



TEXAS CONSERVATION ACTION PLAN

Chihuahuan Desert and Arizona-New Mexico Mountains

DRAFT ECOREGIONS HANDBOOK

JUNE 2011

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



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See links on Texas Parks and Wildlife Department’s [Texas Conservation Action Plan 2011 Web Page](#) for additional references and supporting documents cited in this handbook.

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

SUMMARY

The Chihuahuan Desert and Arizona-New Mexico Mountains (CHIH-AZNM) Ecoregions Handbook is one of the Texas Conservation Action Plan (TCAP) thirteen handbooks, available on the Texas Parks and Wildlife Department’s [Texas Conservation Action Plan website](#):

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

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

It’s important to prioritize where we need to work to the degree that we can: human and financial resources are limited, certain issues demand more immediate resolution, and some species and habitats are simply more in need. The TCAP 2011 taps into a broad network of conservation service providers, natural resources managers, alliances and working groups, policy makers, stakeholders and the public to define **what’s at risk, what issues are most important, where we need to work, how to best engage the right partners to solve the problems, and what to do.**

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

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

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

HOW TO GET INVOLVED

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

There are many wonderful, energetic public and private conservation providers in Texas who have active volunteer networks, strategic needs, and programs. For more information, check the [Natural Resource Conservation Programs and Services for Texas Landowners](#) (TPWD 2007).

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

Phone (512) 389-4800

Email [Texas Conservation Action Plan Coordinator](#)

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

[Texas Conservation Action Plan website](#)

ECOREGIONS OVERVIEW

“West Texas” conjures the images many of us have of Texas legends – one foot in truth and the other in great works of fiction (thank you, Larry McMurtry) – endless open space, mountains in the distance, cultural icons of cowboys and cattle, and inhospitable environments full of prickly pear and little to no water. Most of us experience west Texas at more than 70 miles per hour, driving IH-10 from one side of the state to the other, rarely slowing meander the backroads and take in the details of this truly beautiful landscape. The truth, it turns out, is an incredibly diverse landscape, complex spring-fed oases and lush riparian areas, golden grasslands, and cool mountain canyons .

The Chihuahuan Desert and Arizona-New Mexico Mountains (CHIH-AZNM) ecoregions¹ are a matrix of hardscrabble rock-strewn scrublands and lush vast grasslands, pockets of isolated geologically dependent plants and animals found only on “mountain islands” (Gelbach 1993), biologically diverse and critically important cienegas (springs) that form an “O!” of surprise in a hot desert environment, and stream/riparian complexes that support flora and fauna found nowhere else in the world. At first glance, the entire region appears as we imagine it did hundreds of years ago – sparsely populated, wild, and “untouched;” however, while human settlements in west Texas are few and far between, our imprint on the land has been widespread, across generations, and continues today. Our cultural history of barbed wire, water development, working lands and range management have shaped most of Texas’s natural history, and the “deserts” of west Texas are no exception. Livestock ranching, oil and natural gas exploration, alternative energy development, the movement of goods and services from Mexico and points west across and through Texas, and water development are all complex issues which shape the distribution and well-being of natural resources this region. Ownerships in the Trans Pecos are still large, by any standard, in the thousands of acres, although the difficulty in retaining these large ownerships and pressures for subdivision are evident here as they are throughout Texas. And, while there are several large public sites – Guadalupe Mountains National Park, Big Bend National Park, Big Bend Ranch State Park, and others – in this ecoregion, west Texas remains mostly privately held. Conservation through private partnerships is crucial. Outdoor recreation leases and uses – hunting, fishing, birding, hiking, mountain biking – and retirement sites have replaced or now significantly augment traditional land uses in some areas. These ecoregions combined cover approximately 22,677,181 acres out of Texas’s 171,904,640 acres. **Table 1** crosswalks these ecoregions with other conservation planning units.²

ARIZONA - NEW MEXICO MOUNTAINS

With lower elevations than the nearby Southern Rockies, the Arizona – New Mexico Mountains (AZNM) ecoregion is characterized as warmer and drier than that area. The majority of this ecoregion occurs in the midsection of Arizona, with disjunct pockets in New Mexico. The eastern- and southern-most extents of this ecoregion spans the New Mexico – Texas border as the Guadalupe Mountains formation with higher elevation ponderosa pine forests; surrounding foothills of oak, pinyon and juniper woodlands; and adjacent chapparal. Known locally as “The Guads”, it shares a unique geologic history with the Apache Mountains near Van Horn and the Glass Mountains near Alpine as exposed fossil remnant reefs of the larger Capitan Reef, a Permian Period formation (NPS, n.d., Hayes 1964). This

¹ Griffith, G. 2010. Level III North American Terrestrial Ecoregions: United States Descriptions. Prepared for the North American Commission for Environmental Cooperation (www.cec.org), version May 11, 2010. Corvallis, Oregon.

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

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

limestone foundation contributes to the area’s landscape of eroded sheer cliffs and sheltered wooded canyons, spring systems, cave features, and gypsum dunes. Guadalupe Mountains National Park, is the majority of this ecoregion’s extent in Texas. The remainder of the ecoregion is privately held as rangeland, recreation areas, and research sites for regional universities. **Figure 1** illustrates the location and extent of this ecoregion, embedded in the Chihuahuan Desert ecoregion in Texas. **Table 2** documents the **Ecological Drainage Units (EDU)** and **Hydrologic Units (“HUC 8”, finer scales within EDUs), Ecologically Significant Stream Segments (ESSS)**³ which occur in this area. **Figure 2** shows those EDUs, HUC 8s, and ESSS by ecoregion.

CHIHUAHUAN DESERT

Most of west Texas, also known as the Trans Pecos, is Chihuahuan Desert, extending into central New Mexico to the north and more than 500 miles south into Mexico. The region is arid with annual precipitation approximately 13 inches or less, occurring mostly in the summer months (the “monsoon” of west Texas usually occurs in August). The area is incredibly diverse given the altitude changes – desert grassland and arid shrubland lowlands to high elevation islands of oak, juniper, and pinyon pine woodland – typical of “basin and range” topography. Historic and current livestock grazing operations – stocking levels, fencing, watering – have done much to shape the lower elevations’ vegetation communities. Agricultural production is also prevalent – dryland and irrigated row crops (cotton, onions, alfalfa, “hay”), irrigated pecan orchards, hydroponic tomatoes. Most regional streams are ephemeral, many are spring and groundwater dependent; isolated springfed wetlands dot the landscape infrequently. Steep canyons and arroyos gather what little rainfall reaches the land; these areas have very different and diverse native plants and plant communities. The Texas - Mexico boundary in this ecoregion runs the Rio Grande/Rio Bravo course from El Paso through Big Bend to Amistad Reservoir, near Del Rio. Many people consider Del Rio (and the Devils River watershed to its north) part of this ecoregion, south Texas, *and* the Edwards Plateau. Elements of the Chihuahuan Desert (especially the fish assemblages) need to be addressed in this crossroads area by all three ecoregions. The larger urban and settled areas in the region include El Paso, Presidio, Alpine, Pecos, and Fort Stockton. Mexico’s borderlands communities – Juarez and Ojinaga – and Parque Nacional Cañon de Santa Elena and Parque Nacional Maderas Del Carmen, across the river from Big Bend, are also important influences in this ecoregion. **Figure 1** illustrates the location and extent of this ecoregion in Texas. **Table 3** documents the EDUs and HUC 8s, Ecologically Significant Stream Segments, and mapped reservoirs which occur in this area. **Figure 2** shows those EDUs, stream segments and reservoirs by ecoregion.

³ TPWD. 2002/2005. *Ecologically Significant Stream Segments*.
http://www.tpwd.state.tx.us/landwater/water/environconcerns/water_quality/sigsegs/

Table 1. Crosswalk of CHIH-AZNM Ecoregion with Other Conservation Plan Units

Note Table is formatted 8-1/2" x 11" landscape orientation; see also Ecoregions map on TCAP 2011 website.

2011 TCAP	2005 TXWAP Gould 1960	The Nature Conservancy Terrestrial Ecoregions 1999	Ecological Drainage Units (Watersheds) National Fish Habitat Action Plan <i>TX = Southeast Aquatic Resources Partnership and Desert Fish Habitat Partnership</i> AFWA 2006 Fish Habitat Partnership 2009 Esselman et.al. 2010	All Bird Joint Ventures (JV) and Bird Conservation Regions (BCR) NABSCI-US 2004, USFWS 2009a	Landscape Conservation Cooperatives (LCC) USFWS 2009b	2010 TPWD Land & Water Plan Strategic Regions TPWD 2010	Major Land Resource Regions and Areas (MLRA) NRCS 2006	Natural Regions of Texas LBJ School of Public Policy 1978
Chihuahuan Desert (CHIH) and Arizona/New Mexico Mountains (AZNM)	Trans-Pecos	Chihuahuan Desert (24) and Arizona – New Mexico Mountains (21)	Lower Pecos River Middle Rio Grande/Bravo Lower Rio Grande/Bravo	Rio Grande JV Chihuahuan Desert BCR	Desert	Trans Pecos – Rio Grande (1)	Western Range and Irrigated Region: <i>Southern Desertic Basins, Plains and Mountains (42)</i> Western Great Plains Range and Irrigated Region: <i>Central New Mexico Highlands (70C)</i> Central Great Plains Winter Wheat and Range Region: <i>Southern High Plains Southwest (77D)</i> Southwest Plateaus and Plains Range and Cotton Region: <i>Edwards Plateau Western Part (81A), Southern Edwards Plateau (81D), Western Rio Grande Plain (83B)</i>	Trans Pecos

Figure 1. Ecoregions with County Boundaries

Chihuahuan Deserts in brown, Arizona – New Mexico Mountains in yellow

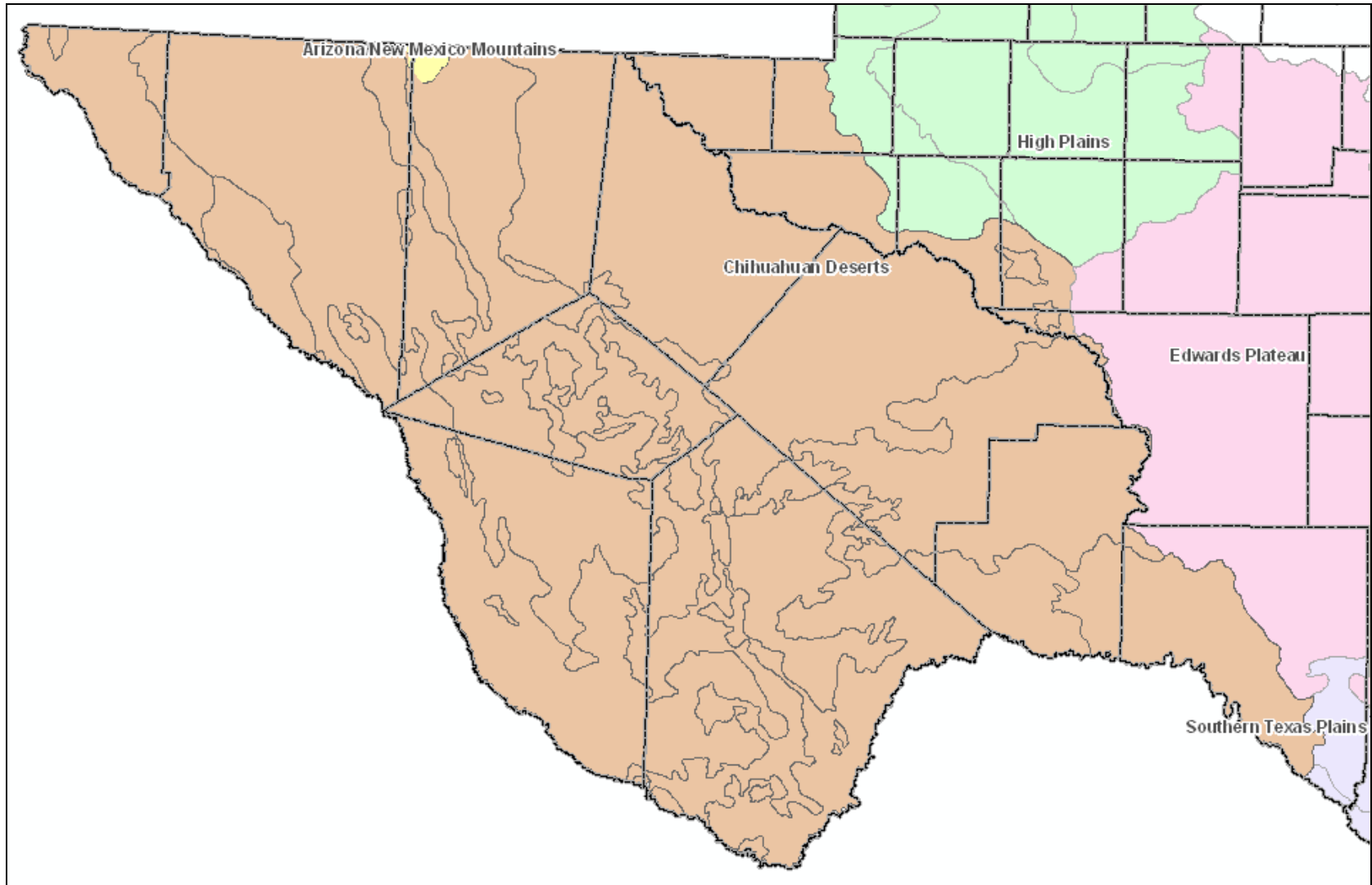


Table 2. AZNM EDUs with Ecologically Significant Stream Segments and Reservoirs

ECOLOGICAL DRAINAGE UNIT SubBasin (HUC 8)	<i>Ecologically Significant Stream Segment TPWD 2002, w/updates 2005</i>	Lakes and Reservoirs
LOWER PECOS		
Upper Pecos - Black	na	na
Delaware	na	na
MIDDLE RIO GRANDE/BRAVO		
Salt Basin	na	na

Note: there are significant aquatic resources in this ecoregion and they are discussed in the Priority Habitats section. This table simply indicates that there are no segments identified in the TPWD 2002/2005 ESSS process for this ecoregion, primarily because most of the region lies within the boundaries of the Guadalupe Mountains National Park.

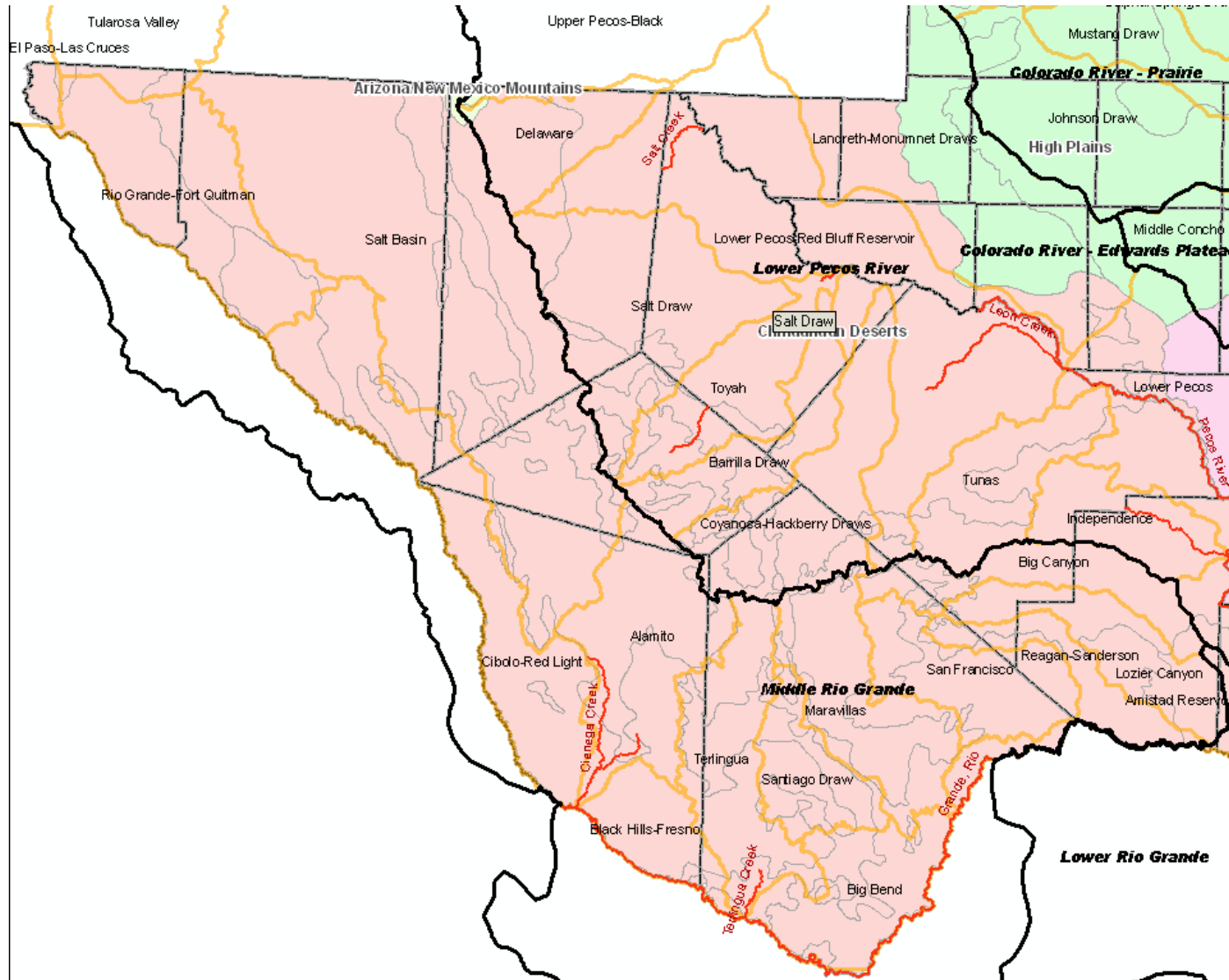
Table 3. CHIH EDUs with Ecologically Significant Stream Segments and Reservoirs

ECOLOGICAL DRAINAGE UNIT SubBasin (HUC 8)	<i>Ecologically Significant Stream Segment TPWD 2002, w/updates 2005</i>	Lakes and Reservoirs
LOWER PECOS		
Upper Pecos - Black		
Delaware		
Lower Pecos	Pecos River	
Lower Pecos - Red Bluff Reservoir	Salt Creek, Leon Creek, Comanche Creek	Red Bluff Reservoir
Salt Draw		
Toyah	Toyah Creek, Madera Canyon	Lake Balmorhea
Barilla		
Coyanosa - Hackberry Draws		
Tunas		
Independence Creek	Independence Creek	
Howard Draw	Pecos River	
Landreth-Monument Draws		
MIDDLE RIO GRANDE/BRAVO		
Salt Basin		
El Paso - Las Cruces		
Tularosa Valley		
Rio Grande - Fort Quitman		
Cibolo - Red Light		
Alamito	Cienega Creek, Alamito Creek, Rio Grande/Bravo	
Terlingua	Rio Grande/Bravo	
Blackhills - Fresno	Rio Grande/Bravo	
Santiago		
Big Bend	Terlingua Creek, Rio Grande/Bravo	
Maravillas	Rio Grande/Bravo	
San Francisco		
Reagan - Sanderson	Rio Grande/Bravo	
Lozier Canyon		
Big Canyon		
LOWER RIO GRANDE/BRAVO		
Amistad Reservoir		Amistad Reservoir
Lower Devils		Amistad Reservoir

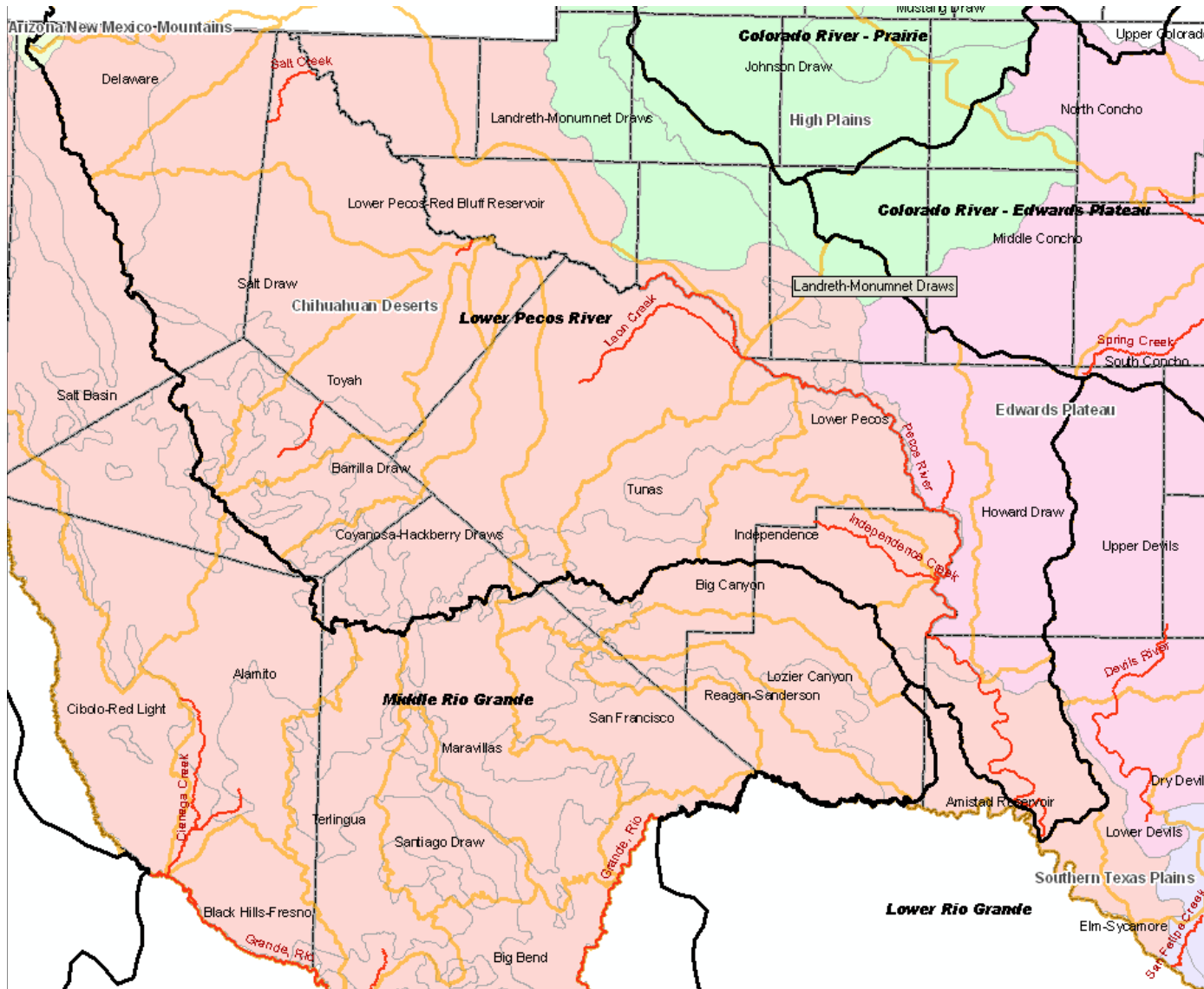
Note: Ecologically Significant Stream Segments and Reservoirs which occur in the Subbasin (HUC 8) but not in the ECOREGION are not included in this table.

Figure 2. EDUs, HUC 8s, and ESSS

Middle Rio Grande EDU boundary in black, HUC 8 boundaries in orange, ESSS in red



Lower Pecos, Lower Rio Grande EDU boundary in black, HUC 8 boundaries in orange, ESSS in red



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

CHIH – AZNM RARE SPECIES AND COMMUNITIES

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

For more information about how the SGCN and Rare Communities lists were developed, including the changes from the 2005 list, see the [Overview Handbook](#). Species and rare communities included in the [2011 TCAP Final SGCN](#) and [Rare Communities](#) lists are supported by current science, peer-reviewed references and/or other dependable, accessible source documentation, and expert opinion. The revised lists for TCAP 2011 are substantial and representative of conservation targets needing attention in this Plan and are sorted into the following categories:

Mammals	Birds
Reptiles and Amphibians	Freshwater Fishes
Invertebrates	Plants
Plant Communities	

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

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

Table 4. CHIH – AZNM Species of Greatest Conservation Need (SGCN)

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

More information is available in the SGCN table online.

Scientific Name	Common Name	Status		Abundance Ranking	
		Federal	State	Global	State
MAMMALS					
<i>Ammospermophilus interpres</i>	Texas antelope squirrel			G4G5	S4
<i>Antilocapra americana</i>	Pronghorn			G5	S3
<i>Antrozous pallidus</i>	Pallid bat			G5	S5
<i>Chaetodipus eremicus</i>	Chihuahuan Desert pocket mouse			G5	S5
<i>Chaetodipus nelsoni</i>	Nelson's pocket mouse			G5	S?
<i>Conepatus leuconotus</i>	Hog-nosed skunk			G5	S4
<i>Corynorhinus townsendii</i>	Townsend's big-eared bat			G4T4	S3? S4?
<i>Cynomys ludovicianus</i>	Black-tailed prairie dog			G5T3	S3
<i>Dipodomys spectabilis</i>	Banner-tailed kangaroo rat			G5	S4
<i>Eptesicus fuscus</i>	Big brown bat			G5	S5
<i>Euderma maculatum</i>	Spotted bat		T	G4	S2
<i>Eumops perotis californicus</i>	Greater western bonneted bat			G5T4	S3
<i>Geomys aurearius</i>	Desert pocket gopher			G3	S2
<i>Lasiurus xanthinus</i>	Western yellow bat			G5	S1
<i>Leopardus pardalis</i>	Ocelot	LE	E	G4	S1
<i>Leptonycteris nivalis</i>	Mexican/Greater longnosed bat	LE	E	G3	S1
<i>Mephitis macroura</i>	Hooded skunk			G5	S4
<i>Microtus mogollonensis</i>	Mogollon vole			G4G5Q	SNR
<i>Mormoops megalophylla</i>	Ghost-faced bat			G4	S2
<i>Mustela frenata</i>	Long-tailed weasel			G5	S5
<i>Mustela nigripes</i>	Black-footed ferret	LE		G1	SH
<i>Myotis californicus</i>	California myotis			G5	S4
<i>Myotis ciliolabrum</i>	Western small-footed myotis			G5	S3
<i>Myotis velifer</i>	Cave myotis			G5	S4
<i>Myotis volans</i>	Long-legged myotis			G5	S4
<i>Myotis yumanensis</i>	Yuma myotis			G5	S4
<i>Myotis thysanodes</i>	Fringed myotis			G5	S3
<i>Nasua narica</i>	White-nosed coati		T	G5	S2?
<i>Notisorex crawfordii</i>	Desert shrew			G5	S4
<i>Nyctinomops femorosaccus</i>	Pocketed free-tailed bat			G4	S3

Scientific Name	Common Name	Status		Abundance Ranking	
		Federal	State	Global	State
<i>Nyctinomops macrotis</i>	Big free-tailed bat			G5	S3
<i>Onychomys arenicola</i>	Mearn's grasshopper mouse			G4G5	S4S5
<i>Panthera onca</i>	Jaguar	LE	E	G3	SH
<i>Parastrellus hesperus</i>	Canyon Bat (western pipistrelle)			G5	S5
<i>Perimyotis subflavus</i>	Tricolored Bat (eastern pipistrelle)			G5	S5
<i>Peromyscus nasutus</i>	Northern rock mouse			G5	S4
<i>Puma concolor</i>	Mountain lion			G5	S2
<i>Scalopus aquaticus texanus</i>	Presidio mole			G5T1Q	S1
<i>Sigmodon fulviventor dalquesti</i>	Tawny-bellied cotton rat			G5	S1
<i>Spilogale gracilis</i>	Western spotted skunk			G5	S5
<i>Sylvilagus robustus</i>	Davis Mountain cottontail			G5TU	S3
<i>Tadarida brasiliensis</i>	Brazilian free-tailed bat			G5	S5
<i>Tamias canipes</i>	Gray-footed chipmunk			G3	S2S3
<i>Taxidea taxus</i>	American badger			G5	S5
<i>Thomomys bottae guadalupensis</i>	Southern pocket gopher			G5T2	S2
<i>Thomomys bottae limpia</i>	Limpia southern pocket gopher			G5T2	S2
<i>Thomomys bottae texensis</i>	Limpia Creek pocket gopher			G5T2	S2
<i>Ursus americanus</i>	Black bear	SAT	T	G5	S3
<i>Vulpes velox</i>	Swift fox			G3	S3?
BIRDS					
<i>Callipepla squamata</i>	Scaled Quail			G5	S4B
<i>Colinus virginianus</i>	Northern Bobwhite			G5	S4B
<i>Cyrtonyx montezumae</i>	Montezuma Quail			G4G5	S3B
<i>Meleagris gallopavo</i>	Wild Turkey			G5	S5B
<i>Circus cyaneus</i>	Northern Harrier			G5	S2B,S3N
<i>Buteogallus anthracinus</i>	Common Black-Hawk		T	G4G5	S2B
<i>Parabuteo unicinctus</i>	Harris's Hawk			G5	S3B
<i>Buteo nitidus</i>	Gray Hawk		T	G5	S2B
<i>Buteo swainsoni</i>	Swainson's Hawk			G5	S4B
<i>Buteo albonotatus</i>	Zone-tailed Hawk		T	G4	S3B
<i>Buteo regalis</i>	Ferruginous Hawk			G4	S2B,S4N
<i>Aquila chrysaetos</i>	Golden Eagle			G5	S3B
<i>Falco sparverius</i>	American Kestrel			G5	S4B
<i>Falco femoralis</i>	Aplomado Falcon	E	E	G4	S1

Scientific Name	Common Name	Status		Abundance Ranking	
		Federal	State	Global	State
<i>Falco peregrinus</i>	Peregrine Falcon	LT	T	G4	S3
<i>Charadrius alexandrinus</i>	Snowy Plover			G4	S3B
<i>Charadrius montanus</i>	Mountain Plover	PT		G3	S2
<i>Numenius americanus</i>	Long-billed Curlew			G5	S3B,S5N
<i>Coccyzus americanus occidentalis</i>	Yellow-billed Cuckoo (western)	C		G5	S4S5B
<i>Athene cunicularia</i>	Burrowing Owl			G4	S3B
<i>Strix occidentalis</i>	Spotted Owl	LT	T	G3T3	S1B
<i>Tyrannus forficatus</i>	Scissor-tailed Flycatcher			G5	S3B
<i>Lanius ludovicianus</i>	Loggerhead Shrike			G4	S4B
<i>Vireo bellii</i>	Bell's Vireo			G5	S3B
<i>Vireo atricapilla</i>	Black-capped Vireo	LE	E	G3	S2B
<i>Vermivora crissalis</i>	Colima Warbler			G3G4	S3B
<i>Parula pitiayumi</i>	Tropical Parula		T	G5	S3B
<i>Aimophila cassinii</i>	Cassin's Sparrow			G5	S4B
<i>Aimophila ruficeps</i>	Rufous-crowned Sparrow			G5	S4B
<i>Ammodramus savannarum</i>	Grasshopper Sparrow			G5	S3B
<i>Chondestes grammacus</i>	Lark Sparrow			G5	S4B
<i>Ammodramus bairdii</i>	Baird's Sparrow			G4	S2
<i>Calcarius mccownii</i>	McCown's Longspur			G4	S4
<i>Piranga rubra</i>	Summer Tanager			G5	S5B
<i>Passerina ciris</i>	Painted Bunting			G5	S4B
<i>Sturnella magna</i>	Eastern Meadowlark			G5	S5B
<i>Icterus spurius</i>	Orchard Oriole			G5	S4B
REPTILES AND AMPHIBIANS					
<i>Anaxyrus (Bufo) woodhousii</i>	Woodhouse's toad			G5	SU
<i>Apalone spinifera</i>	spiny softshell turtle				
<i>Aspidoscelis dixonii</i>	Dixon's whiptail (gray checkered whiptail)				
<i>Cheylydra serpentina</i>	Common snapping turtle				
<i>Coleonyx reticulatus</i>	Reticulated gecko		T	G3	S3
<i>Crotalus atrox</i>	Western diamondback rattlesnake				S4
<i>Crotalus viridis</i>	Prairie rattlesnake				
<i>Gopherus berlandieri</i>	Texas tortoise		T	G4	S2*
<i>Heterodon nasicus</i>	Western hognosed snake				
<i>Kinosternon hirtipes murrayi</i>	Chihuahuan mudturtle		T	G3T3	S1
<i>Phrynosoma cornutum</i>	Texas horned lizard		T	G4G5	S4

Scientific Name	Common Name	Status		Abundance Ranking	
		Federal	State	Global	State
<i>Phrynosoma hernandesi</i>	Mountain shorthorned lizard		T	G5	S3
<i>Pseudemys gorzugi</i>	Rio Grande cooter				S2
<i>Sistrurus catenatus</i>	massasagua				
<i>Tantilla cucullata</i>	Big Bend blackheaded snake		T	G4	S2
<i>Terrapene ornata</i>	Ornate box turtle			G5	S3
<i>Trachemys gaigeae</i>	Big Bend slider				
<i>Trachemys scripta</i>	Red-eared slider				
<i>Trimorphodon vilkinsonii</i>	Chihuahuan Desert Lyre Snake		T	G4	S3*
FRESHWATER FISHES					
<i>Anguilla rostrata</i>	American eel			G4	S5
<i>Atractosteus spatula</i>	alligator gar				
<i>Campostoma ornatum</i>	Mexican stoneroller		T	G3	S1
<i>Cycleptus sp.</i>	(na)				
<i>Cyprinella proserpina</i>	Proserpine shiner		T	G3	S2
<i>Cyprinodon bovinus</i>	Leon Springs pupfish	LE	E	G1	S1
<i>Cyprinodon elegans</i>	Comanche Springs pupfish	LE	E	G1	S1
<i>Cyprinodon eximius</i>	Conchos pupfish		T	G3G4	S1
<i>Cyprinodon eximius ssp</i>	Devils River pupfish				
<i>Cyprinodon pecosensis</i>	Pecos pupfish		T	G1	S1
<i>Dionda argentosa</i>	Manantial roundnose minnow			G2	S2
<i>Dionda diaboli</i>	Devils River minnow	LT	T	G1	S1
<i>Dionda episcopa</i>	Roundnose minnow				
<i>Etheostoma grahami</i>	Rio Grande darter		T	G2G3	S2
<i>Gambusia gaigei</i>	Big Bend gambusia	LE	E	G1	S1
<i>Gambusia nobilis</i>	Pecos gambusia	LE	E	G2	S2
<i>Gambusia senilis</i>	Blotched gambusia		T	G3G4	SX
<i>Gila pandora</i>	Rio Grande chub		T	G3	S1
<i>Hybognathus amarus</i>	Rio Grande silvery minnow	LE	E	G1G2	SX
<i>Ictalurus lupus</i>	Headwater catfish			G3	S2
<i>Ictalurus sp.</i>	Chihuahua catfish				
<i>Macrhybopsis aestivalis</i>	Speckled chub				
<i>Moxostoma austrinum</i>	Mexican redhorse				
<i>Notropis braytoni</i>	Tamaulipas shiner				
<i>Notropis chihuahua</i>	Chihuahua shiner		T	G3	S2
<i>Notropis jemezianus</i>	Rio Grande shiner				

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<i>Notropis simus pecosensis</i>	Pecos bluntnose shiner		T	G2	SX
<i>Oncorhynchus clarki virginalis</i>	Rio Grande cutthroat trout				
<i>Rhinichthys cataractae</i>	Longnose dace				
INVERTEBRATES					
<i>Adhemarius blanchardorum</i>	Blanchard's sphinx			G1	S1
<i>Apodemia chisosensis</i>	Chisos metalmark			G1G2	S1?*
<i>Archeolarca guadalupensis</i>	A cave obligate pseudoscorpion			G1G2	S1
<i>Artesia welbourni</i>	A cave obligate amphipod			G1G2	S1?*
<i>Ashmunella bequaerti</i>	Goat Cave woodlandsnail			G1	S1*
<i>Ashmunella carlsbadensis</i>	Guadalupe woodlandsnail			G1	S1*
<i>Ashmunella edithae</i>	Mckittrick woodlandsnail			G1	S1*
<i>Ashmunella mudgei</i>	Sawtooth Mountain woodlandsnail			G1	S1*
<i>Ashmunella pasonis</i>	Franklin Mountain woodlandsnail			G2G3	S1?*
<i>Ashmunella sprouli</i>	Hell's Canyon woodlandsnail			G1G3	S2?*
<i>Assimineia pecos</i>	Pecos Assimineia	LE	E	G1	S1
<i>Austrotinodes texensis</i>	Texas Austrotinodes caddisfly			G2	S2
<i>Automeris zephyria</i>	Zephyr eyed silkmoth			G2G3	S1S3
<i>Bombus sonorus</i>	Sonoran bumblebee			GU	SU*
<i>Caenis arwini</i>	A mayfly			G1G3	S2?*
<i>Celotes limpia</i>	Scarce streaky-skipper			G2	S2?*
<i>Chitrella major</i>	A cave obligate pseudoscorpion			G1G2	S1*
<i>Cibolacris samalayuca</i>	A grasshopper			G2?	S2?*
<i>Cicindela fulgoris albilata</i>	Glittering tiger beetle			G4T3T4	S2*
<i>Cicindela nevadica olmosa</i>	Los Olmos tiger beetle			G5T2	S2*
<i>Cicindela togata "playa"</i>	White-cloaked tiger beetle			G5T4	S2*
<i>Cochliopa texana</i>	Phantom Cave snail	C		G1Q	S1Q*
<i>Dichopetala oreoeca</i>	A katydid			G2?*	S2?*
<i>Dinocheirus cavicolus</i>	A cave obligate pseudoscorpion			G2G3	S2*
<i>Diplocentrus diablo</i>	A scorpion			G1G2*	S1?*
<i>Eidmannella bullata</i>	A cave obligate spider			G1G2	S1*
<i>Eidmannella delicata</i>	A cave obligate spider			G1G2	S1*
<i>Eidmannella nastuta</i>	A cave obligate spider			G1G2	S1*
<i>Eidmannella reclusa</i>	A cave obligate spider			G1G2	S1*

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<i>Eidmennella tuckeri</i>	A cave obligate spider			G1G2	S1*
<i>Elimia comalensis</i>	Balcones Elimia			G2	S2?*
<i>Ereboporus naturaconservatus</i>	Nature Conservancy diving beetle			G1G2 *	S1*
<i>Euphoria casselberryi</i>	A scarab beetle			G1*	S1*
<i>Farrodes mexicanus</i>	A mayfly			G1G2	S1?*
<i>Gammarus hyalelloides</i>	Diminutive amphipod	C		G1	S1
<i>Gammarus pecos</i>	Pecos amphipod			G1	S1
<i>Heterelmis sp.</i>	Caroline Springs riffle beetle			G1*	S1*
<i>Heterelmis sp.</i>	Devils River Springs riffle beetle			G1*	S1*
<i>Holospira hamiltoni</i>	Hamilton Holospira			G1	S1*
<i>Holospira mesolia</i>	Widemouth Holospira			G1	S1*
<i>Holospira oritis</i>	Mountain Holospira			G1	S1*
<i>Holospira pityis</i>	Pinecone Holospira			G1	S1*
<i>Holospira riograndensis</i>	Rio Grand Holospira			G1	S1*
<i>Holospira yucatanensis</i>	Bartsch Holospira			G1	S1*
<i>Humboldtiana agavofolia</i>	Agave threeband			G1	S1*
<i>Humboldtiana cheatumi</i>	Davis Mountain threeband			G2	S2
<i>Humboldtiana chisoensis</i>	Chisos threeband			G1	S1
<i>Humboldtiana edithae</i>	Boulder slide threeband			G1	S1*
<i>Humboldtiana ferrissiana</i>	Mitre Peak threeband			G2	S2
<i>Humboldtiana fullingtoni</i>	Capote threeband			G1	S1*
<i>Humboldtiana palmeri</i>	Mt. Livermore threeband			G2	S2
<i>Humboldtiana texana</i>	Stockton Plateau threeband			G2	S2
<i>Humboldtiana ultima</i>	Northern threeband			G2	S2
<i>Isoperla jewetti</i>	Grande stripetail			G1	S1*
<i>Latineosus cibola</i>	A mayfly			G1G2	S1?*
<i>Limnephilus adapus</i>	A caddisfly			G1	S1*
<i>Lirceolus cocytus</i>	A cave obligate isopod			G1 *	S1*
<i>Lirceolus nidulus</i>	A cave obligate isopod			G1*	S1*
<i>Neocyloepus boeseli</i>	Texas minute moss beetle			G1G2*	S1*
<i>Neotrichia sonora</i>	A caddisfly			G1	S1*
<i>Ochrotrichia capitana</i>	A caddisfly			G1G3	S2?*
<i>Ochrotrichia guadalupensis</i>	A caddisfly			G1G2	S1?*
<i>Paracyrtophyllus excelsus</i>	A katydid			G1*	S1*
<i>Paruroctonus williamsi</i>	A scorpion			G1*	S1*

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<i>Phallocryptus sublettei</i>	Salt playa fairy shrimp			G2	S1*
<i>Phreatodrobia coronae</i>	A cavesnail			G1G2	S1*
<i>Piruna haferniki</i>	Chisos skipperling			G1G3	S1?
<i>Pogonomyrmex bigbendensis</i>	Big Bend harvester ant			G1G3*	S2?*
<i>Popenaias popeii</i>	Texas hornshell	C	T	G1	S1
<i>Potamilus metnecktayi</i>	Salina mucket		T	G1	S1
<i>Protophila balmorhea</i>	Balmorhea saddle-case caddisfly			G2	S1
<i>Pseudosubulina cheatumi</i>	Chisos foxsnail			G1	S1*
<i>Pseudotryonia adamantina</i>	Diamond Y Spring Snail	C		G1	S1
<i>Pyrgulopsis davisii</i>	Limpia Creek spring snail			G1	S1
<i>Pyrgulopsis metcalfi</i>	Naegele spring snail			G1	S1
<i>Quadrula mitchelli</i>	False Spike		T	GH	SH
<i>Radiocentrum ferrissi</i>	Fringed mountainsnail			G1	S1*
<i>Satyrium polingi</i>	Poling's hairstreak			G2	S1
<i>Seborgia hershleri</i>	A cave obligate amphipod			G1G2	S1?*
<i>Sonorella huecoensis</i>	Hueco Mountains talussnail			G1G2	S1?*
<i>Sonorella metcalfi</i>	Franklin Mountain talussnail			G2	S1
<i>Sphinx eremitoides</i>	Sage sphinx			G1G2	S1?*
<i>Stictotarsus neomexicanus</i>	Bonita diving beetle			G2	S1
<i>Stygobromus n. sp.</i>	Big Bend Cave amphipod			G1G2*	S1*
<i>Stygobromus n. sp.</i>	Independence Cave amphipod			G1G2*	S1*
<i>Texaponium triplehorni</i>	A darkling beetle			G1*	S1*
<i>Thambopasta howdeni</i>	An antlike flower beetle			G1*	S1*
<i>Truncilla cognata</i>	Mexican fawnsfoot		T	G1Q	S1*
<i>Tryonia brunei</i>	Brune Spring snail			G1	S1
<i>Tryonia cheatumi</i>	Phantom Cave Spring Tryonia	C		G1	S1
<i>Tryonia circumstriata</i>	Gonzales spring snail	C		G1	S1
<i>Vaejovis chisos</i>	A scorpion			G1*	S1*
<i>Wormaldia arizonensis</i>	A caddisfly			G2G3	S2?*
PLANTS					
<i>Escobaria guadalupensis</i>	Guadalupe Mountains pincushion cactus			G1	S1
<i>Festuca ligulata</i>	Guadalupe Mountains fescue	C		G1	S1
<i>Achnatherum curvifolium</i>	Guadalupe needlegrass			G3	S2
<i>Acleisanthes acutifolia</i>	Havard trumpets			G3	S1

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<i>Acleisanthes wrightii</i>	Wright's trumpets			G2	S2
<i>Agalinis calycina</i>	Leoncita false foxglove			G1	S1
<i>Agave glomeruliflora</i>	Chisos agave			G2Q	S2
<i>Allolepis texana</i>	Texas false saltgrass			G2	S1
<i>Amsonia tharpii</i>	Tharp's blue-star			G1	S1
<i>Andrachne arida</i>	Trans-Pecos maidenbush			G2	S1
<i>Anulocaulis leiosolenus</i> var. <i>lasianthus</i>	Chihuahuan Ringstem			G4T3	S2
<i>Anulocaulis reflexus</i>	Ojinaga ringstem			G2	S1
<i>Aquilegia chrysantha</i> var. <i>chaplinaei</i>	Guadalupe Mountains columbine			G4T2	S2
<i>Aquilegia chrysantha</i> var. <i>hinckleyana</i>	Hinckley's columbine			G4T1	S1
<i>Aquilegia longissima</i>	long-spurred columbine			G3	S2
<i>Arenaria livermorensis</i>	Livermore sandwort			G1	S1
<i>Arida blepharophylla</i>	gypsum hot spring aster			G1	S1
<i>Arida mattturneri</i>	Matt Turner's aster			G1	S1
<i>Astragalus gypsodes</i>	gyp locoweed			G2	S2
<i>Astragalus mollissimus</i> var. <i>coryi</i>	Cory's woolly locoweed			G5T3	S3
<i>Astragalus mollissimus</i> var. <i>marcidus</i>	withered woolly loco			G5T2	S2
<i>Astragalus waterfallii</i>	Waterfall's milkvetch			G3	S3
<i>Astragalus wrightii</i>	Wright's milkvetch			G3	S3
<i>Batesimalva violacea</i>	purple gay-mallow			G2	S1
<i>Blepharidachne bigelovii</i>	Bigelow's desert grass			G3	S3
<i>Bonamia ovalifolia</i>	bigpod bonamia			G1	S1
<i>Bonamia repens</i>	creeping petrogenia			G3	S2
<i>Bouteloua kayi</i>	Kay's grama			G1	S1
<i>Brickellia baccharidea</i>	resin-leaf brickellbush			G3	S1
<i>Brickellia hinckleyi</i> var. <i>hinckleyi</i>	Hinckley's brickellbush			G2T2	S2
<i>Brickellia hinckleyi</i> var. <i>terlinguensis</i>	Terlingua brickellbush			G2TH	SH
<i>Brickellia parvula</i>	Mt. Davis brickellbush			G3	S1
<i>Brongniartia minutifolia</i>	little-leaf brongniartia			G2	S1
<i>Cardamine macrocarpa</i> var. <i>texana</i>	Texas largeseed bittercress			G3T2	S2
<i>Carex mckittrickensis</i>	Guadalupe Mountains sedge			G1	S1
<i>Centaureum blumbergianum</i>	Blumberg's centaury			G1	S1

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<i>Chaetopappa hersheyi</i>	mat lestdaisy			G3	S2
<i>Chaetopappa parryi</i>	Parry's lestdaisy			G3	S1
<i>Chamaesyce astyla</i>	alkali spurge			G2	S1
<i>Chamaesyce chaetocalyx</i> <i>var. triligulata</i>	three-tongue spurge			G5T1	S1
<i>Chamaesyce geyeri</i> <i>var.</i> <i>wheeleriana</i>	Wheeler's spurge			G5T2	S1
<i>Chamaesyce golondrina</i>	swallow spurge			G2	S2
<i>Chamaesyce jejuna</i>	dwarf broomspurge			G2	S2
<i>Chamaesyce perennans</i>	perennial broomspurge			G3	S3
<i>Chamaesyce polycarpa</i> <i>var.</i> <i>simulans</i>	Big Bend spurge			G5T3	S3
<i>Chrysothamnus spathulatus</i>	Douglas rabbitbrush			G3	S2
<i>Cirsium turneri</i>	cliff thistle			G3	S3
<i>Cleome multicaulis</i>	manystem spiderflower			G2G3	S1
<i>Cleomella longipes</i>	stalked rhombopod			G3G4	S3
<i>Colubrina stricta</i>	Comal snakewood			G2	S1
<i>Coryphantha ramillosa</i> <i>ssp.</i> <i>ramillosa</i>	bunched cory cactus	LT	T	G2G3T2T3	S2S3
<i>Coryphantha robustispina</i> <i>subsp. uncinata</i>	Scheer's cory cactus			G4T3	S3
<i>Crataegus turnerorum</i>	Turners' hawthorn			G3Q	S3
<i>Croton pottsii</i> <i>var.</i> <i>thermophilus</i>	leatherweed croton			G5T2	S1
<i>Croton suaveolens</i>	scented croton			G3	S2
<i>Cryptantha crassipes</i>	Terlingua Creek cat's-eye	LE	E	G1	S1
<i>Cryptantha paysonii</i>	Payson's hiddenflower			G3	S1
<i>Cyperus onerosus</i>	dune umbrella-sedge			G2	S2
<i>Dalea bartonii</i>	Cox's dalea			G1	S1
<i>Draba standleyi</i>	Standley's draba			G2G3	S1
<i>Echinocereus chisoensis</i> <i>var.</i> <i>chisoensis</i>	Chisos Mountains hedgehog cactus	LT	T	G2T1	S1
<i>Echinocereus chloranthus</i> <i>var. neocapillus</i>	golden-spine hedgehog cactus			G4T1	S1
<i>Echinocereus coccineus</i> <i>var.</i> <i>paucispinus</i>	Texas claret-cup cactus			G5T3	S3
<i>Echinocereus davisii</i>	Davis' green pitaya	LE	E	G1	S1
<i>Echinocereus viridiflorus</i> <i>var.</i> <i>canus</i>	graybeard cactus			G5T1	S1
<i>Echinocereus viridiflorus</i> <i>var.</i> <i>correllii</i>	Correll's green pitaya			G5T2	S2
<i>Emorya suaveolens</i>	Emory-bush			G3	S3

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<i>Encelia scaposa</i>	one-head encelia			G3	S2
<i>Ephedra coryi</i>	Cory's ephedra			G3	S3
<i>Ephedra torreyana</i> var. <i>powelliorum</i>	Powells' joint-fir			G5T2	S1
<i>Epithelantha bokei</i>	Boke's button cactus			G3	S3
<i>Ericameria nauseosa</i> var. <i>texensis</i>	Guadalupe Mountains rabbitbrush			G5T2	S1
<i>Eriogonum hemipterum</i> var. <i>hemipterum</i>	Chisos Mountains wild- buckwheat			G4T3	S2
<i>Eriogonum nealleyi</i>	Irion County wild-buckwheat			G2	S2
<i>Eriogonum suffruticosum</i>	bushy wild-buckwheat			G2	S2
<i>Escobaria albicolumnaria</i>	white column cactus			G2G3	S2S3
<i>Escobaria dasyacantha</i> var. <i>chaffeyi</i>	Chaffey's cory cactus			G3T2	S1
<i>Escobaria dasyacantha</i> var. <i>dasyacantha</i>	dense cory cactus			G3T3	S3
<i>Escobaria dasyacantha</i> var. <i>duncanii</i>	Duncan's cory cactus			G3T1T2	S1S2
<i>Escobaria hesteri</i>	Hester's cory cactus			G2	S2
<i>Escobaria minima</i>	Nellie's cory cactus	LE	E	G1	S1
<i>Escobaria sneedii</i> var. <i>sneedii</i>	Sneed's pincushion cactus	LE	E	G2T2	S2
<i>Euphorbia peplidion</i>	low spurge			G3	S3
<i>Eurytaenia hinckleyi</i>	Hinckley's spreadwing			G3	S3
<i>Eysenhardtia spinosa</i>	spiny kidney-wood			G2	S2
<i>Fendlera rigida</i>	stiff fendlerbush			G3	S1
<i>Flyriella parryi</i>	Shinner's brickellbush			G3	S3
<i>Fraxinus papillosa</i>	Chihuahua Ash			G3	S1
<i>Fryxellia pygmaea</i>	small Fryxell-wort			G1	SH
<i>Galium correllii</i>	cliff bedstraw			G2	S1
<i>Gaura boquillensis</i>	Boquillas lizardtail			G3	S2
<i>Genistidium dumosum</i>	brush-pea			G1	S1
<i>Hedeoma apiculatum</i>	McKittrick pennyroyal			G3	S2
<i>Hedeoma molle</i>	hairy false pennyroyal			G3G4	S3S4
<i>Hedeoma pilosum</i>	old Blue pennyroyal			GH	SH
<i>Helianthus neglectus</i>	neglected sunflower			G3	S2
<i>Helianthus paradoxus</i>	Pecos sunflower	LT	T	G2	S1
<i>Hesperaloe funifera</i> subsp. <i>funifera</i>	Mexican hesperaloe			G3	S1
<i>Hesperaloe parviflora</i>	red yucca			G3	S3

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<i>Hexalectris nitida</i>	Glass Mountains coral-root			G3	S3
<i>Hexalectris revoluta</i>	Chisos coral-root			G1G2	S1
<i>Hexalectris warnockii</i>	Warnock's coral-root			G2G3	S2
<i>Hymenopappus biennis</i>	biennial woolywhite			G3G4	S2
<i>Hymenoxys vaseyi</i>	Vasey's bitterweed			G2	S1
<i>Ipomopsis havardii</i>	Havard's standing cypress			G3	S3
<i>Justicia warnockii</i>	Warnock's water-willow			G3	S3
<i>Justicia wrightii</i>	Wright's water-willow			G2	S1S2
<i>Kallstroemia perennans</i>	perennial caltrop			G1	S1
<i>Laennecia turnerorum</i>	Turner's horseweed			G1	S1
<i>Lechea mensalis</i>	Chisos pinweed			G1Q	S1
<i>Lepidospartum burgessii</i>	gypsum scalebroom			G2	S1
<i>Lycium puberulum</i> var. <i>berberioides</i>	silvery wolfberry			G4T3	S3
<i>Lycium texanum</i>	Texas wolf-berry			G2	S2
<i>Machaeranthera viscida</i>	sticky tansy aster			G2	S2
<i>Malacothrix stebbinsii</i>	Stebbin's desert dandelion			G3?	S1
<i>Malaxis wendtii</i>	Wendt's malaxis			G2	S1
<i>Mammillaria wrightii</i> subsp. <i>wrightii</i>	Wright's fishhook cactus			G4T3	S1
<i>Matelea atrostellata</i>	black corona milkvine			G1	S1
<i>Matelea edwardsensis</i>	Plateau milkvine			G3	S3
<i>Matelea sagittifolia</i>	arrowleaf milkvine			G3	S3
<i>Matelea texensis</i>	Texas milkvine			G1	S1
<i>Mimulus dentilobus</i>	fringed monkeyflower			G3	S1
<i>Mortonia sempervirens</i> var. <i>sempervirens</i>	smooth mortonia			G4G5T3	S3
<i>Muhlenbergia villiflora</i> var. <i>villosa</i>	villous muhly			G5T3	S2
<i>Nesaea longipes</i>	longstalk heimia			G2G3	S2
<i>Nissolia platycalyx</i>	broadsepal Nissolia			G3	S1
<i>Nolina arenicola</i>	sand sacahuiste			G2Q	S2
<i>Opuntia arenaria</i>	sand prickly-pear			G2	S2
<i>Opuntia aureispina</i>	golden-spine prickly-pear			G1	S1
<i>Opuntia imbricata</i> var. <i>argentea</i>	stlver cholla			G5T1	S1
<i>Osmorhiza bipatriata</i>	Livermore sweet-cicely			G1	S1
<i>Ostrya chisosensis</i>	Big Bend hop-hornbeam			G2	S1
<i>Paronychia wilkinsonii</i>	Wilkinson's whitlow-wort			G2	S2

Scientific Name	Common Name	Status		Abundance Ranking	
		Federal	State	Global	State
<i>Pediomelum pentaphyllum</i>	Chihuahua scurfpea			G1	SH
<i>Peniocereus greggii</i> var. <i>greggii</i>	desert night-blooming cereus			G3G4T2	S2
<i>Penstemon alamosensis</i>	Alamo beardtongue			G3	S1
<i>Penstemon cardinalis</i> ssp. <i>regalis</i>	royal red penstemon			G3T2	S2
<i>Penstemon wrightii</i>	Wright's beardtongue			G3G4	S3
<i>Perityle aglossa</i>	limestone rock-daisy			G3G4	S3
<i>Perityle angustifolia</i>	rayless rock-daisy			G3G4S3	S3S4
<i>Perityle bisetosa</i> var. <i>appressa</i>	apressed two-bristle rock-daisy			G2T2	S2
<i>Perityle bisetosa</i> var. <i>bisetosa</i>	two-bristle rock-daisy			G2T2	S2
<i>Perityle bisetosa</i> var. <i>scalaris</i>	stairstep two-bristle rock-daisy			G2T1	S1
<i>Perityle cinerea</i>	graylead rock-daisy			G2	S2
<i>Perityle dissecta</i>	slimlobe rock-daisy			G2	S2
<i>Perityle fosteri</i>	Foster's rock-daisy			G1	S1
<i>Perityle huecoensis</i>	Hueco rock-daisy			G1	S1
<i>Perityle lindheimeri</i> var. <i>halimifolia</i>	Devils River rock-daisy			G4T3Q	S3
<i>Perityle rupestris</i> var. <i>albiflora</i>	whiteflower leafy rock-daisy			G4T3	S3
<i>Perityle rupestris</i> var. <i>rupestris</i>	leafy rock-daisy			G4T3	S3
<i>Perityle vitreomontana</i>	Glass Mountains rock-daisy			G1	S1
<i>Perityle warnockii</i>	Warnock's rock-daisy			G1	S1
<i>Phacelia petiolata</i>	stalk-leaf phacelia			G2	S1
<i>Phanerophlebia umbonata</i>	Mexican holly-fern			G3	S1
<i>Philadelphus crinitus</i>	bearded mock-orange			G2Q	S1
<i>Phoradendron hawksworthii</i>	Hawksworth's mistletoe			G3	S3
<i>Phyllanthus ericoides</i>	heather leaf-flower			G2	S1
<i>Physaria mcvaughiana</i>	McVaugh's bladderpod			G3	S3
<i>Physaria valida</i>	strong bladderpod			G3	S1
<i>Pinaropappus parvus</i>	little rock lettuce			G3	S3
<i>Pinus arizonica</i> var. <i>stormiae</i>	pino real			G4T3	S1
<i>Poa strictiramea</i>	Big Bend bluegrass			G3	S1
<i>Polemonium pauciflorum</i> subsp. <i>hinckleyi</i>	Hinckley's Jacob's-ladder			G3T2Q	S1
<i>Polygala maravillasensis</i>	Maravillas milkwort			G2	S1
<i>Polygala palmeri</i>	Palmer's milkwort			G3	S2

Scientific Name	Common Name	Status		Abundance Ranking	
		Federal	State	Global	State
<i>Polygala rimulicola</i> var. <i>rimulicola</i>	rock crevice milkwort			G3T3	S2
<i>Potamogeton clystocarpus</i>	Little Aguja pondweed	LE	E	G1	S1
<i>Proboscidea sabulosa</i>	dune unicorn-plant			G3	S2
<i>Proboscidea spicata</i>	many-flowered unicorn-plant			G1	S1
<i>Prunus havardii</i>	Havard plum			G3	S3
<i>Pseudoclappia arenaria</i>	cienega false clappia-bush			G3	S3
<i>Pseudoclappia watsonii</i>	Watson's false clappia-bush			G1	S1
<i>Pseudocymopterus longiradiatus</i>	long-ray pseudocymopterus			G3	S3
<i>Pseudognaphalium arizonicum</i>	Arizona cudweed			G3G4	S3
<i>Quercus carmenensis</i>	Sierra del Carmen oak			G2	S1
<i>Quercus depressipes</i>	Mexican dwarf oak			G3	S1
<i>Quercus graciliformis</i>	Chisos oak			G1	S1
<i>Quercus hinckleyi</i>	Hinckley's oak	LT	T	G2	S2
<i>Quercus robusta</i>	robust oak			G1Q	S1
<i>Quercus tardifolia</i>	lateleaf oak			G1	S1
<i>Rorippa ramosa</i>	Durango yellow-cress			G2	S1
<i>Rosa stellata</i> subsp. <i>mirifica</i> var. <i>erlansoniae</i>	Erlanson's desert rose			G4T1	S1
<i>Salvia summa</i>	great sage			G3	S2
<i>Schizachyrium spadiceum</i>	honey false bluestem			G3?	S1
<i>Sclerocactus mariposensis</i>	Lloyd's mariposa cactus	LT	T	G2	S2
<i>Scutellaria laevis</i>	smooth-stem skullcap			G1	S1
<i>Sedum havardii</i>	Havard's stonecrop			G2	S2
<i>Selaginella viridissima</i>	green spikemoss			G2	S1
<i>Selinocarpus parvifolius</i>	littleleaf moonpod			G3	S3
<i>Senna orcuttii</i>	Orcutt's senna			G2	S2
<i>Senna ripleyana</i>	Ripley's senna			G1	SH
<i>Seymeria texana</i>	Texas seymeria			G3	S3
<i>Sibara grisea</i>	gray sibara			G3	S1
<i>Sicyos glaber</i>	smooth-bur cucumber			G3	S1
<i>Silene plankii</i>	Plank's catchfly			G3	S1
<i>Solanum davisense</i>	Davis Mountains horse-nettle			G3	S2
<i>Sophora gypsophila</i> var. <i>guadalupensis</i>	Guadalupe Mountains mescal bean			G1T1	S1
<i>Stanleya pinnata</i> var. <i>texana</i>	Texas golden prince's-plume			G5T1	S1
<i>Stenaria butterwickiae</i>	Mary's bluet			G1	S1

Scientific Name	Common Name	Status		Abundance Ranking	
		Federal	State	Global	State
<i>Stenaria mullerae</i> var. <i>pooleana</i>	Jackie's bluet			G1T1	S1
<i>Streptanthus carinatus</i> subsp. <i>carinatus</i>	lyreleaf twistflower			G4T3T4	S3
<i>Streptanthus cutleri</i>	Cutler's twistflower			G2	S2
<i>Streptanthus platycarpus</i>	broadpod twistflower			G3	S3
<i>Streptanthus sparsiflorus</i>	sparsely-flowered jewelflower			G2	S1
<i>Styrax platanifolius</i> subsp. <i>texanus</i>	Texas snowbells	LE	E	G3T1	S1
<i>Styrax platanifolius</i> subsp. <i>youngiae</i>	Young's snowbell			G3T1	S1
<i>Thelocactus bicolor</i> var. <i>flavidispinus</i>	straw-spine glory-of-Texas			G4T2	S2
<i>Thelypodium texanum</i>	Texas thelypody			G3	S3
<i>Tidestromia carnosa</i>	fleshy tidestromia			G3	S2
<i>Valeriana texana</i>	Guadalupe valerian			G3	S2
<i>Viola guadalupensis</i>	Guadalupe Mountains violet			G1	S1
<i>Xylorhiza wrightii</i>	Wright's machaeranthera			G3	S3
<i>Yeatesia platystegia</i>	Texas shrimp-plant			G3G4	S3S4
<i>Zanthoxylum parvum</i>	Shinners' tickle-tongue			G2	S2

Table 5. CHIH-AZNM Rare Communities

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

G_RANK	S_RANK	COMMON_NAME	GLOBAL_NAME	ECOLOGICAL_SYSTEM_NAME	KNOWN COUNTIES	Endemic	KNOWN PROTECTED AREAS
G2	S1	Bigtooth Maple - Chinkapin Oak Forest	Acer grandidentatum - Quercus muehlenbergii Forest	Ecological System: Rocky Mountain Bigtooth Maple Ravine Woodland System CES306.814	Culberson	Y	Guadalupe Mts NP (NPS)
G2	S2	Texas Madrone - Gray Oak - Alligator Juniper - Bigtooth Maple - Chinkapin Oak Forest	Arbutus xalapensis - Quercus grisea - Juniperus deppeana - Acer grandidentatum - Quercus muehlenbergii Forest	Ecological System: Madrean Lower Montane Pine-Oak Forest and Woodland System CES305.796	Culberson	Y	Guadalupe Mts NP (NPS)
G1G2	S1	Alderleaf Mountain-mahogany / New Mexico Muhly Shrubland	Cercocarpus montanus / Muhlenbergia pauciflora Shrubland	Ecological System: Rocky Mountain Lower Montane-Foothill Shrubland System CES306.822	Culberson	N	Guadalupe Mts NP (NPS)
G1G2	S1S2	Arizona Fescue - Pine-dropseed Herbaceous Vegetation	Festuca arizonica - Blepharoneuron tricholepis Herbaceous Vegetation	Ecological System: Southern Rocky Mountain Montane-Subalpine Grassland System CES306.824	Culberson	Y	Guadalupe Mts NP (NPS)
G2	S1	Bigtooth Maple - Chinkapin Oak Forest	Acer grandidentatum - Quercus muehlenbergii Forest	Ecological System: Rocky Mountain Bigtooth Maple Ravine Woodland System CES306.814	Brewster, Culberson, and Jeff Davis, Presidio-Sierra Vieja but may not include chinkapin, but does have 1 or more oak species	Y	Big Bend NP (NPS) & Guadalupe Mts NP (NPS)
G2	S2	Texas Madrone - Gray Oak - Alligator Juniper - Bigtooth Maple - Chinkapin Oak Forest	Arbutus xalapensis - Quercus grisea - Juniperus deppeana - Acer grandidentatum - Quercus muehlenbergii Forest	Ecological System: Madrean Lower Montane Pine-Oak Forest and Woodland System CES305.796	Brewster, Culberson, Jeff Davis, and Presidio	Y	Big Bend NP (NPS) & Guadalupe Mts NP (NPS)
G1G2	S1S2	New Mexico Saltbush / Fleshy Honeysweet Dwarf-shrubland	Atriplex obovata / Tidestromia carnosa Dwarf-shrubland	Ecological Systems: Chihuahuan Mixed Salt Desert Scrub System CES302.017 or Chihuahuan Gypsophilous Grassland and Steppe System CES302.732 or Inter-Mountain Basins Mixed Salt Desert Scrub System CES304.784	Brewster and Presidio	N	Big Bend NP (NPS)
G2	?	Cane Beardgrass Herbaceous Vegetation	Bothriochloa barbinodis Herbaceous Vegetation	Apacherian-Chihuahuan Semi-Desert Grassland and Steppe System CES302.735	Potentially in western Texas	N	No documented protected areas
G1G2	S1S2	Little Walnut / Jamaica Swamp Sawgrass Shrubland	Juglans microcarpa / Cladium mariscus ssp. jamaicense Shrubland	Ecological System: North American Warm Desert Wash System CES302.755	Brewster, Culberson, Presidio, and Terrell	Y	Big Bend NP (NPS), Big Bend Ranch SNA (TPWD), Guadalupe NP (NPS), and Independence Creek Preserve (TNC)
G2G3	S2S3	Juglans microcarpa / Sorghastrum nutans Shrubland	Juglans microcarpa / Sorghastrum nutans Shrubland	Ecological System: North American Warm Desert Wash System CES302.755	Brewster, Culberson, Jeff Davis, and Presidio	Y	Big Bend NP (NPS), Guadalupe Mts NP (NPS), Davis Mountains Preserve (TNC), and Davis Mountains State Park (TPWD)

G_RANK	S_RANK	COMMON_NAME	GLOBAL_NAME	ECOLOGICAL_SYSTEM_NAME	KNOWN COUNTIES	Endemic	KNOWN PROTECTED AREAS
G2	S1S2	Bull Muhly - Sideoats Grama Herbaceous Vegetation	Muhlenbergia emersleyi - Bouteloua curtipendula Herbaceous Vegetation	Ecological System: Apacherian-Chihuahuan Semi-Desert Grassland and Steppe System CES302.735	Brewster, Culberson, El Paso, Jeff Davis, Hudspeth, and Pecos Presidio	N	Big Bend NP (NPS), Davis Mts Preserve (TNC), Chinati Mts SNA (TPWD), Franklin Mts SP (TPWD), Guadalupe Mts NP (NPS), and Sierra Diablo WMA (TPWD)
G2G3	S2	Bulb Panicgrass - Common Wolf's-tail Herbaceous Vegetation	Panicum bulbosum - Lycurus phleoides Herbaceous Vegetation	Ecological System: North American Warm Desert Wash System CES302.755	Brewster, Culberson, El Paso, Jeff Davis, Hudspeth, and Pecos Presidio	N	Big Bend NP (NPS), Guadalupe Mt NP (NPS), Davis Mts Preserve (TNC), and Davis Mountains State Park (TPWD)
G2	S2	Mountain Tail-leaf Sparse Vegetation	Pericome caudata Sparse Vegetation	-	Brewster, Culberson, and Jeff Davis	Y	Davis Mts Preserve (TNC), Big Bend NP (NPS), and Guadalupe Mts (NPS)
G2	S2	Mexican Pinyon - Chisos Red Oak - Weeping Juniper / Royal Sage / Pinyon Speargrass Forest	Pinus cembroides - Quercus gravesii - Juniperus flaccida / Salvia regla / Piptochaetium fimbriatum Forest	Ecological System: Madrean Pinyon-Juniper Woodland System CES305.797	Brewster	N	Big Bend NP (NPS)
G2	S2	Mexican Pinyon - Gray Oak - Weeping Juniper / Royal Sage / Bull Muhly Woodland	Pinus cembroides - Quercus grisea - Juniperus flaccida / Salvia regla / Muhlenbergia emersleyi Woodland	Ecological System: Madrean Pinyon-Juniper Woodland System CES305.797	Brewster	N	Big Bend NP (NPS)
G2	S2	Mexican Pinyon - Gray Oak - Emory Oak / Velvetpod Mimosa / Blue Grama Woodland	Pinus cembroides - Quercus grisea - Quercus emoryi / Mimosa dysocarpa / Bouteloua gracilis Woodland	Ecological System: Madrean Pinyon-Juniper Woodland System CES305.797	Jeff Davis	Y	Davis Mountains Preserve (TNC) and Davis Mountains State Park (TPWD)
G2	S2	Mexican Pinyon - Gray Oak / Lechuguilla / Sideoats Grama Woodland	Pinus cembroides - Quercus grisea / Agave lechuguilla / Bouteloua curtipendula Woodland	Ecological System: Madrean Pinyon-Juniper Woodland System CES305.797	Brewster	N	Big Bend NP (NPS)
G2	S2	Mexican Pinyon - Gray Oak / Mountain Muhly - Pringle's Speargrass Woodland	Pinus cembroides - Quercus grisea / Muhlenbergia montana - Piptochaetium pringlei Woodland	Ecological System: Madrean Pinyon-Juniper Woodland System CES305.797	Jeff Davis	Y	Davis Mts Preserve (TNC) and Davis Mts State Park (TPWD)
G2	S2	Ponderosa Pine - Southwestern White Pine Forest	Pinus ponderosa - Pinus strobiformis Forest	Ecological System: Southern Rocky Mountain Ponderosa Pine Woodland System CES306.648	Culberson and Jeff Davis	Y	Guadalupe Mts NP (NPS) and Davis Mts Preserve (TNC)
G2	S1	Rio Grande Cottonwood / Yerba Mansa Forest	Populus deltoides ssp. wislizeni / Anemopsis californica Forest	-	El Paso	N	No documented protected areas
G2G3	S1	Rio Grande Cottonwood / Hoary Rosemarymint Forest	Populus deltoides ssp. wislizeni / Poliomintha incana Forest	-	Culberson and Hudspeth	N	No documented protected areas
G2G3	S1	Rio Grande Cottonwood / Little Bluestem Woodland	Populus deltoides ssp. wislizeni / Schizachyrium scoparium Woodland	-	Culberson and Hudspeth	N	No documented protected areas
G2G3	S1	Fremont Cottonwood - Velvet Ash Woodland	Populus fremontii - Fraxinus velutina Woodland	Ecological System: North American Warm Desert Riparian Woodland and Shrubland CES302.753	Brewster, Jeff Davis, and Presidio	N	Big Bend NP (NPS), Big Bend SNA (TPWD), Davis Mountains Preserve (TNC), and Davis Mountains State Park (TPWD)

G_RANK	S_RANK	COMMON_NAME	GLOBAL_NAME	ECOLOGICAL_SYSTEM_NAME	KNOWN COUNTIES	Endemic	KNOWN PROTECTED AREAS
G2	S1	Fremont Cottonwood - Goodding's Willow Woodland	Populus fremontii - Salix gooddingii Woodland	Ecological System: North American Warm Desert Riparian Woodland and Shrubland CES302.753	Brewster and Presidio	N	Big Bend NP (NPS) and Big Bend Ranch SNA (TPWD)
G2	S1	Douglas-fir / Netleaf Oak Forest	Pseudotsuga menziesii / Quercus rugosa Forest	Ecological System: Southern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest and Woodland CES305.798	Brewster and Culberson	N	Big Bend NP (NPS) and Guadalupe National Park (NPS)
G1G2	S1S2	Dwarf Oak - Green Sotol Shrubland	Quercus intricata - Dasyliirion leiophyllum Shrubland	Ecological System: Madrean Oriental Chaparral System CES302.031	Brewster	N	Big Bend NP (NPS)
G2	S2	Goodding's Willow - Velvet Ash Temporarily Flooded Woodland	Salix gooddingii - Fraxinus velutina Temporarily Flooded Woodland	Ecological System: North American Warm Desert Riparian Woodland and Shrubland CES302.753	Brewster and Presidio	N	Big Bend NP (NPS) and Big Bend Ranch SNA (TPWD)
G2	S2	Texas Bluestem Herbaceous Vegetation	Schizachyrium cirratum Herbaceous Vegetation	-	Brewster, Culberson, Hudspeth, Jeff Davis, and Presidio	Y	Big Bend NP (NPS), Guadalupe Mts NP (NPS), Davis Mountains Preserve (TNC), and Davis Mountains State Park (TPWD)
G1	S1	Indian grass - Yerba Mansa - Alkali Sacaton - Southern Goldenbush (Honey Mesquite)	Sorghastrum nutans - Anemopsis californica - Sporobolus airoides - Isocoma pluriflora - (Prosopis glandulosa)	-	Pecos and Presidio	Y	No documented protected areas
G2	S1S2	Big Sacaton - Vine-mesquite Tallgrass Prairie	Sporobolus wrightii - Panicum obtusum Herbaceous Vegetation	Ecological System: Chihuahuan-Sonoran Desert Bottomland and Swale Grassland System CES302.746	Culberson, El Paso, Hudspeth, Jeff Davis, Presidio, and Reeves	N	Big Bend Ranch SNA (TPWD) & Guadalupe Mts NP (NPS)
G2G3	S2S3	Fleshy Honeysweet - Orange Caltrop Sparse Vegetation	Tidestromia carnosa - Kallstroemia grandiflora Sparse Vegetation	Ecological Systems: Chihuahuan Mixed Salt Desert Scrub System CES302.017 or Chihuahuan Gypsophilous Grassland and Steppe System CES302.732 or Inter-Mountain Basins Mixed Salt Desert Scrub System CES304.784	Brewster and Presidio	N	Big Bend SNA (TPWD) & Big Bend NP (NPS)
G2G3	S2S3	Rough Tiquilia - Torrey's Yucca / Gyp Dropseed Dwarf-shrubland	Tiquilia hispidissima - Yucca torreyi / Sporobolus nealleyi Dwarf-shrubland	Ecological Systems: Chihuahuan Mixed Salt Desert Scrub System CES302.017 or Chihuahuan Gypsophilous Grassland and Steppe System CES302.732 or Inter-Mountain Basins Mixed Salt Desert Scrub System CES304.784	Culberson, Hudspeth, and Reeves	Y	No documented protected areas
G2	S2	Rough Tiquilia / Gypsum Grama - Gypsum Blazingstar Dwarf-shrubland	Tiquilia hispidissima / Bouteloua breviseta - Mentzelia humilis Dwarf-shrubland	Ecological Systems: Chihuahuan Mixed Salt Desert Scrub System CES302.017 or Chihuahuan Gypsophilous Grassland and Steppe System CES302.732 or Inter-Mountain Basins Mixed Salt Desert Scrub System CES304.784	Culberson, El Paso, Hudspeth, Jeff Davis, and Presidio	Y	Guadalupe Mts NP (NPS) & Gypsum Dunes Preserve (TNC)

G_RANK	S_RANK	COMMON_NAME	GLOBAL_NAME	ECOLOGICAL_SYSTEM_NAME	KNOWN COUNTIES	Endemic	KNOWN PROTECTED AREAS
G2G3	S2S3	Rough Tiquilia / Alkali Sacaton Dwarf-shrubland	Tiquilia hispidissima / Sporobolus airoides Dwarf-shrubland	Ecological Systems: Chihuahuan Mixed Salt Desert Scrub System CES302.017 or Chihuahuan Gypsophilous Grassland and Steppe System CES302.732 or Inter-Mountain Basins Mixed Salt Desert Scrub System CES304.784	Culberson, Hudspeth, and Reeves		Guadalupe Mts NP (NPS)
G2	S1	Rough Tiquilia / Gyp Dropseed Dwarf-shrubland	Tiquilia hispidissima / Sporobolus nealleyi Dwarf-shrubland	Ecological Systems: Chihuahuan Mixed Salt Desert Scrub System CES302.017 or Chihuahuan Gypsophilous Grassland and Steppe System CES302.732 or Inter-Mountain Basins Mixed Salt Desert Scrub System CES304.784	Culberson	N	No documented protected areas
G2	S1S2	Soaptree Yucca / Black Grama Shrub Herbaceous Vegetation	Yucca elata / Bouteloua eriopoda Shrub Herbaceous Vegetation	Ecological Systems: Chihuahuan Sandy Plains Semi-Desert Grassland System CES302.736 or Colorado Plateau Blackbrush-Mormon-tea Shrubland System CES304.763 or Southern Colorado Plateau Sand Shrubland System CES304.793	Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, Presidio, and Reeves	N	No documented protected areas
G2G3	S1	Bulrush - Spikerush Marsh	Schoenoplectus americanus - Eleocharis spp. Herbaceous Vegetation	Ecological System: North American Arid West Emergent Marsh System CES300.729	Culberson, Dallam, and Hemphill	N	Gene How WMA and Guadalupe Mts NP (NPS)
G2G3	S2S3	Netleaf Hackberry - Little Walnut Savanna	Celtis laevigata var. reticulata - Juglans microcarpa / Leptochloa dubia Shrubland	Ecological System: North American Warm Desert Riparian Woodland and Shrubland CES302.753	Brewster, Crockett, Culberson, Jeff Davis, Pecos, Presidio, and Terrell	Y	Chinati Mts SNA (TPWD), Davis Mts Preserve (TNC), Big Bend NP (NPS), Guadalupe Mts NP (NPS), and Independence Creek Preserve (TNC)
G2G3	S1S2	Texas Rocky Mountain Juniper Woodland	Juniperus scopulorum Woodland	Ecological System: Western Great Plains Wooded Draw and Ravine CES303.680	Armstrong, Bailey, Briscoe, Randall, Roberts, and Wheeler	N	Muleshoe NWR (USFWS) and Palo Duro Canyon State Park (TPWD)
G1	S1	Bigtooth Maple - Chisos Red Oak Forest	Acer grandidentatum - Quercus gravesii Forest	Ecological System: Rocky Mountain Bigtooth Maple Ravine Woodland System CES306.814	Brewster and Jeff Davis	Y	Big Bend NP (NPS), Davis Mts State Park (TPWD), and Buffalo Trail Scout Camp (BSA/TNC easement); Davis Mountains Preserve
G1G2	S1S2	Maidenhair Fern - Sawgrass - New Mexico muhly - Mat Rockspirea - Spring Herbaceous Vegetation	Adiantum capillus-veneris - Cladium mariscus subsp. jamaicense - Muhlenbergia pauciflora - Petrophytum caespitosum Herbaceous Vegetation	-	Culberson	N	Guadalupe Mts NP (NPS)
G1	S1	Texas Madrone - Gray Oak - Weeping Juniper - Bigtooth Maple - Chisos Red Oak Forest	Arbutus xalapensis - Quercus grisea - Juniperus flaccida - Acer grandidentatum - Quercus gravesii Forest	Ecological System: Madrean Lower Montane Pine-Oak Forest and Woodland System CES305.796	Brewster	Y	Big Bend NP (NPS)

G_RANK	S_RANK	COMMON_NAME	GLOBAL_NAME	ECOLOGICAL_SYSTEM_NAME	KNOWN COUNTIES	Endemic	KNOWN PROTECTED AREAS
G1G2	S1S2	Sand Sagebrush - Broom Smokebush - Woolly Dalea Gypsum Dune Shrubland	Artemisia filifolia - Psoralea scoparius - Dalea lanata Gypsum Dune Shrubland	Ecological System: North American Warm Desert Active and Stabilized Dune System CES302.744	Culberson and Hudspeth	N	Guadalupe Mts NP (NPS) and Gypsum Dunes Preserve (TNC)
G1G2	S1S2	Sand Sagebrush / Sand Bluestem - Indian Ricegrass Gypsum Dune Shrubland	Artemisia filifolia / Andropogon hallii - Achnatherum hymenoides Gypsum Dune Shrubland	Ecological System: North American Warm Desert Active and Stabilized Dune System CES302.744	Culberson and Hudspeth	Y	No documented protected areas
G1G2	S1S2	Sand Sagebrush / Gypsum Grama - Onion Blanket-flower Shrubland	Artemisia filifolia / Bouteloua breviseta - Gaillardia multiceps Shrubland	-	Culberson and Hudspeth	Y	No documented protected areas
G2	S2	Mule's-fat - Rooseveltweed / Tall Prairie-gentian Shrubland ^{B5}	Baccharis salicifolia - Baccharis neglecta / Eustoma exaltatum Shrubland	Ecological System: North American Warm Desert Interdunal Swale Wetland System CES302.039	Andrews, Ward, and Winkler	Y	Monahans Sandhills SP (TPWD)
G2	S1	Black Grama - Blue Grama Shortgrass Prairie	Bouteloua eriopoda - Bouteloua gracilis Herbaceous Vegetation	Ecological System: Apacherian-Chihuahuan Semi-Desert Grassland and Steppe System CES302.735	Culberson, Presidio, Hudspeth, and Jeff Davis (Brewster Co-Marathon Basin component?)	N	Davis Mts Preserve (TNC), Hip-O-Ranch and other Marfa Grasslands easements (TNC) and Guadalupe Mts NP (NPS)
G1	S1	Mountain Mahogany - Mock Orange - Firecrackerbush - Standley's Draba (Lichens)	Cercocarpus montanus - Philadelphus spp. - Bouvardia ternifolia - Draba standleyi - (Lichens)	-	Jeff Davis	Y	Davis Mts Preserve
G1G2	S1S2	Arizona Fescue - Pine-dropseed Herbaceous Vegetation	Festuca arizonica - Blepharoneuron tricholepis Herbaceous Vegetation	Ecological System: Southern Rocky Mountain Montane-Subalpine Grassland System CES306.824	Culberson and Jeff Davis	Y	Davis Mts SP (TPWD) and Davis Mts Preserve (TNC)
G1	S1	Dune Heliotrope - Sandmat species Sparse Vegetation	Heliotropium racemosum - Chamaesyce sp. Sparse Vegetation	Ecological System: North American Warm Desert Active and Stabilized Dune System CES302.744	Brewster	N	Big Bend NP (NPS)
G1G2	S1S2	Emory oak - Alligator Juniper - Mexican Pinyon - Bullgrass - Tree Cholla Woodland	Quercus emoryi - Juniperus deppeana - Pinus cembroides - Muhlenbergia emersleyi - Opuntia imbricata Woodland	Ecological System: Madrean Pinyon-Juniper Woodland System CES305.797	Brewster and Jeff Davis	N	Big Bend NP (NPS); Davis Mountains Preserve (TNC)
G1	S1	Chairmaker's Bulrush - Clasping Yellowtops - (Puzzle Sunflower) Herbaceous Vegetation	Schoenoplectus americanus - Flaveria chlorifolia - (Helianthus paradoxus) Herbaceous Vegetation	Ecological System: North American Warm Desert Cienega System CES302.747	Pecos, Reeves	N	Diamond Y Spring & Sandia Spring Preserves
G1G2	S1S2	Mesa Dropseed - Slender Crowngrass Herbaceous Vegetation	Sporobolus flexuosus - Paspalum setaceum Herbaceous Vegetation	Ecological Systems: Chihuahuan Sandy Plains Semi-Desert Grassland System CES302.736 or Colorado Plateau Blackbrush-Mormon-tea Shrubland System CES304.763 or Southern Colorado Plateau Sand Shrubland System CES304.793	Crane, Loving, Ward, and Winkler	N	Monahans SP (TPWD)

G_RANK	S_RANK	COMMON_NAME	GLOBAL_NAME	ECOLOGICAL_SYSTEM_NAME	KNOWN COUNTIES	Endemic	KNOWN PROTECTED AREAS
G2	S2	Torrey's Joint-fir / Black Grama Shrub Herbaceous Vegetation	Ephedra torreyana / Bouteloua eriopoda Shrub Herbaceous Vegetation	Ecological Systems: Chihuahuan Sandy Plains Semi-Desert Grassland System CES302.736 or Colorado Plateau Blackbrush-Mormon-tea Shrubland System CES304.763 or Southern Colorado Plateau Sand Shrubland System CES304.793	Andrews, Armstrong, Briscoe, Brewster, Culberson, Deaf Smith, Howard, Hudspeth, Moore, Oldham, Randall, Reeves, and Ward	N	Guadalupe Mts NP (NPS), Palo Duro Canyon SP (TPWD)
G1G2	S1S2	Little Walnut - Spltleaf Brickellbush / Creek Indigo Edwards Plateau Shrubland	Juglans microcarpa - Brickellia laciniata / Indigofera lindheimeriana Edwards Plateau Shrubland	Edwards Plateau Riparian CES303.652	Crockett, Pecos, Terrell, and Val Verde	Y	Devils River SNA (TPWD), Diamond Y preserve (TNC), Dolan Falls Preserve (TNC)
G2	S1	Black Grama - Hairy Grama Shortgrass Prairie ^{B6}	Bouteloua eriopoda - Bouteloua hirsuta Herbaceous Vegetation	Ecological System: Apacherian-Chihuahuan Semi-Desert Grassland and Steppe System CES302.735	El Paso, Hudspeth, Cottle	N	Franklin Mts and Hueco Tanks SP (TPWD) Matador WMA (TPWD)

PRIORITY HABITATS IN THE CHIH-AZNM

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

[Broad habitat categories](#) were developed to organize all ecoregional handbooks.

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

See also [Ecoregions of Texas](#) (report is near the bottom of webpage; Griffith et. al. 2007) and [Ecological Mapping Systems Project](#) (TPWD et. al. *in progress*)

Table 6. AZNM Priority HabitatsTable

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

GENERAL HABITAT TYPES	ARIZONA - NEW MEXICO MOUNTAINS (AZNM)	AZNM Ecological Systems
NATURAL AND SEMI-NATURAL TYPES	<i>Habitats in this column were identified in the workshop; additions were made by editor to riverine and cultural aquatic</i>	<i>NatureServe. 2009. International Ecological Classification Standard: Terrestrial Ecological Classifications for Ecological Systems of Texas' Arizona / New Mexico (Guadalupe) Mountains. NatureServe Central Databases. Arlington, VA. U.S.A. Data current as of 08 October 2009.</i>
Barren/Sparse Vegetation	igneous cliff and rock outcrops salt flats/Pleistocene "lake" southwest of Guadalupe Mountains National Park	North American Warm Desert Bedrock Cliff and Outcrop North American Warm Desert Pavement North American Warm Desert Volcanic Rockland Rocky Mountain Cliff, Canyon and Massive Bedrock
Grassland	Montane grasslands Plains shortgrass grasslands	Apacherian-Chihuahuan Semi-Desert Grassland and Steppe Chihuahuan Loamy Plains Desert Grassland Chihuahuan Sandy Plains Semi-Desert Grassland Southern Rocky Mountain Montane-Subalpine Grassland
Shrubland	Shrub-steppe mosaic Montane foothill shrublands	Madrean Oriental Chaparral Rocky Mountain Lower Montane-Foothill Shrubland
Savanna/Open Woodland	Ponderosa pine woodlands	Madrean Juniper Savanna Southern Rocky Mountain Ponderosa Pine Savanna
Woodland	Oak mottes Mixed oak – pine and oak – juniper woodlands	Madrean Encinal Southern Rocky Mountain Pinyon-Juniper Woodland Southern Rocky Mountain Ponderosa Pine Woodland
Forest <i>See also Riparian and Wetlands</i>	closed canopy pine forests	Madrean Lower Montane Pine-Oak Forest and Woodland Rocky Mountain Aspen Forest and Woodland
Riparian	periodically flooded or subirrigated floodplains, tributary ravines and creekside vegetation in McKittrick Canyon, Guadalupe Arroyo	Rocky Mountain Bigtooth Maple Ravine Woodland North American Warm Desert Lower Montane Riparian Woodland and Shrubland (woody wetland) North American Warm Desert Riparian Mesquite Bosque North American Warm Desert Riparian Woodland and Shrubland

GENERAL HABITAT TYPES	ARIZONA - NEW MEXICO MOUNTAINS (AZNM)	AZNM Ecological Systems
Riverine	Instream habitats of the Upper Pecos - Black, Delaware, and Salt Basin watersheds which intersect this ecoregion	NA
Freshwater Wetland	springs, seeps swale depression wetlands	Chihuahuan-Sonoran Desert Bottomland and Swale Grassland (mixed upland and wetland)
Saltwater Wetland		Chihuahuan-Sonoran Desert Bottomland and Swale Grassland (mixed upland and wetland)
Aquifer		NA
Caves/Karst	Crevices and cliff sites	NA
CULTURAL TYPES	<i>None noted for this ecoregion</i>	
ARTIFICIAL REFUGIA	<i>None noted for this ecoregion</i>	

Table 7. CHIH Priority Habitats

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

GENERAL HABITAT TYPES	CHIHUAHUAN DESERTS (CHIH)	CHIH Ecological Systems
NATURAL AND SEMI-NATURAL TYPES	<i>Habitats in this column were identified in the workshop and Core Ecoregion Team Survey April 2011; additions were made by editor to riverine and cultural aquatic</i>	<i>NatureServe. 2009. International Ecological Classification Standard: Terrestrial Ecological Classifications for Ecological Systems of Texas' Chihuahuan Deserts. NatureServe Central Databases. Arlington, VA. U.S.A. Data current as of 08 October 2009.</i>
Barren/Sparse Vegetation <i>See also Coastal</i>	Aspect-dependent cliff faces, talus slopes, sky islands, arroyos and rock-dominated canyons Dunes Special geologic and soil-dependent habitats: gypsum, Caballos novaculite, bentonite flats, saline evaporative basins Barren ground within the semi-arid grassland matrix (e.g. prairie dog towns) - see also Grassland	North American Warm Desert Active and Stabilized Dune North American Warm Desert Badland North American Warm Desert Bedrock Cliff and Outcrop North American Warm Desert Pavement North American Warm Desert Playa North American Warm Desert Volcanic Rockland Rocky Mountain Cliff, Canyon and Massive Bedrock
Desert Scrub	No habitats were identified in this category; however, additional investigation during the comment period may reveal additional habitats relevant to SGCN.	Apacherian-Chihuahuan Mesquite Upland Scrub Chihuahuan Creosotebush Desert Scrub Chihuahuan Mixed Desert and Thornscrub Chihuahuan Mixed Salt Desert Scrub Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub Chihuahuan Succulent Desert Scrub Tamaulipan Calcareous Thornscrub Tamaulipan Mixed Deciduous Thornscrub
Grassland	Elevation-limited (high and low?) montane grasslands Mesa grasslands (near western Edwards Plateau) Non-montane semi-arid grasslands (tobosa, banded, shortgrass)	Apacherian-Chihuahuan Semi-Desert Grassland and Steppe Chihuahuan Gypsophilous Grassland and Steppe Chihuahuan Loamy Plains Desert Grassland Chihuahuan Sandy Plains Semi-Desert Grassland Southern Rocky Mountain Montane-Subalpine Grassland Western Great Plains Shortgrass Prairie Western Great Plains Tallgrass Prairie

GENERAL HABITAT TYPES	CHIHUAHUAN DESERTS (CHIH)	CHIH Ecological Systems
Shrubland	Arroyo canyon shrubland Sky Island foothill slope shrublands	Edwards Plateau Limestone Shrubland Madrean Oriental Chaparral Rocky Mountain Gambel Oak-Mixed Montane Shrubland Rocky Mountain Lower Montane-Foothill Shrubland
Savanna/Open Woodland	Tree "islands" within grasslands-mosaic Question: is this a naturally occurring habitat type, desired ecological condition?	Madrean Juniper Savanna Southern Rocky Mountain Ponderosa Pine Savanna
Woodland	Montane woodlands Canyon woodlands (both generally dominated by conifer species but also include hardwoods)	Madrean Encinal Madrean Lower Montane Pine-Oak Forest and Woodland Madrean Pinyon-Juniper Woodland Rocky Mountain Aspen Forest and Woodland Rocky Mountain Bigtooth Maple Ravine Woodland Southern Rocky Mountain Pinyon-Juniper Woodland Southern Rocky Mountain Ponderosa Pine Woodland
Forest <i>See also Riparian and Wetlands</i>	Montane forests Canyon forests (both generally dominated by conifer species but also include hardwoods)	(see forest – woodland referenced above)
Riparian	periodically flooded or subirrigated floodplain shrublands, woodlands (mesquite, plateau live oak mottes) and gallery forests (cottonwood, sycamore, ...) associated with the Lower Pecos River and tributaries, Rio Grande and tributaries ephemerally flooded and/or subirrigated arroyos	North American Warm Desert Lower Montane Riparian Woodland and Shrubland North American Warm Desert Riparian Mesquite Bosque North American Warm Desert Riparian Woodland and Shrubland North American Warm Desert Wash Western Great Plains Riparian (mixed upland and wetland)

GENERAL HABITAT TYPES	CHIHUAHUAN DESERTS (CHIH)	CHIH Ecological Systems
Riverine	<p><u>Ecologically Significant Stream Segments:</u> Salt Creek, Leon Creek, Comanche Creek, Toyah Creek, Madera Canyon, Independence Creek, Cienega Creek, Alamito Creek, Terlingua Creek, Lower Canyons of Pecos (Iraan to Amistad R), Rio Grande/Rio Bravo from Rio Conchos (near Presidio) to Amistad Reservoir (Del Rio)</p> <p><u>Other creeks and reaches:</u> Maravillas Creek, Little and Big Aguja creeks, Cherry Creek, McKittrick Creek, Screwbean Draw (Salt Creek trib), Limpia Creek</p> <p><i>Editor's Note: two additional creeks were mentioned in the Survey - Pinto Creek and Live Oak Creek; however, these occur in the South Texas Plains ecoregion and are addressed in that handbook. Devils River is typically associated with CHIH systems and conservation actions in this watershed should be coordinated among three ecoregions: CHIH, South Texas Plains (STPL), and Edwards Plateau (EDPT)</i></p>	NA
Lacustrine <i>See also Cultural Aquatic</i>	Lake Balmorhea	NA
Freshwater Wetland	<p>Natural freshwater springs, cienegas (e.g. Balmorhea Springs) horizontal and vertical seeps along rivers and tributaries Interdunal wetlands Tinajas Oxbows</p>	<p>North American Arid West Emergent Marsh North American Warm Desert Cienega North American Warm Desert Interdunal Swale Wetland Western Great Plains Closed Depression Wetland Western Great Plains Open Freshwater Depression Wetland Chihuahuan-Sonoran Desert Bottomland and Swale Grassland (mixed upland and wetland)</p>

GENERAL HABITAT TYPES	CHIHUAHUAN DESERTS (CHIH)	CHIH Ecological Systems
Saltwater Wetland	Saline springs and seeps, cienegas (e.g. Diamond Y Springs) Saline evaporative basins (Salt flats, Toyah Lake, Pecos Plain salt basins, "salinas")	Western Great Plains Saline Depression Wetland North American Arid West Emergent Marsh North American Warm Desert Cienega North American Warm Desert Interdunal Swale Wetland Western Great Plains Closed Depression Wetland Western Great Plains Open Freshwater Depression Wetland Chihuahuan-Sonoran Desert Bottomland and Swale Grassland (mixed upland and wetland)
Estuary/Estuarine	While no estuaries occur in the CHIH, water quantity and quality in the region contribute to the Rio Grande/Rio Bravo, into (and potentially through) Amistad and Falcon Reservoirs, to the southernmost portions of Laguna Madre (instream flows important)	NA
Aquifer	western Edwards-Trinity aquifer Aquifer feeding Balmorhea Springs complex	NA
Caves/Karst	Caves, sinkholes, grottos, and pseudokarst	NA
CULTURAL TYPES	<i>habitats in this section must support SGCN or rare communities to be considered in this plan</i>	
Agricultural	Farm fields and tilled/fallow croplands	NA
<i>Urban, Suburban, Rural</i>	Abandoned barns, structures, small storage facilities	NA
<i>Industrial</i>		NA
<i>Rights of Way</i>	Bridges, overpasses	NA
Cultural Aquatic	Reservoirs: Imperial Reservoir, upper reaches of Amistad on the Pecos, Red Bluff Maintained ("permanent") windmill or pump-filled stockponds Waste-water wetlands (e.g. Presidio) Shrimp-farm ponds	NA

GENERAL HABITAT TYPES	CHIHUAHUAN DESERTS (CHIH)	CHIH Ecological Systems
ARTIFICIAL REFUGIA		
created wetlands to replace wetlands lost specifically for rare species recovery/persistence	reconstructed cienega	NA

Texas shares its border with four states – New Mexico, Oklahoma, Arkansas, and Louisiana. CHIH-AZNM shares a portion of its border with New Mexico. **Table 8** identifies habitat priorities which *have been identified in the New Mexico Wildlife Action Plan (link to their plan in the table) and also identified CHIH-AZNM Ecoregions*. Every adjacent state’s Action Plan mentions the importance of **intact native riparian zones** and **floodplains, high quality instream habitats, wetlands** of all types, and **native grasslands**. These habitat types are also found in the CHIH-AZNM and are priorities for conservation in this ecoregion. See Statewide/Multi-region handbook for broadscale Conservation Actions for these priorities.

Table 8. Shared Habitat Priorities with Adjacent State – New Mexico

Adjacent States	Ecoregions Shared with Texas	Habitat Priorities Shared with Texas <i>(Action Plans and the National Fish Habitat Action Plan viewer online)</i>
New Mexico (NM)	Arizona – New Mexico Mountains Chihuahuan Desert High Plains	semi-desert grasslands and scrub/shrublands shortgrass prairie ephemeral and perennial tributaries and mainstem of the Pecos, Rio Grande/Rio Bravo, and Brazos Rivers, and associated riparian zones and floodplains springs and seeps wetlands playas TX – NM HUC 8 watersheds are all mapped at low to very low risk (although those near El Paso are mapped at high to very high risk at finer HUC 12 scale) ⁴

⁴ NBII and UGS. National Fish Habitat Risk Assessment Viewer. <http://www.nbii.gov/far/nfhap/>

ISSUES

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

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

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

Table 9. Issues Affecting Conservation in the CHIH - AZNM Ecoregions

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	<p>Salt cedar/tamarisk (<i>Tamarix spp.</i>)</p> <p>Cultivated and Old World grasses (e.g. Lehmann's lovegrass, King Ranch (KR) bluestem, Bermuda grass)</p> <p>Giant reed/river cane (<i>Arundo donax</i>)</p> <p>golden alga (see also <i>Native Problematic Species</i>; it is not conclusively known whether golden alga is native or non-native)</p>	<p>Salt cedar affects water use, monotypic stands, and outcompetes native riparian vegetation (cottonwood, sycamore) at all seral stages and canopy levels; salt cedar and <i>Arundo</i> line the banks of the Rio Grande in the Big Bend reach, armoring the banks and contributing significantly to channel incision and narrowing, which reduces the diversity and quality of habitat for aquatic species</p> <p>Non-native grasses either as improved pastures or naturally expansive have established in many Trans-Pecos grasslands, are a substantial threat to grassland-dependent species (e.g. grassland-obligate birds and pronghorn)</p> <p>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</p> <p>Toxic algal blooms in Lake Balmorhea may adversely impact Comanche Springs pupfish; also known in Pecos River</p>
Non-native Animal	<p>feral and/or free-ranging "pets"</p> <p>FERAL HOGS</p> <p>Introduced ungulates for hunting</p> <p>introduced fishes and mollusks - freshwater springs, streams and marshes</p>	<p>Free ranging pets are introduced predators which adversely affect small mammals, small reptiles, and birds; also contribute pathogens and diseases</p> <p>Feral hogs also decimate important and fragile habitats (e.g. springs, seeps, riparian areas, swale depressional wetlands), degrade instream water quality, and decrease hardwood seedling viability (rooted up, eaten)</p> <p>Aoudad 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</p> <p>Within streams, nonnative species compete with natives, and are a predation risk (e.g. small mouth bass are voracious non-native predators)</p> <p>Bait fish releases ("minnows") can cause problematic congeneric hybridization (e.g. <i>Gambusia</i> sp.)</p>
Native Problematic	<p>Native shrub (e.g. redberry juniper, creosote, tarbrush, mesquite, whitebrush) or "brush" encroachment into grassland systems</p> <p>Mesquite has displaced grasslands especially in areas with subsurface moisture</p> <p>Golden alga (see also <i>Non-native Invasive Species</i>; it is not conclusively known whether golden alga is native or non-native)</p>	<p>Invasive native brush/trees are a significant threat to grassland-obligate birds as well as pronghorn: 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; brush "spooks" pronghorn who need vast open spaces to feel safe from predators and brush-degraded grasslands are no longer suitable for pronghorn foraging. May reduce recharge in some areas.</p> <p>Toxic blooms in Lake Balmorhea may adversely impact Comanche Springs pupfish; also known in Pecos River</p>
Pests, Parasites, Pathogens		
Pests	<p>Pine bark beetle</p> <p>Cactus moth (<i>Cactoblastis cactorum</i>)</p>	<p>Pine bark beetle: add info</p> <p><i>Cactoblastis cactorum</i> has been used a biological control for prickly pears (<i>Opuntia</i> 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.</p>
Parasites	<p><i>Haemonchus</i></p>	<p>pronghorn populations devastated by this parasite; thought to be a major contributing factor to the pronghorn decline across the Trans-Pecos.</p>
Pathogens	<p>White-nose Syndrome (WNS)</p>	<p>WNS affects hibernating bats and is spread through human (we think) and bat vectors, through cave visitation. Mortality is high; prevention and overall cause is unknown.</p>
Power Development and Transmission		
Wind Generation	<p>See also full discussion in Statewide Handbook</p> <p>Competitive Renewable Energy Zones (CREZ): McCamey</p> <p>High ridges in west Texas highly desired dense sitings (wind "farms")</p> <p>Turbine operations</p>	<p>High ridges typically intersect raptor migration corridors (impacts to Golden Eagle, Ferruginous Hawk, Swainson's Hawk)</p> <p>network of maintenance and access roads</p> <p>typically impacts vegetation communities that occur on these ridges - grasslands, shrublands -- which causes habitat loss and contributes to invasive species</p> <p>deep footings may impact karst in certain areas; migratory birds and bats adversely affected through barotrauma and direct collision</p> <p>barotrauma in bats and birds</p> <p>disrupts breeding or feeding behaviors through noise or large presence on a normally open, uninterrupted landscape (pronghorn, grassland birds)</p>

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
Solar or PV (photovoltaic) array siting	level or nearly level sites with high PV potential occur throughout the region	array siting, with the network of maintenance and access roads, impacts shortgrass mesa and other open lowland grassland communities (direct loss and invasive species competition), blocks sun and rain needed for photosynthesis and recovery of vegetation communities; plant and plant community protections are insufficient to trigger environmental compliance in this industry; deep footings may impact karst in certain areas; some may require large quantities of water
Hydro (Dam and Reservoir)	There are no known reservoirs for hydroelectric generation in this area, flood control and water source creation are issue	see also Water Development, Management and Distribution
Biofuels	Row Crop, Switchgrass, Herbaceous: native rangeland and open grasslands converted to croplands (monotypic stands of switchgrass and others) Algae "farms": High amounts of water used/processed, untreated or minimally treated wastewater discharges, site conversion	Loss of native and open grassland birds' habitats for foraging, nesting, and shelter -- Baird's Sparrow (winter), Eastern Meadowlark, Long-billed Curlew, and Cassin's Sparrow Lowlying area and "flats" habitat loss from conversion to farming operation, groundwater pumping which contributes to lowered or drying of springs and spring-dependent aquatic systems, wastewater discharges can create unhealthy to intolerable water chemistry for SGCN
Transmission	New development and expansion of existing lines/corridors construction of new power infrastructure corridors to meet urban user needs, from CREZ generation projects in this region to central TX loads maintenance and operations maintaining clear right-of-way for vehicle clearance/access, prevention of line and tower danger	directly takes habitat and species during construction (loss), degrades adjacent habitat (fragmentation), and may hinder movement (daily or seasonal)
Distribution	Development to power grid and retail users: construction of new power infrastructure corridors to meet urban user needs	mowing, trimming (permanent fragmentation, erosion) herbicide application directly takes habitat and species during construction (loss), degrades adjacent habitat (fragmentation), and may hinder movement (daily or seasonal)
Oil and Natural Gas Production and Delivery		
Seismic exploration	surface and subsurface impacts - linear networked vegetation clearing and soil disturbance, vibration and "explosive" disturbance	habitat loss and fragmentation in arid lands that do not recover quickly vector for invasive species (plant) introductions from equipment and opportunistic colonization in wake of habitat clearing and no reclamation disruption of daily and seasonal activities for fossorial animals (small mammals, reptiles, ground-foraging and ground-nesting birds)
Traditional extraction site development and operation, including pumping and pad sites, gathering stations, transmission/delivery facilities (distribution lines, roadway)	on-site spill potential salt water injection wells flaring road networks	limited ground and surface waters (cieneegas, swale wetlands, others) highly sensitive to change/contamination are at risk from chemical, drilling material, and oil spills and groundwater contamination caused by salt water injection flaring increases acid deposition which affects http://www.esa.org/education_diversity/pdfDocs/aciddeposition.pdf - not sure how this directly affects SGCN or habitats? Extraction operations cause clearing, road networks, pad sites, and large mechanical infrastructure(s) which contribute to direct habitat loss, direct and indirect habitat fragmentation, direct mortality from vehicles and operations, and noise/light disturbance (e.g. sand dunes west of Odessa, dunes sagebrush lizard is threatened by these operations and road mortality; nocturnal birds and bats can be adversely impacted by the light and noise pollution; road networks, constant traffic and noise, and mechanical infrastructure interrupts seasonal and daily movements, foraging and mating behaviors of some mammals, reptiles, and birds; small geographically limited populations of desert plants fragmented or lost).
Hydraulic fracturing ("fracking") or "shale gas" extraction	http://www.energyindustryphotos.com/shale_gas_map_shale_basins.htm deeply injected chemical liquid which fractures substrates and releases gas for capture and delivery: potential groundwater risks, potential chemical spill risks, geologic destabilization	Groundwater and its surface expression in seeps, springs and cieneegas are extremely important habitats in this ecoregion (e.g. LIST SPECIES); groundwater contamination could cause total loss of isolated aquatic populations, adversely affect vegetation that depends on water quantity and quality at springheads, seeps, riparian areas, and instream. Contamination also poses a risk to human and livestock water sources. Fracturing activities may also adversely affect the recharge capacity of porous rock layers and networked karst features.
Lack of Reclamation	reclamation standards vary, requirements limited unmonitored/unregulated decay of obsolete production sites - toxic chemicals in soils and leftover equipment, decaying equipment	Reclamation not required back to NATIVE vegetation (invasive species allowed to colonize or are directly planted for soil stabilization)
Mining		
Sand and Gravel - upland and riverine	sand and gravel mining along and within streams and rivers	http://www.tshaonline.org/handbook/online/articles/gpm01 need map of sand and gravel mines in TX loss of riparian habitats for instream and adjacent mining, sedimentation in streams contributes to loss and degradation of instream habitats

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
Caliche	caliche - small scale on ranches, large scale for county roads	typically for road base, unreclaimed sites, complete/permanent loss of surface communities
Gypsum		Can adversely affect cave and karst features
Bentonite	bentonite	Terlingua Creek - what adverse effects specifically? Instream? Riparian? Other? Both?
Communications Infrastructure		
Cell and other communication towers	towers need to be limited in height and lit to minimize bird strikes (bird-friendly)	Species impacted by towers include all nocturnal migrants including Yellow-billed Cuckoo, Painted Bunting, Summer Tanager, and other species. In rare instances kills totalling thousands of Longspurs have been found around towers.
Transportation		
road and bridge construction (new)	construction of new commercial transportation infrastructure corridors (NAFTA)	directly takes habitat and species during construction (loss), degrades adjacent habitat (fragmentation), and may hinder movement (daily or seasonal)
right of way maintenance	maintaining clear right-of-way for vehicle clearance/access, minimizing fire danger, and maintaining driver visibility	mowing, trimming (permanent fragmentation, erosion) herbicide application some rare plants are known only from sites in ROW; these are not always adequately protected as staff changes occur, management plans are filed away, information not passed through entire chain of command - needs better communication in some places
Border Protection		
	Border Fence	Barrier to daily and seasonal movements of mammals (including large mammals that need vast roaming home ranges such as black bear), reptiles, and some birds; can create a barrier to genetic diversity and fragment larger stable populations into smaller unstable populations Creates artificial roosting and resting perches for raptors, which prey on animals near the fence preferentially Removes, fragments and restricts riparian breeding habitats for several bird species: Summer Tanager, Yellow-billed Cuckoo, Gray Hawk, Common Black Hawk
	Roadways and Levees	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.
	Grading, Dragging	Clearing adjacent to and to a certain distance from the Border Fence and in sections without fencing for security observations also creates a soil erosion, vegetation loss, and water quality issue in the Rio Grande/Rio Bravo affecting several endemic and locally rare species (LIST)
Land & Water Mgmt: FARM	See also Water Development section	
Lack of soil and water management and conservation practices	chemical-laden irrigation water runoff	adverse impacts to sensitive aquatic insects and other invertebrates, fishes, and amphibians
Unsustainable irrigation	Water from Lake Balmorra is used for irrigation Timing of water draw downs do not account for fish and wildlife needs Water-intensive and hydroponic crops grown in the most arid region least able to recover groundwater or surface water resources at the same rate they are being used See also <i>Groundwater Planning and Distribution</i>	Fluctuations in lake level can affect fish spawning and 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)	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)

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
	historic and/or current range-intensive livestock operations out of sync with land capacity non-native hoofstock for hunting operations	Grassland birds affected: Baird's Sparrow, Long-billed Curlew, Eastern Meadowlark, and Cassin's Sparrows
Landowner/land management incentive programs working at cross-purposes	single-objective management such as all-game, all-livestock, all-recreation incentive programs, technical guidance, and management assistance from nearly all providers are not offered with the most complete conservation options (the "menu" is pre-limited for the landowner in the first contact, without letting the landowner choose from a full menu of land and water management options) Landowners do not have a one-stop shop to choose best management practices for their site, for their goals	single species or single habitat type management; e.g. grasslands instead of mosaic and patchy habitat values, productivity vs. diversity?
Fencing	netwire fencing high game fencing	Netwire fencing and most "game" fencing fragments pronghorn daily and seasonal movements, restricts their access to water and food, and increases their vulnerability to predation; their movements are interrupted by fences under which they cannot crawl (they do not jump fences). Issue causes lack of genetic diversity through inbreeding, lack of dispersal into available appropriate habitats (which means that role is unfulfilled or filled by ... instead in the system), and potentially concentrates pathogens High game fencing also adversely impacts many species of native game and non-game wildlife - START HERE
Clearing and loss of important natural sites/habitats	Springs, swales altered for stock uses, domestic use	Loss of natural spring and swale habitats for aquatic and grassland species, changes vegetation community in these areas
Lack of soil management and conservation practices	inappropriate herbicide application (Spike) lack of soil conservation (vegetation conservation/restoration) along stream courses and on grazing lands, soil erosion	is this in the right place – what category better?? Hydrology and streamside vegetation are altered, soil and vegetation is lost in upland areas, water quality is degraded through sediment-laden runoff; dealing with historical and contemporary issues, need, in some instances, different approaches for recovery/restoration
Subdivision of larger lands into smaller parcels ("ranchettes")	Intergenerational ownership changes in values - no longer a working landscape, but now a recreational or disposable income	
Landowner disconnection from rural attitudes/values	Subdivided lands, absentee ownership, and/or non-rural ownership changes in values - no longer a working landscape, but now a recreational or disposable income	
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)	The lack of fire and excessive grazing during drought has resulted in mesquite and creosotebush encroachment of desert grasslands. This increase in brush species and reduction in grasses may reduce recharge in certain areas from uplands into local aquifers and riparian habitats, further accentuating a reduction in surface water. .
Land & Water Mgmt: Municipal	See also Water Development section	
Lack of Zoning and Planning	Planning efforts are minimal, rarely regional	Water: Outlying areas and rural areas with water are targeted to supply municipal needs in other basins Land: Urban sprawl and little regulation on development type contributes to arid land habitat loss of many types (montane grasslands, lowland grasslands, desert shrublands), impervious cover and runoff (degradation of water quality) Continued urban expansion around El Paso (and Midland/Odessa, in the HIPL) have potential to effect prairie dogs, mountain plover, and other SGCN
Land & Water Mgmt: Conservation & Recreation		
Inadequate/Inappropriate Management	managing wildfire (more Rx burning needed to reduce the risk of wildfires)	
Inappropriate Recreational Uses	ORV use in sensitive areas (stream beds, dunes on private sites)	
Not all "public" or "managed" lands are "conservation" lands	While most public lands in this region are managed for recreation compatible with wildlife and fisheries resources, some improvements could be made to trails and recreation facilities to prevent soil erosion, vegetation loss	
Lack of connectivity between	A great deal has been done in the last 20 years to network international sites	

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
public lands managed for conservation	(parques) with the BB National Park, and to connect BBNP with BBRSP, TNC preserves, and TPWD WMAs; however there are some disconnected landscapes and resources in other areas of the region which need attention to enhance ecological function	
Lack of long-range conservation planning and cohesive land conservation/management strategies in each ecoregion		
Water Development, Management and Distribution	SEE ALSO STATEWIDE HANDBOOK	
Surface Water Planning	<p>Natural resources not well-defined or required as a "constraint" in Regional Water Planning (RWP) processes; natural resource professionals are not consistently involved in RWP processes Large municipalities' demands are the primary driving force in surface and groundwater planning</p> <p>Overallocation and dewatering of region's principle rivers</p> <p>New water line construction not considered in planning or operational impacts/costs to resources</p> <p>Although the Trans-Pecos is not experiencing the sprawling urban/suburban growth that many other areas of Texas are, water is a scarce and precious resource out here. . Groundwater withdrawals and surface water diversions deplete the amount of water available for wildlife.</p>	<p>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.</p> <p>Altered flooding regime (timing, periodicity, amounts) that adversely affects flood-dependent riparian and aquatic systems</p> <p>See also other sections: Other Water Source Developments and Technologies: Interbasin Transfers Reservoir Construction and Operation Groundwater Planning and Distribution</p>
Reservoir Construction and Operation	Timing/Periodicity/Intensity of Water Releases releases are unnaturally intense and short duration in the "wrong" season to mimic natural flooding processes; Rio Grande/Bravo and Pecos River	Unnatural hydrograph scours instream and stream-adjacent habitats, shifts vegetation communities out of sync with other riparian communities where flooding is more "natural", vegetation communities and instream animal (invert, fishes, etc.) cannot "rely" on the seasonal changes under which they evolved.
Groundwater Planning and Distribution	<p>Not all aquifers have groundwater districts; groundwater districts are political subdivisions, not aligned necessarily with aquifer boundaries</p> <p>Extraction: groundwater pumping without full accounting for natural resources as a "use"</p>	<p>Inconsistency in districting across the landscape creates conflict and natural resources do not fare well.</p> <p>physical changes to karst, springs, cienegas (water amount and quality) adversely impact some species' thresholds for survival and/or sustainable life history (reproduction, foraging, resting)</p> <p>subirrigated and instream aquatic habitats which rely on springflow through decreased amount of water near the surface or coming into the stream (flow, depth, substrate changes, adjacent riparian habitat changes from dry conditions) and changes in instream water conditions such as temperature, oxygen availability, and other nutrient and chemical factors (such as the age of water source that comes from the aquifer)</p> <p>decreased and degraded aquifer recharge capacity ("drying out the sponge or seive" at certain levels within the aquifer can affect the flow quantity and quality into the aquifer from recharge events)</p>
Other Water Source Developments and Technologies	<p>Interbasin Transfers (Surface and Groundwater)</p> <p>Municipal demands on water and potential for well field development for commercial export out of the region or to the largest municipalities</p>	Most of this is addressed at the statewide level; are there specific resources affected in this region??
	<p>Desalination and Chloride Removal Operations</p> <p>Proposed desalination plant near Dell City</p> <p>Water Treatment Wetlands: Presidio?</p>	may adversely affect sensitive species (e.g. gypsum scalebroom, mountain plover) - appropriate siting, waste discharge, and monitoring will be important to avoid, minimize or mitigate effects
Lack of Information & Resources	One response stated this is an issue, but did not provide additional information	
	Lack of Data (amount, type)this tied to "Lack of Processing Existing Data" lack of bird monitoring data for riparian and montane ecosystems Lack of information on the population/distribution/etc on numerous SGCN is	It is possible given the nature of the ownership landscape - large and privately held - in west Texas, that populations and communities of conservation need occur on private lands. Lack of access to those sites prevents a complete understanding of just how rare or not rare a species may be, and limits cooperative stewardship and best management practices.

General Issue	Ecoregion Issue Identified in Workshops (2010) and Surveys (2011)	Description of Adverse Effects Identified in Workshops (2010) and Surveys (2011)
	a significant problem Climate change models, GIS analysis of land conversion and change overtime, species specific information, community-specific information – see CLIMATE CHANGE SECTION in Statewide handbook	Species-specific monitoring needs: all breeding birds of riparian and montane ecosystems, including Montezuma Quail, Common Black-Hawk, Gray Hawk, Yellow-billed Cuckoo, Spotted Owl, Colima Warbler, Summer Tanager; Sprague's pipit and mountain plover; mountain lion movements, effects on natural and ranching resources, population distribution and stability.
	Predator control without biological standards or supporting management	It is unknown whether predator control activities are affecting the stability of SGCN populations or their contribution to natural system function. Predator control efforts cannot be declared "insufficiently regulated" or "underreported" as limited information is available to assess the stability of these populations. Community-based solutions will need to be devised based on a full and accurate accounting of these populations and their effects on the natural systems and ranching communities in which they range. Predator trapping and/or baiting has an adverse effect on non-target species including black bears and smaller mammals such as hooded skunks, foxes
	Lack of Processing <i>Existing</i> Data this tied to "Lack of Information (amount, type)"	Where census, survey, records and collections are documented, little is done with the data to detect trends and causes for upward or downward shifts. Without this information, it is difficult to focus or prioritize management objectives or share information with private landowners about the importance of some sites, populations or communities. Sharing this information with landowners is crucial as most of Texas is privately owned and conservation must occur with their stewardship help.
	Inadequate understanding of available or widely-accepted conservation Best Management Practices	habitat senescence in areas where natural processes (fire, flood, weather patterns) have been interrupted and not replaced through human intervention or active management
	Lack of targeted and/or ethnically-specific outreach Incertain areas e.g. border and El Paso	
Inadequate Policies, Rules, Enforcement		
	Poaching, Permitting Avoidance and Violations insufficient law enforcement for non-game issues	
	Unregulated or Inadequately Regulated Harvesting : Several predatory species (e.g. coyote, bobcat, mountain lion) are routinely trapped, hunted and killed in the region.	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 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.
	Loss of and impact to "non-jurisdictional" wetlands and other waters	
Other Cross-Cutting Issues		
	Lack of Conservation Funding	
	Climate Change isolated habitats are more at risk than others: sky islands, montane grasslands and forests, cienegas Other arid-land wetland and water-dependent features such as riparian and instream habitats In general, unknown longterm effects, needs	Climate change models, GIS analysis of land conversion and change overtime, species specific information, community-specific information – see CLIMATE CHANGE SECTION in Statewide handbook 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.
	Population Growth Urbanization - Additional Human Population with additional infrastructure needs; sprawl development	directly takes habitat and species during construction (loss), degrades adjacent habitat (fragmentation), and may hinder movement (daily or seasonal) unregulated or unzoned development occurs outside of urban municipal centers into differently regulated county jurisdictions who do not have the authority to prevent resource loss or degradation (includes lack of stormwater and impervious cover controls)
	Economics Ranch	Landowner incentives cannot compete currently with market forces; market forces in some areas cannot support continued large ranch ownership SEE STATEWIDE ISSUES HANDBOOK

CONSERVATION ACTIONS

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

To make conservation progress, we need to work with the information we have, document our progress, share lessons learned, and adapt our approach when necessary. Conservation actions in this handbook are aimed at reducing the negative effects of issues that affect SGCN, rare communities and their habitats at various scales. [Broad actions categories](#) are defined to help organize handbooks. For information about how the Actions framework was developed and for definitions of Action categories, see the *Overview Handbook*.⁵

Actions proposed for the CHIH-AZNM Ecoregion ([Table 10](#)) state what we need to work on, where, and why (what problem we can solve with that action). Actions lay out how that work contributes to a specific desired effect –progress and success.

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

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

From [project inception, well-crafted monitoring and evaluation](#) (cost effective, answers key questions) informs management and allows conservation practitioners to “course-correct” as necessary for effective conservation (CMP 2007, Salzer and Salafsky 2006). With the need for Action Plans to take advantage of several “pots of conservation money,” the people we serve and those who govern private and public conservation funds demand reporting, transparency, and *demonstration* that projects are *positively impacting the conservation of species and habitats*. To get beyond reporting that money was spent and projects were done, AFWA TWW convened a committee in 2009 to craft “effectiveness measures” for the conservation actions across all Plans. A [toolkit for classifying and measuring conservation action effectiveness](#) was produced in 2011, approved by AFWA TWW Executive Committee comprised of state fish and wildlife agency directors and others. These measures will be an important part of moving the plans and conservation forward.

With this revision, the TCAP becomes more involved in a national movement to track conservation actions and progress across local, state, regional and national levels. As with the 2005 Plan, actions presented in this edition vary in detail, scale, and duration; however, this edition encourages the use of the incremental measures of success for conservation projects’ development, implementation, and tracking. To that end, the toolkit in [Measuring the Effectiveness of State Wildlife Grants](#) (AFWA TWW, 2011) is **strongly recommended** to define projects, target audiences and partners, identify desired step-wise intermediate results, and collect the “right” data to report our conservation achievements.

⁵ The category “*Data Collection, Analysis, and Management*” meets Action Plan Required Element 3 – “priority research and survey”. Many of the proposed actions include a monitoring component (Action Plan Required Element 5).

Table 10. CHIH-AZNM Ecoregion Conservation Actions

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

Conservation Action	Direct Mgmt of Natural Resources	Species Restoration	Creation of New Habitat	Acquisition, Easement, or Lease	Land Use Planning	Training, Technical Assistance	Data Collection, Analysis, Management	Conservation Area Designation	Education, Targeted Outreach	Environm Review	Mgmt Planning
Initiate a Conservation Area Designation Incentive Program for landowners to protect desert springs and cienegas from livestock access, restore surrounding wetland fringe vegetation, and contribute data about the location and condition of these incredibly important and sensitive resources.											
Work with local landowners and planning partners to identify and designate Important Bird Areas, primarily for grasslands											
Form multi-partner working group(s) to establish scientifically sound best management practices for prescribed fire application for the ecoregion (timing/season, period/duration, intensity, parameters for RX) for the restoration of sites and heterogeneity in grasslands, but also the longterm health and sustainability of desired ecological conditions (plant communities); work with Rx fire technical experts AND rare species experts to identify concerns, barriers, and solutions. Monitor Bairds sparrow, Cassin Sparrow, Long-billed Curlew, Eastern Meadowlark to determine effectiveness of the applied practices											
Form multi-partner working group(s) to establish scientifically sound best management practices for chemical/mechanical brush control for the ecoregion and specific watersheds											
Form multi-partner working group(s) to establish scientifically sound best management practices for riparian restoration (cottonwood, sycamore, other?), 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)											
Create a multi-disciplinary ecology committee to identify three to five years of highest priority research projects (actual projects, not just concepts) that can be rolled out to universities and collegest to collect the information most needed at the PRACTICAL level for management and conservation improvement on the ground.											
Identify a host website to share ecoregional practitioner (not novice, not landowner, but professional) cross-training opportunities for RX fire, stream rehabilitation, reintroductions, brush management, GIS and corridor identification, other ...											

Conservation Action	Direct Mgmt of Natural Resources	Species Restoration	Creation of New Habitat	Acquisition, Easement, or Lease	Land Use Planning	Training, Technical Assistance	Data Collection, Analysis, Management	Conservation Area Designation	Education, Targeted Outreach	Environm Review	Mgmt Planning
<p>Conservation easements and landowner incentive programs are the best instruments for landowner participation in this region. Landowners with intact grasslands (especially those within priority grassland areas identified by the Rio Grande Joint Venture, The Nature Conservancy, Alamito Creek and Terlingua Creek drainages., grasslands with restoration potential for little investment, willing to change to pronghorn-sensitive fencing, riparian corridors along Ecologically Significant Stream Segments (and to their headwaters), and/or cienegas or springs should be first-eligible. Monitoring of key species (to be identified) must be a part of these projects. Information about methods, short and longterm success (or failure) need to be shared through conservation networks (see Statewide/Multi-region Issues handbook – Information Actions section).</p>											
<p>Work with willing landowners <i>especially adjacent to and in corridors between</i> well-managed public lands to restore and manage grassland and riparian communities in large single-ownership or smaller acreage cooperatives – opportunities to connect/improve historically fragmented management</p>											
<p>Work with the planners of the City of El Paso, Ciudad Juarez, El Paso County, Fort Bliss Military Installation, and Grant County (New Mexico) to reduce the human-induced pollution risks and increase water conservation in the following at-risk watersheds: Avispa Canyon – Rio Grande, Mulberry Dam – Rio Grande, McKelligon Canyon, Ascarate Lake – Rio Grande (National Fish Habitat Action Plan, high to very high risk HUC 12 watersheds); identify specific measures that can be implemented and establish monitoring to determine if outreach and coordination with planning entities is effective</p>											
<p>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.</p>											

Conservation Action	Direct Mgmt of Natural Resources	Species Restoration	Creation of New Habitat	Acquisition, Easement, or Lease	Land Use Planning	Training, Technical Assistance	Data Collection, Analysis, Management	Conservation Area Designation	Education, Targeted Outreach	Environm Review	Mgmt Planning	
<p>Information Needs (Specific)</p> <ul style="list-style-type: none"> ▪ Mapping the most invasive species in the region, to determine priority areas for control and restoration ▪ Presence and status of the following species (why? Are these particular indicators in their habitats? Are they highly threatened? Are they good monitoring indicators for particular habitat health?): <ul style="list-style-type: none"> ○ Comanche Springs Pupfish in L. Balmorhea and inlet canal ○ Breeding bird status and distribution in riparian and montane habitats including Montezuma Quail, Common Black-Hawk, Gray Hawk, Yellow-billed Cuckoo, Spotted Owl, Colima Warbler, Summer Tanager ○ Four quail species, pronghorn, mountain lion, black bear, sprague's pipit, mountain plover ○ Wintering grassland birds • Research on effects of managed flows (dam releases) on the Rio Grande and Pecos Rivers, including sediment dynamics and water quality to what management or recommendation end – be specific • Specific levels of impact of groundwater withdrawals on spring and cienega habitats that support rare and endemic species (e.g. Phantom Lake, Diamond Y, where else – be specific about which species you will monitor to determine site health) 												
Review TPWD policies and regulations on trapping of furbearers and non-game species to reduce unintentional loss of non-target SGCN including (black bear, badger, hog-nosed skunk, hooded skunk, western spotted skunk, and swift fox). Increasing trap inspection intervals from every 36 hours to every 24 hours for furbearers and requiring 24 hour trap checks for non-furbearing target species would potentially reduce the number of non-target losses. Consider implementing mandatory trapper education classes to improve trapping techniques that reduce non-target losses												
Review conservation measures and recovery plans for Aplomado Falcon; determine next best steps to engage partners in accepted measures												
River rehabilitation in/adjacent to identified stretches of the Rio Grande/Rio Bravo from Rio Conchos to Amistad: recommendations for instream flow, quality and intensity management; riparian restoration; and specific work to increase resiliency to climate change												
Climate change models and effects on isolated habitats, riparian areas, and springs/groundwater resources												

Conservation Action	Direct Mgmt of Natural Resources	Species Restoration	Creation of New Habitat	Acquisition, Easement, or Lease	Land Use Planning	Training, Technical Assistance	Data Collection, Analysis, Management	Conservation Area Designation	Education, Targeted Outreach	Environm Review	Mgmt Planning
Form a working group of conservation practitioners and landowners adjacent to border fence and potential border fence areas to craft mitigation objectives. Convey these objectives and projects through the TPWD Borderlands liaison and (what other communication mechanisms?). Document whether recommendations were or will be implemented; document successes and barriers to success in conservation practice journals (Communications)											
Host landowner workshops on conservation instruments – Safe Harbor Agreements, Candidate Conservation Agreements, others – to dispel myths about regulatory constraints. Showcase specific studies and examples from the region (or adjacent ecoregions) for better relationship building. Document through conservation practice and partner surveys over the course of three to five years whether the workshops increase opportunities for these tools to be used and the SPECIFIC barriers to their use											
<p>Improve Environmental Review and Consultation for voluntary practices (wind, solar, communications, transportation):</p> <p>Create mapped zones of sensitive areas (raptor migration corridors, proximity to colonial habitats, other?) to share with wind developers to encourage better siting</p> <p>Identify timing and intensity of barotraumas and impact hazards from wind turbines and encourage wind generation companies to modify practices</p> <p>Identify non-compliant communications towers and provide incentives to bring into compliance (lighting, height); outreach to communications companies about the local hazards of communication towers and recommendations to improve practice to improve conditions for all nocturnal migrants and Yellow-billed Cuckoo, Painted Bunting, Summer Tanager,</p> <p>See Transportation section of Statewide/Multi-region handbook regarding bridge and culvert design (in this region, nesting Cave and Cliff Swallows and bats)</p>											
Determine market values that are driving livestock production, hunting and other recreation, and land sales in this region. Craft a recommendation to landowner incentive program providers that can be used to index conservation practice incentives in ecoregions. Monitor whether this approach was effective to change the conservation program values AND landowner participation in those programs before & after the change.											

Conservation Action	Direct Mgmt of Natural Resources	Species Restoration	Creation of New Habitat	Acquisition, Easement, or Lease	Land Use Planning	Training, Technical Assistance	Data Collection, Analysis, Management	Conservation Area Designation	Education, Targeted Outreach	Environm Review	Mgmt Planning
Identify the barriers to RX fire application to significant grassland restoration areas. Make management recommendations (timing, season, periodicity) to overcome barriers AND match more natural fire episode timing. Craft TARGETD outreach plans to overcome these barriers and work with landowners in core grassland restoration and recovery areas to benefit pronghorn, grassland birds, and small mammals and reptiles. Select a few keystone species for monitoring in these areas – see above.											
Work with private landowners and conservation partners to minimize feral hog populations through aerial shooting, hunting, and trapping. Provide technical guidance and educational programs about the impact and management of feral hogs to benefit ground nesting birds, small mammals, aquatic species											
Where wildlife and fisheries management are not the primary objective and where livestock production is the primary objective, refer landowners to partners who can assist them with best management practices for rotational and site-appropriate grazing management											
Species Restoration: <ul style="list-style-type: none"> Pronghorn populations (not just individuals) coincidental with habitat improvement, fence replacement, restocking, parasite research and plan to deal with this problem, genetic enhancement (?) Black-tailed prairie dog – burrowing owl – black-footed ferret ecosystems: introductions, habitat improvement, management recommendations for compatible land uses Monitoring and continued improvement on re-establishment of Rio Grande silvery minnow to the Big Bend reach of the Rio Grande 											
Identify key areas to promote netwire fencing replacement (with strand barbed wire) for pronghorn benefits. Monitor pronghorn use of these areas to determine if this fencing program is an effective conservation technique or whether it should be coupled with other strategies (what other strategies)											

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

CONSERVATION PARTNERS AND PROGRAMS

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

RESOURCES AND REFERENCES

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

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