricanes of the Gulf, create very specialized, rare plant communities and species. This ecoregion in Texas shares some trans-border wildlife such as ocelot, jaguarondi and many interesting birds which seem to be expanding their ranges in our state – green jay, caracara, belted kingfisher, chachalaca, tropical parula. Well-known for its hunting opportunities – dove, quail, white-tailed deer – the STPL supports a great diversity of terrestrial and aquatic species: javelina, ringtail cat, armadillo, bats, many regional pocket gophers and lizards, an abundance of spring and spring-fed river dependent fishes, and several insects unique to this region.

Some of the region is still in ranching and grazing industries, with hunting, birding, and oil and natural gas production augmenting or replacing those incomes. Agriculture is prevalent primarily in the alluvial soils of the ancient floodplains of the region's rivers. The largest towns and cities include Uvalde, Del Rio/Ciudad Acuña, Eagle Pass/Piedras Negras, Laredo/ Nuevo Laredo. This region is heavily populated in both countries along the border and is highly impacted by border crossing and security operations.

[4] Griffith, G. 2010. Level III North American Terrestrial Ecoregions: United States Descriptions. Prepared for the North American Commission for Environmental Cooperation (www.cec.org), version May 11, 2010. Corvallis, Oregon.
Griffith, G.E., S.A. Bryce, J.M. Omernik, J.A. Comstock, A.C. Rogers, B. Harrison, S.L. Hatch and D. Bezanson. 2007. Ecoregions of Texas. R.S. Geological Survey, Reston VA. http://www.epa.gov/wed/pages/ecoregions/tx_eco.htm (accessed May 2009).

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

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

Table 2 documents the Ecological Drainage Units (EDU) and Hydrologic Units ("HUC 8", finer scale watersheds within EDUs), Reservoirs, and Ecologically Significant Stream Segments[6] (ESSS) which occur in this area.

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

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

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

Table 1. Crosswalk of STPL 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.*

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)
Southern Texas Plains (STPL)	South Texas Plains	Tamaulipan Thorn Scrub (30)	Corpus Christi – Frio – Nueces Guadalupe – San Antonio Laguna Madre Lower Rio Grande/Bravo	Rio Grande JV Gulf Coast JV Tamaulipan Brushlands BCR	Gulf Coast Prairie	Trans Pecos – Rio Grande (1) South Texas Rio Grande (2) Nueces Coastal Bend (3)	Southwest Plateaus and Plains Range and Cotton Region: Edwards Plateau Western (81A), Northern Rio Grande Plain (83A), Western Rio Grande Plain (83B), Central Rio Grande Plain (83C), Lower Rio Grande Plain (83D)	South Texas Brush Country

Figure 1. STPL Ecoregion with County Boundaries
South Texas Plains ecoregion in yellow

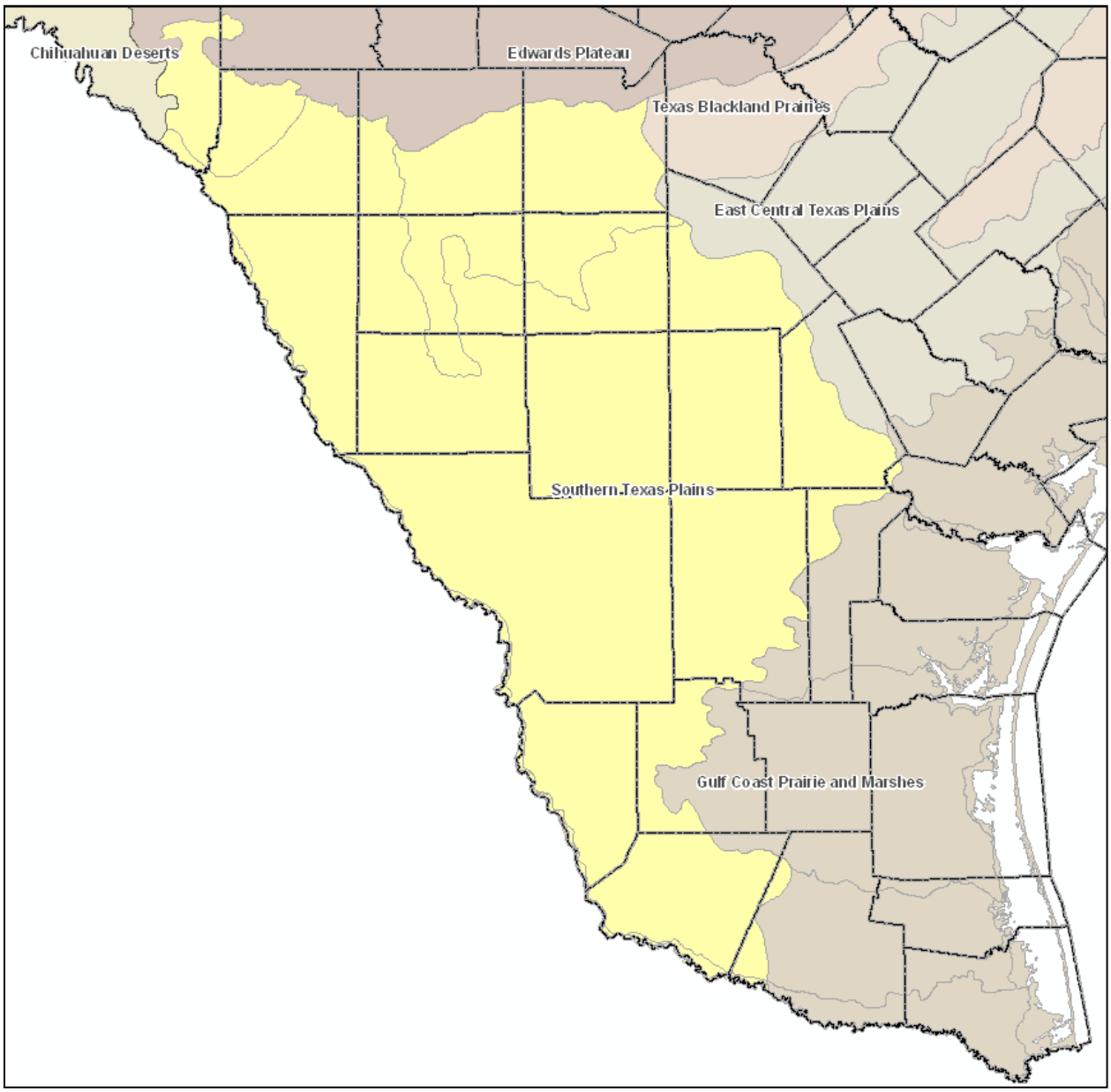


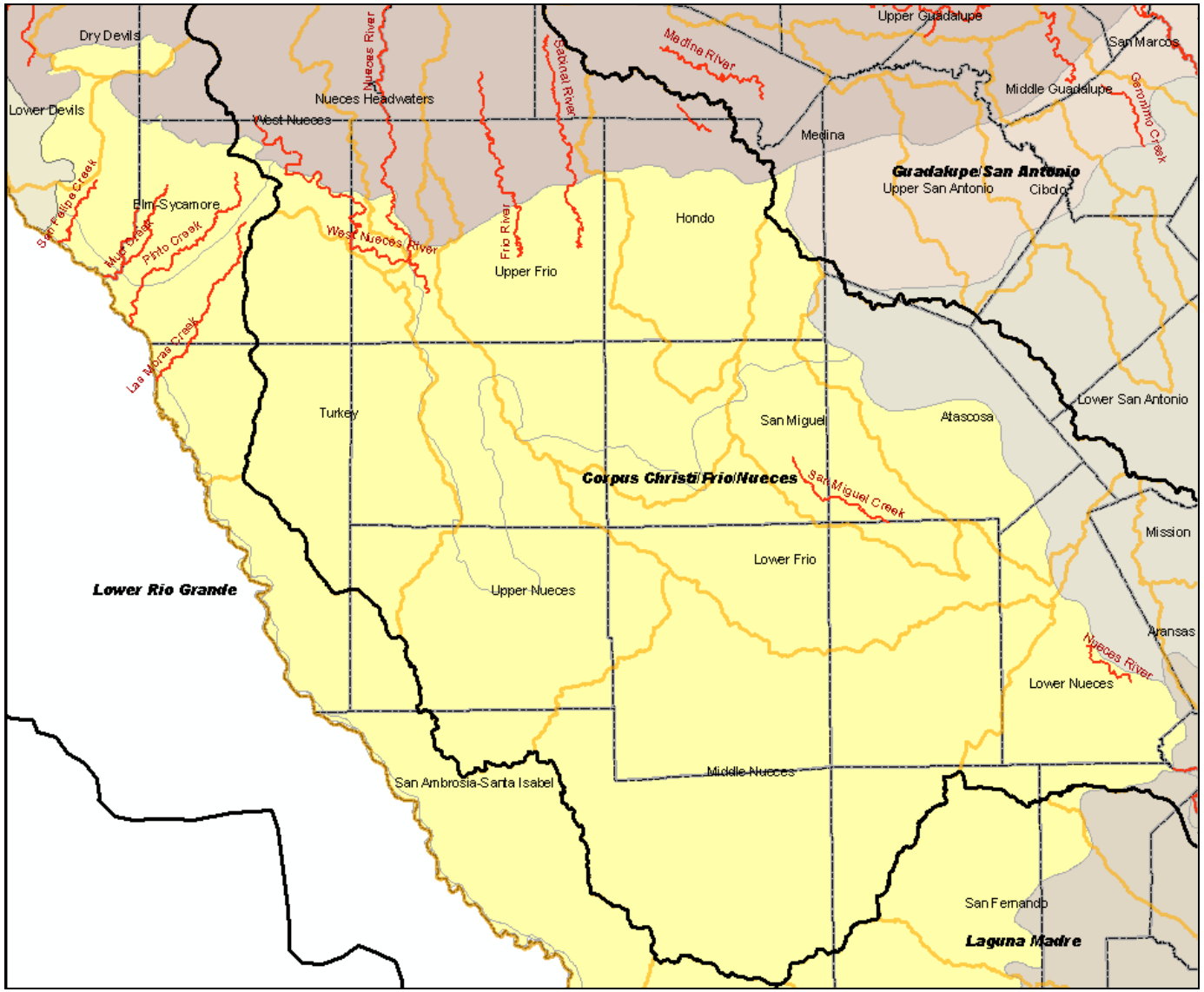
Table 2. STPL EDUs with Ecologically Signifcant Stream Segments and Reservoirs

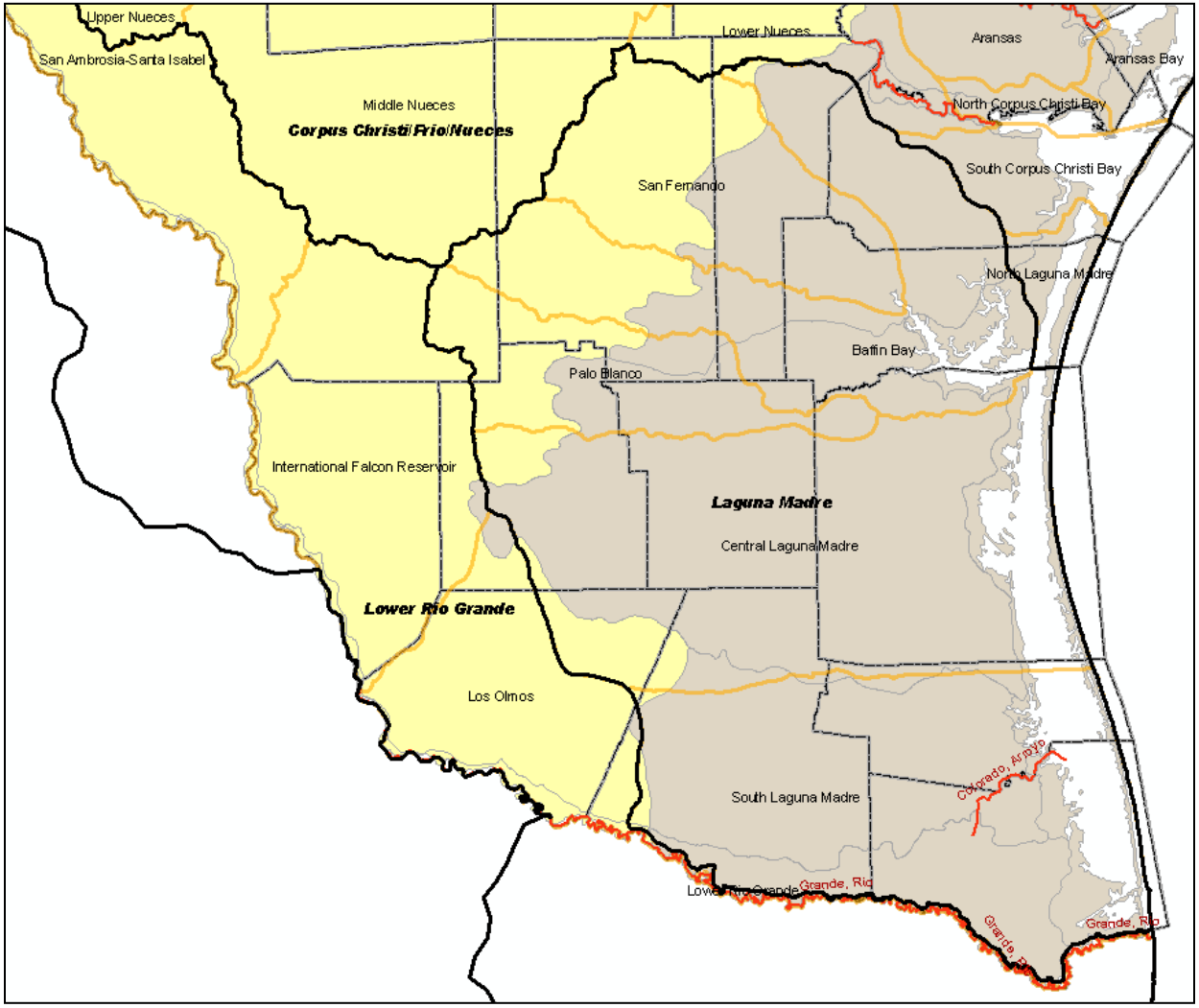
ECOLOGICAL DRAINAGE UNIT SubBasin (HUC 8)	*Ecologically Significant Stream Segment TPWD 2002, w/updates 2005*	**Lakes and Reservoirs**
GUADALUPE - SAN ANTONIO		
Medina		
CORPUS CHRISTI - FRIO - NUECES		
Lower Nueces	Nueces River	Lake Corpus Christi
Atascosa		
West Nueces	West Nueces River	
Nueces Headwaters	Nueces River	
Upper Nueces	Nueces River	Upper Nueces Lake
Upper Frio	Frio River, Sabinal River	
Hondo		
Turkey		
Middle Nueces		
Lower Frio		Choke Canyon Reservoir
San Miguel	San Miguel Creek	
LOWER RIO GRANDE/BRAVO		
Lower Devils		Amistad Reservoir
Elm-Sycamore	San Felipe Creek,Sycamore Creek, Mud Creek, Pinto Creek, Las Moras Creek	
Dry Devils		
San Ambrosia - Santa Isabel		Casa Blanca Lake
International Falcon Reservoir		Falcon Reservoir
Los Olmos	Rio Grande/Bravo, below Falcon Reservoir	Falcon Reservoir

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. STPL EDUs, HUC 8s, and ESSS – 2 maps

Corpus Christi/Frio/Nueces and upper reaches of the Lower Rio Grande EDUs blackoutline, HUC 8s orange outline, ESSS red lines





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

RARE SPECIES AND COMMUNITIES

While most conservation work is done at the habitat level to address issues and threats, Action Plans' stated primary purpose is to improve and sustain *species'* populations and prevent the need to list species as federally or state threatened or endangered.[7] The Species of Greatest Conservation Need (**SGCN**) list, one of the Eight Required Elements in all states' Action Plans, is the foundation for the habitat- and issues- based actions in the Plan. In Texas, we've also identified Rare Communities for this planning process. For more information about how the SGCN and Rare Communities lists were developed, including the changes from the 2005 list, see the Overview Handbook.[8]

Species and rare communities included in the 2012 TCAP Final SGCN and Rare Communities lists are supported by current science, peer-reviewed references and/or other dependable, accessible source documentation, and expert opinion.[9] Each species has a NatureServe calculated state and global conservation rank, which accounts for abundance, stability and threats.[10] Additionally, several species have federal[11] and/or state[12] listing (endangered, threatened, candidate) status. See the key to conservation status and listing ranks[13] 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

[7] Association of Fish and Wildlife Agencies. 2011. State Wildlife Action Plans. http://www.wildlifeactionplans.org/
[8] TPWD. 2012. Texas Conservation Action Plan: Overview Handbook. http://www.tpwd.state.tx.us/landwater/land/tcap/documents/tcap_draft_overview.pdf
[9] TPWD. 2012. Texas Conservation Action Plan: Species of Greatest Conservation Need List and Rare Communities Lists. http://www.tpwd.state.tx.us/landwater/land/tcap/sgcn.phtml
[10] NatureServe. 2011. A network connecting science and conservation (online resources). http://www.natureserve.org/explorer (accessed 2011).
[11] USFWS. 2011. Endangered Species List, by state and county. http://www.fws.gov/southwest/es/EndangeredSpecies/lists/ListSpecies.cfm (accessed 2011).
[12] TPWD. 2011. State Listed Species. http://www.tpwd.state.tx.us/landwater/land/maps/gis/ris/endangered_species (accessed 2011)
[13] TPWD. 2011. Texas Conservation Action Plan: Key to Conservation Status and Listing Ranks. http://www.tpwd.state.tx.us/landwater/land/tcap/documents/species_key_tcap_2011.pdf

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

Broad habitat categories were developed to organize all ecoregional handbooks.[14]

SHARED HABITAT PRIORITIES WITH ADJACENT MEXICO

Texas shares its border with four states – New Mexico, Oklahoma, Arkansas, and Louisiana – and Mexico. Migratory bird species use Texas as a critical link in their pathways to points as far north as Canada and far south as Central America. The STPL ecoregion shares a portion of its border with Mexico.

From 1999 to the present, the North American Bird Conservation Initiative (NABCI) (a working group of government and non-government organizations in Canada, the United States, and Mexico) hasworked to identify shared priority bird species on the continent, promote recognition of these priorities through the *Declaration of Intent for the Conservation of North American Birds and their Habitat* (signed 2005), and develop Continentally Important Proposals for conservation of shared priority species.[15] Several of these proposals intersect the STPL ecoregion and are more fully discussed in the Action section of this document. While these proposals focus on priority areas for birds, these conservation actions would benefit a suite of related species as well. Habitats of special importance in this ecoregion from that effort include native grasslands and wetlands.

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

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

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

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

[15] North American Bird Conservation Initiative. N.d. Continentally Important Proposals: An Introduction.

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

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

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

Table 3. STPL Priority Habitats

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

GENERAL HABITAT TYPES	SOUTH TEXAS PLAINS (STPL)	STPL 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*	*NatureServe. 2009. International Ecological Classification Standard: Terrestrial Ecological Classifications for Ecological Systems of Texas' South Texas Plains. NatureServe Central Databases. Arlington, VA. U.S.A. Data current as of 08 October 2009.*
Barren/Sparse Vegetation	inland live dune fields caliche outcroppings escarpments: bordas, rocky cliffs and ledges along the Rio Grande upland saline barrens gravel ridges	*This section will be updated as the Ecological Mapping Systems project nears completion*
Desert Scrub	*See shrubland category for thornscrub*	Chihuahuan Creosotebush Desert Scrub Chihuahuan Succulent Desert Scrub
Grassland	Mid grass and short grass prairies Saline flats with gulf cordgrass communities **South Texas Sandsheet Grassland is actually in the GCPM ecoregion; it is included in both STPL and GCPM ecoregions' habitat types for this exercise as some practitioners are more familiar calling it a "south Texas" ecotype.*	South Texas Sand Sheet Grassland* Tamaulipan Caliche Grassland Tamaulipan Clay Grassland Tamaulipan Savanna Grassland Tamaulipan Tallgrass Grassland Texas Blackland Tallgrass Prairie Chihuahuan-Sonoran Desert Bottomland and Swale Grassland (mixed upland and wetland)
Shrubland	thorn shrubland – taller shrublands with shorter scrub-shrub; coastal scrub, lomas, south texas plains shrubland	Chihuahuan Mixed Desert and Thornscrub Tamaulipan Calcareous Thornscrub Tamaulipan Mixed Deciduous Thornscrub
Savanna/Open Woodland	Mesquite savanna oak savanna	Edwards Plateau Limestone Savanna and Woodland

GENERAL HABITAT TYPES	SOUTH TEXAS PLAINS (STPL)	STPL Ecological Systems
Woodland	upland woodland (anacua, ebony, hackberry – adjacent to and related to riparian, but not stream edge; out of the floodplain, e.g. near Santa Rosa)	Edwards Plateau Dry-Mesic Slope Forest and Woodland
Riparian	periodically flooded or wet floodplains tributary ravines and creekside shrubland hackberry, elm, ash, oak pecan oak, elm, walnut, ebony, anacua	Edwards Plateau Floodplain Edwards Plateau Riparian Southeastern Great Plains Floodplain Forest Southeastern Great Plains Riparian Forest Tamaulipan Arroyo Shrubland Tamaulipan Floodplain
Riverine	Instream habitats of the watersheds which intersect this ecoregion Ecologically Significant Stream Segments - Nueces River, West Nueces River, Frio River, Sabinal River, San Miguel Creek, San Felipe Creek, Sycamore Creek, Mud Creek, Pinto Creek, Las Moras Creek, Rio Grande/Rio Bravo below Falcon Reservoir	NA
Lacustrine *See also* Cultural Aquatic	Resacas (oxbow lakes)	NA
Freshwater Wetland		Chihuahuan-Sonoran Desert Bottomland and Swale Grassland (mixed upland and wetland)

GENERAL HABITAT TYPES	SOUTH TEXAS PLAINS (STPL)	STPL Ecological Systems
CULTURAL TYPES	*habitats in this column must support SGCN or rare communities to be considered in this plan*	
Agricultural	Turf farms and other agricultural row crop fields	NA
Developed		NA
Urban/Suburban/Rural	Del Rio and Laredo: urban and suburban forest	NA
Rights of Way		NA
Cultural Aquatic	Reservoirs: Corpus Christi, Upper Nueces, Choke Canyon, Amistad, Casa Blanca, Falcon	NA

ISSUES

There are **activities and conditions** which may negatively affect the SGCN populations, rare communities, and the habitats on which they depend in this region. These issues can include **direct or indirect harm** (e.g. inappropriate mining reclamation which uses non-native vegetation or indirectly provides an opportunity for non-native invasive vegetation, streambed gravel mining that directly removes spawning habitat and/or indirectly creates poor water quality downstream) **plus basic "gaps" that prevent us from acting most effectively** (e.g. lack of information, lack of coordination to share current data, incompatible practices among land managers, lack of funding). For information about how this list was developed, see the Overview Handbook and the descriptions of the broad issue categories.[17]

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

The issues covered in the STPL Ecoregion Handbook in Table 4 attempt to present more of the specific causes of SGCN, rare communities, and habitats' decline, providing appropriate context to help target our actions, identified later in this handbook. Several of the habitat types in this handbook are also considered priority habitats in the Statewide/Multi-region handbook.

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

Table 4. STPL Priority Issues Affecting Conservation

Table is formatted 11" x 17", landscape orientation

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
Invasive Species		
Non-native Plant	Salt cedar/tamarisk (*Tamarix spp*.), Giant reed/river cane (*Arundo donax*) Cultivated and Old World grasses (e.g. KR bluestem, guineagrass, Old World bluestems, buffelgrass, Lehman'sn lovegrass, Natalgrass) golden alga (see also *Native Problematic Species*; it is not conclusively known whether golden alga is native or non-native) Water hyacinth, water lettuce, Eurasian water milfoil, giant salvinia, hydrilla	In more aridland streams of this ecoregion, salt cedar and *Arundo* affect hydrology, monotypic stands, and outcompetes native riparian vegetation (cottonwood, sycamore) at all seral stages and canopy levels; these invasive plants armor the banks and contributing significantly to channel incision and narrowing, which reduces the diversity and quality of habitat for aquatic SGCN and can adversely affect stream-adjacent spring habitats Non-native grass dominated areas have claimed millions of acres of native grassland throughout Texas and are a leading cause of steep population declines for wildlife dependent on native grasslands (e.g bobwhite quail, dickcissel, loggerhead shrike, scissor-tailed flycatcher, many types of pollinating insects, and the plants which in turn depend on these). More than 97% of the native grasslands of the U.S. have been lost, primarily to agricultural conversion; therefore, grassland birds are among our nation's fastest declining species, yet only 2% of all U.S. grassland is both publicly owned and managed primarily for conservation. Four grassland species have 5% or less of their distribution on public lands: breeding Dickcissels, Scissor-tailed Flycatchers, and Eastern Meadowlarks, and wintering Harris's Sparrows; across the nation, 48% of grassland-breeding bird species are of conservation concern, including four with endangered populations. *For more detail see North American Bird Conservation Initiative, U.S. Committee, 2011. The State of the Birds 2011 Report on Public Lands and Waters. U.S. Department of Interior: Washington, DC. 48 pages.* Non-native grasses introduced either as livestock forage and monoculture pastures or naturally expansive after introduction have established in many grasslands, are a substantial threat to grassland-dependent species (e.g. grassland-obligate birds). Buffelgrass forms a dense monoculture which out-competes rare plants such as star cactus and further threatens rare plant populations in highway right-of-way. 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 Aquatic invasive plant species are highly successful in area lakes, and up into riverine systems, crowding out native aquatic vegetation, inhibiting access by nesting freshwater fishes to bottom substrates, depleting nutrients and degrading flow/natural hydrograph
Non-native Animal	feral and/or free-ranging "pets" FERAL HOGS Brown-headed cowbirds Introduced ungulates for hunting introduced fishes (smallmouth bass, armored catfish, baitfishes) and mollusks - freshwater springs, streams and marshes	Free ranging pets (cats, dogs as individuals and as packs) are introduced predators which primarily adversely affect small mammals, small reptiles, and birds; in packs, can also adversely affect larger mammals and ground-nesting birds; also contribute pathogens and diseases. It is estimated that 60-100 million feral cats reside in the US and another 60 million pet cats are allowed to roam outside. "Neuter and release" programs only address fecundity in a limited way, and do not address the impact to natural resources. The number of birds predated by feral cats in the U.S. is annually is more than 1 **B**illion; numerous SGCN are affected. The IUCN ranks feral cats as one of the world's worst invasive species. (see The Wildlife Society, Wildlife Professional publication, Spring (March) 2011, Vol. 5 No. 1). Feral hogs decimate important and fragile habitats (e.g. springs, seeps, riparian areas, wetlands), degrade instream water quality, change topography and runoff/collection patterns, and decrease hardwood seedling viability (rooted up, eaten) and vegetation community composition. Hogs also decimate new restoration sites, making recovery expensive or even untenable without hog control. Nutria have been documented to damage aquatic plants (e.g. those which provide important cover for SGCN fishes) and important rare streamside communities and dig up and destabilize banks which can adversely affect some stream margin aquatic SGCN (fishes and insects). Loss of bank stabilization and vegetation can contribute to siltation and instream habitat degradation and loss for other aquatic SGCN. Aoudad, axis, and other introduced exotic hoofstock alter and destroy habitat, compete with native small mammals and ungulates for food, and are disease vectors which can affect native ungulates and domestic livestock; axis and aoudad are particularly fecund and in some areas cause more widespread damage to habitats than hogs Nonnative aquatic fishes can be a predatory risk (smallmouth bass are voracious predators), some are detrimental to native aquatic vegetation (tilapia, carp), species compete or hybridize with natives (small mouth bass with Guadalupe Bass, baitfish releases "minnows" may hybridize with certain *Gambusia* sp.), may be densely successful and crowd out natives and/or affect water flow and quality

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
Native Problematic	Native shrub (e.g. baccharis, mesquite, whitebrush) or "brush" encroachment into grassland systems Golden alga	Invasive native brush/trees where they are not supposed to naturally occur (ravines, riparian areas, outcrops and woodland mottes, thornscrub communities, swales) – depending on species) are a significant threat to habitats for grassland-obligate birds: grassland loss decreases habitat availability and quality for grassland nesting birds, trees provide perches for hunting raptors which also decrease grassland bird, small mammal and reptile success Harmful algal blooms can quickly adversely affect small populations of SGCN fishes
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.
Pathogens	Oak wilt, oak decline (more of an issue in northern portion of this ecoregion) West Nile virus	Plant pathogens listed adversely affect hardwoods in this region, a component of many important SGCN habitats and rare communities in ravine woodlands, riparian borders with uplands, and open savanna West nile has been suggested as an factor in the global decline of the Tamaulipas Crow; may adversely impact SGCN bird species in this region which are shared international priorities
Power Development and Transmission		
Solar or PV (photovoltaic) array siting	High potential for solar energy development in this region	Array siting, with the network of maintenance and access roads, can take up hundreds of acres. Primarily impacts grassland communities and may contribute to brush clearing (rare plant loss, vegetation structure and cover loss in potentially important corridor areas for ocelots and other brush-dependent species) Once installed, the array blocks sun needed for photosynthesis and recovery of vegetation communities; plant and plant community protections are insufficient to trigger environmental coordination in this industry; and maintenance activities may include herbicide or mowing which diminishes the habitat suitability for many ground species (grassland birds, small mammals and reptiles, insects).
Hydro (Dam and Reservoir)	Operations at Falcon Reservoir – internationally managed (http://www.ibwc.state.gov/Organization/Operations/Field_Offices/Falcon.html)	See *Water Development, Management and Distribution*
Biofuels	Row Crop, Switchgrass, Herbaceous: native rangeland and agricultural fields converted to intensive use croplands (monotypic stands of switchgrass and others) Algae "farms": High amounts of water used/processed, untreated or minimally treated wastewater discharges, site conversion	Biofuel production operations can use different herbicides for weed control, fertilizers and pesticides for growth enhancement, because these are not food crops. Runoff from these operations into ephemeral or perennial aquatic systems can contribute to species and habitat degradation. Short term rotations lead to increased harvesting, less fallow field. Loss of native open grassland birds' habitats for foraging, nesting, and shelter -- Baird's Sparrow (winter), Eastern Meadowlark, Cassin's Sparrow, Burrowing Owl, Loggerhead Shrike 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
Transmission	New development and expansion of existing lines/corridors construction of new power infrastructure corridors to bring power from generation sites (primariliy along the coast) to meet urban user needs of this region and north of here maintenance and operations maintaining clear right-of-way for vehicle clearance/access, prevention of line and tower danger	In this ecoregion, broad, long, linear transmission lines create fragmentation of all habitat types; however fragmentation impact to dense shrubland and mesic river bottoms is most detrimental. While some facilities have capacity to span riparian areas, several companies do not have the fiscal capacity or inclination to do so. Contributes to edge effects in dense closed shrublands, deterring use by brushland species (e.g. ocelot) and encouraging invasive species access. While some of these facilities are compatible with grassland communities in this ecoregion, these pathways are not required to reclaim or maintain with native seed or plant sources. See comment above in "Invasives." During route selection, environmental considerations are given secondary consideration to agricultural and developed areas. Mowing and trimming activities during bird breeding seasons or migratory events adversely impact species success; inappropriate seasonal oak trimming can contribute to oak wilt, oak decline; "brushhogging" borders leaves splintered, jagged cuts and adjacent vegetation communities vulnerable to disease and infestations (oak wilt, oak decline, others). Maintenance activities are typically intolerant of dense brush (thornscrub, ravine vegetation) and tall trees (riparian). Transmission lines can be a strike hazard for Whooping Cranes migrating to and from the coast

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
Distribution	Development to power grid and retail users: construction of new power infrastructure corridors to meet urban user needs	Similar impacts to transmission lines, but on smaller scales Bird collisions have been documented to occur more in distribution line corridors than transmission line corridors; siting away from flyway path and wetland resources which attract migrating waterfowl is needed Occasionally, because the area to be maintained is less than a transmission line, the company may employ herbicides Oak trimming or construction through areas with oak in inappropriate seasons, with inappropriate post-trimming treatment, can cause spread of oak wilt and decline.
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 (e.g. pocket gophers and other small mammals, reptiles, ground-foraging and ground-nesting birds)
Traditional extraction site development and operation, including pumping and pad sites, gathering stations, transmission/delivery facilities (distribution lines, roadway	on-site spill potential salt water injection wells corridor clearing/maintenance and road networks	Limited ground and surface waters (resacas, wetlands, ephemeral swale wetlands, others) are highly sensitive to change/contamination from chemical, drilling material, and oil spills and groundwater contamination caused by salt water injection Broad, long. Linear fragementation of all habitat types, least compatible with wetlands, riparian areas and native brushlands. During route selection, environmental considerations are given secondary consideration to agricultural and developed areas. Contributes to edge through interior habitats, in the same way that transmission lines and road networks cause potential for increased predator and nest parasitism access. While some of these facilities could be compatible with grassland communities, most are not required to reclaim to native vegetation with native seed or plant materials, which provides greater opportunity for invasive species introductions (either deliberate or opportunistic). Maintenance typically is intolerant of brush development, tall trees (riparian areas) Hinders daily and seasonal movements of species which avoid open areas adjacent to remaining shrublands Active oil and gas operations contribute to road mortality of small mammals and reptiles; noise/light disturbance which adversely affects nocturnal birds, bats and migratory birds, traffic and mechanical infrastructure interrupt seasonal and daily movements, foraging and mating behaviors of some mammals, reptiles, and birds; small geographically limited populations of aridland plants fragmented or lost.
Hydraulic fracturing ("fracking") or "shale gas" extraction	http://www.energyindustryphotos.com/shale_gas_map_shale_basins.htm http://www.eia.gov/oil_gas/rpd/shale_gas.pdf Western Gulf production basin and the Eagle Ford Shale: Drilling permits in the Eagle Ford — a 24-county South Texas shale play — hit 1,010 in 2010, up from 94 permits in 2009 and 26 in 2008 according to state data. In the first four months of 2011, 743 permits were issued.	Groundwater and its surface expression in seeps, springs and cienegas are extremely important habitats in this ecoregion; additionally, may of the open rangeland areas currently being developed have not experienced this degree of fragmentation or potential threat from site development. Groundwater contamination, spills, and/or drilling liquid waste discharge could cause loss of spring-dependent aquatic populations, adversely affect vegetation that depends on water quantity and quality at springheads, seeps, riparian areas, and instream. Contamination also poses a risk to human and livestock water sources. Deeply injected chemical liquid which fractures substrates and releases gas for capture and delivery: unknown risk of geologic destabilization
Lack of Reclamation	reclamation standards vary, requirements limited unmonitored/unregulated decay of obsolete production sites - toxic chemicals in soils and leftover equipment, decaying equipment	Reclamation not required back to NATIVE vegetation (invasive species allowed to colonize or are directly planted for soil stabilization)
Mining		
Sand and Gravel - upland and riverine	sand and gravel mining along and within streams and rivers	loss of riparian habitats for instream and adjacent mining, sedimentation in streams contributes to loss and degradation of high quality instream habitats
Caliche	caliche - small scale on ranches, large scale for county roads	typically for road base, unreclaimed sites, complete/permanent loss of surface communities; several SGCN plants and plant communities may be affected by removal and vector for invasive plant species

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)	Communications towers are a serious issue with nocturnal migrants in the area. Towers kill numbers of noctural migrant songbirds including Painted Bunting, Orchard Oriole, and warblers.
Transportation		
road and bridge construction (new)	This ecoregion is an important port of entry for goods and services from/to/through Mexico, requiring upgrade to existing and new transportation facilities.	Three National Highway System Congressional High Priority Corridors (http://www.fahwa.dot.gov/planning/nhs/hipricorridors/hpcor.html) have been identified to/from Laredo to points northwest, north and east through Texas, which may involve upgrade to existing highways and surface connecting roadway and/or new construction. Texas Department of Transportation coordinates with TPWD regarding potential natural resources impacts to listed species; however, there is little accommodation for sensitive habitats unless those features are federally protected (federally listed species habitat, critical habitat, jurisdictional wetlands). State-listed species habitats, SGCN, rare communities and the habitats on which they rely are unprotected. The transportation improvements proposed under regional upgrades of existing facilities and new construction may create barriers to fish and wildlife resources' daily and seasonal movements, vectors and opportunities for nonnative species invasions, water quality impacts through stormwater runoff; loss of nonjurisdictional wetlands, riparian, thornscrub/brush, and grassland habitats that are not protected under regulation. In addition to these larger facilties, local connection transportation projects may also contribute to the same kinds of losses and may require even less coordination regarding environmental impacts from planning to implementation if no federal money is used.
right of way maintenance	maintaining clear right-of-way for vehicle clearance/access, minimizing fire danger, and maintaining driver visibility	Mowing, trimming timing (season, frequency) inhibit natural regeneration of grassland plant species and don't provide key habitats (structure, seedheads) at best times of year to accommodate grassland animal and insect needs; brushogging woody species adjacent to grassy ROW can provide vectors for plant pathogens. Most roadsides are reseeded after construction with nonnative species or plant materials and regular maintenance activities also provide additional ground disturbance favorable to invasives; see comments under "Invasive Species" above regarding grasses and grassland birds. Herbicide application runoff can adversely affect very sensitive aquatic features and aquifer conduits which harbor SGCN Some rare plants are known only from sites in ROW; these are not always adequately protected as staff changes occur, management plans are filed away, information not passed through entire chain of command - needs better communication and standard operation procedures in some areas
Border Crossing and Security	See also *Transportation*	
Border Fence	Built environment – fence structure, monitoring stations, roads - adjacent to the river along certain segments of the border to prevent illegal traffic crossing See also Lasky, J.R., W. Jetz, and T.H. Keitt. 2011. Conservation biogeography of the US–Mexico border: a transcontinental risk assessment of barriers to animal dispersal. Diversity and Distributions 17(4): 673–687, July 2011	The Rio Grande is an important corridor and habitat connection between Mexico and Texas. We share management of the water quality and quantity; terrestrial and aquatic species do not abide the political boundary. Unlike in the Chihuahuan Desert ecoregion, collaboration on natural resources conservation has been less of a focus than collaboration on economic development and settlement. Built next to the Rio Grande, the wall removes important riparian and brush habitats for breeding birds (e.g. (Summer Tanager, Yellow-billed Cuckoo, Gray Hawk, Common Black Hawk) and wide-ranging species which use these corridors for daily and seasonal movements, riparian loss can destabilize banks and degrade water quality and temperature with loss of riparian areas and adversely affect instream SGCN, creates a barrier to genetic diversity and fragment larger stable populations into smaller unstable populations, provides opportunities for invasive plant colonization (no reclaimation of cleared areas even to native vegetation), impedes daily and seasonal movements for many species which are intolerant of travel in open areas
Roadways and Levees	Network of roads and levees which are routinely dragged, driven, and monitored	Roads and levees are installed parallel and adjacent to the river corridor. These surface changes impede natural surface runoff, contribute to localized erosion issues, and degrade water quality. Roads are routinely dragged to be able to detect foot and other trespass traffic, creating soil disturbance and repeat vehicle traffic which contributes to road mortality of small reptiles, mammals, ground birds. Light is installed on these sites and disturbs natural daily and seasonal movements, foraging for some species. Roadways and levees form barriers to daily and seasonal movements for small mammals, reptiles, and some fossorial insects which cannot surmount the obstacle or avoid daily traffic; these open corridors also fragment habitat for many thick brush-dependent species and provide edge advantages for predators.
Land & Water Mgmt: FARM	See also Water Development section	

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
Clearing and Loss of Important Habitats	Conversion of riparian, floodplain, and some upland sites (if irrigated) to agricultural production (row crop, orchard)	Intact floodplain habitat remnants are few, far between and relatively small landscapes. This may be on of the most threatened habitat types in the region. Conversion is difficult to revert, even with resources. Aside from the loss of native seed and plant sources, soil horizon disturbance and dewatering creates unfavorable conditions for some species ever recovering. Chemicals may be latent..
Lack of soil and water management and conservation practices	chemical-laden irrigation water runoff	Insufficient stormwater controls between agricultural production and waterways (or dry drainages that lead to waterways during rain events) adverse lead to chemical impacts to sensitive aquatic insects, freshwater mussels, riparian invertebrates, freshwater fishes, amphibians, and eventually bay and estuary systems – invertebrates, fishes, and birds. Streamside Management Zones are important buffers between agricultural practices and aquatic impacts, and these riparian areas serve as important habitats in their own right for many forest and woodland dependent SGCN. Riparian and floodplains are frequently cleared for agricultural production because they are relatively flat, have access to water, and soils are productive.
Unsustainable irrigation	See also *Groundwater Planning and Distribution* Surface water irrigation: timing of water use is incompatible with surface water retention in many important features	Some irrigation in this region draws from aquifer resources which originate in the Edwards Plateau. Because this ecoregion's irrigation practices and many spring-dependent and spring-fed-river dependent rare species and communities both in the Plateau and this ecoregion rely on the same aquifer, these uses are sometimes in conflict. See Edwards Aquifer Recovery Implementation Plan at http://earip.org/ for more background Surface water withdrawals during warmer/drier periods can cause fluctuations in resaca level, reservoirs, river, and wetlands which adversely affects fish and aquatic insect health by exposure to higher water temperature and lower dissolved oxygen
Land & Water Mgmt: RANCH	See also Water Development section	
Incompatible stocking practices	In some areas, working lands are still recovering from historic uses, out-of-date stocking and grazing practices (prior to soil, native vegetation, and water conservation knowledge we have today) on the advice of county tax appraisers rather than range scientists or ecologists historic and/or current range-intensive livestock operations "continuous" even if rotational; out of sync with land capacity landowners may not be aware of potential benefits of wildlife valuation for recovery, rest, or native habitat conversion non-native hoofstock for hunting operations	Grazing can be a helpful tool in grasslands restoration in certain areas and in capacity with the native vegetation. Overstocking, overgrazing or intensive non-rotational grazing, concentrated supplemental feeding, and improperly placed supplemental water sites can contribute to the decline of native grasslands, introduction of nonnative grasses and brush invasion in sites where desired ecological condition is grassland. On some sites, excessive brush clearing to enhance grass cover where brush is native-adapted and important for SGCN, loss of that cover changes the suitability for some rare plants and animals. Overstocking and overgrazing can also quickly degrade riparian integrity sometimes to the point where full recovery is untenable in a lifetime. These practices can also contribute to a shift in the overall vegetation community, microclimate of the site (drier), and decreased recharge (recent science indicates that brush clearing is not always site-appropriate for increased water yield or recharge). Introduction of non-native hoofstock (hogs, axis, aoudad, others), primarily for hunting recreation, depletes resources for native wildlife, has the potential to damage every habitat type important to native resources, and can contribute disease to native populations … see Invasive Species comment above
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 – reseeding, restoration, brush control, streamside and wetland buffers	Native grasslands, savanna, and brushlands are key ecosystems in this ecoregion; land management and restoration assistance in this region typically centers on brush removal and grass planting. Unfortunately, brush removal and sendero cutting (brush fragmentation) may be recommended on sites where this practice is inappropriate (too steep, highly erodible, native adapted for brush and important to rare species) and nonnative grasses may be recommended for reseeding, farmland to pasture conversion, and even "restoration." Additionally, certain herbicides recommended may not be appropriate for all sites and may cause more harm to aquatic surface and groundwater resources than benefits to terrestrial systems. Streamside, wetland buffers may be insufficient to meet ecological objectives or contribute meaningfully to both upland and instream conservation values.
Fencing	high game fencing	High game fencing reduces genetic viability in all species inside the fence (depending on construction), fences in non-natives and can degrade natural habitats quickly without VERY intensive management to control hogs and other destructive non-natives, makes management of a public resource onerous on the landowner, requires intensive planning and is not suitable for most wildlife species or the longterm financial condition of most ranches

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
Clearing and loss of important natural sites/habitats	conversion of native grasslands to nonnative “improved” pastures Brush management on inappropriate sites riparian and floodplain clearing for livestock watering access, allowing livestock access to spring features Small impoundments on tributary creeks, streams, springs, seeps to form stock tanks, ponds, private lakes.	See grassland conservation comments under “Invasive Species” above The desire to increase forage or water production can lead to excessive brush clearing (see brush comments above) In this region, many sites are cleared to the river or creek margins to allow for livestock watering access, maximum forage production, and/or recreational/viewshed access. Riparian loss is a strong contributor to the decline of riparian and aquatic SGCN and rare communities (soil loss and bank degradation, poor water quality, higher water temperatures, more evaporative losses, invasive species opportunities). Impoundments: similar to reservoir development on mainstem rivers, negative impacts caused by impoundments on creeks and springs are just at a smaller scale: loss of instream habitats, loss of wetlands, loss of riparian habitats and natural floodways. The replacement value – still deeper water for flowing waters, pond for stream – is not ecologically synonymous.
Lack of soil management and conservation practices	lack of soil conservation (vegetation conservation/restortaion) along stream courses (Streamside Management Zones, Streamside Best Management Practices/Buffers) Overgrazing (see above) “Clean Pastures”	Hydrology and streamside vegetation are altered, soil and vegetation is lost in upland areas, water quality is degraded through sediment-laden runoff – many aquatic SGCN in this region are highly adapted to springfed, thermally consistent clean water and do not have tolerances for other conditions. Similar to clean farming, clean pastures are a widespread problem for species with long term population declines – essentially centers around monoculture pasture grasses and complete brush removal. Desired ecological condition, even in grasslands, has dense diverse woody species in the drainages and deeper swales. A mixture of woody brush, vines, and trees along fencerows and drainages is paramount for many SGCN for escape cover, thermal cover, loafing areas, nesting substrates, foraging areas, and display areas. Streamside management zones, retaining riparian forest are often not a consideration within cattle and hay pastures. In times of drought, woody cover may be the only structure available.
Subdivision of larger lands into smaller parcels ("ranchettes")	Ownership changes in values, approaches to management (not always a detriment to conservation practices) Subdivided lands create many more land management philosophies, approaches in one area	While not all land subdivision is necessarily a negative event for conservation, subdivision typically brings with it very diverse land ownership styles and objectives, increased potential for feral animal and escaped non-native landscaping, additional surface and groundwater demands on regional resources, and loss of habitat for homesite development and “ponds” (see small impoundment comment above) Some landowners bring their vision of manicured and “tamed” landscaping to suburban and rural areas, mowing native grasslands or converting them to invasive turf grasses, removing brush and woodlands from drainages, clearing fencelines. Typically, these sites also apply fertilizers and herbicides at unspecified rates, causing issues in riparian areas and aquatic habitats from runoff. Forage production is not a consideration in these locations. Most of these sites are too small to qualify for technical assistance or landowner incentives. Outreach, technical guidance and incentive programs have a more difficult time serving this constituency because the effort and resources required are multiplied, but no more service resources (people, time, money) are available. Additionally, it is difficult to provide conservation services that are of value to the ecological needs of the area with many fractured landscapes and objectives. Some tools (e.g. RX fire) and incentive programs are not available for use at smaller scales or cannot be effective to improve conservation values.
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 managing wildfire (more Rx burning needed to reduce the risk of wildfires) inappropriate application	Native grassland and savanna plant and wildlife species are adapted to periodic fire disturbance and its effects are necessary to create the habitat requirements of many species. Grasslands are easily invaded by woody shrubs if the grasslands are in degraded condition, leading to further changes in water infiltration, herbaceous cover, and erosion. Additionally, forb and grass species’ production is often lost without disturbance due to dense, matted perennial herbaceous cover and ground litter. Fire in these systems is needed to maintain/restore the desired ecological structural diversity, successional stages, community composition, insect type and abundance, nutrient cycling and microbial activity. Smaller land holdings, even if fire is applied, cannot mimic the landscape scale fires that are needed for system function and maintenance. Additionally, there is some research to indicate that timing, periodicity, and seasonality of current applications is out of sync with natural cycles (summer, more intense, less frequent) which can adversely affect grassland communities. Rx fire is also not the “tool of choice” although it most closely mimics the natural grass-centric system; many landowners do not have the capacity to apply this tool. Inappropriate fire application (trying to get 100% burn coverage on some sites such as drainages, steep slopes, canyons, and applying fire to other sites where brushland would naturally occur) is detrimental to shrubland and brushland dependent species; these practices can contribute to a shift in the overall vegetation community, microclimate of the site (drier), and decreased recharge (recent science indicates that brush clearing is not always site-appropriate for increased water yield or recharge).
Land & Water Mgmt: Municipal	See also Water Development section	

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
Lack of Zoning and Planning	Not much of this region is urbanized; however, where urban settlement occurs, little of it is managed, planned or zoned. Most communities in this region "sprawl" into the outlying areas without regulation to guide practices or protect resources	Fish and wildlife resources, rare communities and habitats are rarely considered in any development planning processes in this ecoregion, with the exception of federally funded highway and bridge crossing projects; even then, consideration is limited to federally listed species in the constraints analysis. Development in this region is mostly county-managed and counties rarely have or exercise authority to require stormwater pollution prevention, conservation of nonjurisdictional wetlands, open space planning for conservation, floodplain protection, water or other conservation measures from developers. The nature of "sprawl" is not just an issue for fish and wildlife resources, but also for prime farmland and ranchland in these areas. From the LRGV Borderlands/International Affairs Report - June 2009: Region is experiencing rapid housing and commercial development (trade and homeland security related, primarily) which is contributing to development in floodplains (loss of riparian woodlands, water quality impacts), drainage district clearing practices for flood water conveyance (loss of all woody vegetation in ephemeral and permanent waterways), senescence of resacas (waterway drainage, lack of flooding). Many sites are being cleared in advance of development. Current practices are "clean slate" approach, with unnecessary removal of all vegetation to bare ground in preparation for lot sales.
Open Space Protection	Little value is placed in these more rural areas on advance planning for larger parkland and open space protection for wildlife values, water protection, and human quality of life	In this region, urban greenspace set aside would help provide critical stepping stones for migratory species from the Coast to points north. Intact floodplains, riparian areas, wetlands/resacas, and "urban forests" contribute some very important landscapes that, if lost, would sever some aerial, terrestrial, and aquatic fish & wildlife corridors
Water Demand	See also *Groundwater Planning and Distribution*	Most of the municipal water sources in this ecoregion draw from aquifer-sourced freshwater streams, aquifers themselves, or reservoirs sourced from the Edwards Plateau. Because this ecoregion's municipal waters and many spring-dependent and spring-fed-river dependent rare species and communities both in the Plateau and this ecoregion rely on the same aquifer, these uses are sometimes in conflict. See Edwards Aquifer Recovery Implementation Plan at http://earip.org/ for more background
Land & Water Mgmt: Conservation & Recreation		
Inadequate/Inappropriate Management	Inability to manage with conservation tools or to restore to natural communities Lack of information that other land stewards have access to Frequently not included in land manager opportunities	The land stewardship community provides technical training opportunities in various forms to a wide variety of practitioners; however, parkland managers are not frequently included in these discussions as they primarily deal with recreational issues. These are all related and there are opportunities to learn from all land managers. Recreation lands managers typically have to deal with more of the urban-wildland interface issues (trespass, feral cats, vandalism) rather than spending resources on habitat restoration or management. Additionally, some tools may be limited in their utility – discomfort or public concern about applying prescribed fire near urban areas, cutting down trees (even if those are nonnative and will be replaced with natives) Public users intolerant of less manicured or xeriscaped areas – intensive mowing, brush clearing, and herbicide applications to remove "undesirable" vegetation near recreation sites and intensive watering to "green" recreation fields and parklands
Inappropriate Recreational Uses	Whle most public lands in this region are managed for recreation compatible with wildlife and fisheries resources, some improvements could be made	ORV use in sensitive areas (stream beds, steep sites) Trails and recreation facilities sited too close to waterways or overlooks, in riparian areas or floodplains and contribute to soil erosion, vegetation loss
Lack of connectivity between public lands managed for conservation	disconnected landscapes which need attention to enhance ecological function	While there has been a greater emphasis in the last several years to identify intact remaining habitat in this region for ecotourism and "connect" the values of these properties for economic purposes, this region still lacks some important ecological functionality which could be improved by connectivity (stepping stones for migratory birds, corridors for terrestrial wildlife movement, riparian restoration to improve continuous habitat suitability for freshwater fishes)
Water Development, Management and Distribution	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)
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. This region also must consider International Surface Water Planning Overallocation and dewatering of region's principle rivers Disconnection between the groundwater resources which source the region's rivers and streams and the surface water management process	Natural flows from the Rio Concho (Mexico) into the Rio Bravo/Rio Grande through the Chihuahuan Desert ecoregion and into the South Texas Plains ecoregion diminishes significantly to and through Falcon Reservoir. Diversion, overallocated use, and lack of compliance with withdrawal agreements have adversely impacted flow and quality for instream and stream-adjacent habitats – native riparian habitats are quickly disappearing and restoration is not an option without environmental flows allocation and protection. Both surface water and groundwater use for agriculture and municipalities in the U.S. and Mexico (Rio Conchos) has reduced the amount of water present in rivers, creeks, and springs. Instream flow recommendations need to be stepped out from headwaters to estuaries to influence regional water planning processes Most people in this ecoregion are keenly aware of water needs for humans – agricultural, municipal, industrial, commercial and recreational – however, the connections among groundwater recharge (features and amounts), groundwater contributions to surface waters, and surface water quality and quantity related to environmental flows (water for natural resources, from recharge to estuary) are rarely considered in many surface water planning efforts. Nearly every surface water resource in this region is sourced from groundwater recharged over the Edwards Plateau – spring-fed headwaters and river margins feed high quality (incl. Ecologically Significant, see Table 3) streams and rivers, all support or have potential to support SGCN and rare communities in this ecoregion. Understanding, consideration, and protection of ground and surface water resources, from land management over recharge zones in other ecoregions to decisions about impoundment placement to direct withdrawals from ground and surface water from ALL users in this ecoregion, are critical for most of the SGCN and rare communities on this ecoregion's list. Additionally, as many of the surface water resources of this region eventually feed the water resources of adjacent ecoregions and eventually the Gulf, consideration of environmental flow needs related to downstream uses and SGCN is needed during all Regional Planning processes. TMDL recommendations need to consider fish and wildlife resources needs as well. See Edwards Aquifer Recovery Implementation Plan at http://earip.org/ for more background See also *Groundwater Planning*, *Reservoir Construction & Operation* next box and *interbasin Transfe*r below
Reservoir Construction and Operation	Creation of new and modification (expansion) of existing reservoirs Unregulated small stream impoundments on private lands Invasive species Shoreline development - vegetation removal for viewshed, recreational access; hardening and armoring banks Timing/Periodicity/Intensity of Water Releases releases are unnaturally intense, in the "wrong" season to mimic natural flooding processes, and change water chemistry and sediment load in all areas downstream, to the estuaries	At least one new reservoir proposed in the Texas State Water Plan 2007: Nueces Off Channel – construction, impoundment, and operations would adversely affect an Ecologically Significant Stream Segment (see Figure 2, map 2) Reservoir construction: Several streams in this region are of high quality (Ecologically Signficant); riparian zones (some are ancient gallery forests, rare communties) are important to instream aquatic and stream-adjacent SGCN habitats; ES and high quality riparian are rarely considered during site selection for new reservoirs or operations. These areas support SGCN and rare communities, contribute high quality water to reservoirs and downstream segments. Reservoir construction and operation creates a barrier to SGCN movement, completely inundates important and irreplaceable riparian zones, spring systems, and instream habitats. Impoundments: similar to reservoir development on mainstem rivers, negative impacts caused by impoundments on creeks and springs are just at a smaller scale: loss of instream habitats, loss of wetlands, loss of riparian habitats and natural floodways. The replacement value – still deeper water for flowing waters, pond for stream – is not ecologically synonymous. This may be more of an issue in the emerging "urban/suburban" areas. Unnatural hydrograph from reservoir operations/dam releases scours instream and stream-adjacent habitats, shifts vegetation communities out of sync with other riparian communities where flooding is more "natural", rare communities and instream SGCN (invertebrates and fishes) cannot "rely" on the seasonal changes under which they evolved and decline Shoreline Development: In addition to the loss of instream and riparian habitat following inundation, the now-"riparian" and upland habitats surrounding the lake edge is at risk from development. In this region, these habitats were usually cliff edges, recharge features, upland shrubland, canyonlands – many of these sites support SGCN and rare communities. Regional reservoir managers do not reserve much in the way of "setback" from the inundation pool level in their easements. This allows residential development (water withdrawals and septic installation), bulkheading shorelines, clearing and "landscaping" to the water's edge. These lakeside activities contribute fertilizers and other chemicals (e.g. boat gas/oil), untreated or poorly treated human waste (some lake authorities actually have permitting programs to manage/reduce this factor, but not all), and sedimentation to the lake, which eventually impacts in-lake and downstream habitats. Typically, residential development in these areas is also a vector for invasive aquatic and terrestrial plants and feral pets. See Invasive species section above.

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
Groundwater Planning and Distribution	Not all aquifers have groundwater districts; groundwater districts are political subdivisions, not aligned necessarily with aquifer boundaries Extraction: groundwater pumping without full accounting for natural resources as a "use" Disconnection between the groundwater resources which source the region's rivers and streams and the surface water management process	This ecoregion's groundwater resources are in demand from agricultural and municipal uses. Groundwater demand, use, additional development and distribution are all issues. Because groundwater in this ecoregion is generally dependent on the Edwards Aquifer recharged over the Edwards Plateau, and surface artesian expressions in the Plateau and in this region support rare species with waters from that same Aquifer, the agricultural, municipal and natural resource uses of groundwater are sometimes in conflict. Several of the springs of this region are a municipalities primary source of water (e.g. San Felipe Springs in Del Rio) and harbor endemic, extremely rare aquatic SGCN. SGCN and rare communities needs are not addressed in most groundwater planning efforts; surface and groundwater planning processes are generally disconnected, except for the Edwards Aquifer Recovery Implementation Plan (in progress). See Edwards Aquifer Recovery Implementation Plan at http://earip.org/ for more background
Other Water Source Developments and Technologies	Interbasin Transfers (Surface and Groundwater) Municipal demands on water and potential for well field development for commercial export out of the region or to the largest municipalities	Metropolitan areas outside of the region may contribute to reservoir and groundwater development in this region. Those external drivers are not considering the impact to fish and wildlife resources in this basin during their planning processes. Interbasin transfers have increased the potential for opportunistic groundwater well-field development – right of first capture – which could adversely affect groundwater resources and the SGCN which depend on them in this ecoregion, the Edwards Plateau, the Blackland Prairie, all the way to Gulf Coast Prairies and Marshes estuaries. Water chemistry differences can adversely affect SGCN aquatic species with narrow thresholds for change(especially those which have evolved in or near springfed rivers), environmental flows need to be considered in both receiving and withdrawal basins; water transfer may enhance potential transfer of exotic aquatic species (e.g. hydrilla, water hyacinth, zebra mussels, gill parasites).
Lack of Information & Resources		
Survey data for SGCN and Rare Communities	Lack of data means erring on the side of "rarity" to protect values and species which are not yet completely understood, but for which declines have been documented locally; in many cases, the protection is warranted. Lack of data also means that we lack the ability to guide landowner incentives to areas of most need to recover species faster or prevent their decline in the first place.	Categories in this region most needing information to accurately assess status: ▪ Riparian and grassland birds ▪ Small mammals ▪ Cross-border and migratory animals ▪ Reptiles and amphibians ▪ Wetland dependent species ▪ Pollinators for rare plants and communities 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. May have adverse effects on other SGCN including smaller mammals such as skunks, foxes, bobcats, rare cats
Information Sharing	Lack of targeted and/or ethnically-specific outreach	Cultural impacts on wildlife and fisheries resources occur all across Texas. Because we are a diverse state, our conservation messages need to be targeted to deliver meaningful information to the people who can best help us alleviate stressors.
Inadequate Policies, Rules, Enforcement		
Poaching, Permitting Avoidance and Violations	insufficient law enforcement (not enough people or fiscal resources or both) or unclear jurisdiction Voluntary Measures are not Easy to Encourage or Implement, or Existing Regulations needs Wider Application	Illegal take of SGCN raptors by local chicken raisers needs greater education and enforcement, this particularly impacts Harris's Hawks Red-crowned and Green Parakeets have no formal protection though one is proposed as a candidate for listing; these species need protection from nest robbers Lack of stormwater pollution prevention facilities and out of compliance water and wastewater discharges contribute significantly to water quality issues in this region (and the Valley in the GCPM) and adversely affect all aquatic SGCN Loss of and impact to "non-jurisdictional" wetlands and other waters – Wetlands are one of the most imperiled habitats throughout the U.S. and the isolated wetlands in this region are important springs, seeps, oxbow lakes of the Rio Grande/Rio Bravo, and wet grassland swales, all of which provide SGCN habitat Monitoring and enforcement needed on existing commercial turtle regulations

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
Unregulated or Inadequately Regulated Harvesting	Several predatory species (e.g. coyote, bobcat, mountain lion) are routinely trapped, hunted and killed	It is unknown whether predator control activities are affecting the stability of these 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.
Other Cross-Cutting Issues		
Climate Change	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.	From what we know now, riparian areas, wetlands, native grasslands and shrublands may be most affected in this region. These are all very important habitats for SGCN and rare communities, in addition to their importance as migratory pathways/stopovers/stepping stones Need more downscaled climate models for habitat vulnerability analyses in this ecoregion
Demographics	Region has very diverse population, international needs and concerns, and resource users speak languages other than English	Need more targeted bilingual or multilingual outreach and conservation messaging to reach all resource users in this area
Economics	Working Lands vs Conservation Incentive economics	Landowner incentives cannot compete currently with market forces; market forces in some areas cannot support continued large 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*.[18]

Actions proposed for the STPL Ecoregion (Table 5) state what we need to work on, where, and why (what problem we can solve with that action). Actions lay out how that work contributes to a specific desired effect –progress and success.

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

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

From project inception, well-crafted monitoring and evaluation (cost effective, answers key questions) informs management and allows conservation practitioners to "course-correct" as necessary for effective conservation.[19] With the need for Action Plans to take advantage of several "pots of conservation money," the people we serve and those who govern private and public conservation funds demand reporting, transparency, and *demonstration* that projects are *positively impacting the conservation of species and habitats*. To get beyond reporting that money was spent and projects were done, AFWA TWW convened a committee in 2009 to craft "effectiveness measures" for the conservation actions across all Plans. A toolkit for classifying and measuring conservation action effectiveness was produced in 2011, approved by AFWA TWW Executive Committee comprised of state

[18] TPWD. 2011. Texas Conservation Action Plan: Broad Action Category Definitions. http://www.tpwd.state.tx.us/landwater/land/tcap/documents/action_categories_tcap_2011.pdf
The category "*Data Collection, Analysis, and Management*" meets Action Plan Required Element 3 – "priority research and survey". Many of the proposed actions include a monitoring component (Action Plan Required Element 5) and all actions are encouraged to follow the Effectiveness Measures to assist with adaptive managment.

[19] Conservation Measures Partnership. 2010. http://www.conservationmeasures.org/wp-content/uploads/2010/04/CMP_Open_Standards_Version_2.0.pdf
Salzer, D. and N. Salafsky. 2006. Allocating resources between taking action, assessing status, and measuring effectiveness of conservation actions. Natural Areas Journal 26(3): 310-316.

fish and wildlife agency directors and others.[20] These measures will be an important part of moving the plans and conservation forward.

With this revision, the TCAP becomes more involved in a national movement to track conservation actions and progress across local, state, regional and national levels. As with the 2005 Plan, actions presented in this edition vary in detail, scale, and duration; however, this edition encourages the use of the incremental measures of success for conservation projects' development, implementation, and tracking. To that end, the toolkit in *Measuring the Effectiveness of State Wildlife Grants*[21] is **strongly recommended** to define conservation projects, target audiences and partners, identify desired step-wise intermediate results, and collect the "right" data to report our conservation achievements.

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

[21] Same as above

Table 5. STPL Conservation Actions

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

Conservation Action
Invasive Species
Work with adjacent arid lands ecoregions, where *Tamarisk* and *Arundo* are a key issue. Review treatment and eradication success rates on different water bodies, relationship to and effects on spring and seep systems and associated SGCN, and determine course-appropriate actions for treatment in this ecoregion for maximum conservation effectiveness. Document results and share information within similar habitat types across the state.
Intensively work with private landowners and conservation partners to minimize/eradicate feral hog, nutria, axis and aoudad populations. Identify funding sources to assist landowners. Document statewide efforts. Provide technical guidance and educational programs about the impact of these species and management to benefit ground nesting birds, small mammals, aquatic species. Evaluate technical guidance and eradication programs with effectiveness measures.
Promote the use of native grasses in landowner incentive programs for wildlife and fish resource improvement (e.g. Farm Bill, SWG, LIP, and others). Sod-forming exotic grasses and cultivars should not be used in any restoration project, much less those with state or federal dollars, as these are known to be detrimental to native habitats and the wildlife on which they depend. A restoration guide to suitable native grasses for this ecoregion, local sources for native seed and stock, and techniques would be immensely useful to a wide variety of conservation service providers, landowners, and recreation land operators. Promote conversion of nonnative grasses to site appropriate desired ecological conditions especially on lands adjacent to sites already managing for conservation objectives (land trust properties, WMAs, State Parks, some Wildlife Cooperatives and Wildlife Management Plan holders, preserves, etc.).
Provide site appropriate brush removal advice and project implementation to restore native grasslands and savanna, retain intact riparian areas and thornscrub corridors, and protect wetlands, slope and outcrops. Promote use of site-appropriate methods – herbicides, Rx fire, or mechanical – to preserve water quality and prevent soil erosion and invasive grass colonization. Document and share site-appropriate restoration and maintenance plans for the benefit of other conservation practitioners – document what works and what does not in specific site types. Use the effectiveness measures for Direct Management (Stewardship) to assess the efficacy and benefits to *site-specific* SGCN and rare communities.
Intensify outreach and public education efforts especially near boat ramps and high-traffic fishing tournament areas to reduce the proliferation or prevent the introduction of aquatic invasives – plants, mollusks and baitfishes. Highly isolated and vulnerable aquatic SGCN in this region would be severely threatened (moreso than they are currently) by such introductions. Identify effectiveness measures for this outreach effort and document progress.
Phase out stocking practices of small mouthed bass and stripers in freeflowing river sections where these introduced predators have the potential to permanently and adversely affect native rare freshwater minnows, shiners, pupfish and others SGCN aquatics of springfed rivers and streams in this ecoregion.
Pests, Parasites, Pathogens
In areas with a high concentration of oak wilt or oak decline vulnerable species deter the inappropriate timing or disposal of oak trimming to slow/prevent the spread of this disease. Document areas of oak wilt or oak decline with the Texas Forest Service to help them concentrate their outreach and incentive programs on this front (see also *Power Development* below)
Monitor *Cactoblastus* distribution in Texas and document in a public resource (published journal, centralized website, Wildflower Center database?) in order to determine threats to native *Opuntia* sp.
Power Development and Transmission
Develop voluntary conservation guidance for solar development, similar to the working group and products of the Wind Power Development Guidelines working group. Encourage 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 and ensure that this data is provided to TPWD Habitat Assessment section so that they can better assess installation and operational impacts, propose avoidance and mitigation measures. Support the development of an online resources mapper for developers to use to avoid areas of highest ecological significance.
In areas with a high concentration of oak wilt or oak decline, vulnerable species and/or a lot of tree trimming activitiy (e.g. ROW) deter the inappropriate timing or disposal of oak trimmings to slow/prevent the spread of this disease. Follow Texas Forest Service Guidelines for tree trimming timing, cut treatment, equipment protocols and trimming disposal. Avoid the use of brush-hogging vertically to trim back ROW edges. Document areas of oak wilt, oak decline with the Texas Forest Service to help them concentrate their outreach and incentive programs on this front
Work with Transmission Line and Distribution Line ROW developers and maintenance plans to promote: • use of locally sourced native grasses in post-construction and maintenance re-seeding • spanning streamside, wetland, and dense thornscrub habitats • active eradication of non-native species • seasonally-sensitive maintenance to avoid impacts to ground-nesting and migratory birds Where possible, emphasize restoration of the desired ecological condition after construction.
Oil and Natural Gas Production and Delivery
Work with oil and gas ROW developers and maintenance plans to promote: • use of locally sourced native grasses in post-construction and maintenance re-seeding • stream and wetland buffers of existing native vegetation • active eradication of non-native species • conservation of riparian areas, all wetlands and wet areas

Conservation Action
• seasonally-sensitive maintenance to avoid impacts to ground-nesting and migratory birds Where possible, emphasize restoration of the desired ecological condition after construction.
Mining
Develop a short list of best management practices for site assessment prior to sand and gravel operations (e.g. relationship and connectivity surface water resources which harbor/support SGCN), water quality protection and aquatic feature adjacent vegetation protection, and setbacks from sensitive features. Provide conservation outreach to operators to inform them of the new regulations requiring a TCEQ permit for river and stream adjacent operations. Work with TCEQ permitting requirements to include information about the sensitivity and importance of riparian areas, springs, seeps and other water features, including nonjurisdictional wetlands and swales, to encourage best practices (avoidance, stormwater pollution prevention, minimization).
Work with mining operations developers, maintenance plans, and remediation contractors to promote: • use of locally sourced native grasses in post-construction and maintenance re-seeding • stream and wetland buffers of existing native vegetation • active eradication of non-native species • seasonally-sensitive operations to avoid impacts to ground-nesting and migratory birds Emphasize restoration of the desired ecological condition in remediation efforts.
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) and areas adjacent to bat roost sites (tree groves, predominately here) -- 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
In areas with a high concentration of oak wilt or oak decline, vulnerable oak species and/or a lot of tree trimming activitiy (e.g. ROW) deter the inappropriate timing or disposal of oak trimmings to slow/prevent the spread of this disease. Follow Texas Forest Service Guidelines for tree trimming timing, cut treatment, equipment protocols and trimming disposal. Avoid the use of brush-hogging vertically to trim back ROW edges. Document areas of oak wilt or oak decline with the Texas Forest Service to help them concentrate their outreach and incentive programs on this front
Provide TXDOT with native grass species lists, seed sources and restoration technique guides to encourage use of natives in ROW remediation following construction and restoration if the opportunities for conversion arise. Native grasses have improved drought tolerance and are adapted to Texas' soils and climates. Native grass seeding also requires less water inputs which would reduce remediation costs. Document use of native ROW by SGCN.
Provide outreach to landowners adjacent to TXDOT ROW in areas where TXDOT has implemented native restoration (native grasses used) or conservation (rare plant protection plans, maintenance plans to protect rare communities or features) to support SGCN recovery or protection to further understanding of these important resources and their site-appropriate management, reduce landowner maintenance in these areas, and promote SGCN recovery. Use outreach effectiveness measures to document progress.
Identify specific areas for TXDOT Districts, county road managers to improve right-of way (ROW) restoration and management: ▪ Post construction, restore sites with native seed sources and materials ▪ Remove invasive species and restore site-appropriate vegetation on ROW ▪ Promote suitable wildlife passage construction for culverts, bridges directly related to mortality documentation on ocelots, suitable adjacent habitat, and known occupied locations (see ICOET design recommendations) ▪ Create specific maps and management strategies for rare plant species in ROW ▪ When mowing along roadways, mow approximately 15 feet from the shoulder within undeveloped areas; in areas beyond 15 feet and on ROW through rural lands do not mow between April and October in order to allow ground nesting birds to produce and native grassland plants to seed out.; mow on a 4-year cycle at an 8-inch height (if roadway, both sides of the road are not mowed in the same year, saves significant dollars for mowing costs and reduces accidents). ▪ Provide interpretive signage re these practices and outreach to neighboring properties so this can serve as a demonstration, prevent private maintenance of public ROW ▪ Identify monitoring sites which can serve as mitigation as long as information is shared through a public database and conservation practice networks.
Land & Water Mgmt: FARM

Conservation Action
A North Carolina State University study of linear and block field borders on 24 farms found that quail populations almost doubled on farms where 2-3 percent of the cropland edge was allowed to go fallow. It also found that blocks of fallow habitat (one quarter acre to 6 acres in size) produced twice the number of quail as narrow (10-foot) linear field borders. While this study targeted quail production, other SGCN grassland birds, small mammals, reptiles, rare plants and insects, and the grassland/shrubland communities themselves, would also benefit from these practices: • Leave brushy or grassy borders around fields/orchards. These borders can help to prevent erosion, protect water quality and if left un-mowed can provide nesting areas • Leave jagged edges on fields. Fields with straight edges appear to provide less habitat • Preserve or restore woody draws (cover in draws will re-establish naturally if left unplowed or un-mowed; invasive nonnative plants should be removed). • Alternating crops in the same field is an excellent way to reduce erosion and build soil fertility. Planting row crops followed by wheat or other small grains the next year provides habitat diversity for quail. Planting legumes or grass every third or fourth year is a good rotation for soil conservation and SGCN. • Remove dense sod-forming monoculture grasses. Thick mats of grass hinder movement and make feeding difficult. Native warm-season grasses, properly managed, provide cover and food. Mixing legumes with grasses improves habitat for young quail.
Encourage and incentivize voluntary stormwater pollution prevention control to catch field runoff in treatment wetlands, native streamside buffers, or catchment with filtration substrates prior to discharge to local waterways. Document voluntary compliance and efficacy of this approach in waterway segments with SGCN (fishes, invertebrates, amphibians) where farmland runoff has adversely impacted water quality (sedimentation, turbidity, chemical).
Land & Water Mgmt: RANCH
Conservation easements and landowner incentive programs (e.g. Farm Bill Conservation Title, USFWS Partners Program, Grazing Lands Conservation Initiative, TPWD Landowner Incentive Program …) are the best instruments for landowner participation in this region. Landowners with intact grasslands (especially those within priority grassland areas identified by Rio Grande Joint Venture, and The Nature Conservancy, USFWS Partners Program, NRCS Farm Bill wildlife biologists), grasslands with restoration potential for little investment, dense diverse thornscrub suitable for rare plants and ocelots, riparian corridors along Ecologically Significant Stream Segments (and to their headwaters), and/or springs, wetlands or resacas; and adjacent to or along natural system corridors/watersheds related to well-managed conservation lands should be first-eligible. Monitoring of key SGCN from a variety of taxa 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).
Promote the use of native grasses in landowner incentive programs for wildlife and fish resource improvement (e.g. Farm Bill, SWG, LIP, and others). Sod-forming exotic grasses and cultivars should not be used in any restoration or improvement project as these are known to be detrimental to native habitats and the wildlife on which they depend. Properly managed native grasses do not require annual fertilization; highly palatable native grasses (i.e. Yellow Indiangrass, Little Bluestem, Big Bluestem, Switchgrass, and Eastern Gammagrass) provide high protein levels required for livestock and hay production. These factors make native grasses a sustainable option for Texas' rangeland and SGCN benefits. Native grasses have improved drought tolerance and are adapted to Texas' soils and climates. Economic analysis comparing introduced grass to native grass in a commercial cow-calf production system has estimated greater returns for native grasses when fertilizer costs are $40- 50 per acre. In addition to terrestrial and aquatic wildlife benefits, pasture conversion back to native grasslands reap public benefits through improved water quality, groundwater recharge, carbon sequestration, erosion control, outdoor education, and recreational opportunities. A restoration guide to suitable native grasses for this ecoregion, local sources for native seed and stock, and techniques would be immensely useful to a wide variety of conservation service providers, landowners, and recreation land operators. Incorporate SGCN fish and wildlife habitat values and recommendations in rotational grazing system recommendations (Grazing Lands Conservation Initiative). Promote conversion of nonnative grasses to site appropriate desired ecological conditions especially on lands adjacent to sites already managing for conservation objectives (land trust properties, WMAs, State Parks, some Wildlife Cooperatives and Wildlife Management Plan holders, preserves, etc.).
Provide site appropriate brush removal and prescribed fire advice and project implementation to restore native grasslands and savanna, retain intact riparian areas and site appropriate brushlands, and protect wetlands and outcrop features. Promote use of site-appropriate methods – prescribed fire, herbicides, mechanical – to preserve water quality and prevent soil erosion and invasive grass colonization. Document and share site-appropriate restoration and maintenance plans for the benefit of other conservation practitioners – document what works and what does not in specific site types. Use the effectiveness measures for Direct Management (Stewardship) to assess the efficacy and benefits to SGCN and rare communities.
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.
Species Restoration: Work with public and private landowners, existing incentive tools, and regulatory assurances to re-establish an Aplomado Falcon population in Cameron and Willacy counties
Land & Water Mgmt: Municipal
Work with decision-makers and developers urban areas, emerging communities, and adjacent larger ranches with desirable habitats in and adjacent to High and Very High Risk HUC 12 watersheds identified on the National Fish Habitat Action Plan viewer (http://www.nbii.gov/far/nfhap/) to reduce human-induced, identified pollution risks and improve/protect water quality. Focus on those watersheds which also have an intersection with SGCN aquatic species and/or intact streamside rare communities. Identify specific measures that can be implemented and establish monitoring to determine if outreach and coordination with planning entities is effective
Develop one to two page best management practices to target outreach to urban areas, emerging communities and adjacent larger ranches with desirable habitats focused on the significance of native grasslands and shrublands, intact floodplain-extent riparian habitat, sensitive hydrologic features including nonjurisdictional wetlands which host SGCN rare plants and communities, drainage and floodway protection, and water use conservation related to SGCN *specific to their community*. Include information on programs available to them for guidance, conservation incentives, and restoration (e.g. FEMA floodplain buyouts, stormwater pollution prevention plans, open space planning). Monitor the targeted outreach effectiveness and determine if the approach could be successfully implemented in other areas (e.g. adjacent ecoregions with similar issues).

Conservation Action
Form a working group of ecologists, conservation field practitioners, urban biologists, and recreation services providers to provide consistent information from the conservation community to current and emerging urban areas. Key issues may be: ▪ Park and open space planning for *specific* regional habitat connectivity (daily and seasonal SGCN movements), riparian and streamside protection, water quality protection, floodplain set asides, mitigation banks for in-jurisidiction projects ▪ Resaca system needs, effects of certain human activities, and protection ▪ Water quality protection through stormwater pollution prevention plans and facilities even where not required by regulation, leaving natural floodways intact rather than armoring ▪ Water conservation practices and direct relationship to benefits for humans and SGCN in their areas ▪ Invasive species prevention and removal in public land, rights of way, planned developments (e.g. encourage tree conservation where appropriate and native plant use in new housing areas, incentives for landscape conversion to natives especially in areas near waterways) ▪ Collaboration with counties for environmental protections (stormwater, invasive species, reclamation, dumping, other?) ▪ Tax incentives for infill development, restoration, conservation planning; or disincentives for open land conversion, sprawl Identify sources of volunteers and/or funding which could help municipalities employ conservation practices. As with any outreach program, these efforts need to have reporting objectives and monitoring of sorts to determine effectiveness, share lessons learned and hone approaches for future and emerging areas which will be experiencing these issues in the future.
Land & Water Mgmt: Conservation & Recreation
Work with Texas land trusts and other public and private lands partners to identify Tamaulipan thornscrub, riparian, and wetland priority conservation areas for long-term rotating and/or perpetual conservation that have directly benefit SGCN and rare communities, water quality and estuaries downstream, have high native plant and community diversity, are large functional blocks which could be networked to benefit seasonal and daily movements of SGCN, could serve as a seed source for local restoration projects, are adjacent to or in proximity of existing managed conservation lands (World Birding Center sites, USFWS National Wildlife Refuges, TNC preserves, TPWD Wildlife Management Areas and Parks). Restoration sites on agricultural lands need to be identified and networked to existing conservation lands to enhance the sustainability of the restoration efforts and self-sustaining resiliency in the face of climate change. Given the regional growth and pace of development, conservation easements, Purchase of Development Rights program implementation, contributions to Texas Water Trust, and other perpetual management agreements need to be high priority. High priority bird species conservation goals using Rio Grande Joint Venture information on current population estimates, percent global population, research on area sensitivity or acreage required for minimum viable populations, daily metabolic requirements for breeding and wintering species, ranges of seed/insect (kilocalorie etc.) production per acre made available from various prairie types, generation of grassland bird use days (similar to duck use days), land use changes over time, and population trend data is our best first estimate for a conservation acreage target; starting point for the next 10 years. Another criteria may be for geographical locations within 1 hour of urban boundaries so they could serve as locations for education, outreach or demonstration. See urban recommendations.
Establish a regional public lands management experience cooperative to identify restoration needs and sites, invasive species removal priorities, trail development and recreation planning improvement, and management practice (e.g. Rx Fire, Brush Control, Restoration) improvement opportunities. Work together to pursue restoration funding and volunteers to share (e.g. burn teams, burn trailers/equipment, trail teams, riparian restoration teams, go in together on equipment and/or plant materials, schedule) among priority projects to benefit SGCN and rare communities, improve water quality, and provide demonstration areas for public and private landowner outreach. Review effectiveness measures and reporting to determine if this is a viable, useful collaboration; what benefits to agencies/organizations have been realized; what improvements have been made for SGCN conservation (status improvement, resiliency, permanent protection).
Technical Guidance FOR/WITH Conservation Service Providers (Audubon, NRCS, TPWD, TNC, NPAT, NPSOT, FWS, NWTF,RGJV and NBCI) specific to the issues and resources of this region to help share lessons learned and encourage creative conservation tool use: Land conservation tools: conservation easements, fee title, donations, mitigation banking, Safe Harbor, Candidate Conservation Agreements, Candidate Conservation Agreements with Assurances, stewardship/management incentive programs; include how priorities for action are determined, which are most successful and why, best practices – timelines, documentation, monitoring; lessons learned; and how to measure effectiveness of the tool used. Wildlife Tax Valuation – benefits, best practices to benefit SGCN and priority habitats; barriers to implementation and lessons learned to overcome barriers; monitoring recommendations Landowner Education: how to deliver the best message, what kinds of tools and support landowners expect, how to select and target your audience, levels of response based on type of outreach, how to measure effectiveness and application of the training, costs-benefit analysis, lessons learned. Prescribed Fire: technical training requirements, time, and costs for an effective program; how to develop a program and what partner resources are available; how to engage private landowners in Rx fire application; how to best deal with urban – wildland interface issues (what stakeholders need to be involved); how to generate interest in burn cooperatives to enhance the scale of fire application; lessons learned over time in this region; how to measure effectiveness of Rx Fire application (site specific and programmatically). Brush Management: where appropriate/inappropriate, current state of the science and practice, best tools for certain soils/substrates and brush species, how to develop a program and roll it out to private landowners, potential partners; lessons learned over time in this region; how to measure effectiveness of brush treatment application (site specific and programmatically). Same kinds of training programs for thornscrub and riparian restoration. See Best Management Practice development recommendations above. 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
Water Development, Management and Distribution

Conservation Action
See http://www.twdb.state.tx.us/gwrd/gcd/gcdhome.htm for a current map of Groundwater Planning Districts that intersect this ecoregion; see also http://earip.org for information about Edwards Aquifer Recovery Implementation Plan progress. **Groundwater management** is a key issue in this ecoregion, which covers many municipalities, emerging communities, watersheds and significant aquatic features which support many of the region's SGCN. Ground and surface waters which feed this ecoregion's human and resource needs originate primarily in the Edwards Plateau. Coordination across Groundwater Management Areas and ecoregions is needed. Connectivity between surface and groundwater in this region is important and needs to be considered in both planning processes. Support the establishment of groundwater conservation district(s) that align most closely with the aquifer boundaries and use areas in and out of these basins to support management for conservation, preservation, recharging, and prevention of waste of groundwater resources. Continue to support and contribute to the processes and outcomes of the Edwards Aquifer Regional Implementation Plan which affects environmental water flows through and downstream of this region. See the following reports, processes that are currently evolving in 2011: http://earip.org/EcoRest/12-11-09%20Ecosystem%20Restoration%20Subcommittee%20Report%20Final.pdf and http://earip.org/EcoRest/12-11-09%20San%20Marcos%20River%20Restoration%20Options%20Report.pdf Aside from the EARIP processes, identify a coalition or natural resources advisory group of terrestrial and aquatic ecologists across natural resources management entities for the ecoregion to craft SPECIFIC science-based recommendations and regionally specific information regarding groundwater-surface water connection for environmental flow needs for aquatic and terrestrial SGCN and rare communities, sensitive and unique areas which may be adversely affected by groundwater withdrawals and/or interbasin transfers. Additional recommendations for accurate and complete water accounting would be useful for all planning processes. Given small budgets for time and travel, elect a spokesperson (or rotating spokesperson) to attend and participate in regional meetings and convey the group's recommendations. Evaluate the effectiveness of this activity and share lessons learned in other regions which could benefit from this experience.
See http://www.twdb.state.tx.us/wrpi/rwp/map.asp for a current map of Regional Water Planning Groups that intersect this ecoregion. **Surface water management** is a key issue in this ecoregion, which covers many municipalities, emerging communities, watersheds and significant aquatic features which support many of the region's SGCN. Ground and surface waters which feed this ecoregion's human and resource needs originate primarily in the Edwards Plateau. Coordination across Surface WATer Regional Planning Areas and ecoregions is needed. Connectivity between surface and groundwater in this region is important and needs to be considered in both planning processes. Additionally, environmental flows to estuaries must be considered in the Regional Water Planning process. Aside from the EARIP processes, identify a coalition or natural resources advisory group of terrestrial and aquatic ecologists across natural resources management entities for the ecoregion to craft SPECIFIC science-based recommendations and regionally specific information regarding groundwater-surface water connection for environmental flow needs for aquatic and terrestrial SGCN and rare communities; sensitive and unique areas which may be adversely affected by reservoir development, interbasin transfers, off channel reservoirs, and withdrawals; opportunities for water quality improvement (see TMDL recommendation). Support the conversion or transfer of existing unused water rights to the Texas Water Trust to protect instream uses. Develop a means to aid in funding the transfer of unused water rights to TWT. Study current water use and rates paid in large urban areas, versus the cost of longterm ecological loss from reservoirs or other water development projects. Convey the findings to regional surface water planning groups and make recommendations for mitigation to recover desired ecological conditions. Consider water rates directly proportionate to use to encourage conservation. Additional recommendations for accurate and complete water accounting would be useful for all planning processes. Given small budgets for time and travel, elect a spokesperson (or rotating spokesperson) to attend and participate in regional meetings and convey the group's recommendations. Evaluate the effectiveness of this activity and share lessons learned in other regions which could benefit from this experience.
Reservoir Management Work with International Boundary Waters Commission, appropriate state and federal officials, Falcon Reservoir operators, local municipalities, irrigation users, and ecologists with specific knowledge of flood-affected and flow-affected Rio Grande/Rio Bravo species to manage instream flows above and below Falcon Reservoir, including flood releases to mimic natural river system flushing, provide necessary hydrograph for SGCN aquatics, decrease invasive aquatic species, and support estuary health in Laguna Madre.
Lack of Information & Resources
Little is documented in scientific publications about the potential or specific effects of "fracking" on surface or groundwater resources, although this is a fast-growing area of concern. More published information is needed, specifically about the effects to SGCN aquatic resources dependent on groundwater, springs and seeps, and wetlands in this area. From that information, collaborative work is needed among ecologists and extraction companies to prevent and minimize the adverse effects to habitats and SGCN which depend on them. Documentation is key.

Conservation Action
Create a multi-disciplinary multi-partner regional ecology committee to identify three to five years of highest priority research projects (actual projects, not just concepts) that can be rolled out to educational and research institutions, NGOs and agencies to collect information most needed at the PRACTICAL level for management and conservation improvement on the ground. Some priorities for consideration identified in the TCAP process: • monitor the status of key suite of breeding and wintering grassland and savanna birds to support the Rio GrandeJoint Venture • Need specific distribution, abundance and trend data on spot-tailed earless lizard, desert massasauga, all SGCN small mammals in this ecoregion, and bats (including habitat use documentation in the Rio Grande Valley) • Use LIDAR and the methods of the Texas Ecological Mapping Systems project to determine the potential full extent of the rarest SGCN and opportunities for downlisting/delisting, targeted recovery efforts, , landowner incentive programs with longterm or permanent conservation easements and purchase of development rights, Safe Harbor and Candidate Conservation Agreements, and SGCN rank updates • longterm monitoring of regional scale summer wildfire sites to document vegetation community and animal assemblage recovery, timing, compared to areas which have not been burned in 5, 10, 15 years, and compared to areas which are burned in different seasons • map and monitoring bank stability, native vegetation recovery, and native animal use in areas treated with Tamarisk removal (various means/methods/timing) to recommend most effective and ecologically sound practices for landowners; • phenology studies related to insect fauna, particularly pollinators of rare plants/communities, and the documented and potential effects of climate change in grassland, shrubland, wetland and geologically isolated plant communities; • Research on effects of managed flows (dam releases), including sediment dynamics and water quality, and their effects on SGCN fishes and aquatic invertebrates, especially those in vulnerable watersheds. • Evaluate specific groundwater withdrawal impacts on spring, seep and karst habitats that support SGCN and rare communities; identify key headwater areas for landowner outreach and incentives; also, refine the ranges and relatedness of *Dionda argentosa, Dionda serena*, and *Dionda episcopa* to help identify threats and conservation needed for the various "populations" • Evaluate the role of predators in priority habitats in this Plan; using existing data and a protocol for collecting additional data, identify the frequency, extent, and effects of predator control activities on the stability of certain predators' populations and their contribution to natural system function; based on findings and other western states' successful management strategies, identify community-based and community-supported solutions to balance predator control effects with ecological needs. • Buidling on the work done for the Springs of Texas and the TPWD Springs program, continue to identify and map spring sites, evaluate aquatic fauna and rare plant community associations with these features; use the information to determine watersheds for restoration and conservation focus. Provide spatial information to the TXNDD and the Texas Ecological Mapping Systems program for enhanced conservation planning and landowner outreach. • Identify and map the most critical brushlands and connectivity corridors for a suite of SGCN – all taxa – to focus landowner incentive programs 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. Prioritize population health and distribution studies for those SGCN which are not yet listed, are candidates or have been identified as imminently threatened. Document findings in published literature, including specific conservation recommendations, and the Texas Natural Diversity Database.
Conservation practice providers need to identify a suite of native plant species for each priority habitat type which can be promoted with one voice to plant materials centers and commercial distributors. Engage Master Naturalists, Native Plants Society of Texas, Native Prairies Association, land trust and NGO volunteers in coordinated/targeted seed and material collection. Assess success of these programs and the use and success of the materials over time to determine if this is an effective approach or whether on-site or nearby collection on a project-by-project basis is more effective (conservation and costs).
Form multi-partner working group(s) to establish scientifically sound best management practices for **prescribed fire application** for the ecoregion (timing/season, period/duration, intensity, parameters for RX) for the restoration of prairie grasslands in appropriate areas (not areas where desired ecological condition is brushland or riparian corridors Work with Rx fire technical experts and SGCN/rare communities experts to identify concerns, barriers, and solutions. Explore the barriers to applying this tool on private lands and make recommendations to overcome these barriers (policy? Targeted outreach? Technical workshops? Where are the most important areas, audiences?). Review existing successful practices: FWS, NBCI, NRCS, NPAT, TPWD, NWTF, TFS, TNC, and JVs are organizations tackling this issue within parts of the state. Identify key SGCN from a variety of taxa and rare communities in the recommendations for monitoring to determine effectiveness of the applied practices. Identify the data repository for this monitoring information so that practitioners can share lessons learned. *See note at end of table about conservation effectiveness tracking.*
Form multi-partner working group(s) to establish scientifically sound best management practices for **riparian restoration** for the ecoregion and Mexico, including timing, water needs, reasonable recommendations for initial planting diversity, ways to encourage full complement of desired ecological condition of community, how to prevent or control specific invasives without negatively impacting restoration, locally sourced seed and plant materials for the ecoregion (and finer scales if needed). Work with riparian restoration technical experts and SGCN/rare communities experts to identify concerns, barriers, and solutions. Identify key SGCN from a variety of taxa and rare communities to monitor to determine effectiveness of the applied practices. Share recommendations and case practices with partners managing conservation targets across the border. Identify the data repository for this monitoring information so that practitioners can share lessons learned. *See note at end of table about conservation effectiveness tracking.*

Conservation Action
Form multi-partner working group(s) to establish scientifically sound best management practices for **thornscrub restoration** for the ecoregion and Mexico (timing/season, period/duration, intensity, parameters for RX) for the restoration of prairie grasslands in appropriate areas (not areas where desired ecological condition is brushland or riparian corridors Work with thornscrub restoration and management experts and SGCN/rare communities experts to identify concerns, barriers, and solutions. Explore the barriers to applying this tool on private lands and make recommendations to overcome these barriers (policy? Targeted outreach? Technical workshops? Where are the most important areas, audiences?). Share recommendations and case practices with partners managing conservation targets across the border. Review existing successful practices: FWS, NBCI, NRCS, NPAT, TPWD, NWTF, TFS, TNC, and JVs are organizations tackling this issue within parts of the state. Identify key SGCN from a variety of taxa and rare communities in the recommendations for monitoring to determine effectiveness of the applied practices. Identify the data repository for this monitoring information so that practitioners can share lessons learned. *See note at end of table about conservation effectiveness tracking.*
Establish a regional *lands* management experience cooperative to identify restoration needs and sites for connectivity, invasive species removal priorities, trail development and recreation planning improvement, and management practice improvement opportunities. Work together to pursue restoration funding and volunteers to share (e.g. burn teams, burn trailers/equipment, trail teams, riparian restoration teams, go in together on equipment and/or plant materials, schedule) among priority projects to benefit SGCN and rare communities, improve water quality, and provide demonstration areas for public and private landowner outreach. *See also public lands management recommendations in the Statewide Handbook.*
Inadequate Policies, Rules, Enforcement
Develop and promote voluntary conservation measures for all nonjurisdictional wetlands, including site appropriate buffer protection recommendations, restoration options, and desired ecological condition for mitigation. Document development projects which do and do not choose to implement voluntary measures, visit with developers to assess reasons for choices, and craft recommendations for TPWD Habitat Assessment to improve voluntary protection of unregulated resource. See Effectiveness measures for Environmental Review.
See information needs regarding predator data collection
Other Cross-Cutting Issues
Determine market values that are driving agricultural conversion (biofuels? crop prices? Urban growth?), livestock production, hunting and other recreation, and land subdivision in this region. Craft a recommendation to landowner incentive program providers that can be used to index conservation practice incentives in ecoregions. Monitor whether this approach was effective to change the conservation program values AND landowner participation in those programs before & after the change
Climate Change Climate change models and effects on grasslands, shrublands, riparian areas, and springs/groundwater resources Form a working group with adjacent ecoregions' aquatic and terrestrial ecologists to identify river rehabilitation goals in/adjacent to undammed stretches below Falcon to the estuaries to evaluate/implement instream flow recommendations; improve the quality, timing, and seasonality of releases, improve riparian restoration, and increase connectivity to improve resilience to climate

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