Section IV – Guideline for the Texas Priority Species List

Associated Tables

Introduction

For many years the management and conservation of wildlife species has focused on the individual animal or population of interest. Many times, directing research and conservation plans toward individual species also benefits incidental species; sometimes entire ecosystems. Unfortunately, there are times when highly focused research and conservation of particular species can also harm peripheral species and their habitats. Management that is focused on entire habitats or communities would decrease the possibility of harming those incidental species or their habitats. A holistic management approach would potentially allow species within a community to take care of themselves (Savory 1988); however, the study of particular species of concern is still necessary due to the smaller scale at which individuals are studied. Until we understand all of the parts that make up the whole can we then focus more on the habitat management approach to conservation.

Species Conservation

In terms of species diversity, Texas is considered the second most diverse state in the Union. Texas has the highest number of bird and reptile taxon and is second in number of plants and mammals in the United States (NatureServe 2002). There have been over 600 species of bird that have been identified within the borders of Texas and 184 known species of mammal, including marine species that inhabit Texas' coastal waters (Schmidly 2004). It is estimated that approximately 29,000 species of insect in Texas take up residence in every conceivable habitat, including rocky outcroppings, pitcher plant bogs, and on individual species of plants (Riley in publication). To relate the species of conservation concern with their priority status, abundance, associated ecoregions and habitats, problems/threats, conservation actions, and needed monitoring a comprehensive chart was developed.

The Texas Priority Species List

Overview

For the Comprehensive Wildlife Conservation Strategy (CWCS) Texas Priority Species List five major groups of wildlife are used to classify all species of concern. These groups are: birds (page 733), mammals (page 744), herptiles (page 748), aquatic species (page 752), and terrestrial invertebrates (page 767). From all species found within Texas, those considered as “priority species” were chosen, listed in the appropriate wildlife group then ranked as a low, medium, or high priority conservation need. Federal and state rankings are listed to distinguish among federally and state endangered and/or threatened species and species of concern. Species without federal or state listings are considered species of concern if they are listed for the CWCS. These species are grouped with federally and state listed species of concern to avoid confusion. NatureServe global, federal and state conservation status rankings are listed for general abundance classifications; however, known numbers of individuals are further identified with actual data where possible. Each species is then linked to the ecoregions or river basins in which they may be found in Texas. Within the ecoregions, acronyms are assigned to habitat classes and are then related to applicable species. Finally, problems or threats, conservation actions, and monitoring plans for each species are designated by a letter and often a number. The following is a guide to this system.

Associated Tabs

Rankings and Status Key (page 778)

Federal and state endangered and threatened *status* rankings are listed and used in the **Status** column of the species list. Again, species without federal and/or state listings are considered species of concern if they are listed for the CWCS. These species are grouped with federally and state listed species of concern to reduce confusion. *Rankings, rank qualifiers, infraspecific taxon, conservation status ranks, variant ranks, national and subnational conservation status rank, and breeding status qualifiers* are used under the global, federal, and state NatureServe abundance ranking when appropriate and available. These are listed in the **Abundance Ranking** column for appropriate species.

Habitat Key (page 780)

For each general habitat class acronyms are assigned for ease of use and to save space in the species list. Typically, the acronym was chosen by the first letters of each habitat class name. This list begins with aquatic and ends with unknown habitat type. It is alphabetized according to the acronym chosen. Once these habitats were assigned acronyms they were used under each ecoregion or river basin to relate to the appropriate species of concern. Each habitat class is separated by a comma if more than one appropriate habitat class is found in the ecoregion. This key is used in the **Ecoregion and Associated Habitats** column of the species list.

Problems Key (page 781)

Problems and threats are first identified with a number for each broad problem type, from agricultural to vehicular traffic issues. These general categories are further broken down into specific problems and threats, designated by a letter. Any appropriate general (number) and specific (letter) problem is related to each species of concern by listing them in the **Problems** column. Species which encounter effects from all specific problems under a general category are designated with just the number. If a species is affected by multiple specific problems in each general category then the general number is followed by the appropriate specific letters. Each group of problems is separated by a comma.

Conservation Actions Key (page 783)

Conservation actions are first identified with a number for each broad action type, from agricultural to vehicular traffic issues. These general categories are further broken down into specific conservation actions, designated by a letter. Any appropriate general (number) and specific (letter) action is related to each species of concern by listing them in the **Conservation Actions** column. Species which may encounter effects from all specific actions under a general category are designated with just the letter. If a species is affected by a few specific conservation actions in each general category then the general number is followed by the appropriate specific letters. Each group of conservation actions is separated by a comma.

Monitoring Key (page 790)

Monitoring plans are first identified with a number for each broad monitoring type, from competition to survey. These general categories are further broken down into specific monitoring plans designated by a letter. Any appropriate general (number) and specific (letter) monitoring plan is related to each species of concern by listing them in the **Monitoring** column. Species which may encounter effects from all specific monitoring under a general category are designated with just the number. If a species may be affected by a few specific monitoring plans in each general category then the general number is followed by the appropriate specific letters. Each group of monitoring plans is separated by a comma.

Citations (page 791 and 850)

Two listed groups of citations are used to indicate the sources of information on wildlife abundance and distribution and also on references used to determine problems and threats. Citations are alphabetized within their appropriate groupings. Citations for high priority species are grouped according to the major groups of wildlife: birds, mammals, herptiles, aquatic, and terrestrial invertebrates. This list is found under the *citations species* tab of the species list. The citations for problems and threats are grouped according to the specific problem listed. The citations list for problems and threats is found under the *citations problems* tab.

Birds

Species Name	Common Name	Priority	Status: Federal	Status: State	Abundance: G	Abundance: S	Pinewoods	Gulf Coast Praries and Marshes	Post Oak Savannah	Blackland Prairie	Cross Timbers and Prairies	Rolling Plains	High Plains	Edwards Plateau	South Texas Plains	Trans-Pecos	Problems	Conservation Actions	Monitoring
***Charadrius melodus*	**Piping plover	High	FT	ST	G3	S2			WL	WL	WL	WL			WL		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
***Dendroica chrysoparia*	**Golden-cheeked warbler	High	FE	SE	G2	S2B								P,PW,W			1a,2cde,3ac,4bd,5fio,6cfg,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
***Grus americana*	**Whooping crane	High	FE	SE	G1	S1		E,MB, MF,MS	WL,NIG, CR	G,NIG, CR							1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
***Picoides borealis*	**Red-cockaded woodpecker	High	FE	SE	G3	S2B	P										1a,2cde,3ac,4bd,5fio,6cfg,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
***Sterna antillarum*	**Least tern (interior)	High	FE	SE	G4T2Q	S3B		A	A	A	A	A	A	A	A		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
***Tympanuchus cupido attwateri*	**Greater prairie-chicken (Attwater's)	High	FE	SE	G4T1	S1B		G,NIG, CR									1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
***Vireo atricapillus*	**Black-capped vireo	High	FE	SE	G2G3	S2B			WFG	P,PW		P,PW,W, S	S	P,PW,W, S	P,PW,W	PW,S	1a,2cde,3ac,4bde,5fio,6cfg,7abde,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Aimophila aestivalis	Bachman's sparrow	High	SC	ST	G3	S3B	NIG,WFG	G,NIG, P,PW									1a,2cde,3ac,4bd,5fio,6cfg,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Aimophila botterii	Botteri's sparrow	High	SC	SC	G4	S3B									NIG		1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Amazona viridigenalis	Red-crowned parrot	High	SC	SC	G2	SNA									U		2e,6,7,9,11,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	all apply
Ammodramus henslowii	Henslow's sparrow	High	SC	SC	G4	S2S3N/SXB	NIG	G,NIG			G,NIG						1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Anas acuta	Northern pintail	High	SC	SC	G5	S3B/S5N	WL,A,CR	WL,A,CR	WL,A,CR	WL,A, CR	WL,A, CR	WL,A,CR	WL,A,CR	WL,A,CR	WL,A,CR	WL,A,CR	1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Anas fulvigula	Mottled duck	High	SC	SC	G4	S4B		WL,G,NIG,CR							WL,NIG		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Anthus spragueii	Sprague's pipit	High	SC	SC	G4	S3N	NIG	G,NIG	NIG	G,NIG	G,NIG	NIG	G		G,NIG		1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd

Aquila chrysaetos	Golden eagle	High	SC	SC	G5	S3B	NIG,WFG		NIG,WFG	G,NIG,P,PW,WFG		NIG,P,PW,W		P,PW,W	NIG,P,PW,W,WFG	G,PW	1a,2cde,3ace,4bd,5fhino,6cdfg,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Athene cunicularia	Burrowing owl	High	SC	SC	G4TU	S2B		G,NIG,CR	NIG,CR	G,NIG,CR	G,NIG,CR	NIG,CR	G,CR		NIG,CR	G,CR	1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	all apply
Buteo regalis	Ferruginous hawk	High	SC	SC	G4	S2B/S4N		NIG,CR	NIG,WFG	G,NIG,P,PW,WFG		NIG,P,PW,W	G,CR		NIG,P,PW,W,WFG		1a,2cde,3ace,4bd,5fhino,6cdfg,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Calothorax lucifer	Lucifer hummingbird	High	SC	SC	G4G5	S4B							S,U			S,U	1,2ce,3ac,4bde,5fi,6,7,9,10,11,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Charadrius alexandrinus	Snowy plover	High	SC	SC	G4	S3B		WL	WL	WL	WL	WL	WL	WL	WL	WL	1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Charadrius montanus	Mountain plover	High	SC	SC	G2	S2			NIG	G,NIG,CR		NIG	G	P	NIG,CR	G	1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Charadrius wilsonia	Wilson's plover	High	SC	SC	G5	S4B		WL							WL		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Circus cyaneus	Northern harrier	High	SC	SC	G5	S2B/S3N	NIG	G,NIG,WL,MB	NIG	G,NIG	G,NIG	NIG	G	P	NIG	G	1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Colinus virginianus	Northern bobwhite	High	SC	SC	G5	S4B	NIG	G,NIG	NIG	G,NIG	G,NIG,S	NIG		S	NIG		1,2ce,3ac,4bde,5fi,6,7abde,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Dendroica cerulea	Cerulean warbler	High	SC	SC	G4	SHB/S3N	WFG	P,PW	WFG	P,PW,WFG	P,PW,W,WFG		B				1a,2cd,3ace,4b,5fhin,6cg,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Egretta caerulea	Little blue heron	High	SC	SC	G5	S5B	WL	WL	WL	WL	WL				WL		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	all apply
Falco peregrinus anatum	American peregrine falcon	High	SC	SE/ST	G4T3	S2B										M	1a,2cde,3ac,4bd,5fio,6cfg,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Falco sparverius	American kestrel (southeastern)	High	SC	SC	G5	S4B	NIG,WFG	G,NIG,P,PW	NIG,WFG	G,NIG,P,PW,WFG					NIG,P,PW,W,WFG		1a,2cde,3ace,4bd,5fhino,6cdfg,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Geothlypis trichas	Common yellowthroat (Brownsville)	High	SC	SC	G5T2	S1B									NIG,MF		1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Helmitheros vermivorum	Worm-eating warbler	High	SC	SC	G5	S3B	WFG	P,PW	WFG	P,PW,WFG	P,PW,W,WFG	P,PW,W	B	P,PW,W			1a,2cd,3ace,4b,5fhin,6cg,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Laterallus jamaicensis	Black rail	High	SC	SC	G4	S2B		WL							WL		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Limnothlypis swainsonii	Swainson's warbler	High	SC	SC	G4	S3B	WFG	P,PW	WFG	P,PW,WFG							1a,2cd,3ace,4b,5fhin,6cg,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Numenius americanus	Long-billed curlew	High	SC	SC	G5	S3B/S5N	NIG	G,NIG,CR	NIG	G,NIG	G,NIG	NIG	G,CR	P	NIG,CR	G	1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd

Oporornis formosus	Kentucky warbler	High	SC	SC	G5	S3B	WFG	P,PW	WFG	P,PW, WFG	P,PW, W,WFG	P,PW,W	B	P,PW,W			1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Rallus elegans	King rail	High	SC	SC	G4G5	S3B	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL	1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Seiurus motacilla	Louisiana waterthrush	High	SC	SC	G5	S3B	WFG	P,PW	WFG	P,PW, WFG	P,PW, W,WFG	P,PW,W	B	P,PW,W			1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Sturnella magna	Eastern meadowlark	High	SC	SC	G5	S5B	NIG,CR	G,NIG, CR	NIG,CR	G,NIG, CR	G,NIG, CR	NIG,CR	G,CR	P,CR	NIG,CR	G,CR	1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Tryngites subruficollis	Buff-breasted sandpiper	High	SC	SC	G4	S2S3	NIG	G,NIG, WL	NIG	G,NIG	G,NIG	NIG	G	P	NIG		1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Tympanuchus pallidicinctus	Lesser prairie-chicken	High	SC	SC	G3	S2B						NIG	G				1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Vermivora chrysoptera	Golden-winged warbler	High	SC	SC	G4	S3	WFG	P,PW	WFG	P,PW, WFG	P,PW, W,WFG	P,PW,W	B				1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
*****Mycteria americana***	**Wood stork	Med	SC	ST	G4	SHB/S2N	WL	WL	WL	WL	WL				WL		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	all apply
Aimophila cassinii	Cassin's sparrow	Med	SC	SC	G5	S4B		G,NIG	WFG	PW	S	S	S	S	B	S	1,2ce,3ac,4bde,5fi,6cfg,7abde,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Ammodramus bairdii	Baird's sparrow (42 accepted state records)	Med	SC	SC	G4	S2					G,NIG	NIG	G	P	NIG	G	1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Ammodramus leconteii	Le Conte's sparrow	Med	SC	SC	G4	S3	NIG	G,NIG, MS			G,NIG			P			1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Asio flammeus	Short-eared owl	Med	SC	SC	G5	S4N	NIG	WL,G,NIG,MB	NIG	G,NG	G,NIG	NIG	G		NIG	G	1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Aythya affinis	Lesser scaup	Med	SC	SC	G5	S3B,S5N	A,WL	A,WL	A,WL	A,WL	A,WL	A,WL	A,WL	A,WL	A,WL	A,WL	1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Aythya americana	Redhead	Med	SC	SC	G5	S3B/S4N	A,WL	A,WL	A,WL	A,WL	A,WL	A,WL	A,WL	A,WL	A,WL	A,WL	1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Buteo swainsoni	Swainson's hawk	Med	SC	SC	G5	S4B	NIG	G,NIG, CR	NIG	G,NIG	G,NIG	NIG	G	P	NIG,CR	G	1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Calcarius pictus	Smith's longspur	Med	SC	SC	G5	S3	NIG				G,NIG						1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Calidris canutus	Red knot	Med	SC	SC	G5	S3N		WL			WL	WL	WL	WL	WL		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Caprimulgus carolinensis	Chuck-will's-widow	Med	SC	SC	G5	S3S4B	WFG	W,PW	WFG	P,PW, WFG	P,PW, W,WFG	P,PW,W	B	P,PW,W	P,PW,W, WFG		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd

Coturnicops noveboracensis	Yellow rail	Med	SC	SC	G4	S3N		WL,MB,MF,MS	WL,NIG	WL,G,NIG	WL,G,NIG	WL,NIG	WL,G		WL,NIG		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Cyrtonyx montezumae	Montezuma quail	Med	SC	SC	G4G5	S3B								P,PW,W		PW	1a,2cde,3ac,4bd,5fio,6cfg,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Dendroica discolor	Prairie warbler	Med	SC	SC	G5	S3B	WFG	P,PW	WFG	P,PW,WFG	P,PW,W,WFG,S	P,PW,W,S	S				1a,2cde,3ace,4bde,5fhin,6cfg,7abde,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Egretta rufescens	Reddish egret	Med	SC	ST	G4	S3B									WL,A		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	all apply
Elanoides forficatus	Swallow-tailed kite	Med	SC	ST	G5	S2B	NIG	G,NIG	NIG	G,NIG			B		P,PW,W		1a,2cd,3ace,4b,5fhin,6cg,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Eremophila alpestris	Horned lark	Med	SC	SC	G5	S5B	NIG	G,NIG,CR	NIG,CR	G,NIG,CR	G,NIG,CR	NIG,CR	G,CR		NIG,CR	G,CR	1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Euphagus carolinus	Rusty blackbird	Med	SC	SC	G5	S3	WFG										1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Haliaeetus leucocephalus	Bald eagle	Med	FT	ST	G4	S3B,S3N	V	V	V	V	V	V	V	V	V		1a,2cde,3ac,4bd,5fio,6cfg,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Icterus cucullatus	Hooded oriole (both Mexican & Sennett's)	Med	SC	SC	G5TU	S4B/S3B		P,PW						P,PW,W,S	P,PW,W,WFG		1a,2cde,3ace,4bde,5fhin,6cfg,7abde,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Icterus graduacauda	Audubon's oriole	Med	SC	SC	G5T4	S3B		P,PW,B							P,PW,W,WFG,B		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Icterus spurius	Orchard oriole	Med	SC	SC	G5	S4B	WFG	P,PW	WFG	P,PW,WFG	P,PW,W,WMG	P,PW,W	B	P,PW,W	P,PW,W,WFG	PW	1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Lanius ludovicianus	Loggerhead shrike	Med	SC	SC	G5	S4B	NIG	G,NIG	NIG	G,NIG	G,NIG	NIG	G	P	NIG	G	1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Limnodromus griseus	Short-billed dowitcher	Med	SC	SC	G5	S3		WL	WL	WL	WL	WL	WL	WL	WL		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Melanerpes erythrocephalus	Red-headed woodpecker	Med	SC	SC	G5	S3B	WFG	P,PW	WFG	P,PW,WFG	P,PW,W,WFG	P,PW,W		P,PW,W			1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Micrathene whitneyi	Elf owl	Med	SC	SC	G5	S4B								P,PW,W	P,PW,W,WFG	PW	1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Otus flammeolus	Flammulated owl	Med	SC	SC	G4	S3B										PW	1a,2cde,3ac,4bd,5fio,6cfg,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Pachyramphus aglaiae	Rose-throated becard (30 accepted state records)	Med	SC	ST	G4G5	SA									P,PW,W,WFG		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Parabuteo unicinctus	Harris's hawk	Med	SC	SC	G5	S3B		P,PW					B	P,PW,W	P,PW,W,WFG	PW	1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd

Passerina ciris	Painted bunting	Med	SC	SC	G5	S4B	NIG	G,NIG,P,PW	NIG	G,NIG,P,PW	G,NIG,P,PW,S,W	NIG,P,PW,S,W	G,S	P,PW,W,S	NIG,P,PW,W	G,PW,S	1a,2cde,3ace,4bde,5fhin,6cfg,7abde,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Pegadis chihi	White-faced ibis	Med	SC	ST	G5	S4B	WL	WL	WL	WL	WL	WL	WL		WL		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	all apply
Picoides villosus	Hairy woodpecker	Med	SC	SC	G5	S4B	F,WFG		F,WFG		P,PW,W	P,PWM,W	S	P,PW,W			1a,2cde,3ac,4bd,5fio,6cfg,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Protonotaria citrea	Prothonotary warbler	Med	SC	SC	G5	S3B	WFG	P,PW	WFG	P,PW,WFG	P,PW,W,WFG	P,PW,W	B	P,PW,W	P,PW,W,WFG		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Rynchops niger	Black skimmer	Med	SC	SC	G5	S4B		A,WL,MB							A,WL,MB		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Setophaga ruticilla	American redstart	Med	SC	SC	G5	S2B	F,WFG	F,P,PW									1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Sitta pusilla	Brown-headed nuthatch	Med	SC	SC	G5	S4B	WFG	P,PW									1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Sterna nilotica	Gull-billed tern	Med	SC	SC	G5	S4B		A,G,NIG,WL,CR							A,NIG,WL,CR		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Thryomanes bewickii	Bewick's wren (eastern)	Med	SC	SC	G5	S5B		P,PW	WFG	P,PW,WFG	P,PW,W,WFG,S						1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Tyto alba	Barn owl	Med	SC	SC	G5	S5B		T,B							NIG,P,PW,W,WFG	G,PW	1a,2cde,3ace,4bd,5fhino,6cdfg,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Recurvirostra americana	American avocet	Med	SC	SC	G5	S4B,S5N	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL	1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
***Pelecanus occidentalis*	**Brown pelican	Low	FT	SE	G4	S3B		A							A		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	all apply
Aeronautes saxatalis	White-throated swift	Low	SC	SC	G5	S4B										PW	1a,2cde,3ac,4bd,5fio,6cfg,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Aimophila ruficeps	Rufous-crowned sparrow	Low	SC	SC	G5	S4B			WFG	PW	S	S		S	B	S	1,2ce,3ac,4bde,5fi,6cfg,7abde,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Amazilia yucatanensis	Buff-bellied hummingbird	Low	SC	SC	G4	S3B		P,PW,U	WFG,U	P,PW,U					P,PW,W,U		1a,2cde,3ac,4bd,5fio,6cfg,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Ammodramus maritimus	Seaside sparrow	Low	SC	SC	G4	S4B		MS							MS		1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Ammodramus nelsoni	Nelson's sharp-tailed sparrow	Low	SC	SC	G5	S4N		MS							MS		1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Ammodramus savannarum	Grasshopper sparrow	Low	SC	SC	G5	S3B	NIG	G,NIG,B	NIG	G,NIG	G,NIG	NIG	G	P,S	NIG,B	G	1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd

Amphispiza bilineata	Black-throated sparrow	Low	SC	SC	G5	S4B					S	S	S	S	B	S	1,2ce,3ac,4bde,5fi,6cfg,7abde,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Archilochus alexandri	Black-chinned sparrow	Low	SC	SC	G5	S5B										S	1,2ce,3ac,4bde,5fi,6cfg,7abde,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Arenaria interpres	Ruddy turnstone	Low	SC	SC	G5	S5		WL							WL		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Asturina nitidus	Gray hawk	Low	SC	ST	G4G5	S2B									P,PW,W	PW	1a,2cde,3ac,4bd,5fio,6cfg,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Aythya valisineria	Canvasback	Low	SC	SC	G5	S4	A,WL,CR,I	A,WL,CR,I	A,WL,CR,I	A,WL,CR,I	A,WL,CR,I	A,WL,CR,I	A,WL,CR,I	A,WL,CR,I	A,WL,CR,I	A,WL,CR,I	1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Bartramia longicauda	Upland sandpiper	Low	SC	SC	G5	S3B,S4N	NIG	G,NIG	NIG	G,NIG	G,NIG	NIG	G	P	NIG	G	1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Botaurus lentiginosus	American bittern	Low	SC	SC	G4	S3	WL	Wl,MB,MF,MS	A	A	A	A	A		A	A	1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Buteo albicaudatus	White-tailed hawk	Low	SC	ST	G4G5	S4B		G,NIG,B,CR							NIG,B,CR		1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Buteo albontatus	Zone-tailed hawk	Low	SC	ST	G4	S3B								P,PW,W	P,PW,W	PW	1a,2cde,3ac,4bd,5fio,6cfg,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Buteo lagopus	Rough-legged hawk	Low	SC	SC	G5	S3N						NIG	G				1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Buteo lineatus	Red-shouldered hawk	Low	SC	SC	G5	S4B	WFG	P,PW	WFG	P,PW,WFG	P,PW,W,WFG			P,PW,W	P,PW,W,WFG		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Buteogallus anthracinus	Common black-hawk	Low	SC	ST	G4G5	S2B									P,PW,W,WFG	PW	1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Calcarius mccownii	McCown's longspur	Low	SC	SC	G5	S4		G,NIG	NIG	G,NIG	G,NIG	NIG	G	P	NIG	G	1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Calidris alba	Sanderling	Low	SC	SC	G5	S5		WL				A	A		A		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Calidris himantopus	Stilt sandpiper	Low	SC	SC	G5	S3		WL,CR	WL,CR	WL,CR	WL,CR	WL,CR	WL,CR	WL,CR	WL,CR		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Calidris mauri	Western sandpiper	Low	SC	SC	G5	S5	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL	1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Callipepla squamata	Scaled quail	Low	SC	SC	G5	S4B					G,NIG,S	NIG,S	G,S	P,S	NIG,P,B	G,S	1,2ce,3ac,4dde,5i,6,7abde,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Camptostoma imberbe	Northern beardless-tyrannulet	Low	SC	ST	G5	S3B									P,PW,W,WFG		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd

Campylorhynchus brunneicapillus	Cactus wren	Low	SC	SC	G5	S4B								S	B		1,2ce,3ac,4bde,5fi,6cfg,7abde,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Cardinalis sinuatus	Pyrrhuloxia	Low	SC	SC	G5	S4B		B						S	B	S	1,2ce,3ac,4bde,5fi,6cfg,7abde,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Catherpes mexicanus	Canyon wren	Low	SC	SC	G5	S5B					S	S	S	S	B	S,PW	1a,2cde,3ace,4bde,5fhin,6cdfg,7abde,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Chaetura pelagica	Chimney swift	Low	SC	SC	G5	S3S4B	U	U	U	U	U	U	U	U	U	U	2e,6,7,9,11,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Chloroceryle americana	Green kingfisher	Low	SC	SC	G5	S4B		RI,ST,A						RI,ST,A	RI,ST,A	RI,ST,A	1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Chondestes grammacus	Lark sparrow	Low	SC	SC	G5	S4B	NIG	G,NIG,P,PW,B	NIG	G,NIG,P,PW	G,NIG,P,PW,W	NIG,P,PW,W	G,CR,B	P,PW,W	NIG,P,PW,W,B	G,PW	1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Chondrohierax uncinatus	Hook-billed kite	Low	SC	SC	G4	S2									P,PW,W,WFG		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Chordeiles minor	Common nighthawk	Low	SC	SC	G5	S4B	NIG,U	G,NIG,U	NIG,U	G,NIG,U	G,NIG,U	NIG,U	G,U	P,U	NIG,U	G,U	1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Cistothorus platensis	Sedge wren	Low	SC	SC	G5	S4	NIG,WL	G,NIG,WL	NIG,WL	G,NIG,WL					NIG,WL		1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Coccyzus americanus	Yellow-billed cuckoo	Low	SC	SC	G5	S4S5B	WFG	P,PW	WFG	P,PW,WFG	P,PW,W,WFG	P,PW,W	B	P,PW,W	P,PW,W,WFG	PW	1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Columba flavirostris	Red-billed pigeon	Low	SC	SC	G5	S3B									P,PW,W,WFG		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Contopus virens	Eastern wood-pewee	Low	SC	SC	G5	S4B	WFG	P,PW	WFG	P,PW,WFG	P,PW,W,WFG	P,PW,W	B	P,PW,W	P,PW,W,WFG		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Corvus imparatus	Tamaulipas crow	Low	SC	SC	G5	S3									U		2e,6,7,9,11,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	all apply
Cyanocorax morio	Brown jay	Low	SC	SC	G5	S2B									P,PW,W,WFG		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Dendrocygna bicolor	Fulvous whistling-duck	Low	SC	SC	G5	S4B		WL,CR,I							WL,CR,I		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Dendroica dominica	Yellow-throated warbler	Low	SC	SC	G5	S4B	WFG	P,PW	WFG	P,PW,WFG	P,PW,W,WFG	P,PW,W	B	P,PW,W	P,PW,W,WFG		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Dryocopus pileatus	Pileated woodpecker	Low	SC	SC	G5	S4B	WFG	P,PW	WFG	P,PW,WFG	P,PW,W,WFG			P,PW,W			1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Egretta thula	Snowy egret	Low	SC	SC	G5	S5B	A,WL	A,WL	A,WL	A,WL	A,WL	A,WL	A,WL	A,WL	A,WL	A,WL	1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	all apply

Egretta tricolor	Tricolored heron	Low	SC	SC	G5	S5B	A,WL	A,WL	A,WL	A,WL	A,WL		A,WL		A,WL		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Empidonax virescens	Acadian flycatcher	Low	SC	SC	G5	S4S5B	WFG	P,PW	WFG	P,PW,WFG	P,PW,W,WFG		B	P,PW,W	P,PW		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Falco columbarius	Merlin	Low	SC	SC	G5	S3N	NIG	G,NIG	NIG	G,NIG		NIG			NIG	G	1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Falco femoralis	Aplomado falcon	Low	FE	SE	G4T2	S1		G,NIG,MB					G		NIG	G	1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Falco mexicanus	Prairie falcon	Low	SC	SC	G5	S3B		G,NIG	NIG	G,NIG			G			G	1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Falco peregrinus tundrius	Arctic peregrine falcon	Low	SC	ST	G4T3T4	S3N	V	V	V	V	V	V	V	V	V	V	1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Gallinago delicata	Wilson's snipe (formerly common snipe)	Low	SC	SC	G5	S5	WL,NIG	WL,G,NIG	WL,NIG	WL,G,NIG	WL,G,NIG	WL,NIG	WL,G	WL,P	WL,NIG	WL,G	1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Glaucidium brasilianum	Ferruginous pygmy-owl	Low	SC	ST	G5T3	S3B									P,PW,W,WFG		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Haematopus palliatus	American oystercatcher	Low	SC	SC	G5	S3B		WL							WL		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Himantopus mexicanus	Black-necked stilt	Low	SC	SC	G5	S5B	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL	1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Hylocichla mustelina	Wood thrush	Low	SC	SC	G5	S4B	WFG	P,PW	WFG	P,PW,WFG	P,PW,W,WFG			P,PW,W	P,PW,W,WFG		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Icterus gularis	Altamira oriole	Low	SC	SC	G5	S3B									P,PW,W,WFG		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Icterus parisorum	Scott's oriole	Low	SC	SC	G5	S3B						P,PW,W,S	S			PW,S	1a,2cde,3ace,4bde,5fhin,6cfg,7abde,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Ictinia mississippiensis	Mississippi kite	Low	SC	SC	G5	S4B	WFG	P,PW	WFG	P,PW,WFG	P,PW,W,WFG	P,PW,W	B	P,PW,W	P,PW,W,WFG	PW	1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Ixobrychus exilis	Least bittern	Low	SC	SC	G5	S4B	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL	1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Limosa fedoa	Marbled godwit	Low	SC	SC	G5	S4		WL,CR			WL	WL	WL	WL	WL		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Limosa haemastica	Hudsonian godwit	Low	SC	SC	G4	S2		WL,CR	WL	WL	WL	WL	WL	WL	WL		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Melanerpes aurifrons	Golden-fronted woodpecker	Low	SC	SC	G5	S5B		P,PW	WFG	P,PW,WFG	P,PW,W,WFG	P,PW,W	B	P,PW,W	P,PW,W,WFG		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd

Myiarchus crinitus	Great crested flycatcher	Low	SC	SC	G5	S4B	WFG	P,PW	WFG	P,PW, WFG	P,PW, W,WFG	P,PW,W	B	P,PW,W	P,PW,W, WFG		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Numenius phaeopus	Whimbrel	Low	SC	SC	G5	S4		WL,CR			WL	A	A		A		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Nyctanassa violacea	Yellow-crowned night-heron	Low	SC	SC	G5	S4B	WL	WL	WL	WL	WL	WL	WL	WL	WL		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	all apply
Ortalis vetula	Plain chachalaca	Low	SC	SC	G5	S3B									P,PW,W, WFG		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Parula pitiayumi	Tropical parula	Low	SC	ST	G5	S3B									P,PW,W, WFG		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Parus atricristatus	Black-crested titmouse	Low	SC	SC	G5			P,PW,F			P,PW, W,WFG	P,PW,W	B	P,PW,W	P,PW,W, WFG		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Passerina versicolor	Varied bunting	Low	SC	SC	G5	S4B								S	B	S	1,2ce,3ac,4bde,5fi,6cfg,7abde,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Patagioenas fasciata	Band-tailed pigeon	Low	SC	SC	G4											PW	1a,2cde,3ac,4bd,5fio,6cfg,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Pelecanus erythrorhynchos	American white pelican	Low	SC	SC	G3	S2B/S3N	A,WL	A,WL	A,WL	A,WL	A,WL	A,WL	A,WL	A,WL	A,WL	A,WL	1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	all apply
Phainopepla nitens	Phainopepla	Low	SC	SC	G5	S4B										PW	1a,2cde,3ac,4bd,5fio,6cfg,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Picoides scalaris	Ladder-backed woodpecker	Low	SC	SC	G5	S5B		P,PW	WFG	P,PW	P,PW, W	P,PW,W	S	P,PW,W	P,PW,W	PW	1a,2cd,3ace,4b,5fhin,6cg,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Platalea ajaja	Roseate spoonbill	Low	SC	SC	G5	S4B	WL	WL	WL	WL					WL		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	all apply
Pluvialis dominica	American golden-plover	Low	SC	SC	G5	S3	NIG,WL	G,NIG, WL,CR	NIG,WL	G,NIG, WL	G,NIG, WL	NIG,WL	G,WL	WL	NIG,WL		1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Podiceps auritus	Horned grebe	Low	SC	SC	G5	S3N	A	A	A	A	A	A	A	A		A	1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Podiceps nigricollis	Eared grebe	Low	SC	SC	G5	S3B,S5N	A	A	A	A	A	A	A	A	A	A	1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Polioptila melanura	Black-tailed gnatcatcher	Low	SC	SC	G5	S4B									B	S	1,2ce,3ac,4bde,5fi,6cfg,7abde,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Porphyrio martinica	Purple gallinule	Low	SC	SC	G5	S4B	WL	WL	WL						WL		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Rallus limicola	Virginia rail	Low	SC	SC	G5	S3B	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL	1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd

Rallus longirostris	Clapper rail	Low	SC	SC	G5	S4B		MS									1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Scolopax minor	American woodcock	Low	SC	SC	G5	S2B/S3N	WFG	P,PW	WFG	P,PW,WFG	P,PW,W,WFG	P,PW,W	B		P,PW,W,WFG		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Spiza americana	Dickcissel	Low	SC	SC	G5	S4B	NIG	G,NIG	NIG	G,NIG	G,NIG	NIG	G	P	NIG	G	1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Spizella breweri	Brewer's sparrow	Low	SC	SC	G5	S4							S	S	B	S	1,2ce,3ac,4bde,5fi,6cfg,7abde,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Spizella pusilla	Field sparrow	Low	SC	SC	G5	S5B	NIG,WFG	B,PW	NIG,WFG	G,NIG,P,PW	G,NIG,P,PW,W	NIG,P,PW,W	G	P,PW,W	NIG,P,PW,W	G,PW	1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Sporophila torqueola	White-collared seedeater	Low	SC	SC	G5	S1B									NIG		1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Sterna forsteri	Forster's tern	Low	SC	SC	G5	S5	A	A	A	A	A	A	A	A	A	A	1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Strix occidentalis	Spotted owl	Low	SC	SC	G3T3	S1B										PW	1a,2cde,3ac,4bd,5fio,6cfg,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	all apply
Sturnella neglecta	Western meadowlark	Low	SC	SC	G5	S5B	NIG,CR	G,NIG,CR	NIG,CR	G,NIG,CR	G,NIG,CR	NIG,CR	G,CR	P,CR	NIG,CR	G,CR	1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Toxostoma crissale	Crissal thrasher	Low	SC	SC	G5	S4B								S		S	1,2ce,3ac,4bde,5fi,6cfg,7abde,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Toxostoma curvirostre	Curve-billed thrasher	Low	SC	SC	G5	S4B		B	WFG	P,PW,WFG		P,PW,W,S	S	P,PW,W,S	P,PW,W,WFG	PW,S	1a,2cde,3ace,4bde,5fhin,6cfg,7abde,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Toxostoma longirostre	Long-billed thrasher	Low	SC	SC	G5	S4B		B							P,PW,W,WFG,B	PW,S	1a,2cde,3ace,4bde,5fhin,6cfg,7abde,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Toxostoma rufum	Brown thrasher	Low	SC	SC	G5	S4B	WFG	B,P,PW	WFG	P,PW,WFG	P,PW,W,WFG			P,PW,W	P,PW,W,WFG		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Tringa flavipes	Lesser yellowlegs	Low	SC	SC	G5	S5	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL	1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Tringa melanoleuca	Greater yellowlegs	Low	SC	SC	G5	S5	WL	WL	WL	WL	WL	WL	WL	WL	WL		1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Tringa solitaria	Solitary sandpiper	Low	SC	SC	G5	S5	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL	1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Tyrannus forficatus	Scissor-tailed flycatcher	Low	SC	SC	G5	S3B	NIG,WFG	G,NIG,P,PW	NIG,WFG	G,NIG,P,PW	G,NIG,P,PW,W	NIG,P,PW,W	G	P,PW,W	NIG,P,PW,W	G,PW	1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Tyrannus tyrannus	Eastern kingbird	Low	SC	SC	G5	S4B	NIG,WFG	G,NIG,P,PW	NIG,WFG	G,NIG,P,PW	G,NIG,P,PW,W	NIG,P,PW,W	G	P,PW,W	NIG,P,PW,W		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd

Tyrannus vociferans	Cassin's kingbird	Low	SC	SC	G5	S3B						NIG,S	G,S			G,S	1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Vermivora crissalis	Colima warbler	Low	SC	SC	G3G4	S3B										PW	1a,2cde,3ac,4bd,5fio,6cfg,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Vermivora luciae	Lucy's warbler	Low	SC	SC	G5	S3B										S	1,2ce,3ac,4bde,5fi,6cfg,7abde,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Vermivora pinus	Blue-winged warbler	Low	SC	SC	G5	S4	WFG	P,PW,F	WFG	P,PW,WFG	P,PW,W,WFG		B		P,PW,W,WFG		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Vermivora virginiae	Virginia's warbler	Low	SC	SC	G5	S3B							S			S	1,2ce,3ac,4bde,5fi,6cfg,7abde,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Vireo bellii	Bell's vireo	Low	SC	SC	G5	S3B	WFG	P,PW	WFG	P,PW,WFG	P,PW,W,WFG,G,S	P,PW,W,S	S	P,PW,W,S	P,PW,W,WFG	PW,S	1a,2cde,3ace,4bde,5fhin,6cfg,7abde,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Vireo flavifrons	Yellow-throated vireo	Low	SC	SC	G5	S4	WFG	P,PW	WFG	P,PW,WFG	P,PW,W,WFG	P,PW,W	B	P,PW,W	P,PW,W,WFG		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Vireo gilvus	Warbling vireo	Low	SC	SC	G5	S3B	WFG	P,PW	WFG	P,PW,WFG	P,PW,W,WFG	P,PW,W	B	P,PW,W	P,PW,W,WFG	PW	1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Vireo vicinior	Gray vireo	Low	SC	SC	G4	S4B						P,PW,W,S	S	P,PW,W,S		PW,S	1a,2cde,3ace,4bde,5fhin,6cfg,7abde,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Elanus leucurus	White-tailed kite	Low	SC	SC	G5	S4B	NIG	G,NIG	NIG,WFG	G,NIG					B,NIG		1,2ce,3ac,4d,5i,6,7ab,8c,10,12,14d	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Wilsonia citrina	Hooded warbler	Low	SC	SC	G5	S5B	WFG	P,PW	WFG	P,PW,WFG	P,PW,W,WFG			P,PW,W	B,P,PW		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Phalaropus tricolor	Wilson's phalarope	Low	SC	SC	G5	S3B,S5N	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL	1a,2ace,3,4abce,5abcdegijklmr,6aceg,7c,8b,9ab,10,11,12,14	1abcefg,2,3,4,5,6,7bcdefghklmnopq,8,9abcdefghi,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Zenaida macroura	Mourning dove	Low	SC	SC	G5	S5B	WFG	P,PW	WFG	P,PW,WFG	P,PW,W,WFG,G,S			P,PW,W,S	P,PW,W,WFG		1a,2cde,3ace,4bde,5fhin,6cfg,7abde,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd
Zonotrichia querula	Harris's sparrow	Low	SC	SC	G5	S4	WFG	B	WFG	P,PW,WFG	P,PW,W,WFG,G,S	P,PW,W,S			B		1a,2cde,3ace,4bd,5fhino,6cgf,7ab,10,12	1,2abcdefgi,3abcde,4,5,6,7abcdefghijklmpq,8abcdefghiklm,9,10,11,12,13,14,15,16	1,2,3,4,5,6,7,8,9abcd

** Listed Species with Recovery Plans

Mammals

Species Name	Common Name	Priority	Status: Federal	Status: State	Abundance Ranking: G	Abundance Ranking: F	Abundance Ranking: S	Pineywoods	Gulf Coast Praries and Marshes	Post Oak Savannah	Blackland Prairie	Cross Timbers and Prairies	Rolling Plains	High Plains	Edwards Plateau	South Texas Plains	Trans-Pecos	Problems	Conservation Actions	Monitoring
***Corynorhinus townsendii*	**Townsend's big-eared bat	High	SC	SC	G4T4		S3?						C,MI,BU,R	C,MI,BU,R	C,MI,BU,R		C,MI,BU,R	2abcd,3a,4fg,5abcdfhipq,7fg,10,12	1abefg,2abcdefg,3acd,4cde,5,6,7abcefhilp,9abcdgijkl,10,12ac,14abe,15	3,4,5,6,7,8,9
***Leopardus pardalis*	**Ocelot	High	FE	SE	G4		S1		P,PW,F							P,PW,W,F	PE,S	2abcd,3a,4fg,5abcdhi,6a,7ag,10,12,13,14d	1d,2acdefg,3ad,4cd,5,6,7ceflp,8cdefkm,9abcdfil,10,12ac,14abe,15	3,4,5,6,7,8,9
Corynorhinus rafinesquii	Rafinesque's big-eared bat	High	SC	ST	G3G4		S3	F,CU,BR,BU,FO										2abcd,3a,4fg,5abcdfhipq,7fg,10,12	1abefg,2abcdefg,3acd,4cde,5,6,7abcefhilp,9abcdgijkl,10,12ac,14abe,15	3,4,5,6,7,8,9
Dipodomys compactus compactus	Padre Island kangaroo rat	High	SC	SC	G4T3		S3		MBI									2abcd,3a,4fg,5abcdhi,7g,10,12,14adf	2acdefgh,3adkl,4acd,5,6,7ceflp,9dfil,10,12ac,14,15	3,4,5,6,7,8,9
Myotis austroriparius	Southeastern myotis	High	SC	SC	G3G4		S3	F,CU,FO,BR,C		F,CU,FO,BR,C	F,CU,FO,BR,C							2abcdf,3a,4bfg,5abcdfhipq,7fg,10,12	1abefg,2abcdefg,3acd,4cde,5,6,7abcefhilp,9abcdgijkl,10,12ac,14abe,15	3,4,5,6,7,8,9
Nasua narica	White-nosed coati	High	SC	ST	G5		S2?		F,P,PW						F,P,PW,W	F,P,PW,W	PW	2abcd,3a,4fg,5ei,6a,7ag,10,12,13	1d,2acdefg,3ad,4cd,5,6,7ceflp,8cdefkm,9abcdfil,10,12ac,14abe,15	3,4,5,6,7,8,9
***Leptonycteris nivalis*	**Mexican/Greater longnosed bat	Med	FE	SE	G3		S1										PW,S	5pqr,7g,12,13	6,7lq,9l,12ac,14abe,15	1,3,4,5,6,7,8,9
***Ursus americanus luteolus*	**Louisiana black bear	Med	FT	ST	G5T3		SNA	F										2abcd,3a,4fg,5abcdehi,7ag,10,12	2acdefg,4cd,5,6,7eflp,9dl,10,12ac,14abe,15	3,4,5,6,7,8,9
Antilocapra americana	Pronghorn	Med	SC	SC	G5	N5	S5						NIG	G			G	1b,2bc,4df,7bd	1abcef,2acdfg,4abc,8gh,9abcdgil,10,12,14ab,e,15	3,4,5,6,7,8,9
Blarina hylophaga plumblea	Elliot’s short-tailed shrew	Med	SC	SC	G5T1Q		S1		F,MB	F	F							2abcd,3a,4fg,5abcdhi,7g,12,13	2acdefgh,3adkl,4acd,5,6,7ceflp,9dfil,12ac,14,15	3,4,5,6,7,8,9
Chaetodipus nelsoni	Nelson's pocket mouse	Med	SC	SC	G5											RS	RS	1,5i,7g,12	1abefg,5,6,7lp,9l,12ac,14abe,15	3,4,5,6,7,8,9
Conepatus leuconotus	Hog-nosed skunk	Med	SC	SC	G5				B,G,NIG			B,G,NIG	B,NIG	B,G	B,P	B,NIG	B,G	7g	5,6,12,15	3,4,5,6,7,8,9
Cynomys ludovicianus	Black-tailed prairie dog	Med	SC	SC	G5T3		S3						NIG,P,PW	G	P,PW		G,PW	1,2abcd,3a,4fg,5ei,7fg,10,12,14d	1abefg,2acdefg,3ad,4acd,5,6,7ceflp,9dil,10,11a,12ac,14abe,15	3,4,5,6,7,8,9
Dipodomys elator	Texas kangaroo rat	Med	SC	ST	G2		S2					G,NIG,P,PW	NIG,P,PW					13	5,6,7l,9l,12ac,14abe,15	3,4,5,6,7,8,9
Dipodomys spectabilis	Banner-tailed kangaroo rat	Med	SC	SC	G5	S5	S4							G,GS			G,GS	1b,2bc,4df,7bd	1abcef,2acdfg,4abc,8gh,9abcdgil,10,12,14ab,e,15	3,4,5,6,7,8,9

Geomys attwateri	Attwaters pocket gopher	Med	SC	SC	G4		S4		G	NIG	G,NIG					NIG		1,2abcd,3a,4fg,5i,6c,7bdg,9bce,10,12,14d	1abefg,2acdefg,3ad,4acd,5,6,7ceflp,8cdefghk,9abcdfgil,10,11ab,12ac,14abe,15	3,4,5,6,7,8,9
Geomys aurenarius	Desert pocket gopher	Med	SC	SC	G3		S2								B		B	1,2abcd,3a,4fg,5i,6c,7bdg,9bce,10,12,14d	1abefg,2acdefg,3ad,4acd,5,6,7ceflp,8cdefghk,9abcdfgil,10,11ab,12ac,14abe,15	3,4,5,6,7,8,9
Geomys streckerii	Strecker's pocket gopher	Med	SC	SC	G4T1	C2	S1									B,NIG		1,2abcd,3a,4fg,5ei,7fg,10,12,14d	1abefg,2acdefg,3ad,4acd,5,6,7ceflp,9dil,10,11a,12ac,14abe,15	3,4,5,6,7,8,9
Lutra canadensis	River otter	Med	SC	SC	Appendix II, CITES			WL,MB	WL,MB		WL,MB	WL,MB			WL,MB			3,4,5abcdeghijkln,6a,9,12	2acdefg,3acdefijkl,4acd,6,7cdefghjklmnpq,8m,9defl,10,11abd,12,14,15	3,4,5,6,7,8,9
Mephitis macroura	Hooded skunk	Med	SC	SC	G5		S4										B	7g	6,7l,9l,12ac,14abe,15	3,4,5,6,7,8,9
Mustela frenata	Long-tailed weasel	Med	SC	SC	G5		S5	W,WFG	B,F,PW	F,WFG	F,PW,WFG	B,PW,W,WFG	B,PW,W	B	B,F,PW,W	B,F,PW,W,WFG	B,PW	7g	6,7l,9l,12ac,14abe,15	3,4,5,6,7,8,9
Mustela nigripes	Black-footed ferret	Med	FE	SE	G1	N1	SH					G,NIG,P,PW	NIG,P,PW	G,S	P,PW,S		G,PW,S	5e,6a,7fg,12	1abcef,2acdfg,4abc,8gh,9abcdgil,10,12,14ab,e,15	3,4,5,6,7,8,9
Oryzomys couesi aquaticus	Coues rice rat	Med	SC	ST	G5T?		S2		RE							RE		1,2abcd,4e,5di,7ag,10,12,13,14d	1abdefg,2acdefg,3acdei,4acde,6,7l,9il,10,12ac,14abe,15	3,4,5,6,7,8,9
Peromyscus truei comanche	Palo Duro mouse	Med	SC	ST	G5T3Q		S2						R	R				13	5,6,7l,9l,12ac,14abe,15	3,4,5,6,7,8,9
Puma concolor	Mountain lion	Med	SC	SC	G5		S2	W,WFG	B,F,P,PW	F,WFG	F,P,PW,WFG	B,P,S,PW,W,WFG	B,S,P,PW,W	B,S	B,F,P,S,PW,W	B,F,P,PW,W,WFG	B,PW,S	2abcd,3a,4fg,5abcdehi,7ag,10,12	2acdefg,4cd,5,6,7eflp,9dl,10,12ac,14abe,15	3,4,5,6,7,8,9
Spilogale gracilis	Western spotted skunk	Med	SC	SC	G5		S5						NIG,B	G,B	B,P	B,NIG	B,G	7g	6,7l,9l,12ac,14abe,15	3,4,5,6,7,8,9
Spilogale putorius	Eastern spotted skunk	Med	SC	SC	G4T		S4	NIG,WFG	G,NIG,P,PW		G,NIG,P,PW	G,NIG,P,PW,W	NIG,P,PW,W	G	P,PW,W	NIG,P,PW,W		7g	6,7l,9l,12ac,14abe,15	3,4,5,6,7,8,9
Sylvilagus robustus	Davis Mountain cottontail	Med	SC	SC	G5TU												B	7g	6,7l,9l,12ac,14abe,15	3,4,5,6,7,8,9
Tamias canipes	Gray-footed chipmunk	Med	SC	SC	G3		S2S3										G,PW	1,13	1abefg,5,6,7l,9l,12ac,14abe,15	3,4,5,6,7,8,9
Taxidea taxus	American badger	Med	SC	SC	G5		S5		G,NIG,P,PW	NIG	G,NIG,P,PW	G,NIG,P,PW	NIG,P,PW	G	P,PW	NIG,P,PW,W	G,PW	1,2abcd,3a,4fg,5i,7g,12	1abefg,2acdefg,4acd,6,7cefl,9dil,10,12ac,14abe,15	3,4,5,6,7,8,9
Thomomys bottae guadalupensis	Southern pocket gopher	Med	SC	SC	G5T2	N2	S2										G,B	1,5ir,9e,12	1abefg,5,6,7lq,9l,11ab,12ac,14abe,15	3,4,5,6,7,8,9
Ursus americanus	Black bear	Med	SC	ST	G5		S3								F,P,PW,S		PWMS	2abcd,3a,4fg,5abcdehi,7ag,10,12	2acdefg,4cd,5,6,7eflp,9dl,10,12ac,14abe,15	3,4,5,6,7,8,9
Vulpes velox	Swift fox (kit fox)	Med	SC	SC	G3		S3?						NIG,B	G,B	B,P		G,B	2abcd,3a,5ei,7g,10,12	2acdefg,3ad,6,7ceflp,9l,10,11a,12ac,14abe,15	3,4,5,6,7,8,9

***Trichechus manatus*	**West Indian manatee	Low	FE	SE	G2		S1		E									3,4,5abcdeghijklmnpr,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9ae
Ammospermophilus interpres	Texas antelope squirrel	Low	SC	SC	G4G5		S4										PW	1,7g,13	1abefg,5,6,7l,9l,12ac,14abe,15	3,4,5,6,7,8,9
Antrozous pallidus	Pallid bat	Low	SC	SC	G5		S5						NIG,P,PW,S	G,S	P,PW,B,S,F		B,G,PW,S	5ep,7fg,12	6,7l,9l,12ac,14abe,15	3,4,5,6,7,8,9
Blarina carolinensis	Southern short-tailed shrew	Low	SC	SC	G5N5			F,WFG		F,WFG								4fgh,7g,8d,12,13	2acdfg,4abc,9l,10,12,14ab,e,15	3,4,5,6,7,8,9
Chaetodipus eremicus	Chihuahuan Desert pocket mouse	Low	SC	SC	G5		S5										B	uk	6,7l,9l,12ac,14abe,15	3,4,5,6,7,8,9
Cratogeomys castanops	Yellow-faced pocket gopher	Low	SC	SC									RS	RS			RS	7g	5,6,7l,9l,12ac,14abe,15	3,4,5,6,7,8,9
Erethizon dorsatum	Porcupine	Low	SC	SC	G5		S5						B,P,PW,W	B,S	B,F,P,PW,W		B,PW,S	7g	6,7l,9l,12ac,14abe,15	3,4,5,6,7,8,9
Euderma maculatum	Spotted bat	Low	SC	ST	G4		S2										B,G,PW,S	7g	2b,6,7l,9jkl,12ac,14abe,15	3,4,5,6,7,8,9
Eumops perotis californicus	Greater western bonneted bat	Low	SC	SC	G5T4		S3										RS	2b,5in,7eg,12	2acef,3ei,4acd,6,7cjklmq,9ehl,12ac,14abe,15	3,4,5,6,7,8,9
Geomys personatus davisi	Texas (Davis') Pocket Gopher	Low	SC	SC	G4T2		S2									SS		4fgh,7g,8d,12,13	2acdfg,4abc,9l,10,12,14ab,e,15	3,4,5,6,7,8,9
Geomys personatus maritimus	Maritime pocket gopher	Low	SC	SC	G4		S4		SS							SS		2abcd,3ac,4fg,5di,7g,12,14f	2acef,3adk,4acd,5,6,7clmp,9del,12ac,14abe,15	3,4,5,6,7,8,9
Geomys personatus personatus	Barrier island Texas pocket gopher	Low	SC	SC	G4TNR	NNR	SNR		G,NIG,MB									2abcd,3ac,4fg,5adi,7g,12,14f	2acef,3adk,4acd,5,6,7clmp,9del,12ac,14abe,15	3,4,5,6,7,8,9
Geomys texensis bakeri	Frio pocket gopher	Low	SC	SC	G2QT2	N2	S2								P,PW	NIG		1,2abcd,3ac,4fg,5di,7g,12,14f	1abefg,2acef,3adk,4acd,5,6,7clmp,9del,12ac,14abe,15	3,4,5,6,7,8,9
Geomys texensis texensis	Llano pocket gopher	Low	SC	SC	G3T2		S2								SS			1,2abcd,3ac,4fg,5di,7g,12,13,14f	1abefg,2acef,3adk,4acd,5,6,7clmp,9del,12ac,14abe,15	3,4,5,6,7,8,9
Herpailurus yaguarondi	Jaguarundi	Low	FE	SE	G4		S1		B							B		1,2abcd,3a,4fg,5i,7ag,10,12,13,14d	1abdefg,2acdefg,6,7l,9il,10,12ac,14abe,15	3,4,5,6,7,8,9
Lasiurus ega	Southern yellow bat	Low	SC	ST	G5		S1		FO							FO		2b,5dp,7fg,9e,12,13	2bdf,6,7lq,9l,11ab,12ac,14abe,15	3,4,5,6,7,8,9
Lasiurus xanthinus	Western yellow bat	Low	SC	SC	G5		S1									FO	FO	7g	2b,6,7l,9l,12ac,14abe,15	3,4,5,6,7,8,9
Microtus mogollonensis	Mogollon vole	Low	SC	SC	G4G5Q		SNR										PW	1,5in,7c,9,12	1abdefg,3acdi,4acde,6,7cefjklmp,9defil,10,12,14,15	3,4,5,6,7,8,9

Microtus ochrogaster	Prairie vole	Low	SC	SC	G5		S1	NIG					NIG	G				1,5i,7bg,12	1abefg,2acdefg,3ad,4acd,5,6,7p,9il,12ac,14abe,15	3,4,5,6,7,8,9
Mormoops megalophylla	Ghost-faced bat	Low	SC	SC	G4		S2								B,P,PW,S,C,TU,MI	B,P,PW,C,TU,MI	B,PW,S,C,TU,MI	5pq,7g,12,13	6,7l,9l,12ac,14abe,15	3,4,5,6,7,8,9
Myotis velifer	Cave myotis	Low	SC	SC	G5		S4				C,CU,BU,N,BR,R	C,CU,BU,N,BR,R	C,CU,BU,N,BR,R	C,CU,BU,N,BR,R	C,CU,BU,N,BR,R	C,CU,BU,N,BR,R	C,CU,BU,N,BR,R	7g	2b,6,7l,9jkl,12ac,14abe,15	3,4,5,6,7,8,9
Myotis yumanensis	Yuma myotis	Low	SC	SC	G5		S4								C,MI,BU,R	C,MI,BU,R	C,MI,BU,R	2b,5pq,7fg,12	6,7l,9jkl,12ac,14abe,15	3,4,5,6,7,8,9
Mytois thysanodes	Fringed myotis	Low	SC	SC	G5		S3										G,S,PW	2b,5pq,7fg,12	6,7l,9jkl,12ac,14abe,15	3,4,5,6,7,8,9
Notisorex crawfordii	Desert shrew	Low	SC	SC	G5		S4							UK		UK	UK	7g	5,6,7l,9l,12ac,14abe,15	3,4,5,6,7,8,9
Nyctinomops femorosaccus	Pocketed free-tailed bat	Low	SC	SC	G4		S3										C,R,BU	2b,5in,7eg,12	2acef,3ei,4acd,6,7cjklmq,9ehl,12ac,14abe,15	3,4,5,6,7,8,9
Nyctinomops macrotis	Big free-tailed bat	Low	SC	SC	G5		S3		C,FO,BU,R				C,FO,BU,R	C,FO,BU,R		C,FO,BU,R	C,FO,BU,R	2b,5in,7eg,12	2acef,3ei,4acd,6,7cjklmq,9ehl,12ac,14abe,15	3,4,5,6,7,8,9
Onychomys arenicola	Mearn's grasshopper mouse	Low	SC	SC	G4G5		S4S5										G,S,PW	7g,13	5,6,7l,9l,12ac,14abe,15	3,4,5,6,7,8,9
Peromyscus nasutus	Northern rock mouse	Low	SC	SC	G5		S4										R	4fgh,7g,8d,12,13	2acdfg,4abc,9l,10,12,14ab,e,15	3,4,5,6,7,8,9
Scalopus aquaticus texanus	Presidio mole	Low	SC	SC	G5T1Q		S1										SS	7g	5,6,7l,9l,12ac,14abe,15	3,4,5,6,7,8,9
Sigmodon fulviventer dalquesti	Tawny-bellied cotton rat	Low	SC	SC	G?												G,PW	1,7g	1abefg,5,6,7l,9l,12ac,14abe,15	3,4,5,6,7,8,9
Sylvilagus aquaticus	Swamp rabbit	Low	SC	SC	G5		S5	MB,A	MB,A	MB,A	MB,A	MB,A			MB,A			3,4,5abcdeghijkln,6a,9,12	2acdefg,3acdefijkl,4acd,6,7cdefghjklmnpq,8m,9defl,10,11abd,12,14,15	3,4,5,6,7,8,9
Tadarida brasiliensis	Brazilian free-tailed bat	Low	SC	SC	G5		S5	V	V	V	V	V	V	V	V	V	V	2b,5pq,7fg,9e,12	2b,6,7l,9jkl,11ab,12ac,14abe,15	3,4,5,6,7,8,9
Thomomys bottae limpia	Limpia southern pocket gopher	Low	SC	SC	G5T2	C2	S2										PW	1,8d,12	1abefg,5,6,7lq,9l,12ac,14abe,15	3,4,5,6,7,8,9
Thomomys bottae texensis	Limpia Creek pocket gopher	Low	SC	SC	G5T2	N2	S2										G	1,12	1abefg,5,6,7lq,9l,12ac,14abe,15	3,4,5,6,7,8,9

** Listed Species with Recovery Plans

Aquatic

Taxa Category	Species Name	Common Name	Priority	Status: Federal	Status: State	Abundance Ranking: G	Abundance Ranking: S	Brazos	Canadian	Colorado	Cypress Creek	Guadalupe	Lavaca	Neches	Nueces	Red	Rio Grande	Sabine	San Antonio	San Jacinto	Sulphur	Trinity	Gulf of MX	Problems	Conservation Actions	Monitoring
	Black corals		Low	SC	SC																		O,SW	mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Fire corals		Low	SC	SC																		O,SW	mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Hydrocorals		Low	SC	SC																		O,SW	mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Octocorals		Low	SC	SC																		O,SW	mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Stony corals		Low	SC	SC																		O,SW	mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Amphipods	*Gammarus hyalelloides*	Diminuitive amphipod	High	FC	SC	G1	S1										AQ,ST,L,MF							2,3,4,8ab,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Gammarus pecos	Diamond Y amphipod	High	SC	SC	G1	S1										AQ,ST							2,3,4,5abcdeghijklmnpr,8ab,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Gammarus sp. 1 (Lang et al. 2003)	Griffin Spring amphipod	High	SC	SC												AQ,ST							2,3,4,5abcdeghijklmnpr,8ab,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Gammarus sp. 2 (Lang et al. 2003)	East Sandia Spring amphipod	High	SC	SC												AQ,ST							2,3,4,5abcdeghijklmnpr,8ab,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Gammarus sp. C (Cole 1985)	Phantom Lake amphipod	High	SC	SC												AQ,ST							2,3,4,5abcdeghijklmnpr,8ab,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Gammarus sp. M (Cole 1985)	Toyahvale amphipod	High	SC	SC												AQ,ST							2,3,4,5abcdeghijklmnpr,8ab,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Gammarus sp. S (Cole 1985)	San Solomon Spring amphipod	High	SC	SC												AQ,ST							2,3,4,5abcdeghijklmnpr,8ab,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Ingolfiella n. sp.	Comal Springs ingolfiellid amphipod	High	SC	SC							AQ							AQ					2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Stgobromus pecki	Peck's Cave amphipod	High	FE	SE/ST	G1	S1					AQ							AQ					2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Stygobromus balconis	Balcones Cave amphipod	High	SC	SC	G1	S1			AQ														2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a

	Stygobromus bifurcatus	Bifurcated Cave amphipod	High	SC	SC	G1	S1	AQ	AQ	AQ					AQ		2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Stygobromus dejectus	Cascade Cave amphipod	High	SC	SC	G1	S1			AQ					AQ		2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Stygobromus flagellatus	Ezell's Cave amphipod	High	SC	SC	G1	S1		AQ	AQ					AQ		2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Stygobromus hadenoecus	Devil's Sinkhole amphipod	High	SC	SC	G1	S1					AQ					2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Stygobromus limbus	Border Cave amphipod	High	SC	SC								AQ				2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Stygobromus longipes	Long-legged Cave amphipod	High	SC	SC	G1	S1			AQ					AQ		2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Stygobromus n. sp. 1	Lost Maples Cave amphipod	High	SC	SC							AQ					2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Stygobromus n. sp. 2	Neel's Cave amphipod	High	SC	SC				AQ								2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Stygobromus reddelli	Reddell's Cave amphipod	High	SC	SC	G1	S1		AQ								2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Artesia subterranea	Hadziid amphipod	Med	SC	SC		SNR			AQ					AQ		2,3,4,5abcdeghijklmnpr,8ab,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Holsingerius samacos	Hadziid amphipod	Med	SC	SC					AQ					AQ		2,3,4,8ab,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Hyalella texana	Clear Creek amphipod	Med	SC	SC	G1	S1		AQ,ST								2,3,4,8ab,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Texiweckelia texensis	Hadziid amphipod	Med	SC	SC					AQ					AQ		2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Isopods	*Caecidotea* n. sp	Big Thicket blind isopod	High	SC	SC						AQ,ST			AQ,ST		AQ,ST	2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Caecidotea n. sp	Cave Springs isopod	High	SC	SC						AQ,ST			AQ,ST		AQ,ST	2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Liceolus n. sp.	Dandrige Springs isopod	High	SC	SC								AQ				2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Liceolus smithii	San Marcos well isopod	Med	SC	SC		S1			AQ					AQ		2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Crayfish	*Procambarus nechesae*	Neches crayfish	High	SC	SC	G1G2	S1S2				ST			ST		ST	2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a

	Procambarus nigrocinctus	Black-girdled crayfish	High	SC	SC									ST,PY				ST,PY			ST,PY			2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Procambarus nueces	Nueces crayfish	High	SC	SC		S1								ST									2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Procambarus steigmani	Steigmans crayfish	High	SC	SC	G1?	S1?													ST,RI,I,MF		ST,RI,I,MF		2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Procambarus texanus	Smithville crayfish	High	SC	SC	G1	S1			I,O														2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Cambarellus ninae	Texas coastal crayfish	Med	SC	SC	G3	SNR					I,MF	I,MF		I,MF				I,MF					2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Fallicamberus devastator	Texas prairie crayfish	Med	SC	SC	G3	S2?							ST,RI,I,MF				ST,RI,I,MF			ST,RI,I,MF			2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Fallicamberus macneesei	MacNeeses crayfish	Med	SC	SC			ST,RI,I,MF												ST,RI,I,MF		ST,RI,I,MF		2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Orconectes maletae	Upshur crayfish	Med	SC	SC	G2	S1?							ST,RI,I,MF		ST,RI,I,MF		ST,RI,I,MF			ST,RI,I,MF			2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Procambarus brazoriensis	Brazoria crayfish	Med	SC	SC			ST,RI,I,MF																2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Procambarus kensleyi	Kensleys crayfish	Med	SC	SC	G3	S3							ST,RI,I,MF		ST,RI,I,MF		ST,RI,I,MF			ST,RI,I,MF			2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Shrimp	*Macrobrachium acanthurus*	Cinnamon river shrimp	High	SC	SC												ST,RI,I,L,E							2,4,5abcdeghijklmnpr,6acdefg,7cf,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Macrobrachium carcinus	Bigclaw river shrimp	High	SC	SC			ST,RI,I,L,E		ST,RI,I,L,E		ST,RI,I,L,E	ST,RI,I,L,E	ST,RI,I,L,E	ST,RI,I,L,E		ST,RI,I,L,E	ST,RI,I,L,E	ST,RI,I,L,E	ST,RI,I,L,E		ST,RI,I,L,E		2,4,5abcdeghijklmnpr,6acdefg,7cf,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Macrobrachium ohione	Ohio shrimp	Med	SC	SC			ST,RI,I,L,E		ST,RI,I,L,E		ST,RI,I,L,E	ST,RI,I,L,E	ST,RI,I,L,E	ST,RI,I,L,E			ST,RI,I,L,E	ST,RI,I,L,E		ST,RI,I,L,E			2,4,5abcdeghijklmnpr,6acdefg,7cf,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Macrobrachium olfersii	Bristled river shrimp	Med	SC	SC							ST,RI,I,L,E	ST,RI,I,L,E				ST,RI,I,L,E		ST,RI,I,L,E					2,4,5abcdeghijklmnpr,6acdefg,7cf,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Pleoticus robustus	Royal red shrimp	Med	SC	SC																		SW	2,4,5abcdeghijklmnpr,6acdefg,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Calathaemon holthuisi	Ezell's Cave shrimp	Low	SC	SC							AQ							AQ					2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Farfantopenaeus aztecus	Brown shrimp	Low	SC	SC			SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E			SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E	mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Penaeus aztecus	Brown shrimp		SC	SC			SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E			SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E	mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a

	Farfantopenaeus duorarum	Pink shrimp	Low	SC	SC			SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E			SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E	mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Penaeus duorarum	Pink shrimp		SC	SC			SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E			SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E	mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Litopenaeus setiferus	White shrimp	Low	SC	SC			SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E			SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E	mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Penaeus setiferus	White shrimp		SC	SC			SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E			SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E	mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Other Crustaceans	*Iberobathynella bowmani*	Bathynellid: primative crustacean	Med	SC	SC					AQ														2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Crabs	*Callinectes sapidus*	Blue crab	Low	SC	SC			SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E			SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E	mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Insects	*Erpetogomphus eutainia*	Blue-faced ringtail (dragonfly)	High	SC	SC	G4	SNR					AQ,RI							AQ,RI					2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Erythrodiplax fusca	Red-faced dragonlet (dragonfly)	High	SC	SC	G4	SNR			T,RI,I,PY,L,MF														2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Gomphus gonzalezi	Tamaulipan clubtail (dragonfly)	High	SC	SC	G2	SNR										ST,RI							5abcdeghijklmnpr	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Heterelmis comalensis	Comal Springs riffle beetle	High	FE	SC	G1	S1					AQ							AQ					2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Limnebius texanus	Texas minute moss beetle	High	SC	SC		SH										AQ,ST							2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Protoptila arca	San Marcos saddle-case caddisfly	High	SC	SC	G1	S1					AQ,ST							AQ,ST					2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Stygoparnus comalensis	Comal Springs dryopid beetle	High	FE	SC	G1	S1					AQ							AQ					2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Comaldessus stygius	Comal Springs diving beetle	Med	SC	SC	G1	S1					AQ							AQ					2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Haideoporous texanus	Texas diving beetle	Med	SC	SC	G1	S1					AQ							AQ					2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Homoleptohyphes mirus	Desert stream mayfly	Med	SC	SC		SNR										AQ,ST							2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Leptobasis melinogaster	Cream-tipped swampdamsel	Med	SC	SC	GNR	SNR								ST									uk	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Somatochlora margarita	Texas emerald (dragonfly)	Med	SC	SC	G2	S2				ST			ST		ST		ST		ST	ST	ST		5abcdeghijklmnpr	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a

	Stictotarsus neomexicanus	Bonita diving beetle	Med	SC	SC		S1								ST						2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Mussels	***Arkansia wheeleri*	**Ouachita rock-pocketbook	High	FE	SE	G1	S1			ST,RI				ST,RI							mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Fusconaia askewi	Texas pigtoe	High	SC	SC	G2	S1S2			ST,RI		ST,RI		ST,RI		ST,RI		ST,RI	ST,RI	ST,RI	mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Fusconaia lananensis	Triangle pigtoe	High	SC	SC	G1Q	S1									ST,RI			ST,RI		mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Lampsilis bracteata	Texas fatmucket	High	SC	SC	G1	SNR	ST,RI	ST,RI												mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Lampsilis satura	Sandbank pocketbook	High	SC	SC	G2	S1			ST,RI, I,L?		ST,RI, I,L?		ST,RI, I,L?		ST,RI, I,L?		ST,RI, I,L?		ST,RI, I,L?	mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Obovaria jacksoniana	Southern hickorynut	High	SC	SC	G2G3	SNR			ST,RI		ST,RI		ST,RI		ST,RI			ST,RI		mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Pleurobema riddellii	Louisiana pigtoe	High	SC	SC	G1G2	S1			ST,RI		ST,RI		ST,RI		ST,RI		ST,RI	ST,RI	ST,RI	mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Popenaias popeii	Texas hornshell	High	FC	SC	G1	S1		ST,RI						ST,RI						mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Potamilus amphichaenus	Texas heelsplitter	High	SC	SC	G1	S1					ST,RI, I				ST,RI, I		ST,RI, I	ST,RI, I	ST,RI, I	mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Potamilus metnecktayi	Salina mucket	High	SC	SC		S1								ST,RI						mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Quadrula aurea	Golden orb	High	SC	SC	G1	SNR		ST,RI, I		ST,RI, I		ST,RI, I				ST,RI, I				mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Quadrula couchiana	Rio Grande monkeyface	High	SC	SC	GH	SH								ST,RI						mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Quadrula houstonensis	Smooth pimpleback	High	SC	SC	G2	SNR	ST,RI, I	ST,RI, I												mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Quadrula petrina	Texas pimpleback	High	SC	SC	G2G3	SNR		ST,RI		ST,RI						ST,RI				mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Quincuncina mitchelli	False spike	High	SC	SC	G1	SH	ST,RI	ST,RI		ST,RI				ST,RI		ST,RI				mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Truncilla cognata	Mexican fawnsfoot	High	SC	SC	GH	SH								ST,RI						mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Truncilla macrodon	Texas fawnsfoot	High	SC	SC	G2	SNR	ST,RI	ST,RI												mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a

	Quadrula nodulata	Wartyback	Med	SC	SC	G4	S2S3				ST,RI,I,L			ST,RI,I,L		ST,RI,I,L		ST,RI,I.L			ST,RI,I,L		mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Truncilla donaciformis	Fawnsfoot	Med	SC	SC	G5	S1							ST,RI,I,L		ST,RI,I,L		ST,RI,I,L		ST,RI,I,L	ST,RI,I,L	ST,RI,I,L	mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Arcidens confragosus	Rock pocketbook	Low	SC	SC	G4	SNR	ST,RI,I,L		ST,RI,I,L	ST,RI,I,L	ST,RI,I,L		ST,RI,I,L		ST,RI,I,L		ST,RI,I,L	ST,RI,I,L	ST,RI,I,L	ST,RI,I,L	ST,RI,I,L	mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Lasmigona complanata	White heelsplitter	Low	SC	SC	G5	S1					ST,RI,I,L							ST,RI,I,L	ST,RI,I,L		ST,RI,I,L	mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Strophitus undulatus	Creeper	Low	SC	SC	G5	S1	ST,RI,I,L		ST,RI,I,L	ST,RI,I,L	ST,RI,I,L		ST,RI,I.L		ST,RI,I,L		ST,RI,I.L	ST,RI,I,L	ST,RI,I,L	ST,RI,I,L	ST,RI,I,L	mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Snails	*Assiminea pecos*	Pecos assiminea	High	FC	SC	G2	S1										AQ						2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Cochliopa texana	Phantom Cave snail	High	FC	SC	G1	S1										AQ						2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Orygocerus sp.	Straight-shell hybrobia	High	SC	SC			AQ							AQ								2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Pseudotryonia adamantina	Diamond tryonia	High	FC	SC		S1										AQ						2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Tryonia adamantia	Diamond Y Spring snail	High	FC	SC	G1	S1										AQ						2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Tryonia brunei	Burnes tryonia	High	SC	SC		S1										AQ						2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Tryonia cheatumi	Phantom spring tryonia	High	FC	SC		S1										AQ						2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Tryonia circumstriata	Gonzales spring snail	High	SC	SC	G1	S1										AQ						2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Phreatodrobia imitata	Mimic cavesnail	Med	SC	SC	G1	S1					AQ							AQ				2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Pygrulopsis metcalfi	Naegele springsnail	Med	SC	SC		S1										AQ						2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Pyrgulopsis davisi	Limpia Creek springsnail	Med	SC	SC		S1										AQ						2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Plants	*Potamogeton clystocarpus*	Little aguja pondweed	High	FE	SE	G1	S1										ST						2,3,4,5abcdeghijklmnpr,6acdefg,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Halodule wrightii	Shoalgrass	Med	SC	SC			SG,E		SG,E		SG,E			SG,E		SG,E		SG,E	SG,E		SG,E	2,3,4,5abcdeghijklmnpr,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a

	Halophila sp.	Clovergrass	Med	SC	SC			SG,E		SG,E		SG,E			SG,E		SG,E		SG,E	SG,E		SG,E	2,3,4,5abcdeghijklmnpr,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Ruppia maritima	Widgeongrass	Med	SC	SC			SG,E		SG,E		SG,E			SG,E		SG,E		SG,E	SG,E		SG,E	2,3,4,5abcdeghijklmnpr,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Syringonium filiforme	Manateegrass	Med	SC	SC			SG,E		SG,E		SG,E			SG,E		SG,E		SG,E	SG,E		SG,E	2,3,4,5abcdeghijklmnpr,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Thalassia testudinum	Turtlegrass	Med	SC	SC			SG,E		SG,E		SG,E			SG,E		SG,E		SG,E	SG,E		SG,E	2,3,4,5abcdeghijklmnpr,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Zizania texana	Texas wild-rice	Med	FE	SE	G1	S1			AQ,ST,RI													2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Fish	*Campostoma ornatum*	Mexican stoneroller	High	SC	ST	G3	S1										AQ,ST,RI						2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Cycleptus elongatus	Blue sucker	High	SC	ST	G3G4	S3	ST,RI	ST,RI	ST,RI	ST,RI	ST,RI	ST,RI	ST,RI	ST,RI	ST,RI	ST,RI	ST,RI	ST,RI	ST,RI	ST,RI	ST,RI	2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Cyprinella lepida	Plateau shiner	High	SC	SC	G1G2	S1S2								AQ,ST,RI								2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Cyprinella proserpina	Proserpine shiner	High	SC	ST	G3	S2										AQ,ST,RI						2,3,4,5abcdeghijklmnpr,6acdefg,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Cyprinella sp.	Nueces river shiner	High	SC	SC	G1G2	S1S2								AQ,ST,RI								2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Cyprinodon eximius	Conchos pupfish	High	SC	ST	G3G4	S1										AQ,ST,RI						2,3,4,5abcdeghijklmnpr,6acdefg,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Cyprinodon eximius ssp	Devils River pupfish	High	SC	ST	G3G4	S1										AQ,ST,RI						2,3,4,5abcdeghijklmnpr,6acdefg,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Cyprinodon pecosensis	Pecos pupfish	High	SC	ST	G1	S1										AQ,ST,RI						2,3,4,5abcdeghijklmnpr,6acdefg,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Cyprinodon rubrofluviatilis	Red River pupfish	High	SC	SC	G4	S4	AQ,ST,RI		AQ,ST,RI						AQ,ST,RI							2,3,4,5abcdeghijklmnpr,6acdefg,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Etheostoma grahami	Rio Grande darter	High	SC	ST	G3	S2										AQ,ST,RI						2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Gambusia clarkhubbsi	San Felipe gambusia	High	SC	SC	G1	S1										AQ,ST						2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Gambusia gaigei	Big Bend gambusia	High	FE	SE	G1	S1										AQ,MF						2,3,4,6acdefg,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Gambusia senilis	Blotched gambusia	High	SC	SE/ST	G3G4	SX										AQ,ST						2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a

Gila pandora	Rio Grande chub	High	SC	ST	G3	S1										ST,RI					2,3,4,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Ictalurus lupus	Headwater catfish	High	SC	SC	G3	S2			AQ,ST,RI		AQ,ST,RI			AQ,ST,RI		AQ,ST,RI		AQ,ST,RI			2,3,4,5abcdeghijklmnpr	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Ictalurus sp.	Chihuahua catfish	High	SC	SC	G1G2	S1										AQ,ST					2,3,4,5abcdeghijklmnpr	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Macrhybopsis aestivalis	Speckled chub	High	SC	SC	G5	S3S4										AQ,ST,RI					2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Macrhybopsis marconis	Burrhead chub	High	SC	SC	G4	S4					RI							RI			2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Menidia clarkhubbsi	Unisexual silverside	High	SC	SC		SNR								MS							2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Micropterus salmoides nuecensis		High	SC	SC										RI		RI					2,3,4,5abcdeghijklmnpr,6acdefg	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Notropis braytoni	Tamaulipas shiner	High	SC	SC	G4	S4										RI					3,4,5abcdeghijklmnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Notropis buccula	Smalleye shiner	High	FC	SC	G2Q	S2	ST,RI														2,3,4,5abcdeghijklmnpr	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Notropis chalybaeus	Ironcolor shiner	High	SC	SC	G4	S3				AQ,ST,RI	AQ,ST,RI		AQ,ST,RI		AQ,ST,RI		AQ,ST,RI	AQ,ST,RI		AQ,ST,RI	2,3,4,5abcdeghijklmnpr	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Notropis chihuahua	Chihuahua shiner	High	SC	ST	G3	S2										ST,RI					2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Notropis jemezanus	Rio Grande shiner	High	SC	SC	G3	S3										ST,RI					2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Notropis oxyrhynchus	Sharpnose shiner	High	FC	SC	G3	S3	ST,RI,														5abcdeghijklmnpr	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Notropis potteri	Chub shiner	High	SC	SC	G4	S4	RI								RI						2,3,4,5abcdeghijklmnpr,7cf,8ab,10,12,14bcde	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Pteronotropis hubbsi	Bluehead shiner	High	SC	ST	G3	S1											ST,RI,I,L				2,3,4,5abcdeghijklmnpr	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Rhinichthys cataractae	Longnose dace	High	SC	SC	G5	S2										ST,RI					2,3,4,5abcdeghijklmnpr	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Satan eurystomus	Widemouth blindcat	High	SC	ST	G1	S2												AQ			2,3,4,5abcdeghijklmnpr	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Scartomyzon austrinus	West Mexican redhorse	High	SC	SC		S1										ST,RI					2,3,4,5abcdeghijklmnpr	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a

Trogloglanis pattersoni	Toothless blindcat	High	SC	ST	G1	S1					AQ							AQ					2,3,4,5abcdeghijklmnpr	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
***Cyprinodon bovinus*	**Leon Springs pupfish	Med	FE	SE	G1	S1										AQ,ST,MF							2,3,4,5abcdeghijklmnpr,6acdefg,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
***Cyprinodon elegans*	**Comanche Springs pupfish	Med	FE	SE	G1	S1										AQ,ST,MF							2,3,4,5abcdeghijklmnpr,6acdefg,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
***Etheostoma fonticola*	**Fountain darter	Med	FE	SE	G1	S1					AQ,ST							AQ,ST					2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
***Gambusia heterochir*	**Clear Creek gambusia	Med	FE	SE	G1	S1			AQ														2,3,4,6acdefg,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
***Gambusia nobilis*	**Pecos gambusia	Med	FE	SE	G2	S2										AQ,ST							2,3,4,6acdefg,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Ammocrypta clara	Western sand darter	Med	SC	SC	G3	S3				ST,RI			ST,RI		ST,RI		ST,RI			ST,RI			2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Anguilla rostrata	American eel	Med	SC	SC	G5	S4	RI	RI	RI	RI	RI	RI	RI	RI	RI	RI	RI	RI	RI	RI	RI		2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Awaous banana	River goby	Med	SC	ST	G5	S1										RI,E							2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Dionda argentosa	Manantial roundnose minnow	Med	SC	SC	G2	S2										AQ.ST.RI							2,3,4,5abcdeghijklmnpr,6acdefg,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Dionda diaboli	Devils River minnow	Med	FT	ST	G1	S1										AQ,ST,RI							2,3,4,5abcdeghijklmnpr,6acdefg,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Dionda episcopa	Roundnose minnow	Med	SC	SC	G5	S5										AQ,ST							uk	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Dionda nigrotaeniata	Guadalupe roundnose minnow	Med	SC	SC	G4	S4					AQ,ST,RI							AQ,ST,RI					2,3,4,5abcdeghijklmnpr,6acdefg,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Dionda serena	Nueces roundnose minnow	Med	SC	SC	G2	S2								AQ,ST,RI									2,3,4,5abcdeghijklmnpr,6acdefg,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Gobionellus atripinnis	Blackfin goby	Med	SC	ST		S1										E							2,3,4,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Macrhybopsis australis	Prairie chub	Med	SC	SC	G2G3	SNR									RI								2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Macryhbopsis storeriana	Silver chub	Med	SC	SC	G5	S3	RI																2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Microphis brachyurus	Opossum pipefish	Med	SC	ST	G4G5	S1										MS,SG,E,SW						MS,SG,E,SW	2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a

Micropterus treculi	Guadalupe bass	Med	SC	SC	G3	S3	ST,RI		ST,RI		ST,RI			ST,RI				ST,RI					2,3,4,5abcdeghijklmnpr,6acdefg	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Notropis atrocaudalis	Blackspot shiner	Med	SC	SC	G4	S3	ST			ST			ST		ST		ST		ST	ST	ST		2,3,4,5abcdeghijklmnpr,7cf,8ab,9,10,12,14bcde	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Notropis bairdi	Red River shiner	Med	SC	SC	G4	S3									RI								2,3,4,5abcdeghijklmnpr	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Notropis maculatus	Taillight shiner	Med	SC	SC	G5	S1				ST,RI										ST,RI			2,3,4,5abcdeghijklmnpr	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Notropis sabinae	Sabine shiner	Med	SC	SC	G4	S3							ST,RI				ST,RI		ST,RI		ST,RI		2,3,4,5abcdeghijklmnpr,6acdefg,9	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Notropis shumardi	Silverband shiner	Med	SC	SC	G5	S4	RI		RI	RI			RI		RI		RI		RI		RI		2,3,4,5abcdeghijklmnpr,6acdefg,8ab,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Oncorhynchus clarki virginalis	Rio Grande cutthroat trout	Med	FE	SE												AQ,ST,RI							2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Percina maculata	Blackside darter	Med	SC	ST	G5	S1									ST,RI								2,3,4,5abcdeghijklmnpr	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Scaphirhynchus platorynchus	Shovelnose sturgeon	Med	SC	ST	G4	S2										ST,RI,I							2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
***Hybognathus amarus*	**Rio Grande silvery minnow	Low	FE	SE/ST	G1G2	SX										RI							2,3,4,5abcdeghijklmnpr,6acdefg,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Centropomus parallelus	Fat snook	Low	SC	SC	G5	S3?										SW,E						SW,E	2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Centropomus undecimalis	Common snook	Low	SC	SC	G5	S3?	SW,E		SW,E		SW,E			SW,E		SW,E		SW,E	SW,E		SW,E	SW,E	2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Erimyzon oblongus	Creek chubsucker	Low	SC	ST	G5	S2S3				ST,RI	ST,RI		ST,RI		ST,RI		ST,RI	ST,RI	ST,RI	ST,RI	ST,RI		2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Etheostoma radiosum	Orangebelly darter	Low	SC	SC		S3									AQ,ST,RI								2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Hiodon alosoides	Goldeye	Low	SC	SC	G5	S3									ST,RI,I,L								5abcdeghijklmnpr,9	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Macrhybopsis tetranema	Peppered chub	Low	SC	SC	G1	S1		RI															2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Notropis girardi	Arkansas River shiner	Low	FT	ST	G2	S2		RI															2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Notropis simus pecosensis	Pecos bluntnose shiner	Low	SC	SE/ST		SX										ST,RI							2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a

	Polyodon spathula	Paddlefish	Low	SC	ST	G4	S3				RI,I,L			RI,I,L		RI,I,L		RI,I,L		RI,I,L	RI,I,L	RI,I,L		2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Pristis pectinata	Smalltooth sawfish	Low	FE	SC																		SW,RI,SG,E	2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Pristis Perotteti	Largetooth sawfish	Low	IUCN RED LIST																			SW,RI,SG,E	2,3,4,5abcdeghijklmnpr,8ab,9,10,12	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Rhinobatos lentiginosus	Atlantic guitarfish	Low	SC	SC																		SG,E,SW	5abcdeghijklmnpr	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Drums	*Cynoscion nebulosus*	Spotted seatrout	Low	SC	SC	G5	S4	SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E			SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E	mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Micopogonias undulatus	Atlantic croaker	Low	SC	SC	G5	S4	SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E			SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E	mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Pogonias cromis	Black drum	Low	SC	SC			SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E			SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E	mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Sciaenops ocellatus	Red drum	Low	SC	SC	G5	S4	SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E			SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E	mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Flounders	*Paralichthys leghostigma*	Southern flounder	Low	SC	SC	G5	S5	SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E			SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E	mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Jacks	*Seriola dumerili*	Greater amberjack	Low	SC	SC																		SW	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Mackerels	*Scomeromorus cavalla*	King mackerel	Low	SC	SC																		SW,E	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Scomeromorus maculatus	Spanish mackerel	Low	SC	SC																		SW,E	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Mullets	*Mugil cephalis*	Striped mullet	Low	SC	SC	G5	S5	SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E			SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Mugil curema	White mullet	Low	SC	SC	G5	S5	SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E			SW,MS,SG,E		SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Sea Basses	*Epinephalus drummondhayi*	Yellowedge grouper	Low	SC	SC																		SW	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Epinephalus itajara	Goliath grouper (jewfish)	Low	SC	SC																		SW	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Epinephalus morio	Red grouper	Low	SC	SC																		SW	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Mycteroperca bonaci	Black grouper	Low	SC	SC																		SW	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a

	Mycteroperca microlepis	Gag grouper	Low	SC	SC			SW	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Mycteropterca phenax	Scamp	Low	SC	SC			SW	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Snappers	*Lutjanus campechanus*	Red snapper	Low	SC	SC			SW	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Rhomboplites aurorubens	Vermilion snapper	Low	SC	SC			SW	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Sharks	*Alopias superciliosus*	Bigeye thresher	Low	SC	SC			SW	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Alopias vulpinus	Thresher	Low	SC	SC			SW	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Carcharhinus acronotus	Blacknose	Low	SC	SC			SW	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Carcharhinus altimus	Bignose	Low	SC	SC			SW	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Carcharhinus brachyurus	Narrowtooth	Low	SC	SC			SW	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Carcharhinus brevipinna	Spinner	Low	SC	SC			SW	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Carcharhinus falciformis	Silky	Low	SC	SC			SW	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Carcharhinus galapagensis	Galapagos	Low	SC	SC			SW	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Carcharhinus isodon	Finetooth	Low	SC	SC	GNR	SNR	SW,E	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Carcharhinus leucas	Bull	Low	SC	SC	G5	S5	SW,E	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Carcharhinus limbatus	Blacktip	Low	SC	SC			SW,E	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Carcharhinus longimanus	Oceanic whitetip	Low	SC	SC			SW	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Carcharhinus obscurus	Dusky	Low	SC	SC			SW	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Carcharhinus perezi	Caribbean reef	Low	SC	SC			SW	5abcdeghijklmnpr,9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a

Carcharhinus plumbeus	Sandbar	Low	SC	SC	SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Carcharhinus porosus	Smalltail	Low	SC	SC	SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Carcharhinus signatus	Night	Low	SC	SC	SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Carcharodon carcharias	White	Low	SC	SC	SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Cetorhinus maximus	Basking	Low	SC	SC	SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Galeorhinus cuvier	Tiger	Low	SC	SC	SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Ginglymostoma cirratum	Nurse	Low	SC	SC	SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Hexanchus griseus	Sixgill	Low	SC	SC	SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Hexanchus nakamurai	Bigeye sixgill	Low	SC	SC	SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Isurus oxyrinchus	Shortfin mako	Low	SC	SC	SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Isurus paucus	Longfin mako	Low	SC	SC	SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Lamna nasus	Porbeagle	Low	SC	SC	SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Negaprion brevirostris	Lemon	Low	SC	SC	SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Notorynchus cepedianus	Sevengill	Low	SC	SC	SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Odontaspis noronhai	Bigeye sand tiger	Low	SC	SC	SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Odontaspis taurus	Sand tiger	Low	SC	SC	SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Prionace glauca	Blue	Low	SC	SC	SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Rhincodon typus	Whale	Low	SC	SC	SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a

	Rhizoprinodon porosus	Caribbean sharpnose	Low	SC	SC													SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Rhizoprinodon terranovae	Atlantic sharpnose	Low	SC	SC													SW,E	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Sphyrna lewini	Scalloped hammerhead	Low	SC	SC													SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Sphyrna mokorran	Great hammerhead	Low	SC	SC													SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Sphyrna tiburo	Bonnethead	Low	SC	SC													SW,E	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Sphyrna zygaena	Smooth hammerhead	Low	SC	SC													SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Squatina dumeril	Atlantic angel	Low	SC	SC													SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Billfish	*Istiophorus platypterus*	Sailfish	Low	SC	SC													SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Makaira nigrican	Blue marlin	Low	SC	SC													SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Tetrapturus albidus	White marlin	Low	SC	SC													SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Tetrapturus pfluegeri	Longbill spearfish	Low	SC	SC													SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Magalops atlanticus	Atlantic tarpon	Low	SC	SC			SW,MS,SG,E	SW,MS,SG,E	SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E	SW,MS,SG,E	SW,MS,SG,E		SW,MS,SG,E	SW,MS,SG,E	mnpr,6acdefg,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Rachycentron canadum	Cobia	Low	SC	SC													SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
	Xiphias gladius	Swordfish	Low	SC	SC													SW	5abcdeghijklmnpr, 9,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9a
Mammals	*Balaenoptera musculus*	Blue whale	Low	FE	SE	G2	S1											SW	3,4,5abcdeghijklmnpr,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9ae
	Balaenoptera physalus	Finback whale	Low	FE	SE	G3G4	S1											SW	3,4,5abcdeghijklmnpr,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9ae
	Eubalaena glacialis	Black right whale	Low	FE	SE	G1	S1											SW	3,4,5abcdeghijklmnpr,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9ae
	Feresa attenuata	Pygmy killer whale	Low	SC	ST	G4	S1											SW	3,4,5abcdeghijklmnpr,7cf,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efh,10,11,12,14,15	3,5,7,8,9ae

Globicephala macrorhynchus	Short-finned pilot whale	Low	SC	ST	G5	S1	SW	3,4,5abcdeghijklmn pr,7cf,8ab,9,10,11, 12,13,14	2cdefgh,3abdefghijkl,4ac d,6abd,7cdeghklmnopq,8 cdefij,9efh,10,11,12,14,15	3,5,7,8,9ae
Kogia breviceps	Pygmy sperm whale	Low	SC	ST	G4	S1	SW	3,4,5abcdeghijklmn pr,7cf,8ab,9,10,11, 12,13,14	2cdefgh,3abdefghijkl,4ac d,6abd,7cdeghklmnopq,8 cdefij,9efh,10,11,12,14,15	3,5,7,8,9ae
Kogia simus	Dwarf sperm whale	Low	SC	ST	G4	S1	SW	3,4,5abcdeghijklmn pr,7cf,8ab,9,10,11, 12,13,14	2cdefgh,3abdefghijkl,4ac d,6abd,7cdeghklmnopq,8 cdefij,9efh,10,11,12,14,15	3,5,7,8,9ae
Mesoplodon europaeus	Gervais beaked whale	Low	SC	ST	G3	S1	SW	3,4,5abcdeghijklmn pr,7cf,8ab,9,10,11, 12,13,14	2cdefgh,3abdefghijkl,4ac d,6abd,7cdeghklmnopq,8 cdefij,9efh,10,11,12,14,15	3,5,7,8,9ae
Orcinus orca	Killer whale	Low	SC	ST	G4G5	S1	SW	3,4,5abcdeghijklmn pr,7cf,8ab,9,10,11, 12,13,14	2cdefgh,3abdefghijkl,4ac d,6abd,7cdeghklmnopq,8 cdefij,9efh,10,11,12,14,15	3,5,7,8,9ae
Physeter macrocephalus	Sperm whale	Low	FE	SE	G3G4	S1	SW	3,4,5abcdeghijklmn pr,7cf,8ab,9,10,11, 12,13,14	2cdefgh,3abdefghijkl,4ac d,6abd,7cdeghklmnopq,8 cdefij,9efh,10,11,12,14,15	3,5,7,8,9ae
Pseudorca crassidens	False killer whale	Low	SC	ST	G4	S1	SW	3,4,5abcdeghijklmn pr,7cf,8ab,9,10,11, 12,13,14	2cdefgh,3abdefghijkl,4ac d,6abd,7cdeghklmnopq,8 cdefij,9efh,10,11,12,14,15	3,5,7,8,9ae
Stenella frontalis	Atlantic spotted dolphin	Low	SC	ST	G5	S1	SW	3,4,5abcdeghijklmn pr,7cf,8ab,9,10,11, 12,13,14	2cdefgh,3abdefghijkl,4ac d,6abd,7cdeghklmnopq,8 cdefij,9efh,10,11,12,14,15	3,5,7,8,9ae
Steno bredanensis	Rough-toothed dolphin	Low	SC	ST	G4	S1	SW	3,4,5abcdeghijklmn pr,7cf,8ab,9,10,11, 12,13,14	2cdefgh,3abdefghijkl,4ac d,6abd,7cdeghklmnopq,8 cdefij,9efh,10,11,12,14,15	3,5,7,8,9ae
Ziphius cavirostris	Goose-beaked whale	Low	SC	ST	G4	S1	SW	3,4,5abcdeghijklmn pr,7cf,8ab,9,10,11, 12,13,14	2cdefgh,3abdefghijkl,4ac d,6abd,7cdeghklmnopq,8 cdefij,9efh,10,11,12,14,15	3,5,7,8,9ae
Tursiops truncatus	Atlantic bottlenose dolphin	Low	SC	SC	G5	S2	SW,MS, SG,E	2,3,4,5abcdeghijkl mnpr,7cf,8ab,9,10, 11,12,13,14	2cdefgh,3abdefghijkl,4ac d,6abd,7cdeghklmnopq,8 cdefij,9efh,10,11,12,14,15	3,5,7,8,9ae

** Listed with Recovery Plans

Herptiles

			Status		Abundance Ranking		Ecoregion & Associated Habitats												
Species Name	**Common Name**	**Priority**	**Federal**	**State**	**G**	**S**	***Pineywoods***	***Gulf Coast Praries and Marshes***	***Post Oak Savannah***	***Blackland Prairie***	***Cross Timbers and Prairies***	***Rolling Plains***	***High Plains***	***Edwards Plateau***	***South Texas Plains***	***Trans-Pecos***	**Problems**	**Conservation Actions**	**Monitoring**
***Bufo houstonensis*	**Houston toad	High	FE	SE	G1	S1			SS	SS							2,4fgh,5bdefinp,7eg, 9,11,12,13	2acdefg,3d,4cd,5,6,7abcefhiklmp,9abce fgil,10,11ab,12,13,14,15	1,3,4,5,6,7,8 ,9
***Eurycea nana*	**San Marcos salamander	High	FT	ST	G1	S1								A			2abc,5abchip,7cel,9,1 1,12,13	2acdefg,3d,4cd,5,6,7abcefhiklmp,9abce fgil,10,11ab,12,13,14,15	1,3,4,5,6,7,8 ,9
***Eurycea rathbuni*	**Texas blind salamander	High	FE	SE	G1	S1								A			2abc,5abchip,7cel,9,1 1,12,13	2acdefg,3d,4cd,5,6,7abcefhiklmp,9abce fgil,10,11ab,12,13,14,15	1,3,4,5,6,7,8 ,9
Eurycea chisholmensis	Salado salamander	High	SC	SC	G1	S1								A			2abc,5abchip,7cel,9,1 1,12,13	2acdefg,3d,4cd,5,6,7abcefhiklmp,9abce fgil,10,11ab,12,13,14,15	1,3,4,5,6,7,8 ,9
Eurycea latitans	Cascade Caverns salamander	High	SC	ST	G3	S3								A			2abc,5abchip,7cel,9,1 1,12,13	2acdefg,3d,4cd,5,6,7abcefhiklmp,9abce fgil,10,11ab,12,13,14,15	1,3,4,5,6,7,8 ,9
Eurycea naufragia	Georgetown salamander	High	SC	SC	G1	S1								A			2abc,5abchip,7cel,9,1 1,12,13	2acdefg,3d,4cd,5,6,7abcefhiklmp,9abce fgil,10,11ab,12,13,14,15	1,3,4,5,6,7,8 ,9
Eurycea neotenes	Texas salamander	High	SC	SC	G1	S1								A			2abc,5abchip,7cel,9,1 1,12,13	2acdefg,3d,4cd,5,6,7abcefhiklmp,9abce fgil,10,11ab,12,13,14,15	1,3,4,5,6,7,8 ,9
Eurycea pterophila	Fern bank salamander	High	SC	SC	G2	S2								A			2abc,5abchip,7cel,9,1 1,12,13	2acdefg,3d,4cd,5,6,7abcefhiklmp,9abce fgil,10,11ab,12,13,14,15	1,3,4,5,6,7,8 ,9
Eurycea robusta	Blanco blind salamander	High	SC	ST	G1	S1								A			2abc,5abchip,7cel,9,1 1,12,13	2acdefg,3d,4cd,5,6,7abcefhiklmp,9abce fgil,10,11ab,12,13,14,15	1,3,4,5,6,7,8 ,9
Eurycea sosorum	Barton Springs salamander	High	FE	SE	G1	S1								A			2abc,5abchip,7cel,9,1 1,12,13	2acdefg,3d,4cd,5,6,7abcefhiklmp,9abce fgil,10,11ab,12,13,14,15	1,3,4,5,6,7,8 ,9
Eurycea spp.	Central Texas spring salamanders	High	FE/FT	SE/ST										SP			2abc,5abchip,7cel,9,1 1,12,13	2acdefg,3d,4cd,5,6,7abcefhiklmp,9abce fgil,10,11ab,12,13,14,15	1,3,4,5,6,7,8 ,9
Eurycea tonkawae	Jollyville plateau salamander	High	SC	SC	G1	S1								A			2abc,5abchip,7cel,9,1 1,12,13	2acdefg,3d,4cd,5,6,7abcefhiklmp,9abce fgil,10,11ab,12,13,14,15	1,3,4,5,6,7,8 ,9
Eurycea tridentifera	Comal blind salamander	High	SC	ST	G1	S1								A			2abc,5abchip,7cel,9,1 1,12,13	2acdefg,3d,4cd,5,6,7abcefhiklmp,9abce fgil,10,11ab,12,13,14,15	1,3,4,5,6,7,8 ,9
Eurycea troglodytes	Valdina Farms salamander (2 sp.)	High	SC	SC	G3	S3								A			2abc,5abchip,7cel,9,1 1,12,13	2acdefg,3d,4cd,5,6,7abcefhiklmp,9abce fgil,10,11ab,12,13,14,15	1,3,4,5,6,7,8 ,9

Eurycea waterlooensis	Austin blind salamander	High	SC	SC	G1	S1								A			2abc,5abchip,7cel,9,11,12,13	2acdefg,3d,4cd,5,6,7abcefhiklmp,9abcefgil,10,11ab,12,13,14,15	1,3,4,5,6,7,8,9
Phrynosoma cornutum	Texas horned lizard	High	SC	ST	G4G5	S4		G,NIG,P,PW	NIG,WFG	G,NIG,P,PW,WFG		NIG,P,PW,W,S	G,S	P,PW,S,W	NIG,P,PW,W,WFG	G,PW,S	1,2abcd,5ehip,6c,7g	1abceg,2acdefg,7l,8cdefm,9l,10,12,14,15,	2,3,4,5,6,7,8,9
Pituophis ruthveni	Louisiana pinesnake	High	FC	ST	G5T3	S2	F										2abcd,5ehipr,7abdg,14d	2acdefg,4acd,6,7eflq,9abcgl,10,12,14abe,15	1,3,4,5,6,7,8,9
Terrapene spp.	Box turtles	High	SC	SC	G5T4	G5T4	V	V		V	V	V	V	V	V	V	1,2abcd,5ehip,6c,7g	1abceg,2acdefg,7l,8cdefm,9l,10,12,14abe,15,	3,4,5,6,7,8,9
***Graptemys spp.*	**Map turtles	Med	FC	ST	G5	S3S5	A					A	A	A			2abcf,3,4abce,5behijklnr,7eg,9,12,14	2cdefg,3acdefgijk,4acde,6,7cefhkml,9dfhil,10,11ab,12,14,15	1,3,4,5,6,7,8,9
***Lepidochelys kempii*	**Kemp's ridley sea turtle	Med	FE	SE	G1	S1		O,SW,MS,SG,E									3,4,5abcdeghijklmnpr,6acdefg,7cefg,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efhil,10,11,12,14,15	1,2,3,5,7,8,9ace
Crotalus horridus	Timber rattlesnake	Med	SC	ST	G4	S4	F,WFG		F,WFG	F,P,PW,WFG				F,W,P,PW			1,2abcdf,3a,4befg,5efhijr,7abdg,10,12,14d	1abdefg,2acdefg,3a,4c,6,7abefhilpq,9abcdgil,10,12,14abe,15	1,3,4,5,6,7,8,9
Malaclemys terrapin	Diamond-backed terrapin	Med	SC	SC	G4	S3	A										2abcd,3abcde,4abce,5ehijn,7eg,9,12	2acdefg,3acdei,4acde,6,7cefhklmp,9adefhil,11ab,12,14,15	1,3,4,5,6,7,8,9
Nerodia harteri	Brazos watersnake	Med	SC	ST	G2	S2							A				2abcf,3,4be,5bhijklnr,7eg,9,12,14	2cdefg,3acdei,4acde,6,7cefhkml,9dfhil,10,11ab,12,14,15	1,3,4,5,6,7,8,9
Notophthalmus meridionalis	Black-spotted newt	Med	SC	ST	G1	S1		A							A		1,2abcd,3ace,4bcefg,5abcdehijlnp,7eg,9,10,12	1abdefg,2acdefg,3acdei,4acde,6,7cefhklmp,9adefhil,10,11,12,14,15	1,3,4,5,6,7,8,9
Pseudemys gorzugi	Rio Grande river cooter	Med	SC	SC	G4	S3S4									A	A	1,2f,3a,4befg,5dehij,6cg,7ceg,9,10,12	1adefg,2acdefg,3acdei,4acde,6,7cefklm,8cdefj,9defhil,10,11abc,12,14,15	1,2,3,4,5,6,7,8,9
Rana areolata	Crawfish frog	Med	SC	SC	G4	S3	A	A									1,2abcdf,3acd,4befg,5abcdehijkln,7abcdeg,9,10,12,14d	1abdefg,2acdefg,3acdefgijk,4acde,6,7abcefhijklmop,9abdefhl,10,12,14,15	1,3,4,5,6,7,8,9
Siren sp.	Rio Grande (lesser) siren	Med	SC	ST				A							A		1,2abcdf,3a,4be,5dfin,7abdeg,9,12	1abdefg,2acdefg,3acdei,4acde,6,7abcefhijklmp,9abcdefgil,11,12,14,15	1,3,4,5,6,7,8,9
***Chelonia mydas*	**Green sea turtle	Low	FT	ST	G3	S1		O,SW,MS,SG,E									3,4,5abcdeghijklmnpr,6acdefg,7cefg,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efhil,10,11,12,14,15	1,2,3,5,7,8,9ace
***Dermochelys coriacea*	**Leatherback sea turtle	Low	FE	SE	G2	S1		O,SW,MS,SG,E									3,4,5abcdeghijklmnpr,6acdefg,7cefg,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efhil,10,11,12,14,15	1,2,3,5,7,8,9ace
**Nerodia paucimaculata	**Concho watersnake	Low	SC	ST	G2	S2							A	A			2abcf,3,4be,5bhijklnr,7eg,9,12,14	2cdefg,3acdei,4acde,6,7cefhkml,9dfhil,10,11ab,12,14,15	1,3,4,5,6,7,8,9
Agkistrodon contortrix pictigaster	Trans-Pecos copperhead	Low	SC	SC	G5T4	S5										A	1,2abcdf,3a,4fg,5ei,7eg,10,12,14d	1abefg,2acdefg,3acdei,4acde,6,7cefijklm,9defhil,10,12,14,15	1,3,4,5,6,7,8,9
Alligator mississippiensis	American alligator (4 sp.)	Low	SC	SC	G5	S4	A	A							A		1,2abcdf,3a,4b,5ijn,6c,7eg,9,12	1abefg,2acdefg,3acdefi,4acde,6,7bcefhijklmp,8cdef,9efhil,11,12,15	1,2,3,4,5,6,7,8,9

Ambystoma talpoideum	Mole salamander	Low	SC	SC	G5	S3	F,WFG										1,2abcd,3a,4befg,5fijn,7eg,9c,10,12,14d	1abdefg,2acdefg,3acdei,4acde,6,7cefhklmp,9adefhil,10,11,12,14,15	1,3,4,5,6,7,8,9
Amphiuma tridactylum	Three-toed amphiuma	Low	SC	SC	G5	S5	A	A									1,2abcd,3a,4befg,5fijn,7eg,9c,10,12,14d	1abdefg,2acdefg,3acdei,4acde,6,7cefhklmp,9adefhil,10,11,12,14,15	1,3,4,5,6,7,8,9
Aspidocelis dixoni	Gray-checkered whiptail	Low	SC	SC	G3G4	S3S4										G,S	7g,8e	2f,5,6,9l,10,12,14abe,15	1,3,4,5,6,7,8,9
Caretta caretta	Loggerhead sea turtle	Low	FT	ST	G3	S2		O,SW,MS,SG,E									3,4,5abcdeghijklmnpr,6acdefg,7cefg,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efhil,10,11,12,14,15	1,2,3,5,7,8,9ace
Cemophora lineri	Texas scarlet snake	Low	SC	ST	G5	S3S4	SS	SS							SS		1,2abcd,3a,4fg,5i,6c,7g,12,14d	1abcdefg,2acdefg,3c,4cd,6,7eflp,8cdefk,9dil,12,14abe,15	1,2,3,4,5,6,7,8,9
Coleonyx reticulatus	Reticulate banded gecko	Low	SC	ST	G3	S3										RS	2abcd,3a,4fg,5abcdehi,7g,10,12,14d	2acdefg,3c,4cd,6,7eflp,9dil,10,12,14abe,15	1,3,4,5,6,7,8,9
Crotalus viridis	Prairie rattlesnake	Low	SC	SC	G5	S5						G,NIG	G,NIG			G,NIG	1,2abcd,3a,4fg,5eir,7fg,10,12,14d	1abdefg,2acdefg,3a,4c,6,7abefhilpq,9abcdgil,10,12,14abe,15	1,3,4,5,6,7,8,9
Crotaphytus reticulatus	Reticulate collared lizard	Low	SC	ST	G3	S2									T		1,2abcd,3a,4fg,5abcdehi,7g,10,12,14d	1abcdefg,2acdefg,3c,4cd,6,7eflp,9dil,10,12,14abe,15	1,3,4,5,6,7,8,9
Deirochelys reticularia	Chicken turtle	Low	SC	SC	G5	S5	A	A	A	A	A		A				2abcf,3acd,4bcf,5behiln,7eg,8d,10,12	2cdefg,3acdefgijk,4acde,6,7cefhkml,9dfhil,10,11,12,14,15	1,3,4,5,6,7,8,9
Drymarchon corais	Western indigo snake	Low	SC	ST	G4	S3		B						S,B	B		2abcd,3a,4fg,5abcdehi,7g,10,12,14d	2acdefg,3c,4cd,6,7eflp,9dil,10,12,14abe,15	1,3,4,5,6,7,8,9
Drymobius margaritiferus	Speckled racer	Low	SC	ST	G5	S1		P,PW							P,PW,W,WFG		1,2abcdf,3a,4befg,5abcdehijlnr,7eg,9,10,12,14d	1abefg,2acdefg,3acdei,4acde,6,7cefijklmq,9defhil,10,11ab,12,14,15	1,3,4,5,6,7,8,9
Eretmochelys imbricate	Hawksbill sea turtle	Low	FE	SE	G3	S1		O,SW,MS,SG,E									3,4,5abcdeghijklmnpr,6acdefg,7cefg,8ab,9,10,11,12,13,14	2cdefgh,3abdefghijkl,4acd,6abd,7cdeghklmnopq,8cdefij,9efhil,10,11,12,14,15	1,2,3,5,7,8,9ace
Eumeces anthracinus	Coal skink	Low	SC	SC	G5	S4	F,NIG,WFG,										1,2abcdf,3a,4befg,5i,7g,10,12,13	2acdefg,3acde,4abcde,5,6,9defhl,10,12,15	1,3,4,5,6,7,8,9
Gambelia wislizeni	Long-nosed leopard lizard	Low	SC	SC	G5	S5							SS			SS	7g,8e	2f,5,6,9l,10,12,14abe,15	1,3,4,5,6,7,8,9
Gopherus berlandieri	Texas tortoise	Low	SC	ST	G4	S3		B							B		1,2abcf,3a,5abcdehi,6ac,7ag,10,11,12,14d	1abdefg,2acdefg,3acd,4acde,6,7ceflp,8bcdefkm,9abcdeil,10,12,13,14abe,15	1,2,3,4,5,6,7,8,9
Heterodon nasicus gloydi	Dusty hog-nosed snake	Low	SC	SC	G5T3T4Q									F,G,P,PW,W	F,G,P,PW,W	F,G,W	1,2abcd,3a,4f,5i,7g,10,12	1abeg,2acdefg,3c,4cd,6,7efl,9dl,10,12,14abe,15	1,3,4,5,6,7,8,9
Holbrookia lacerata	Spot-tailed earless lizard	Low	SC	SC	G3G4	S3?		P,B,PW						P,B,W,PW	P,PW,B,WFG		1,9	1abdefg,11abd	3,4,5,6,7,8,9
Holbrookia propinqua	Keeled earless lizard	Low	SC	SC	G3?	S3?		MB,SS				SS			SS		1,2abcd,3a,4fg,5di,7g,9bce,10,12	1abeg,2acdefg,3ad,4d,6,7efl,9dil,10,11,12,14abe,15	1,3,4,5,6,7,8,9

Hypopachus variolosus	Sheep frog	Low	SC	ST	G5	S2		B,G,NIG,U,CR							B,NIG,U,CR		1,2abcd,3a,4befg,5ijn,7eg,9,10,12,14d	1abdefg,2acdefg,3acdei,4acde,6,7cefklmp,9defhil,10,11ab,12,14,15	1,3,4,5,6,7,8,9
Kinosternon hirtipes	Chihuahuan mud turtle	Low	SC	ST	G3	S1										A	2abcdf,4bfg,5i,7eg,10,12,13	2acdefg,3acde,4abcde,5,6,9defhl,10,12,15	1,3,4,5,6,7,8,9
Macrochelys temminckii	Alligator snapping turtle	Low	SC	ST	G3G4	S3	A	A						A	A		2abcdf,3a,4be,5egij,7eg,12	2cdef,3cd,4cde,6,7ceghiklmo,9efhil,11,14,15	1,3,4,5,6,7,8,9
Necturus beyeri	Gulf Coast waterdog	Low	SC	SC	G4	S3	A	A									1,2abcd,3a,4befg,5eijn,7eg,9,10,12,14d	1abdefg,2acdefg,3acdei,4acde,6,7cefklmp,9defhil,10,11ab,12,14,15	1,3,4,5,6,7,8,9
Nerodia clarkia	Saltmarsh snake	Low	SC	SC	G4Q	S4		MB									2abcdf,3abcde,4abce,5ijln,7eg,9c,12	2acdefg,3acdejli,4acde,6,7cefijklmp,9defhil,10,11,12,14,15	1,3,4,5,6,7,8,9
Ophisaurus attenuatus	Slender glass lizard	Low	SC	SC	G5	S5	G,NIG,WFG	G,P,PW	NIG,WFG	G,NIG,P,PW,WFG	G,NIG,W,P,PW,WFG	NIG,W,P,PW	G	W,P,PW			1,2abcd,3a,4befg,5eijn,7g,8f,9,10,12,14d	1abdefg,2acdefg,3acdei,4acde,6,7cefklmp,9abcdefhil,10,11ab,12,14,15	1,3,4,5,6,7,8,9
Phrynosoma hernandesi	Mountain short-horned lizard	Low	SC	ST	G5	S3										G,PW	2abcd,3a,4fg,5abcdehi,6c,7g,9ce,11,12,14d	2acdefg,3ad,4d,6,7efil,8cdef,9dil,11ab,12,13,14abe,15	1,2,3,4,5,6,7,8,9
Phrynosoma modestum	Round-tailed horned lizard	Low	SC	SC	G5	S5						GS	GS		GS	GS	1,2abcd,3a,4fg,5abcdehir,6c,7g,9,10,12,14d	1abcdefg,2acdefg,3c,4cd,6,7eflpq,8cdefk,9dil,10,11ab,12,14abe,15	1,2,3,4,5,6,7,8,9
Rana grylio	Pig frog	Low	SC	SC	G5	S2	A	A									2abcdf,3acde,4abcefg,5ehijln,6a,7eg,8d,9,10,12,14df	2acdefg,3acdefgijkl,4acde,6,7cefhjklmp,8cdefjm,9defhil,10,11,12,14,15	1,2,3,4,5,6,7,8,9
Scaphiopus hurterii	Hurter’s spadefoot	Low	SC	SC	G5	S5	F,NIG,WFG,CR	F,G,NIG,P,PW,CR	F,NIG,WFG,CR	F,G,NIG,P,PW,WFG,CR	G,NIG,P,PW,W,WFG,CR			F,NIG,W,P,PW,CR	F,NIG,W,P,PW,WFG,CR		1,2abcd,3ace,4bcefg,5abcdehijlnp,7eg,9,10,12	1abdefg,2acdefg,3acdefgijk,4acde,6,7cefhklmp,9adefhil,10,11,12,14,15	1,3,4,5,6,7,8,9
Sceloporus arenicolus	Dunes sagebrush lizard	Low	SC	SC	G2	S2							SD			SD	2abcd,4f,5i,7g,9ab,10,12	2acdefg,4cd,6,7el,9il,10,11bd,12,14abe,15	1,3,4,5,6,7,8,9
Sistrurus catenatus	Massasauga	Low	SC	SC	G3G4	S3S4		G,NIG,SS,WL	NIG,SS,WL	G,NIG,SS,WL		NIG,SS,WL	G,SS,WL		NIG,SS,WL	SS,WL	1,2abcdf,3a,4befg,5abcdeghijn,7efg,10,12,14abcdf	1abefg,2acdefgh,3degi,4acde,6,7efhiklmp,9defghl,10,12,14,15	1,3,4,5,6,7,8,9
Sistrurus miliarius	Pygmy rattlesnake	Low	SC	SC	G5	S5	F,WFG	F,P,PW									1,2abcdf,3a,4befg,5abcdefhijkn,7g,10,12,14d	1abdefg,2acdefgh,3acdeijl,4acde,6,7abcefhijklmp,9defghil,10,12,14,15	1,3,4,5,6,7,8,9
Syrrhophus cystignathoides	Rio Grande chirping frog	Low	SC	SC	G4									U,B,RE	U,B,RE		1,2abcd,3a,4befg,5ijn,7eg,9,10,12,14d	1abdefg,2acdefg,3acdei,4acde,6,7cefklmp,9defhil,10,11ab,12,14,15	1,3,4,5,6,7,8,9
Trachemys gaigeae	Big Bend slider	Low	SC	SC	G3	S2										A	2abcf,3,4be,5behijklnr,7eg,8d,9,12,14	2cdefg,3acdei,4acde,6,7cefhkml,9dfhil,10,11,12,14,15	1,3,4,5,6,7,8,9
Trimorphodon vilkinsonii	Chihuahuan Desert lyre snake	Low	SC	ST	G4											R	1,2abcdf,3a,4f,5abcdehi,6c,7g,10,11,12,14d	1abcefg,2cdefg,3acd,4acde,6,7cefikl,8cdef,9l,10,12,13,14abe,15	1,2,3,4,5,6,7,8,9

** Listed Species with Recovery Plans

Terrestrial Invertebrates

Order (Class)	Family	Species Name	Status: Federal	Abundance Ranking: G	Abundance Ranking: S	# Documented in Population	Ecoregion & Associated Habitats: Pineywoods	Gulf Coast Praries and Marshes	Post Oak Savannah	Blackland Prairie	Cross Timbers and Prairies	Rolling Plains	High Plains	Edwards Plateau	South Texas Plains	Trans-Pecos	Problems	Conservation Actions	Monitoring
Stylommatophora (Gastropoda)	Helminthoglyptidae	*Sonorella metcalfi*	SC	G2	S1											PW	2c,5o,12	5b,9l,14abe,15	7
	Humboldtianidae	*Humboldtiana cheatumi*	SC	G2	S2											LL,M	12	5b,9l,15	4,7
	Humboldtianidae	*Humboldtiana chisosensis*	SC	G1	S1											M		9l,15	7
	Humboldtianidae	*Humboldtiana ferrissiana*	SC	G2	S2											LL,M	13	5,9l,14abe,15	4,7
	Humboldtianidae	*Humboldtiana palmeri*	SC	G2	S2											M		15	7
	Humboldtianidae	*Humboldtiana texana*	SC	G2	S2											M		15	7
	Humboldtianidae	*Humboldtiana ultima*	SC	G2	S2											LL,M		15	7
	Polygyridae	*Daedalochila hippocrepis*	SC	G1	S1											UK			7
	Polygyridae	*Euchemotrema leai cheatumi*	SC	G5T1	S1				UK						UK				7
Polydesmida (Myriapoda)	Polydesmidae	*Speodesmus falcatus*	SC						C	C				C	C				5,7,8,9ac
	Polydesmidae	*Speodesmus ivyi*	SC						C	C				C	C				5,7,8,9ac
	Polydesmidae	*Speodesmus reddelli*	SC						C	C				C	C				5,7,8,9ac
	Polydesmidae	*Speodesmus castellanus*	SC							C	C								5,7,8,9ac
	Polydesmidae	*Speodesmus echinourus*	SC											C					5,7,8,9ac
Schizomida (Myriapoda)	Protoschizomidae	*?Agastoschizomus n.sp.*	SC			1imm.								C	C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Symphyla (Myriapoda)	Scolopendrellidae	*Symphyllela texana*	SC							C	C			C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Scolopendrellidae	*Symphyllela pusilla*	SC			3				C	C			C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Scutigerellidae	*Scutigerella palmonii (Michelbacher)*	SC			3								C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Scolopendrellidae	*Symphyllela reddelli*	SC			1								C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Scutigerellidae	*Scutigerella linsleyi (Michelbacher)*	SC			3								C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Scutigerellidae	*Scutigerella silvestrii (Michelbacher)*	SC			15								C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Araneae (Arachnida)	Dictynadae	*Cicurina (Cicurella) caliga (Cokendolpher & Red*	SC			5				C	C						1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Dictynadae	*Cicurina (Cicurella) coryelli (Gertsch)*	SC			8					C						1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Dictynadae	*Cicurina (Cicurella) hoodensis (Cokendolpher &*	SC			16				C	C						1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac

Dictynadae	*Cicurina (Cicurella) mixmaster (Cokendolpher &*	SC					C					1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina aenigma (Gertsch)*	SC				C			C			1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina armadillo (Gertsch)*	SC				C	C		C			1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina bandera (Gertsch)*	SC							C			1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina bandida (Gertsch)*	SC	G1	S1		C	C		C			1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina baronia (Gertsch)*	FE	G1	S1	C	C			C	C		1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina barri (Gertsch)*	SC							C			1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina blanco (Gertsch)*	SC							C			1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina bowni (Gertsch)*	SC				C	C					1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina caverna (Gertsch)*	SC							C			1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina cueva (Gertsch)*	SC	G1	S1		C	C		C			1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina delrio (Gertsch)*	SC							C		C	1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina dorothea (Gertsch)*	SC							C			1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina elliotti (Gertsch)*	SC				C	C		C			1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina ezelli (Gertsch)*	SC				C			C			1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina gatita (Gertsch)*	SC			C	C			C	C		1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina gruta (Gertsch)*	SC							C			1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina hexops (Chamberlin and Ivie)*	SC						C	C			1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina holsingeri (Gertsch)*	SC							C		C	1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina joya (Gertsch)*	SC							C			1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina machete (Gertsch)*	SC					C		C			1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina madla (Gertsch)*	FE	G1	S1	C	C			C	C		1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina marmorea (Gertsch)*	SC					C					1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina mckenziei (Gertsch)*	SC							C			1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina medina (Gertsch)*	SC			C	C			C	C		1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina menardia (Gertsch)*	SC							C			1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina microps (Chamberlin and Ivie)*	SC					C	C	C			1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina minorata (Gersch and Davis)*	SC			C	C			C	C		1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina mirifica (Gertsch)*	SC							C		C	1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac

Dictynidae	*Cicurina modesta (Gertsch)*	SC				C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina obscura (Gertsch)*	SC				C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina orellia (Gertsch)*	SC				C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina pablo (Gertsch)*	SC				C	C	1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina pampa (Chamberlin and Ivie)*	SC				C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina pastura (Gertsch)*	SC				C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina patei (Gertsch)*	SC				C	C	1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina porteri (Gertsch)*	SC				C	C	1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina puentecilla (Gertsch)*	SC				C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina rainesi (Gertsch)*	SC				C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina reclusa (Gertsch)*	SC				C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina reddelli (Gertsch)*	SC		C	C	C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina reyesi (Gertsch)*	SC		C	C	C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina riogrande (Gertsch and Mulaik)*	SC					C,UK	1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina rosae (Gertsch)*	SC				C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina rudimentops (Chamberlin and Ivie)*	SC	C				C	1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina russeli (Gertsch)*	SC		C		C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina sansaba (Gertsch)*	SC			C	C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina selecta (Gertsch)*	SC				C	C	1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina serena (Gertsch)*	SC				C	C	1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina sheari (Gertsch)*	SC				C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina sintonia (Gertsch)*	SC	C				C	1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina sprousei (Gertsch)*	SC				C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina stowersi (Gertsch)*	SC				C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina suttoni (Gertsch)*	SC				C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina texana (Gertsch)*	SC				C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina travisae (Gertsch)*	SC		C	C	C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina ubicki (Gertsch)*	SC		C		C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Dictynidae	*Cicurina uvalde (Gertsch)*	SC				C	C	1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac

	Dictynidae	*Cicurina venefica (Gertsch)*	SC									C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Dictynidae	*Cicurina venii (Gertsch)*	FE	G1	S1		C	C				C	C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Dictynidae	*Cicurina vespera (Gertsch)*	FE	G1	S1		C	C				C	C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Dictynidae	*Cicurina vibora (Gertsch)*	SC					C	C						1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Dictynidae	*Cicurina wartoni (Gertsch)*	SC	G1	S1			C	C			C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Dictynidae	*Cicurina watersi (Gertsch)*	SC									C	C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Leptonetidae	*Neoleptoneta anopica (Gertsch)*	SC					C	C						1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Leptonetidae	*Neoleptoneta coeca (Chamberlin and Ivie)*	SC									C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Leptonetidae	*Neoleptoneta concinna (Gertsch)*	SC					C	C			C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Leptonetidae	*Neoleptoneta devia (Gertsch)*	SC					C	C			C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Leptonetidae	*Neoleptoneta microps (Gertsch)*	FE	G1	S1							C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	**Leptonetidae	*Neoleptoneta myopica (Gertsch)*	FE	G1	S1							C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Leptonetidae	*Neoleptoneta new species*	SC				C	C				C	C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Leptonetidae	*Neoleptoneta new species*	SC					C				C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Leptonetidae	*Neoleptoneta paraconcinna (Cokendolpher & Red*	SC			4		C	C						1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Leptonetidae	*Neoleptoneta valverde (Gertsch)*	SC									C	C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Linyphiidae	*Islandiana unicornis Ivie*	SC							C	C				1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Linyphiidae	*Meioneta llanoensis (Gertsch and Davis)*	SC			198		C	C			C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Nesticidae	*Eidmannella bullata (Gertsch)*	SC			6								C	1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Nesticidae	*Eidmannella delicata (Gertsch)*	SC									C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Nesticidae	*Eidmannella nasuta (Gertsch)*	SC				C	C				C	C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Nesticidae	*Eidmannella reclusa (Gertsch)*	SC					C	C			C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Nesticidae	*Eidmannella tuckeri (Cokendolpher & Reddell)*	SC											C	1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Opiliones (Arachnida)	Phalangodidae	*Texella bilobata*	SC			2						C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Phalangodidae	*Texella brevidenta*	SC			1						C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Phalangodidae	*Texella brevistyla*	SC			9						C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Phalangodidae	*Texella cokendolpheri*	FE	G1	S1							C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Phalangodidae	*Texella diplospina*	SC			10						C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Phalangodidae	*Texella grubbsi*	SC			3						C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac

	Phalangodidae	*Texella hardeni*	SC			3			C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Phalangodidae	*Texella homi*	SC			3				C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Phalangodidae	*Texella jungi*	SC			6			C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Phalangodidae	*Texella longistyla*	SC			1					C	1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Phalangodidae	*Texella mulaiki (Goodnight and Goodnight)*	SC			27	C	C	C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	**Phalangodidae - Bee Creek C	*Texella reddelli (Goodnight and Goodnight)*	FE	G1	S1				C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Phalangodidae	*Texella renkesae*	SC			5			C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	**Phalangodidae - Bone Cave H	*Texella reyesi*	FE	G1Q	S1			C	C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Phalangodidae	*Texella spinoperca*	SC			12			C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Pseudoscorpiones (Arachnida)	Bochicidae	*Leucohya texana (Muchmore)*	SC			1			C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Bochidae	*Leucohya texana*	SC						C	C		1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Cheiridiidae	*Apocheiridium reddelli*	SC						C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Cheiridiidae	*Cheiridium reyesi*	SC						C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Chernetidae	*Dinocheirus cavicolus*	SC			22			C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Chernetidae	*Dinocheirus texanus (Hoff and Clawson)*	SC			1			C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Chernetidae	*Dinocheirus venustus (Hoff and Clawson)*	SC			26			C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Chernetidae	*Hesperochernes molestus (Hoff)*	SC			26			C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Chernetidae	*Hesperochernes occidentalis (Hoff and Bolsterli)*	SC			7			C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Chernetidae	*Hesperochernes riograndensis (Hoff and Clawson*	SC			2			C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Chernetidae	*Hesperochernes unicolor (Banks)*	SC			2			C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Chernetidae	*Neoallochernes stercoreus (Turk)*	SC			13			C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Chthoniidae	*Tyrannochtonius texanus*	SC						C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Chthoniidae	*Tyrannochtonius troglodytes (Muchmore)*	SC						C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Chtoniidae	*Tyrannochtonius troglodytes*	SC						C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Garypidae	*Archeolarca guadalupensis (Muchmore)*	SC	G1	S1	7					R	1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Neobisiidae	*Tartarocreagris altimana*	SC						C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Neobisiidae	*Tartarocreagris amblyopa*	SC						C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Neobisiidae	*Tartarocreagris attenuata*	SC						C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
	Neobisiidae	*Tartarocreagris comanche (Muchmore)*	SC			*22,1	C	C	C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac

	Neobisiidae	*Tartarocreagris cookei*	SC			8		C	C		C	C	1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
	Neobisiidae	*Tartarocreagris domina*	SC								C		1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
	Neobisiidae	*Tartarocreagris grubbsi*	SC								C		1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
	Neobisiidae	*Tartarocreagris hoodensis*	SC						C	C			1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
	Neobisiidae	*Tartarocreagris proserpina*	SC								C		1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
	Neobisiidae	*Tartarocreagris reyesi*	SC					C	C		C	C	1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
	Neobisiidae	*Tartarocreagris texana (Muchmore)*	FE	G1	S1	2			C	C	C		1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
	Neobisiidae	*Microbisium parvulum (Banks)*	SC			4					C		1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
	Neobisiidae	*Tartarocreagris infernalis (Muchmore)*	SC			*35,2			C	C	C		1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
	Neobisiidae	*Tartarocreagris intermedia (Muchmore)*	SC			1					C		1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
	Neobisiidae	*Tartarocreagris reddelli (Muchmore)*	SC			3					C		1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
	Syarinidae	*Chitrella elliotti*	SC								C		1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
	Syarinidae	*Chitrella major*	SC			3					C		1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
Coleoptera (Insecta)	Anobiidae	*Ptinus tumidus (Fall)*	SC			1	F					F	2c,4fg,6f,13		5,7,8,9ac
	Anobiidae	*Trichodesma pulchella (Schaeffer)*	SC			1	F					F	2c,4fg,6f,13		5,7,8,9ac
	Anobiidae	*Trichodesma sordida (Horn)*	SC			1	UK					UK	13		5,7,8,9ac
	Anobiidae	*Trichodesma texana (Schaeffer)*	SC			1+	F					F	2c,4fg,6f,13		5,7,8,9ac
	Anobiidae	*Tricorynus texanus (White)*	SC			1	F					F	2c,4fg,6f,13		5,7,8,9ac
	Anthribidae	*Neoxenus versicolor (Valentine)*	SC			1+	F					F	2c,4fg,6f,13		5,7,8,9ac
	Anthribidae	*Ormiscus albofasciatus (Schaeffer)*	SC			1	F					F	2c,4fg,6f,13		5,7,8,9ac
	Anthribidae	*Ormiscus irroratus (Schaeffer)*	SC			1	F					F	2c,4fg,6f,13		5,7,8,9ac
	Anthribidae	*Phoenicobiella schwarzii (Schaeffer)*	SC			1	F					F	2c,4fg,6f,13		5,7,8,9ac
	Anthribidae	*Toxonotus penicellatus (Schaeffer)*	SC			1	F					F	2c,4fg,6f,13		5,7,8,9ac
	Brentidae	*Apion aculeatum (Fall)*	SC			1+	UK					UK	13		5,7,8,9ac
	Brentidae	*Apion buchanani (Kissinger)*	SC			1+	UK					UK	13		5,7,8,9ac
	Brentidae	*Heterobrenthus texanus (Schaeffer)*	SC			1	UK					UK	13		5,7,8,9ac
	Buprestidae	*Agrilus dollii (Schaeffer)*	SC			1	F					F	2c,4fg,6f,13		5,7,8,9ac
	Buprestidae	*Agrilus subtropicus (Schaeffer)*	SC			1	UK					UK	13		5,7,8,9ac
	Buprestidae	*Pachyschelus fisheri (Vogt)*	SC			1	UK					UK	13		5,7,8,9ac

Buprestidae	*Spectralia prosternalis (Schaeffer)*	SC			1	UK					UK	13		5,7,8,9ac
Buprestidae	*Trigonogya reticulaticollis (Schaeffer)*	SC			1	UK					UK	13		5,7,8,9ac
Carabidae	*Agra oblongopunctata oblongopunctata (Chevrol*	SC			1+	F					F	2c,4fg,6f,13		5,7,8,9ac
Carabidae	*Apenes sp. UASM 11*	SC			1	F					F	2c,4fg,6f,13		5,7,8,9ac
Carabidae	*Calleida fimbriata (Bates)*	SC			1+	F					F	2c,4fg,6f,13		5,7,8,9ac
Carabidae	*Galerita aequinoctialis (Chaudoir)*	SC			1+	F					F	2c,4fg,6f,13		5,7,8,9ac
Carabidae	*Nemotarsus rhombifer (Bates)*	SC			1	F					F	2c,4fg,6f,13		5,7,8,9ac
Carabidae	*Rhadine exilis*	FE	G1	S1			C	C		C	C	1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Carabidae	*Rhadine infernalis*	FE	G1G2	S1			C	C		C	C	1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
**Carabidae	*Rhadine persephone*	FE	G1	S1				C	C	C				5,7,8,9ac
Carabidae	*Rhadine reyesi*	SC			35			C	C			1,2abcd,3a,4f g,5i,6c,14d	14abe	5,7,8,9ac
Cerambycidae	*Adetus sp. EGR 1*	SC			1	CL					CL	6f,13		5,7,8,9ac
Cerambycidae	*Agallissus lepturoides (Chevrolat)*	SC			1	F					F	2c,4fg,6f,13		5,7,8,9ac
Cerambycidae	*Ataxia tibialis (Schaeffer)*	SC			1	F					F	2c,4fg,6f,13		5,7,8,9ac
Cerambycidae	*Cacostola lineata (Hamilton)*	SC			1	F					F	2c,4fg,6f,13		5,7,8,9ac
Cerambycidae	*Callipogonius cornutus (Linsley)*	SC			1	F					F	2c,4fg,6f,13		5,7,8,9ac
Cerambycidae	*Desmiphora aegrota (Bates)*	SC			1	F					F	2c,4fg,6f,13		5,7,8,9ac
Cerambycidae	*Dihammaphora dispar (Chevrolat)*	SC			1	UK					UK	13		5,7,8,9ac
Cerambycidae	*Ecyrus penicillatus (Bates)*	SC			1	F					F	2c,4fg,6f,13		5,7,8,9ac
Cerambycidae	*Hemierana marginata suturalis (Linell)*	SC			1	F					F	2c,4fg,6f,13		5,7,8,9ac
Cerambycidae	*Sphaenothecus trilineatus (Dupont)*	SC			1	UK					UK	13		5,7,8,9ac
Chrysomelidae	*Baliosus sp. EGR 1*	SC			1	F,CL					F,CL	2c,4fg,6f,13		5,7,8,9ac
Chrysomelidae	*Brucita marmorata (Jacoby)*	SC			1	F					F	2c,4fg,6f,13		5,7,8,9ac
Chrysomelidae	*Chaetocnema rileyi (White)*	SC			1	SD,SS					SD,SS	13		5,7,8,9ac
Chrysomelidae	*Chlamisus maculipes (Chevrolat)*	SC			1	F					F	2c,4fg,6f,13		5,7,8,9ac
Chrysomelidae	*Dibolia championi (Jacoby)*	SC			1	UK					UK	2c,4fg,13		5,7,8,9ac
Chrysomelidae	*Disonycha barberi (Blake)*	SC			1	F					F	2c,4fg,6f,13		5,7,8,9ac
Chrysomelidae	*Disonycha stenosticha (Schaeffer)*	SC			1	F					F	2c,4fg,6f,13		5,7,8,9ac
Chrysomelidae	*Epitrix sp. EGR 1*	SC			1	F					F	2c,4fg,6f,13		5,7,8,9ac

Chrysomelidae	*Heptispa sp. EGR 1*	SC			1	UK	UK	13	5,7,8,9ac
Chrysomelidae	*Malacorhinus acaciae (Schaeffer)*	SC			1	F	F	2c,4fg,6f,13	5,7,8,9ac
Chrysomelidae	*Megascelis texana (Linell)*	SC			1	F	F	2c,4fg,6f,13	5,7,8,9ac
Chrysomelidae	*Octotoma championi (Baly)*	SC			1	F	F	2c,4fg,6f,13	5,7,8,9ac
Chrysomelidae	*Pachybrachis duryi (Fall)*	SC			1	F	F	2c,4fg,6f,13	5,7,8,9ac
Chrysomelidae	*Pachybrachis sp. EGR 2*	SC			1	F	F	2c,4fg,6f,13	5,7,8,9ac
Chrysomelidae	*Pachybrachis sp. EGR 6*	SC			1	F,CL	F,CL	2c,4fg,6f,13	5,7,8,9ac
Chrysomelidae	*Parchicola sp. EGR 1*	SC			1+	F	F	2c,4fg,6f,13	5,7,8,9ac
Chrysomelidae	*Pentispa distincta (Baly)*	SC			1+	F	F	2c,4fg,6f,13	5,7,8,9ac
Chrysomelidae	*Plagiodera thymaloides (Stal)*	SC			1+	F	F	2c,4fg,6f,13	5,7,8,9ac
Cicindelidae	*Cicindela cazieri*	SC	G2	S2			UK		5,7,8,9ac
Coccinellidae	*Diomus pseudotaedatus (Gordon)*	SC			1+	UK	UK	13	5,7,8,9ac
Coccinellidae	*Hyperaspis rotunda (Casey)*	SC			1	F	F	2c,4fg,6f,13	5,7,8,9ac
Curculionidae	*Allopentarthrum sp. TAC 1*	SC			1	F	F	2c,4fg,6f,13	5,7,8,9ac
Curculionidae	*Allopentarthrum sp. TAC 2*	SC			1	F	F	2c,4fg,6f,13	5,7,8,9ac
Curculionidae	*Andranthobius sp. TAC 1*	SC			1	F	F	2c,4fg,6f,13	5,7,8,9ac
Curculionidae	*Apteromechus texanus (Fall)*	SC			1	F	F	2c,4fg,6f,13	5,7,8,9ac
Curculionidae	*Brachystylus microphthalmus (Champion)*	SC			1+	F	F	2c,4fg,6f,13	5,7,8,9ac
Curculionidae	*Chalcodermus semicostatus (Schaeffer)*	SC			1	F	F	2c,4fg,6f,13	5,7,8,9ac
Curculionidae	*Chalcodermus serripes (Fahraeus)*	SC			1+	UK	UK	2c,4fg,13	5,7,8,9ac
Curculionidae	*Conotrachelus rubescens (Schaeffer)*	SC			1	F	F	2c,4fg,6f,13	5,7,8,9ac
Curculionidae	*Elleschus sp. TAC 1*	SC			1	F	F	2c,4fg,6f,13	5,7,8,9ac
Curculionidae	*Eubulus sp. TAC 1*	SC			1	F	F	2c,4fg,6f,13	5,7,8,9ac
Curculionidae	*Haplostethops sp. TAC 1*	SC			1	F	F	2c,4fg,6f,13	5,7,8,9ac
Curculionidae	*Notolomus sp. TAC 1*	SC			1	F	F	2c,4fg,6f,13	5,7,8,9ac
Curculionidae	*Notolomus sp. TAC 2*	SC			1	F	F	2c,4fg,6f,13	5,7,8,9ac
Curculionidae	*Platyomus flexicaulis (Schaeffer)*	SC			1	F	F	2c,4fg,6f,13	5,7,8,9ac
Curculionidae	*Plocetes versicolor (Clark)*	SC			1+	CL	CL	6f,13	5,7,8,9ac
Elateridae	*Anchastus augusti (Candeze)*	SC			1+	F	F	2c,4fg,6f,13	5,7,8,9ac

	Languriidae	*Hapalips texanus (Schaeffer)*	SC			1	F					F		2c,4fg,6f,13		5,7,8,9ac
	Languriidae	*Loberus ornatus (Schaeffer)*	SC			1	F					F		2c,4fg,6f,13		5,7,8,9ac
	Languriidae	*Toramus chamaeropis (Schaeffer)*	SC			1	UK					UK		13		5,7,8,9ac
	Mycetophagidae	*Berginus sp. EGR 1*	SC			1	F					F		2c,4fg,6f,13		5,7,8,9ac
	Phengodidae	*Cenophengus pallidus (Schaeffer)*	SC			1	F					F		2c,4fg,6f,13		5,7,8,9ac
	Ptilodactylidae	*Lachnodactyla texana (Schaeffer)*	SC			1+	F					F		2c,4fg,6f,13		5,7,8,9ac
	Salpingidae	*Dacoderus n. sp. (Aalbu & Andrews, ms.)*	SC			1	F					F		2c,4fg,6f,13		5,7,8,9ac
	Scarabaeidae	*Deltochilum scabriusculum scabriusculum (Bates)*	SC			1+	F,B					F,B		2c,4fg,6f,13		5,7,8,9ac
	Scarabaeidae	*Malagoniella astyanax yucateca (Harold)*	SC			1+	B					B		6f,13		5,7,8,9ac
	Scarabaeidae	*Onthophagus batesi (Howden & Cartwright)*	SC			1+	F					F		2c,4fg,6f,13		5,7,8,9ac
	Scarabaeidae	*Phanaeus adonis (Harold)*	SC			1+	B					B		6f,13		5,7,8,9ac
	**Silphidae	*Nicrophorus americanus*	FE	G2	S1			V	V							5,7,8,9ac
	Staphylinidae (Pselaphinae)	*Batrisodes (Babnormodes) feminiclypeus*	SC			5				C				1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
	Staphylinidae (Pselaphinae)	*Batrisodes (Babnormodes) gravesi (Chandler and*	SC			15			C	C				1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
	Staphylinidae (Pselaphinae)	*Batrisodes (Babnormodes) uncicornis (Casey)*	SC			217		C	C	C	C	C		1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
	Staphylinidae (Pselaphinae)	*Batrisodes (Babnormodes) wartoni (Chandler and*	SC			10				C				1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
	Staphylinidae (Pselaphinae)	*Batrisodes (Excavodes) clypeonotus (Brendel)*	SC			2					C			1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
	Staphylinidae (Pselaphinae)	*Batrisodes (Excavodes) cryptotexanus (Chandler a*	SC			15			C	C				1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
	Staphylinidae (Pselaphinae)	*Batrisodes (Excavodes) globosus (LeConte)*	SC			4				C	C			1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
	Staphylinidae (Pselaphinae)	*Batrisodes (Excavodes) grubbsi (Chandler)*	SC			6					C			1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
	**Staphylinidae (Pselaphinae)	*Batrisodes (Excavodes) texanus*	FE	G1	S1	2				C				1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
	Staphylinidae (Pselaphinae)	*Batrisodes (Excavodes) reyesi (Chandler)*	SC			*10,5				C	C			1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
	Staphylinidae (Pselaphinae)	*Batrisodes (Excavodes) venyivi (Chandler)*	FE	G1	S1	2					C			1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
	Staphylinidae (Pselaphinae)	*Texamaurops reddelli (Barr and Steeves)*	SC	G1	S1	2			C	C	C			1,2abcd,3a,4fg,5i,6c,14d	14abe	5,7,8,9ac
	Tenebrionidae	*Rhypasma sp. EGR 1*	SC			1	F					F		2c,4fg,6f,13		5,7,8,9ac
	Tenebrionidae	*Strongylium aulicum (Maklin)*	SC			1+	F					F		2c,4fg,6f,13		5,7,8,9ac
	Tenebrionidae	*Strongylium championi (Gebien)*	SC			1+	UK					UK		13		5,7,8,9ac
	Tenebrionidae	*Talanus mecoselis (Triplehorn)*	SC			1	F					F		2c,4fg,6f,13		5,7,8,9ac
Lepidoptera (Insecta)	Hesperiidae	*Agathymus neumoegeni chisosensis*	SC	T2									PW,B,S	13	15	

	Hesperiidae	*Agathymus neumoegeni mcalpinei*	SC	T1	SNR										13	15	
	Hesperiidae	*Agathymus remingtoni valverdiensis*	SC	T2								T			7g,13	15	
	Hesperiidae	*Euphyes bayensis*	SC	G2	S1		MB,G	MB,G							9e?	6b	
	Hesperiidae	*Megathymus streckeri texanus*	SC	T5?					UK	UK		UK	UK		8a,13	14abe	
	Hesperiidae	*Piruna haferniki*	SC	G2	S1?									PW	13	6b	
	Hesperiidae	*Stallingsia maculosus*	SC	G2	S1S2			T,F					T,F		1a,5e	6b	
	Lycaenidae	*Fixsenia polingi*	SC	G2	S1									PW	13	6b	
	Riodinidae	*Apodemia chisosensis*	SC	G1G2	SNR							PW,W,R		PW,R	13		5,7,8
	Saturniidae	*Agapema galbina*	SC	G1	SX			T,B					T,B		2abcd,5i,12	12b	
	Saturniidae	*Sphingicampa blanchardi*	SC	G1	SNR			T,PW					T,PW,W		uk		5,7,8
	Sphingidae	*Adhemarius blanchardorum*	SC	G1	S1									M	13	6b	7
	Sphingidae	*Sphinx eremitoides*	SC	G1G2	SNR							P,PW			1	14abe	5,7,8,9ac
	Superfamily	**Species Name**															
Hymenoptera (Insecta)	Apoidea	*Andrena (Micrandrena) micheneri (Ribble)*	SC			5		UK					UK		1,2abcd	5	4
	Apoidea	*Andrena (Scrapteropsis) flaminea (LaBerge)*	SC			>50			UK				UK			5	4
	Apoidea	*Andrena (Tylandrena) scotoptera (Cockerell)*	SC			>14				UK	UK	UK			1,2abcd	5	4
	Apoidea	*Anthophorula (Anthophorisca) ignota (Timberlake*	SC			3					UK		UK			5	4
	Apoidea	*Brachynomada (Melanomada) sp. A*	SC			13		UK					UK			5	4
	Apoidea	*Calliopsis (Verbenapis) michenerella (Shinn & Er*	SC			>100							SS			5	4
	Apoidea	*Coelioxys (Xerocoelioxys) piercei (Crawford)*	SC			4							UK			5	4
	Apoidea	*Colletes bumeliae (Neff)*	SC			47			SS	SS		SS			1,2abcd	5	4
	Apoidea	*Colletes inuncantipedis (Neff)*	SC			42			SS	SS	SS	SS			1,2abcd	5	4
	Apoidea	*Colletes saritensis (Stephen)*	SC			83		SS					SS			5	4
	Apoidea	*Eucera (Synhalonia) birkmanniella (Cockerell)*	SC			6			UK	UK					1,2abcd	5	4
	Apoidea	*Eucera (Synhalonia) texana (Timberlake)*	SC			1				UK	UK				1,2abcd	5	4
	Apoidea	*Hesperapis (Carinapis) sp. B*	SC			>70			SS	SS					1,2abcd	5	4
	Apoidea	*Holcopasites (Holcopasites) jerryrozeni (Neff)*	SC			31						UK	UK			5	4
	Apoidea	*Macrotera (Cockerellula) lobata (Timberlake)*	SC			7							UK		1,2abcd	5	4
	Apoidea	*Macrotera (Cockerellula) parkeri (Timberlake)*	SC			3						UK				5	4

Apoidea	*Macrotera (Cockerellula) robertsi (Timberlake)*	SC	5							UK	UK			5	4
Apoidea	*Megachile (Megachiloides) parksi (Mitchell)*	SC	2		UK	UK				UK	UK			5	4
Apoidea	*Osmia (Diceratosmia) botitena (Cockerell)*	SC	7		UK	UK				UK	UK			5	4
Apoidea	*Perdita (Cockerellia) fraticincta (Timberlake)*	SC	10	UK							UK			5	4
Apoidea	*Perdita (Cockerellia) tricincta (Timberlake)*	SC	>90	UK							UK		1,2abcd	5	4
Apoidea	*Perdita (Epimacrotera) dolanensis (Neff)*	SC	22							UK	UK			5	4
Apoidea	*Perdita (Hexaperdita) agasta (Timberlake)*	SC	1								UK			5	4
Apoidea	*Perdita (Hexaperdita) albipes (Timberlake)*	SC	1									UK		5	4
Apoidea	*Perdita (Hexaperdita) alexi (Timberlake)*	SC	2		UK									5	4
Apoidea	*Perdita (Hexaperdita) fedorensis (Cockerell)*	SC	1		UK									5	4
Apoidea	*Perdita (Perdita) atriventris (Timberlake)*	SC	2		UK									5	4
Apoidea	*Perdita (Perdita) cara (Timberlake)*	SC	5									UK		5	4
Apoidea	*Perdita (Perdita) congrua (Timberlake)*	SC	1									UK		5	4
Apoidea	*Perdita (Perdita) crotonis decipiens (Timberlake)*	SC	3	UK	UK								1,2abcd	5	4
Apoidea	*Perdita (Perdita) fidissima (Timberlake)*	SC	1	UK							UK			5	4
Apoidea	*Protandrena (Heterosarus) subglaber (Timberlak*	SC	>12							UK	UK			5	4
Apoidea	*Protandrena (Protandrena) maurula (Cockerell)*	SC	6				UK	UK		UK				5	4
Apoidea	*Pseudopanurgus bradleyi (Timberlake)*	SC	1							UK				5	4
Apoidea	*Stelis (Protostelis) texana (Thorp)*	SC	5			UK	UK			UK				5	4

Status

FE	Federally endangered species or population.
FT	Federally threatened species or population.
FC	Species of federal concern; specific notation.
SE	State endangered species or population.
ST	State threatened species or population.
SC	Species of concern at the federal or state level.

Rankings

Rank	Definition
GX	**Presumed Extinct** (species)— Not located despite intensive searches and virtually no likelihood of rediscovery. **Eliminated** (ecological communities)—Eliminated throughout its range, with no restoration potential due to extinction of dominant or characteristic species.
GH	**Possibly Extinct** (species)— Missing; known from only historical occurrences but still some hope of rediscovery. **Presumed Eliminated**— (Historic, ecological communities)-Presumed eliminated throughout its range, with no or virtually no likelihood that it will be rediscovered, but with the potential for restoration, for example, American Chestnut Forest.
G1	**Critically Imperiled**—At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.
G2	**Imperiled**—At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.
G3	**Vulnerable**—At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.
G4	**Apparently Secure**—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
G5	**Secure**—Common; widespread and abundant.

Rank Qualifiers

Rank	Definition
?	**Inexact Numeric Rank**—Denotes inexact numeric rank (e.g., G2?)
Q	**Questionable taxonomy**—Taxonomic distinctiveness of this entity at the current level is questionable; resolution of this uncertainty may result in change from a species to a subspecies or hybrid, or the inclusion of this taxon in another taxon, with the resulting taxon having a lower-priority conservation priority.

Infraspecific Taxon Conservation Status Ranks

Infraspecific taxa refer to subspecies, varieties and other designations below the level of the species. Infraspecific taxon status ranks (T-ranks) apply to plants and animal species only; these T-ranks do not apply to ecological communities.

Rank	Definition
T#	**Infraspecific Taxon** (trinomial)—The status of infraspecific taxa (subspecies or varieties) are indicated by a "T-rank" following the species' global rank. Rules for assigning T-ranks follow the same principles outlined above for global conservation status ranks. For example, the global rank of a critically imperiled subspecies of an otherwise widespread and common species would be G5T1. A T-rank cannot imply the subspecies or variety is more abundant than the species as a whole-for example, a G1T2 cannot occur. A vertebrate animal population, such as those listed as distinct population segments under under the U.S. Endangered Species Act, may be considered an infraspecific taxon and assigned a T-rank; in such cases a Q is used after the T-rank to denote the taxon's informal taxonomic status. At this time, the T rank is not used for ecological communities.

Variant Ranks

G#G#	**Range Rank**—A numeric range rank (e.g., G2G3) is used to indicate the range of uncertainty in the status of a species or community. Ranges cannot skip more than one rank (e.g., GU should be used rather than G1G4).
GU	**Unrankable—-**Currently unrankable due to lack of information or due to substantially conflicting information about status or trends. Whenever possible, the most likely rank is assigned and the question mark qualifier is added (e.g., G2?) to express uncertainty, or a range rank (e.g., G2G3) is used to delineate the limits (range) of uncertainty.
GNR	**Unranked**—Global rank not yet assessed.

National (N) and Subnational (S) Conservation Status Rank

NX **SX**	**Presumed Extirpated**—Species or community is believed to be extirpated from the nation or state/province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.
NH **SH**	**Possibly Extirpated** (Historical)—Species or community occurred historically in the nation or state/province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years.
N1 **S1**	**Critically Imperiled**—Critically imperiled in the nation or state/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation
N2 **S2**	**Imperiled—**Imperiled in the nation or state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province.
N3 **S3**	**Vulnerable**—Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
N4 **S4**	**Apparently Secure—**Uncommon but not rare; some cause for long-term concern due to declines or other factors.
N5 **S5**	**Secure**—Common, widespread, and abundant in the nation or state/province.
NNR **SNR**	**Unranked**—Nation or state/province conservation status not yet assessed.
NU **SU**	**Unrankable**—Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
NNA **SNA**	**Secure**—Common, widespread, and abundant in the nation or state/province.
N#N# **S#S#**	**Range Rank** —A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).
Not Provided	Species is known to occur in this nation or state/province. Contact the relevant natural heritage program for assigned conservation status.

Breeding Status Qualifiers

B	**Breeding**—Conservation status refers to the breeding population of the species in the nation or state/province.
N	**Nonbreeding—**Conservation status refers to the non-breeding population of the species in the nation or state/province.

Habitat

A	Aquatic
AQ	Aquifer and Springs
B	Brushland
BR	Bridges
BU	Buildings
C	Cave
CL	Clay Loam
CR	Cropland
CU	Culverts
E	Estuaries and Tributaries
F	Forest (including sabal palm forests)
FO	Foliage (i.e. Yucca, Hackberry, Sycamore, Native and Ornamental Palm Fronds)
G	Grassland
GS	Gravel Soils
I	Impoundments
L	Natural Lakes
LL	Leaf Litter
M	Mountains
MB	Marsh Barrier Island or Marsh
MF	Freshwater Marsh
MI	Mines
MS	Saltwater Marsh
N	Nests
NIG	Native and Introduced Grasses
O	Other
P	Parkland
PW	Parkland Woodland Mosaic
PY	Playas
R	Rocky Slopes, Ridges, Outcrops, Crevices, Piles or Under Rocks
RE	Resacas
RI	Rivers
RS	Rocky Soils
S	Shrubland
SD	Sand Dunes
SG	Sea Grasses
SP	Springs
SS	Sandy Soils (specific plant species may be required)
ST	Streams
SW	Salt Water in the Gulf of Mexico
T	Thornscrub, Thorn Forest
TU	Tunnels
V	Various
W	Woodland
WFG	Woodland, Forest, and Grassland Mosaic
WL	Wetlands
U	Urban
UK	Unknown

Problems

1	Agricultural	**a**	Improper livestock grazing
		b	Development into intensive cropland, etc.
2	Development	**a**	Construction activity (i.e. building roads, structures, hardscape,oil and gas exploration)
		b	Modification of natural community with 110m of population location
		c	Urbanization; urban sprawl
		d	Utilities
		e	Direct mortality with structures
		f	Creation/modification of large reservoirs
3	Erosion	**a**	Infrastructure (i.e. ditches, jetties collision structures, ship channels, navigation traffic)
		b	Sea level rise
		c	Siltation and/or beach erosion
		d	Subsidence
		e	Lack of sedimentation from freshwater inflow
4	Fragmentation	**a**	Salt-water intrusion
		b	Reservoirs and dams
		c	Instream flows
		d	Fencing
		e	Channelization
		f	Inhibited dispersal due to fragmentation (i.e. lack of habitat, highways, agricultural fields, and human development)
		g	Reduced genetic variability and reduced gene flow
		h	Hybridization
5	Human Disturbance	**a**	Foot traffic
		b	Garbage
		c	Noise
		d	Vegetation disturbance
		e	Popular with collectors, accidental takes, or popular for target practice
		f	Deforestation and tree-harvesting
		g	Fishing Line
		h	Recreation
		i	Land or drainage alteration; land-use changes (i.e. draining, filling, bulkheading)
		j	Dredging activities
		k	Fishing (commercial)
		l	Increased turbidity
		m	Conflict with rookeries
		n	Drainage of wetlands
		o	Gravel mining
		p	Vandalism
		q	Mine blasting; cave closures

		r	Food source is threatened
6	Invasive	**a**	Disease and pathogens (oyster drill and Vibrio species)
		b	Forest pest epizootics (e.g., bark beetles, blister beetles, defoliating catapillars, etc.) that occur through natural causes or the interaction of human and
		c	Animals (i.e. feral goats, feral hogs, non-native big game, red imported fire ants, carp, apple snails, European starling, pets, poultry)
		d	Herbaceous plants (i.e.wild mustard)
		e	Aquatic plants (i.e. water hyacinth, hydrilla, cattail, giant salvinia, water trumpet)
		f	Grasses & grass-like plants (i.e. fescue, bahia, bufflegrass, bermudagrass, KR bluestem, cogon grass, deep-rooted sedge)
		g	Woody plants (i.e.coral bean, salt cedar, privet, ligustrum, Chinese tallow, Brazilian pepper)
7	Management	**a**	Brush eradication
		b	Fire suppression
		c	Lack of authority to manipulate water levels to improve habitat
		d	Plant succession
		e	Ground-water pumping
		f	Species or populations are considered destructive or pests
		g	Lack of knowledge or unpublished data in one location
8	Natural	**a**	Hurricanes
		b	Flood events
		c	Brood parasitism (i.e. cowbirds, other brood parasites)
		d	Direct competition
		e	Stochastic events
		f	Wildfire
9	Pollution	**a**	Petroleum/chemical spills
		b	Non-point and point source
		c	Contaminated water discharge
		d	Airborne sulfates, nitrates, heavy metals, and other pollutants from population and industrial centers located in North America or other parts of the World
		e	Indiscriminate pesticide use
10	Political		Fragmentation due to tax policies
11	Predators		Native and non-native (i.e. coyote, feral cats, rats, feral dogs, racoon)
12	Protection		Lack of protection
13	Range		Naturally limited range
14	Vehicle Traffic	**a**	Beach compaction
		b	Nest disturbance
		c	Energy expenditure
		d	Direct mortality (i.e. road kill)
		e	Boat traffic
		f	Off-roading

Conservation Actions

1	Agricultural	**a**	Emphasize the importance of proper grazing. Work with state, federal, and private agencies to continue to develop cost-effective means to balance grazing and wildlife. Patch grazing appears to be very promising. Support Farm Bill programs which encourage proper grazing management.
		b	Work with federal state and private organization to promote (incentives) leaving some cover for wildlife. The economic benefits of wildlife can sometimes equal or surpass the agricultural value of land.
		c	Research on best class, stocking rate, season of use and measures of percent utilization to promote diversity of desireable plant and bird species (no more than 40% utilization - Saiwana (1990) but where some brush loafing and escape cover exists, high intensity, short duration grazing produces greater abundance of forb and grass cover favored by some birds especially critical during drought (Campbell-Kissock et al. 1984). Summer deferral and winter grazing appear most beneficial to some birds (NBQ).
		d	Restore and protect of thornscrub by planting on both private and public lands and by purchase (fee title) or conservation easement, provide grants for reforestation with native species, priority should be the most threatened biotic communities with buffer zones and connected into corridors for movement, staging, and build energy reserves for migration.
		e	Maintain communication with farming community through the NRCS and FSA, Support conservation through Farm Bill Programs, and provide information concerning Landowner Incentive Program (LIP), Partners for Fish and Wildlife (PFW), and other landowner incentive/conservation programs.
		f	Seek to prohibit or minimize grazing in ecoregions, fencing, and develop alternative water sources for livestock.
		g	Fencing of sensitive areas (or portions of sensitive areas), when appropriate, for at least part of the year would keep out grazing animals and allow the understory to regenerate.
2	Development	**a**	Fund research of local species distributions by season, flight corridors, migration corridors, and behavior; Develop site planning alternatives.
		b	Proposed wind power in the Gulf Coast poses a potential threat to migrating birds. Extensive pre-production EIS work is needed especially during peak hawk migration; FCC regulation, placement and design alteration as needed.
		c	Land use planning and zoning to control urban sprawl and to conserve habitat corridors along streams and rivers (seek to minimize encroachment of urban development along riparian areas, including hike and bike trails); retro-active property tax penalties when agricultural land is sold for development.
		d	Education and habitat preservation in areas undergoing urbanization.
		e	Natural resource agencies and private landowners should make every effort to ensure that oil, gas, and wind power development proceed with as little impact as possible to native wildlife.
		f	Continue to monitor Section 404 Permit Applications submitted through USACE and TCEQ, continue educating landowners concerning best management practices for construction activites, actively participate in planning meetings with local/municipal governments, provide information to landowners/public concerning utilization of native plants/ecosystems in landscaping, limit mining permits on state land, utilize GIS and Ground-truthing to analyze landscape to identify areas with critical conservation/corridor values, work with TxDOT, and the Public Utilities Commission to

		g	Identify opportunities to work with public utilities concerning conservation issues and provide information concerning best management practices to utilities.
		h	Lobby for a more effective and inclusive Coastal Zone Management Program from the Office of Ocean and Coastal Resource Management (NOAA).
		i	Ensure that proper lighting is maintained on tall structures, and that regular monitoring for bird strikes is carried out
3	Erosion	**a**	Continue to monitor Section 404 Permit Applications submitted through USACE and TCEQ, continue educating landowners concerning best management practices for agriculture/forest management/community planning, maintain communication with farming community through the NRCS and FSA, and support conservation through Farm Bill Programs.
		b	Education through Technical Guidance - TAES/NRCS Seminars, Field Days, BW Brigade Summer Camps, 4-H Projects, literature on wind and water erosian control, mechanical and natural means to reduce head cutting.
		c	Work with local, state, and federal governments to maintain wooded buffers between uplands and wetlands.
		d	Improve water quality by restoring the habitat upstream. Wetland and Riparian habitat can serve as a buffer (filter) for the surrounding land use. Restoration of grasslands and the creation of grass buffers will improve water and land quality. Utilize conservation programs that are available through TPWD, NRCS, FSA, USFWS, etc… Provide technical guidance to landowners, businesses and municipalities about downstream issues.
		e	Work with local, state, and federal governments to encourage marsh creation using marsh mounds, terracing,etc., using dredge material.
		f	Manually move sediments from upshore sedimentation areas to downshore areas that need it. This is already being done by the Galveston District of USACE at the Old Colorado River Channel. Work on designing new systems that allow sediment transport at ship channel entrances.
		g	Put in measures like shoreline protection to stop erosion (ex. Mad Island Marsh Preserve) of intertidal marshes along the GIWW. Enforce shipping traffic laws and pass legislation to slow vessels down or make shipping industry responsible. Use dredge material from channels in ways to build marsh, create bird islands, etc. (The widening and deepening of the Houston Ship Channel Project is a good example)
		h	Covering existing live oyster reef with sediments can be detrimental; find ways of protecting reefs or management practices to increase reef production and growth.
		i	Work with subsidence districts. Develop proactive wetlands restoration and protection projects using Corps of Engineers, Texas General Land Office, Texas Parks and Wildife, US Fish and Wildlife programs.
		j	Work with Texas Water Development Board long-term planning groups to secure adequate future inflows. Support sand nourishment projects where appropriate.
		k	Participate in federal navigation project review to insure proper jetty construction, sand bypassing, etc.
		l	Develop coastal wetland protection/restoration projects using Corps of Engineers, Texas General Land Office, Texas Parks and Wildife, US Fish and Wildlife, NOAA, and other funding programs
4	Fragmentation	**a**	Encourage broad coalition (environmental and agricultural) support for environmentally favorable policies that have application in the restriction of what can be done on public lands with public resources.

		b	Education through Technical Guidance - TAES/NRCS Range Mgmt Seminars, Field Days, literature on advantages and disadvantages of fencing, "too much of a good thing." This may include Natural resource agencies critically evaluating the need for additional cross-fencing when formulating cost-shareble practices, the removal of unnessecary fences and the marking of needed fences when appropriate.
		c	Natural resource agencies should utilize GIS models to plan cooperative habitat restoration efforts for declining species.
		d	Continue to monitor Section 404 Permit Applications submitted through USACE and TCEQ, participate in local levee and flood planning board meetings, work with local Water Planning Boards to emphasize use of water conservation and other measures rather than new reservoir construction, work with local conservation groups to seek alternatives to new reservoir construction, maintain contact with local legislators concerning biological/ecological impacts that will result from construction of new reservoirs, and restoration and conservation of large blocks of habitat.
		e	The creation of new reservoirs is one of the most important conservation issues facing many migratory species. The destruction of large tracts of land will have detrimental affects to migrating sepcies or those with large home ranges. The change in historic river flows will affect downstream wetlands and floodplains. Contiguous tracts of land is one of the most important habitat types in Texas in protecting many species. Alternatives to reservoir constructions need to be explored.
5	Genetic	a	Work with local, state, and federal governments to encourage and fund the study of relationships of organisms within each egoreigion, and/or habitat; move the data to a common database such as NatureServe.
		b	Work with local, state, and federal governments to encourage and fund the determination of taxonomic vailidity by modern methods; move the data to a common database such as NatureServe.
6	Habitat	a	Work with local, state, and federal governments to encourage and fund systematically checking for suitable habitat locations; move the data to a common database such as NatureServe.
		b	Work with local, state, and federal governments to encourage and fund the survey of all known colonies of host vegetation or food sources; Determine the status of all host plant populations and available food sources; move the data to a common database such as NatureServe.
		c	Encourage small tract clear cuts rather than total area clear cuts.
		d	If possible, encourage the use of artificial habitats (i.e. artificial hollow trees, buildings, artifical reefs, bat houses, replica hollow trees and caves).
7	Human Disturbance	a	Encourage non-traditional forest management practices modeled after the South Georgia and North Florida quail hunting plantations (www.talltimbers.org) such as uneven-aged management, and singletree selection harvest methods that maintain southern pine stands in an open, park-like structure with less than 50% tree canopy cover.
		b	Education through Technical Guidance - TAES/State Forestry Seminars, Field Days, literature on site planning.
		c	Education through Technical Guidance - TAES/NRCS Seminars, Field Days, BW Brigade Summer Camps, 4-H Projects, literature on advantages of stock tanks and water for wildlife, offer SWG for challenge-cost share with NRCS for wetland reserve program, riparian buffers and other Farm Billing practices on private land.
		d	Seek agreement with International Water and Boundary Commission and various water districts to limit brush eradication within floodways.
		e	Education through Technical Guidance - TCEX/TAES/NRCS Seminars, Field Days, BW Brigade Summer Camps, 4-H Projects, literature on recreational value of land, property tax incentives, and qualifying wildlife management practices.
		f	Continue to monitor Section 404 Permit Applications submitted through USACE and TCEQ, continue educating landowners concerning best management practices for forest management, maintain communication with farming community through the NRCS and FSA, and support conservation through Farm Bill Programs.

		g	Continue to support scientific management of fisheries and establish and enforce appropriate fishing regulations.
		h	Continue educating landowners concerning best management practices for forest management, work with Texas Forestry Association to communicate the value of bottomland hardwood forests both ecologically and economically, work with Texas Logging Council to continue improvement of logging operations in bottomland hardwoods, and continue to educate landowners concerning programs to restore bottomland hardwoods like LIP, PFW and Farm Bill programs.
		i	Identify opportunities to obtain carbon sequestration funding, continue to provide opportunites to landowner for reforestation projects using LIP, PFW, Farm Bill and other programs, and utilize GIS to identify critical areas for reforestation, conservation, and mitigation projects.
		j	For gravel mining: design alteration, restoration upon completion back to wetlands, and reduce permitting on state owned land.
		k	Enforce Clean Water Act and restore hydrology.
		l	Document resources that could be affected by disturbances at each location. Seasonal area closures and buffer zones could be implemented in areas where species are breeding or feeding. Any type of "unnatural" disturbance should not be allowed in these areas at fragile times. Provide recreational users with educational material that discusses the impact of disturbance on wildlife and provide them with alternative recreational suggestions.
		m	Reduce filling and drainage of wetlands; reduce amount habitat conversion of natural habitats to various types of construction.
		n	Reduce or minmize the impact of dredging activities regarding the productivity of water resources (i.e bay seagrasses, etc.) or bury existing faunal or floral communities.
		o	Limit commercial fishing and stabilize shrimp and crab stocks, change harvesting practices to environmentally friendly methods. Encourage fisherman to use it once it is available. Protect fishery nursery habitat, TPWD is already doing so in the Eastern Arm of Matagorda Bay.
		p	Support and educate landowners concerning restroration of native wetlands, and programs that provide support to do so, continue to monitor Section 404 Permit Applications submitted through USACE and TCEQ, continue educating landowners concerning best management practices for forest management/agriculture/community planning, maintain communication with farming community through the NRCS and FSA, and support conservation through Farm Bill Programs.
		q	Encourage and support the preservation and planting of limited and necessary food and shelter sources.
8	Invasive	a	Education on proper bird feeder/bird house management for the preventation of avian diseases.
		b	Reduce feral hogs and feral goats through education and control method; Feral animals destroy understory and ground plants. These animals should be removed, and the sensitive locations should be fenced when appropriate.
		c	Support any research on improving control measures of invasive species. Educate and inform about the spreading of invasive species, its possible that certain habitat management techniques help spread the distribution of certain invasive species.
		d	Work with state, federal, and private agencies to continue to develop cost-effective means of removal of invasive species.
		e	Educate and inform landowners about the effects of exotics on wildlife.

		f	Fund research on invasive species such as with the Texas invasive species monitoring committee to assess risks and recommend policies that regulate importation of exotics.
		g	Education through Technical Guidance - TAES/NRCS Seminars, Field Days, BW Brigade Summer Camps, 4-H Projects, literature on value of native grasses and disadvantages of exotic grasses in holistic range management.
		h	Native plantings should be required for all Conservation Reserve Program contract.
		i	Educate boaters concerning the transport of aquatic invasives on boat trailers, boat motors and fishing equipment, support additional research on management techniques for invasive species, and actively apply control measures.
		j	Institute water level fluctuations for the management of certain specie (i.e. Properly timed freshwater inflows will keep both Dermo and the oyster drill populations down allowing oysters to thrive. Too much freshwater will kill oyster reefs too, so there must be a balance).
		k	Continue eradication practices, encourage or give incentive to do so. Stop the use of feeding and baiting for deer and/or turkey, feral hogs probably benefit more from this than deer or turkey, especially wetter regions.
		l	Continue the use of cowbird traps, issue more depradation plans, and educate the public.
		m	Monitoring, regionally and within each ecoregion, insect-pathogen epizootics and develop/implement appropriate response strategies to insect-pathogen epizootics.
9	Management	**a**	Research on response of production and species diversity by season, frequency and environmental conditions (soil moisture, humidity, temperature, etc) of most effective prescribed fire.
		b	Emphasize the importance of periodic prescribed fire and adopt/implement fire policies that mimic natural fire regimes in frequency, size, intensity, etc. Work with and support the Texas Forest Service and the National Forest Service in their prescribed burning programs. Support legislation that facilitates prescribed burning on private lands. Support private prescribed burning assocations (i.e.Hill Country Coop) and promulgate right to burn laws
		c	Educate youth through primary and secondary curriculums regarding ecological succession and biodiversity effects on plant and animal community health, and ultimately human health and need for balance in amount of landscape in various seral stages
		d	Development of landowner-based management cooperatives, where landowners join forces to manage for habitat at more than just a 20-acre basis; support Audubon's quail cooperative efforts.
		e	Fund broad coalition (environmental and agricultural, industry and private foundations) support for ground water quality and conservation policies that may take form in statutory restrictions on 'right of capture.' Fund Joint Ventures and other partners that leverage resources to purchase or obtain conservation easements on surface and ground water rights that are most vulnerable to loss or degradation.
		f	Education through Technical Guidance - TAES/NRCS Brush Sculpting Seminars, Field Days, literature, Realistic water conservation policy and practice - 100% eradication not economically or ecologically sound.

		g	Natural resource agencies should fully consider the needs of declining wildlife species when formilating brush managed contracts as well as sponsoring research on the response of avifauna to brush control efforts.
		h	Lake management is a something historically biologist have had little influence over but which has a lot of potential for migratory bird management. For example, Lake Texoma has a plan in place that allows for some water level manipulations to encourage wetland vegetation to germinate that will provide a forage base for waterfowl in winter. A similar management plan could be negotiated with other reservoir management organizations to provide new mudflats during shorebird migration or time specific water levels to coincide when rookeries are active.
		i	Controlled burning, discing, tilling, herbicide, spoil deposition, Beneficial Use sites
		j	Survey caves and mines before closure
		k	Use specially designed gates that do not interfere with airflow or the passage of bats to protect roosts in abandoned mines and important caves
		l	Gather and publish available "grey" literature data and technical report documentation for the species in order to direct and facilitate research directions and prioritization
10	Political		Natural resource agencies need to take a more active role in promoting and holding conservation easements.
11	Pollution	a	Educate landowners about indiscriminate pesticide use.
		b	Reduction of non-point pollutants and the monitoring of air, soil, water, and plant and animal tissues for trends in non-point pollutants; Better monitoring of discharge permit conditions, BMP during construction, maintaining buffers to prevent direct runoff.
		c	Increase awareness of the effects of groundwater and hydrocarbon pumping along the Upper Texas Coast.
		d	Prevention, Rapid Cleanup, Proper preparation/drills, develop innovative cleanup techniques.
12	Population	a	Baseline study needed before further research and conservation actions can continue: Determine the distribution and abundance to yield a final species status
		b	Baseline study needed before further research and conservation actions can continue: Reintroduce populations when feasible.
		c	Baseline study needed before further research and conservation actions can continue: Survey and search for populations to determine/refine knowledge of their biology
13	Predators	a	Reduce feral cat population through education and control methods.
		b	Trapping, animal control, educate public about keeping cats indoors.
14	Protection	a	Protection of fragile locations from various forms of habitat destruction
		b	Protection extant populations from various forms of habitat destruction
		c	Fund broad coalition (environmental and agricultural, industry and private foundations) support for water conservation policies that have application to insure instream flows to coastal estuaries and bays and healthy riparian ecosystems. Fund Joint Ventures and other partners that leverage resources to purchase or obtain conservation easements on critical or high priority sites (surface or water rights) vulnerable to loss or degradation.

		d	State protection for isolated wetlands.
		e	Using current GIS; analyze the landscape and identify critical corridors with high conservation needs, continue to participate in West Gulf Coastal Plain, and other similar intiatives, support additional acquisition of lands for conservation, continue to promote LIP and PFW programs for private landowners and actively pursue identification of funding sources for these conservation purchases.
15	Range		Baseline study needed before further research and conservation actions can continue: Delimit range.
16	Vehicle Traffic	**a**	Identify critical bird-use areas, and mark them as no wake zones and enact new or enforce existing regulations.
		b	Reduce impacts to seagrasses (scarring), impacts to waterfowl esp. redhead ducks where a majority of the North American population winters.

Monitoring

1	Competition		Determine and continue to monitor the degree and result of competition with local flora and fauna
2	Disease		Determine and continue to monitor the associated population diseases and monitor spread
3	Disturbance		Determine and continue to monitor how manmade alterations influence species or populations (i.e. roads, fire breaks, structures)
4	Genetic		Determine and continue to monitor if a population is disjunct and/or genetically stable over whole range or isolate
5	Habitat	**a**	Identify and monitor foraging habitat requirements
		b	Identify and quantify diet; continue to monitor food habits
		c	Identify and study environmental parameters required for species or populations (i.e. temperature, humidity, seasons, plants); monitor any changes
		d	Identify and study possibilities for artificial habitats; monitor their use
		e	Determine habitat availability and monitor locations
		f	Survey and monitor the effects of species or populations on the local habitat
6	Management		Determine and monitor effects of various management practices on species, populations, and habiats (i.e. prescribed burning, discing)
7	Population	**a**	Monitor size of population
		b	Monitor seasonal fluctuations in population size
		c	Monitor long term trends in population size
		d	Determine date of most recent occurrence in the region; monitor and document futher occurrences
		e	Determine and document incidental take
		f	Estimate life history parameters (i.e. litter size, survival, age at first reproduction, reproductive behavior)
		g	Determine and monitor minimum viable population
8	Range	**a**	Determine habitat range of species or population; monitor changes
		b	Determine and monitor dispersal and movement patterns
		c	Determine historical range and monitor movements
9	Survey	**a**	Monitor and document successful survey techniques, creating protocols
		b	Centralized collection point for road mortalities; monitor causes
		c	Identify, map, and ground truth locations and habitats; including nest sites; monitor high priority locations
		d	Develop and monitor live-trapping technique or techniques that have low mortality
		e	Develop and monitor deterrents (in place of killing the animals or transporting them elsewhere)

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Birds

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Seagrass Conservation Plan for Texas 1999

Medium Priority Conservation Actions

Introduction

The following recommendations were made by the Wildlife Diversity staff of the Texas Parks and Wildlife Department during meetings held in 2004. These are specific projects that are regional in nature and potentially fundable by State Wildlife Grant monies.

Rolling Plains and High Plains

CRP and Grassland Species

Title: Evaluation of CRP to Grassland Species

Purpose Statement: Evaluate the influence of CRP to High and Rolling Plains grassland species such as lesser prairie chicken, bobwhite quail, swift fox and grassland birds.

Broad Objectives:

1. Delineate historic and current CRP distribution in the High and Rolling Plains by species planted, acreage, management and other relevant contract parameters.
2. Delineate historic and current distributions and seasonal habitat use of High and Rolling Plains grassland species of management concern.
3. Partner with other interested parties (such as NGOs, federal and state agencies) for project support and implementation (e.g., data mining, funding, landowner and data access).
4. Research and evaluate, at a variety of scales (landscape, macro and micro habitat) the effects of CRP types and management histories on the High and Rolling Plains grassland species of management concern.
5. Work with USDA, FSA and other interested parties (e.g., QU, TX Quail Council, LPC Interstate Working Group, Interstate Swift Fox Conservation Team, PLJV, Partners in Flight) to promote financial incentives that are conducive to management of grassland species of concern.
6. Work with USDA-FSA to implement and evaluate the CRP Northern Bobwhite Quail Habitat Initiative (CP33: Habitat Buffers for Upland Birds).

Dune Ecology

Title: Ecology and management recommendations for dune ecosystems of the High Plains and Trans-Pecos

Purpose Statement: Characterize the ecology of the High Plains and Trans-Pecos dune ecosystem, focusing on the sand dune lizard as an umbrella species and determine best management practices for the lizard and the dune ecosystem.

Broad Objectives:

1. Conduct review of literature and knowledgeable individuals concerning High Plains and Trans-Pecos dune ecosystem and sand dune lizard.
2. Use aerial photography, LANDSAT, etc., to identify dune ecosystem habitat.
3. Conduct ecological research on dune ecosystems.
4. Survey for and conduct ecological research on sand dune lizard.
5. Develop management guidelines for dune ecosystem and sand dune lizard based on research results.
6. Publish results and management guidelines.

Energy Development and Grassland Species

Title: Energy development and grassland species of concern

Purpose statement: Evaluate potential energy development impacts on species of concern in the High and Rolling Plains.

Broad objectives:

1. Conduct review of literature and partner with knowledgeable individuals to synthesize available information and identify information needs as related to the potential impacts of energy development on avian and bat communities.
2. Develop partnerships among interested parties such as, but not limited to, state and federal agencies, NGO’s and private industry.
3. In cooperation with project partners, identify research and adaptive management funding sources.
4. Conduct monitoring and research at proposed and existing wind power sites to evaluate the potential impacts to avian and bat communities.
5. Develop guidelines for evaluating wind power project proposals in Texas.
6. Work with developers and operators to implement wildlife-friendly practices at wind power sites.
7. Produce brochure that synthesizes what we know about wind power impacts in Texas.
8. Evaluate potential impacts of oil/gas exploration and operation activities and infrastructure on grassland species of management concern.

Black-tailed Prairie Dog Management Plan

Title: Implementation of Statewide Black-tailed Prairie Dog Management Plan
Purpose Statement: Secure five years of dedicated funding to ensure implementation of the Texas Black-tailed Prairie Dog Conservation and Management Plan.

Broad Objectives:

1. Draft a State Conservation Agreement which brings together all stakeholders into a formal agreement to devote resources to the implementation of the Texas Black-tailed Prairie Dog Management Plan.
2. Hire summer intern(s) to conduct prairie dog population monitoring.
3. Integrate plague windshield monitoring into TPWD survey routes and/or develop new routes for the purpose of monitoring for plague-related die-offs.
4. Fund the publication of brochures aimed at some of the specific topics outlined in the Education and Outreach goal in the Texas Black-tailed Prairie Dog Management Plan.
5. Fund research as determined necessary by the Texas Black-tailed prairie Dog Working Group.
6. Dedicated funding for use as a financial incentive to landowners for the establishment of prairie dog colonies in incentive focus areas.
7. Based on results of the cattle weight gain study (if funded), dedicated per-acre funding for landowners interested in protecting and increasing the size of an existing prairie dog colony.
8. Work with USDA to integrate prairie dog-friendly management practices into existing or new financial incentives.
9. Develop an information packet for regulatory and technical guidance biologists as a means of promoting prairie dog conservation to private landowners.

Ogallala Aquifer

Title: Evaluation of the relationship between the Ogallala Aquifer and playas, saline lakes and riparian systems in the High and Rolling Plains

Purpose Statement: Evaluate the relationship between the Ogallala Aquifer and playas, saline lakes and riparian systems in the High and Rolling Plains, as the relationship relates to conservation and management of species of management concern.

Broad Objectives:

1. Review literature and partner with knowledgeable individuals to synthesize available information concerning relationships between the Ogallala Aquifer and playas, saline lakes and riparian systems in the High and Rolling Plains.
2. From the above information, specifically address the issues of (a) playa and saline lakes as mechanisms of recharge for the Ogallala Aquifer, (b) groundwater depletion and aquifer levels, (c) relationship among groundwater depletion, surface water streamflows and aquifer levels and (d) effects of increased rates of aquifer depletion on riparian restoration efforts in the High and Rolling Plains.
3. Delineate and verify the current remaining springs with viable flows in the High and Rolling Plains; use these data to back-calculate diminished capacity over recent and historic time periods relative to documented historic flows.
4. Research and evaluate the impacts of changes to aquifer levels over time to playas, saline lakes, riparian systems and the species of management concern that depend upon and utilize these habitat types.
5. Research and evaluate the human dimensions component(s) of the underground water use and management issue; in particular, conduct a survey to determine value judgments associated with uses of underground Ogallala water in the High and Rolling Plains.
6. Partner with other interested parties (such as NGOs, private entities, landowners and federal and state agencies) for project support and implementation; included in this partnership might also be a working relationship with hydrology and agriculture experts and researchers.

Riparian System Restoration

Title: Riparian System Restoration and Intensive Vegetation Removal

Purpose Statement: Promote and implement active riparian restoration in the High and Rolling Plains ecoregions.

Broad Objectives:

1. Remove invasive vegetation, particularly salt cedar and Russian olive, from state-owned Wildlife Management Areas and State Parks in the High and Rolling Plains.
2. Create demonstrations on these state-owned lands depicting methods, costs, benefits, etc. of riparian restoration and post-restoration management activities.
3. Develop a pamphlet for regulatory and technical guidance biologists as a means of promoting riparian restoration and management to private landowners.
4. Hold riparian restoration field days across the High and Rolling Plains.
5. Research the effects of riparian restoration, particularly the removal of invasive vegetation, on the water table and native riparian vegetation.
6. Work with USDA/FSA in promoting riparian-friendly financial incentives, such as Continuous CRP and Riparian Buffers.
7. Develop new EQIP emphasis areas focusing on restoring and managing healthy riparian corridors.
8. Partner with other interested parties (such as NGOs, federal and state agencies) for project implementation, particularly demonstration site development, outreach/education products and field days.

Pineywoods/Post Oak Savannah

Inventory and Monitoring

Title Inventory and monitor plant communities of concern on private lands in the Pineywoods and Post Oak Savannah

Purpose Statement: To develop and implement an inventory and monitoring program for plant communities of concern such as micro wetlands, xeric sandhills, farkleberry sandylands, longleaf pine upland savannahs, longleaf pine wetland savannahs and upland oak-hickory sandhills in the Pineywoods and Post Oak Savannah Ecoregions.

Broad Objectives:

1. Conduct a review of plant communities of concern in the Pineywoods and Post Oak Savannah Ecoregions.
2. Using National Agricultural Imagery Program (NAIP) aerial photography, identify and map plant communities of concern.
3. Rank plant communities of concern mapped features based upon highest probability of intact natural and semi-natural function (first, second and third order).
4. Ground truth the first and second order communities on cooperative private timber corporation and private landowners. Omit the third order and anomalies.
5. Conduct a floristic assessment of the plant restricted to these plant communities. Identify and map plant species of concern.
6. Produce an annual inventory report and county level map of plant communities of concern and acreages identified.

Additional Priorities:

<u>Longleaf Pine Restoration and TSRB</u>

Pineywoods and Post Oak Savannah

<u>Bear Restoration and Management</u>

Pineywoods and Post Oak Savannah

See Black Bear Management Plan 2005-2015

Edwards Plateau

Impacts to Bird and Plant Communities from Brush Removal

Working Title: Effects of NRCS brush removal on bird and plant communities of the Edwards Plateau

Purpose Statement: To detect any change in the bird and plant communities of the Edwards Plateau subject to NRCS brush removal.

Broad Objectives:

1. Select 3-5 study sites.
2. Collect baseline, pre-treatment data.
3. Collect post-treatment data for 3-5 years.
4. Analyze results and publish.

Developer Liaison FTE and Conservation at Urban/Wildland Interface

Title: Developer Liaison Full Time Employee and Conservation at Urban/Wildland Interface

Purpose Statement: Promote the Texas Parks and Wildlife Department acquisition of a full time employee (FTE) to liaise with developers of commercial and residential property in the Texas Hill Country region in order minimize unnecessary damage to critical habitat and potentially maintain open space within development.

Broad Objectives:

1. Hire, through grant or permanent funding source, a wildlife biologist with background in Urban/Wildland issues as well as the development of land and conservation design subdivisions.
2. Promote (advertise) this FTE through current field biologists including Diversity biologists, Technical Guidance Biologists and Urban Biologists to increase chances of working with developers.
3. Create contacts with private developers and other critical private development infrastructure personnel (e.g. architects, subcontractors, homebuilder).
4. Set specific criteria for contacting and working with developers that are interested in acquiring or developing Texas Hill Country lands.
5. Work toward further incentives to work with conservation design when developing land through additional tax abatement (Wildlife Management Valuation) or other monetary or aesthetic means.
6. Promote current TPWD programs for use in the development of land.
7. Maintain long-term relationships with developers and monitor all development projects in which developers are willing to work with Conservation Design.
8. Branch out to work in all other areas of the state including the Houston, Dallas/Fort Worth, El Paso, South Texas and the Coast.

Additional Priorities:

<u>Cave Invertebrate Systematics</u>

Edwards Plateau

Trans-Pecos

Assessment of Landscape and Smaller-scale Changes

Title: An assessment of the biological changes at the landscape and population scale of Trans-Pecos grasslands OR Chihuahuan Desert grasslands in Texas: A Century of Change: The Good, the bad and the ugly.

Purpose Statement: To determine the occurrence and effects of long-term change (particularly shrub encroachment and desertification) on the Chihuahuan Desert grasslands of Texas and their faunal components at both the landscape and population level.

Broad Objectives:

1. Conduct review of literature, museum collections and knowledge individuals for information concerning the past and present status of Chihuahuan Desert grasslands and selected faunal components in Texas.
2. Use aerial photographs to compare past and present extents of Chihuahuan Desert grasslands.
3. Determine and compare historical and current composition of grassland and selected fauna.
4. Analyze results and publish with management recommendations.

Rio Grande and Pecos River Corridor Restoration

Title: Rio Grande and Pecos River Corridor Restoration

Purpose statement: Evaluate impacts to and restore ecological functions of hydrological and biological systems in the river corridors.

Broad objectives:

1. Develop bi-national partnerships with NGO's, governmental organizations (federal, state and local) and private landowners adjacent to the river.
2. Evaluate effects of land use and water allocation on downstream flows.
3. Evaluate effects of groundwater removal on spring, stream and river flows.
4. Evaluate impacts of altering natural flood regimes on riparian habitats and native biota.
5. Evaluate effects of non-native invasive species on river flows and native biota.
6. Determine the impact of reduced downstream flows on health and function of riparian habitats and native species.
7. Educate the public as to the impacts of invasive species, land use changes and groundwater removal.
8. Develop incentives for landowners to implement riparian zone conservation practices.
9. Implement invasive species control and habitat management programs to improve natural water storage and downstream flows.
10. Implement and support community based watershed management programs to address non-point source pollution.
11. Seek legislation to address natural resource needs.
12. Renegotiate water allocations and secure instream flows for conservation.

Additional Priorities:

<u>Surface Water Inventory</u>

Trans-Pecos

Homesteads for Wildlife

Title: Homesteads for Wildlife

Purpose Statement: Development and implement a new cost-sharing grant program that funds habitat management practices on small acreage properties.

Broad Objectives:

1. Fund habitat improvement practices on small acreage lands (e.g. <100 acres?).
2. Increase acreage on individual cooperator's properties devoted to specific land management practices for wildlife (acres disked, burned, planted to native plants, cross-fenced, mowed, deferred from grazing, etc.).
3. Restore rangelands and old fields with prescribed burning, brush sculpting and reseeding practices.
4. Maintain existing wildlife habitat on small acreage (fund conservation and management of existing wildlife habitat on small acreage properties for nongame).
5. Increase acreage of surface water for wildlife (improve water distribution, develop surface water for use by waterfowl, pipe water to watering facilities, construct watering facilities, construct shallow seasonal water catchments, etc.) on individual cooperator's properties and improve water quality along watersheds for wildlife and downstream flows (riparian buffers, field waterways, field borders, water diversions, etc.).
6. Maintenance and management of existing wooded corridors and riparian zones to promote habitat connectivity.
7. Assist landowners in developing partnerships with other non-traditional wildlife organizations and programs (e.g. Texas Wildscapes) to achieve recognition and other potential sources of funds. Examples of programs include TPWD’s and National Wildlife Federation’s *Best of Texas Backyard Habitat Program* and NRCS’s *Backyard Conservation Program*.

Prairie Conservation

Title: Prairie conservation in the Blackland Prairie and Fort Worth Prairie Ecoregions
Silvaneanus Dropseed Prairie Inventory Conservation
Purpose Statement: Identify and promote measures to conserve and restore prairie remnants in the Blackland Prairie and Fort Worth Prairie Ecoregions.

Broad Objectives:

1. Develop partnerships among interested parties such as, but not limited to, state and federal agencies, universities and NGO's.
2. In cooperation with project partners, identify funding sources for conducting inventory, research and demonstration projects.
3. Identify and inventory prairie remnants.
4. Form a network of landowners willing to allow native seed and seed hay harvest for prairie restoration projects.
5. Work with existing native seed increase projects to increase the availability and diversity of commercially available native plant materials.
6. Provide information and resources to landowners with potential prairie restoration projects.
7. Determine effectiveness of restoration and management techniques for maintaining diversity of prairie flora and fauna.
8. Educate the public on the importance of the prairie ecosystem.

Texas Horned Lizard and Northern Bobwhite Habitat Management

Title: Texas Horned Lizard Population Response to Quail Habitat Management

Purpose Statement: Examine the impact of common quail habitat management practices on Texas horned lizard and other declining herpetofauna in the Cross Timbers ecoregion.

Broad Objectives:

1. Identify potential project partners and develop partnerships (state and federal agencies, universities and NGO's).
2. Work with project partners to identify, seek and obtain funding to conduct research projects.
3. Conduct scientific research to investigate the population response of Texas horned lizard and other declining herpetofauna (Box turtles, Slender Glass Lizard, Prairie Skink, Dusty Hog-nosed snake) to management practices such as, but not limited to, prescribed burning, brush sculpting, prescribed grazing and grass monoculture conversion to native prairie restoration.
4. Publish results in scientific journals and develop brochures that synthesize what we know about the impacts of these habitat management practices on herpetofauna.
5. Evaluate the applicability and effectiveness of utilizing existing cost-share grant programs like **EQIP-Rolling Plains Grassland Bird/Quail Emphasis Area** for improving habitat for declining herpetofauna.

South Texas

Watershed and Riparian Restoration

Title: Watershed Function and Bottomland Riparian Restoration

Purpose Statement: Evaluate the interrelationships between the status of all land uses within watersheds and their impacts on the health and functions of floodplain habitats, estuaries and bays.

Broad Objectives:

1. Evaluate changing land use effects on downstream flows.
2. Evaluate the effects of groundwater removal on spring, stream and river flows.
3. Determine the impact of reduced downstream flows on health and function of floodplain habitats, estuaries and bays.
4. Determine the impact of reduced downstream flows on indigenous and migratory fauna and flora.
5. Implement habitat management programs to improve natural water storage and downstream flows.
6. Evaluate effects of habitat management programs.
7. Evaluate impacts of altering natural flood regimes on floodplain habitats, bays and estuaries.
8. Educate public of the impacts of land use changes and groundwater removal.
9. Seek legislation to address natural resource needs.
10. Seek regulatory relief for landowners benefiting endangered species.
11. Implement and support community based watershed management programs to address non-point source pollution.
12. Develop funds for small landowners to implement watershed improvement practices like stream fencing, riparian zone plantings, creating no-mow zones and controlling bank erosion.
13. Comprehensively evaluate all major rivers to identify areas with high bank erosion problems and work with landowners to address these problems.

Landscape Connection of Native Blocks of Habitat

Title: Landscape Connection of Native Blocks of Habitat

Purpose Statement: Evaluate the effects of fragmentation of habitats throughout Texas.

Broad Objectives:

1. Conduct literature review on habitat fragmentation as it pertains to Texas habitats.
2. Determine patch size impacts on native fauna and flora in different habitats.
3. Determine size, shape and distribution of corridors that effectively increase the size of the habitat patches for fauna and flora.
4. Educate the public on the effects of patch size to wildlife.
5. Address regulatory concerns of landowners benefiting endangered species.

Ocelot Inventory, Thornscrub Restoration, Acquisition, Corridors

Title: Habitat restoration, acquisition and analysis of existing habitat

Purpose statement: Evaluate potential habitat for presence of ocelot and acquire, restore and connect existing areas that may serve as suitable habitat for ocelot.

Broad objectives:

1. Conduct surveys using camera trapping, scent station posts and other methods in areas of suitable habitat to determine ocelot occurrence and range in Texas.
2. Develop partnerships among interested parties such as, but not limited to, state and federal agencies, NGO's, private industry and landowners.
3. Develop habitat restoration efforts where possible in areas nearest to known occupied ocelot habitat to increase available habitat and establish corridors. Encourage restoration of diverse native brush communities with species appropriate to the soils and conditions at each site.
4. Identify ocelot cover types, map important corridors and habitat patches and develop restoration blueprints.
5. Develop economic incentives for private landowners to maintain ocelot habitat on their land, to promote recovery of the species. Incentives could include the promotion of tourist-related activities, safe harbor agreements (U.S. Fish and Wildlife Service 1997), government incentives (particularly those for habitat conservation provided by the Farm Bill) and/or conservation easements that allow landowners to retain ownership and keep the habitat intact without fragmentation.
6. Encourage use of rare and threatened vegetative plant species where appropriate.

Rio Grande Valley Butterfly Survey

Title: Lower Rio Grande Valley Butterfly Survey

Purpose statement: Document butterfly species diversity, abundance and distribution in the Lowe Rio Grande Valley.

Background statement: The Lower Rio Grande Valley has, by far, the greatest total butterfly diversity of any comparable sized region in the United States.

Broad objectives:

1. Develop partnerships with NGOs, governmental organizations, private landowners and interested individuals.
2. Establish Internet-based means of communicating, coordinating survey efforts, maintaining data and verifying sightings.
3. Develop outreach materials to publicize the work and need for surveyors.
4. Coordinate with owners of public and private tracts to organize butterfly survey events in new or under-surveyed areas such as locations in Starr County.
5. Identify species in need of conservation, their habitats and host plants.
6. Conserve critical habitat areas.

Gulf Coast Prairies and Marshes

Restoration at a Landscape Scale

Title: Coastal Prairie Restoration at a Landscape Scale

Purpose Statement: Restore Coastal Prairies in large enough blocks to be inhabited by all indigenous species depending on this ecosystem. Note: Coastal Prairies not only include climax tall grass communities, but also include freshwater wetlands which might normally occupy up to 30% of the surface, riparian woodlands along creeks and minor drains and bottomland forests along rivers.

Broad Objectives:

1. Partner with conservation organizations, agencies and landowners to create a team to provide the technical expertise and funding to implement projects.
2. Evaluate the size, distribution and condition of native grasslands and riparian woodlands available for restoration in the Coastal Prairie Ecosystem.
3. Address regulatory concerns about endangered species and other laws for landowners cooperating in project.
4. Restore habitats which include the full range of activities (e.g. providing funding for management on public and private property, providing technical assistance, creating and managing specialty work teams for conducting controlled burns, acquisition of specialty equipment for loan to landowners, maintaining seed sources for nurseries replanting forests and prairies). Determine effects of patch size and distribution of prairie and forest remnants on native fauna and flora.
5. Determine effectiveness of habitat restoration and management on native fauna and flora.
6. Evaluate the effects of upstream land use on floodplain functions.
7. Evaluate the need to purchase land or conservation easements.
8. Educate the public on the importance of Coastal Prairie Ecosystem.
9. Reintroduce species extirpated from coastal prairie habitats where feasible and monitor results.

Coastal Marsh Restoration

Title: Coastal Marsh Restoration

Purpose Statement: Restore coastal marshes and varying salinity regimes to their 1950 acreages.

Broad Objectives:

1. Partner with conservation organizations, agencies and landowners to create a team to provide the technical expertise and funding to implement projects.
2. Work with regulatory agencies to provide the protection needed to existing marshes.
3. Determine 1950 distribution, size, condition and salinity of coastal marshes.
4. Determine changes needed to obtain restoration goal.
5. Address regulatory concerns about endangered species and other laws for landowners cooperating in project.
6. Develop and manage habitats for native fauna and flora.
7. Evaluate effects of management.
8. Evaluate the effects of upstream land use on marsh, estuary and bay functions.
9. Evaluate the effect of in-stream flows on marsh, estuary and bay functions.
10. Evaluate the need to purchase land or conservation easements.
11. Determine impacts/trade offs of conflicting uses of coastal marshes, estuaries and bays to flora and fauna.
12. Educate the public on the importance of Coastal Marsh Ecosystem.

Additional Priorities:

<u>Evaluation of Impact of Wind Farms on Avian Species and Bats</u>

Gulf Coast Prairies and Marshes

Statewide

Statewide Plant Community Identification

Title: Land Cover/Land Use database of Texas

Purpose Statement: To develop, update and maintain a database and map depicting the land cover types (plant communities) and uses for the state of Texas.

Broad Objectives:

1. Conduct a review of plant community and land cover/use literature, maps, etc.
2. Select a plant community classification for the state and add/delete/adapt the classification to a minimum mapping unit (e.g. five ac.).
3. Using LANDSAT and National Agricultural Imagery Program (NAIP) aerial photography, identify and map plant communities and/or land cover/use.
4. Ground-truth a percentage of remotely sensed data.
5. Produce a map as well as an updatable database of the plant communities, land cover and land use types of Texas.

TPWD as an Active Participant in Working Groups

Title: TPWD as an Active Participant in Working Groups

Purpose Statement: Develop a funding source for TPWD to utilize participation in wildlife working groups (i.e. a group of interested parties or stakeholders where TPWD represents the state's interests in the management of wildlife resources in Texas). Typically, funding (either monetary, in-kind, or both) is not guaranteed or implied by membership in a working group but rather each member's contribution is time given to planning, inventory and monitoring efforts, suggestions for regulatory changes, etc.

Broad Objectives:

1. Develop a funding source from which TPWD can dedicate money to be used for travel (potentially out-of-state) to participate in working group meetings as well as rental of space when TPWD hosts a meeting.
2. Create a framework where TPWD working group representatives can query Commissioners and TPWD managers to determine the state's position.
3. Brief Commission annually on working group progress.
4. Develop a list of species or habitats where working groups could significantly assist in a species' or habitat's recovery.
5. Initiate dialog with members of other wildlife-oriented NGO's and governments as well as commodity groups and landowner groups who may be potential working group members; have all viewpoints involved from the start.
6. Study other working groups to assess what has worked and what has not.
7. Focus attention on ecoregional working groups and tie individual species (where possible) into an ecoregion.
8. Potential working groups include the following:
   - Texas cave and karst working group,
   - Non-game reintroduction and translocation working group,
   - Invasive plant information/action group,
   - Borderlands working group,
   - Lesser prairie chicken working group.

<u>Access to Land</u>

Statewide

Supplemental Species Information

Introduction

Discussions with professional mammalogists and a review of the literature and books on Texas mammals indicates that information on basic ecology, conservation and management issues is insufficient or non-existent for many non-game mammal species. A review of the status of mammals in Texas reveals numerous species without status reports or with reports that are 12 to 20 years old. Landscape fragmentation; urban development; habitat conversion and degradation; predator control; and competition from and the effects of exotic plants, animals, parasites and diseases have placed huge pressures on all wildlife species and their habitats. In many cases these factors alone or in combination have dramatically affected both the distribution and densities of many species of mammals that were once common across Texas. Assessing the status and knowledge of mammals, identifying information gaps and population declines and developing management strategies is critical to the success of TPWD meeting the requirements of its mission statement.

Supplemental Mammal Information

High Priority Species

Name
Scientific: *Dipodomys compactus compactus*
Common: Padre Island kangaroo rat or Barrier Island kangaroo rat

Status: Federal: None
State: None
Global: None
Priority: High

Distribution: Gulf Prairies and Marshes

Habitat Type: Barrier Islands
Community: Secondary sand dunes and areas of sparse vegetation.

Reasons for Concern:

1. Habitat loss.

Status Needs:

1. Initiate surveys to determine range of this subspecies. Does it extend to San Jose Island and barrier islands further north as well as extent of subspecies south of Rio Grande?
2. Initiate surveys in developed areas of Mustang and Padre Islands to determine if this subspecies persists within areas of altered dune structure and altered vegetation cover (i.e. urban landscapes).

Monitoring Needs:

1. Assess occupied areas.

Research Needs:

1. Determine range of subspecies.
2. Determine if population is disjunct and/or genetically stable over whole range or isolated.

Management Needs:

1. Need to be developed.

Name
Scientific: *Leopardus pardalis*
Common: Ocelot

Status: Federal: Endangered
State: Endangered
Global: G4
Priority: High

Recovery Plan: In Press. Listed cats of Texas: Recovery Plan.

Distribution: Rio Grande Plains
Known populations: Willacy and Kennedy county population (Navarro-Lopez 1985) and Cameron County, Laguna Atascosa National Wildlife Refuge Population (Laack 1991).

Habitat: Shrubland
Community: Tamaulipan thornshrub communities (Navarro-Lopez 1985, Tewes1986, Laack 1991); prefer thornshrub communities with >95% canopy closure avoid areas of intermediate (50-75%) to no canopy cover (Horne 1998). Other microhabitat features of the Tamaulipan thornshrub community important to ocelot include canopy height (>2.4m) and vertical cover (89% visual obscurity at 1-2m layer) (Maehr and Caso in preparation).

Reasons for Concern:

1. Lack of suitable habitat (Tewes and Miller 1987) and continued habitat loss and fragmentation (Wilkins et al 2000, Sunquist and Sunquist 2002).
2. Inhibited dispersal due to lack of habitat, highways, agricultural fields and human development (Laack 1991, Shinn 2002).
3. Reduced genetic variability and reduced gene flow between LANWR and Willacy-Kennedy county populations (Maehr and Caso in preparation).
4. High degree of vehicle collisions and subsequent mortality (Haines et al., *in preparation*).
5. Disease (Pence et al 1995).

Status Needs:

1. Provide support for continued research to determine extent of present populations, particularly outside of Cameron County.
2. Continue to evaluate population status and current threats in Mexico. Priority of recovery efforts may hinge on current information available in Mexico.
3. Camera evaluation of other parts of the state where ocelots may occur.
4. Centralized collection point for road mortalities.

Monitoring Needs:

1. Continued radio collaring, camera trapping and more extensive survey of state.

Research Needs:

1. To be determined in recovery plan.

Management Needs:

1. Recovery actions as identified in the ocelot recovery plan will be followed for this species. Actions have not yet been identified.

Name
Scientific: *Corynorhinus rafinesquii*
Common: Rafinesque's Big-eared Bat

Status:

Federal: none
State: Threatened
Global: G3/G4
Priority: High

Distribution: East Texas Pineywoods

Habitat Type:

Bottomland hardwoods. Historically lowland pine and hardwood forests with large hollow trees; associated with ecological communities near water.

Roosting and Foraging Ecology:

Roosts in bottomland hardwood trees, crevices behind loose tree barks, culverts, bridges and buildings. Hibernacula have been found in cisterns. Often roosts in more open, cooler and well-lit areas than do most species. Maternity colonies select very large tree hollows, usually within one km of water (BCI 2001). Often forage within one m of the ground in forested habitat.

Reasons for Concern:

1. Uncommon throughout its range.
2. Population has not been adequately monitored, but available evidence indicates the species is declining significantly.
3. Degradation of roosting and feeding sites by commercial logging practices and development.
4. Habitat destruction in the form of clearing forests, destruction of bottomland hardwoods and adverse timber management practices by various entities (i.e. land managers, foresters etc) in the piney wood habitat of east Texas.
5. Human disturbance and destruction of roosting sites.
6. Lack of knowledge concerning population status.

Population Status Needs:

1. Identify, map and revisit all known roost sites and recent capture sites to determine current distribution.
2. Conduct field surveys to identify new roost sites.

Monitoring Needs:

1. Visit known roost sites periodically to determine presence and population estimates/trends.
2. Conduct field surveys to identify maternity roosts and hibernacula.

Research Needs:

1. Quantify differential use of summer and winter roosts.
2. Identify maternity and hibernation roost temperature requirements. Detailed roost knowledge is needed in order to provide artificial roosts.
3. Further identify foraging habitat requirements.
4. Further identify and quantify diet.
5. Further study artificial roost designs as old buildings collapse and large hollow trees are unavailable.

Management Needs:

1. Develop incentives for private landowners to maintain their suitable bottomland hardwood forests.
2. Protection of large hollow tree roosts and forest management aimed at providing large trees for future habitat, especially in lowland areas near water sources (BCI 2001).
3. Discourage landowners from capping open cisterns and develop a grating technique as they may serve as potential hibernacula.
4. Discourage landowners from removing abandoned buildings which may serve as roost sites and encourage the stabilization of old buildings when possible.
5. In areas where timber harvest has already occurred, encourage regeneration of the area back into hardwoods rather than a change of land use to residential or agriculture.
6. Acquire public lands around existing protected areas to increase size of contiguous habitat.
7. Encourage an increased harvest rotation of hardwoods and lowland pine to increase biodiversity; encourage small tract clear cuts rather than total area clear cuts.
8. Encourage the use of artificial roosts such as artificial hollow trees and large scale bat houses.

Name
Scientific: *Corynorhinus townsendii*
Common: Townsend's big-eared bat

Status:

Federal: None
State: None
Global: G4T4
Priority: High

Distribution: High Plains, Rolling Plains, Edwards Plateau, Trans-Pecos

Habitat Type: Occurs in a wide variety of habitats but its distribution tends to be geomorphically determined and is strongly correlated with the availability of caves or cave-like roosting habitat (i.e. old mines) (Idaho Conservation Effort, 1999).

Roosting and Foraging Ecology:

Roosts in caves, mines, rock shelters, possibly rocky crevices and occasionally buildings (Schmidly 1991&2004, Tuttle 2003, Easterla 1973). Hibernacula mainly in caves and mines (Idaho Conservation Effort, 1999). They emerge after dark to feed. Specific foraging activity unknown for Texas but in other parts of range they forage over fields, streams, forest edges, mountain slopes, cliff faces and in clearing (BCI 2001). Most often take insects in flight, but also glean them from foliage. Feed mostly on small moths and occasionally beetles (BCI 2001). While resting between foraging bouts, they may use alternate night roosts in rock shelters, returning to day roosts just before daybreak (BCI 2001).

Reasons for Concern:

1. Loss of habitat due to blasting old mine tunnels, destruction of caves
2. Roosts extremely susceptible to human disturbance and vandalism.

Population Status Needs:

1. Identify, map and revisit all known roost sites and recent capture sites to determine current status and distribution.
2. Conduct field surveys to identify new roost sites, in particular a) gypsum caves in the Panhandle region which may be used as hibernacula; b) abandoned mines in the Trans-Pecos; and c) caves in the Edward's Plateau and Trans-Pecos.

Monitoring Needs:

1. Visit known roost sites periodically to determine presence and population estimates/trends.

Research Needs:

1. Determine roost temperature requirements for maternity and hibernation sites.

Management Needs:

1. Protect lands around existing significant roosts to increase size of contiguous habitat.
2. Survey abandoned mines before closure.
3. Use specially designed gates that do not interfere with airflow or the passage of bats to protect roosts in abandoned mines and important caves.
4. Continue education and public awareness of the use of caves and mines as bat habitat.

Name
Scientific: *Myotis austroriparius*
Common: Southeastern myotis

Status:

Federal: None
State: None
Global: G3/G4
Priority: High

Distribution: Mostly found in East Texas Pineywoods, recently extending into Oak Woodlands and Prairies.

Habitat Type: Bottomland hardwoods. Historically lowland pine and hardwood forests with large hollow trees; associated with ecological communities near water.

Roosting and Foraging Ecology:

Roosts in live, hollow bottomland hardwood trees near slow-moving rivers. They switch roots frequently. Also roost in man-made structures such as abandoned houses, bridges, culverts and bat houses. Hibernacula unknown but likely within vicinity of summer range, may also use snags. Forages over water and probably feeds on midges, mosquitoes, small moths, beetles and crane flies.

Reason for Concern:

1. Degradation of roosting and feeding sites by commercial logging practices and development.
2. Disturbance and/or destruction of roosts in man-made structures.
3. Loss of roosts and habitat due to flooding of low lying riparian areas to create reservoirs.

Population Status Needs:

1. Identify, map and revisit all known roost sites and recent capture sites to determine current distribution.
2. Conduct field surveys to identify new roost sites and hibernacula.

Monitoring Needs:

1. Visit known roost sites periodically to determine presence and population estimates/trend.

Research Needs:

1. Quantify differential use of summer and winter roosts.
2. Further identify foraging habitat.

Management Needs:

1. Develop incentives for private landowners to maintain suitable bottomland hardwood forests, including retention of live hollow trees such as black gum and water tupelos.
2. Discourage landowners from capping open cisterns as they may serve as potential hibernacula and maternity colonies.
3. Discourage landowners from removing abandoned buildings and standing snags which may serve as roost sites.
4. Leaving or planting a percentage of young gum trees during logging in order to provide for future roosting sites once mature trees are gone. After logging, encourage regeneration back into hardwoods rather than a change of land use to residential or agriculture.
5. Encourage an increased harvest rotation of hardwoods and lowland pine to increase biodiversity; encourage small tract clear cuts rather than total area clear cuts.
6. Encourage the use of artificial roosts- both standard bat houses and artificial trees.

Name
Scientific: *Nasua narica (Scott Humphreys)*
Common: White-nosed coati

Status: Federal: Not listed
State: Threatened
Global: G5
Priority: High

Distribution: South Texas Plains, southern Gulf Coast Prairies, the Edwards Plateau and the Trans-Pecos (Chapman and Feldhamer 1982, Schmidly 2004).
Note: Peripheral in Texas.

Habitat Type: Forest and wooded canyons usually near water (Gompper 1995).
Community: Juniper (*Juniperus sp.*), Madrone (*Arbutus sp.*), Manzanita (*Ehretia anacua*), Oaks (*Quercus sp.*), Prickly Pear (*Opuntia sp.*)

Reasons for Concern:
1. Erratic distribution.
2. Habitat loss.
3. Pet trade.

Status Needs:
1. Unknown

Monitoring Needs:
1. Document sightings in historic range.
2. Determine method for estimating population trends.
3. Camera evaluation of other parts of the state where coatis may occur.
4. Centralized collection point for road mortalities.

Research Needs:
1. Determine habitat availability.
2. Determine if populations are contiguous over historic range.
3. Determine dispersal and movement patterns within Texas and between Mexico.

Management Needs:
1. Inform landowners of preferred habitats and encourage voluntary protection.
2. Develop public awareness of this species.

Medium Priority Species

Name
Scientific: *Blarina hylophaga plumblea*
Common: Elliot's Short-tailed Shrew

Status: Federal: None
State: None
Global: None
Priority: Medium

Recovery Plan: None

Distribution: Aransas and Bastrop counties only (Schmidley, 2004, Reilly et al., in press).

Habitat Type: Forest and coastal prairie marshes.
Community: Relictual Loblolly pine (*Pinus taeda*) on sandy soils and coastal marshes (Reilly et al., in press).

Reasons for Concern:
Taxonomic confusion with similar specie, inadequate knowledge of geographic distribution, potential low population density and lack of suitable habitat within area of occurrence (George et al., 1981, Reilly et al., in press).

Status Needs:
1. Initiate surveys to determine range of this subspecies. Does it occur in suitable habitats in other counties adjacent to present known occurrence?
2. Initiate needed surveys.

Monitoring Needs:
1. A protocol to monitor species presence over large geographic areas in East Texas.
2. Assess occupied areas within areas of occurrence.

Research Needs:
1. Determine range of subspecies.
2. Determine if population is genetically continuous and/or genetically stable over whole range or isolated (Brant and Ortí, 2002, Reilly et al., in press).
3. Determine population levels in areas of occurrence.
4. Develop a live-trapping technique or techniques that have low mortality.

5. Estimate life history parameters (litter size, survival, age at first reproduction, etc.) in a variety of locations throughout the range.
6. Assess resource requirements (food, habitat) in a variety of locations throughout the state.

Management Needs:

1. Inform landowners of preferred habitats and encourage voluntary protection of the unique habitats.

Name
Scientific: *Geomys attwateri*
Common: Attwater's pocket gopher

Status: Federal: N4
State: S4
Global: G4
Priority: Medium

Distribution: Brazos River in south-central Texas (Milam and Burleson counties) south along the west bank of the Brazos River to the Gulf Coast (Matagorda County), southwest along the coast beyond Rockport (Aransas and San Patricio counties) and northwest ward to Atascosa County.

Habitat: Grasslands
Community: Sandy soils of bunchgrass and annual forb community; also occurs in silty clay loam soils and in habitat dominated by annual plants.

Reasons for Concern:

1. Loss of habitat due to clearing for cropland, pastures and urban development.
2. Loss of habitat due to invasion of woody plants associated with grassland degradation.
3. Potential decreases in numbers due to imported fire ant predation and overuse of pesticides and herbicides in agricultural areas.

Status Needs:

1. Provide support for continued research to determine stability of populations.

Monitoring Needs:

1. Monitor current populations to determine trends.

Research Needs:

1. Determine extent of present populations and monitor population status periodically.

Management Needs:

1. Improve private landowner participation in monitoring efforts and prevention of loss of habitat by invasion of woody plants.
2. Encourage landowner participation in wise grazing practices that perpetuates grassland habitat.
3. Increase public education on detrimental environmental effects of urban development.

Name

Scientific: *Leptonycteris nivalis*

Common: Mexican Long-nosed Bat

Status: Federal: Endangered (USFWS Recovery Plan, September 1994)

State: Endangered/S1

Global: G3

Priority: Medium

Distribution: Trans-Pecos, Big Bend region of Texas (Brewster and Presidio Co.)

Habitat Type: Forested and scrub grasslands

Roosting and Foraging Ecology:

Roosts in high elevations of the Chisos Mountains (desert scrub, pine-oak and pine habitats at high elevations 500-3000m).

Feeds on nectar from desert cacti (*Agave*) found at various elevations in more open scrub-grassland areas.

Reasons for Concern:

1. Known roost site in Big Bend has declining or fluctuating populations and is difficult to adequately survey.
2. Cave roosts in Mexico may be disturbed or destroyed.
3. Food source may be threatened by harvesting by moonshining operations.

Status Needs:

1. Identify other potential roosts in the Big Bend Region.

Monitoring Needs:

1. Establish a standard method for estimating roost population size and obtain an annual population estimate at Mount Emory Cave roost.
2. Map agave population locations and periodically determine density and phenology of flowering agave plants in BBNP.
3. Determine their annual date of species arrival and departure at Emory Peak cave roost.

Research Needs:

1. Determine foraging habitat needs during all parts of the bat's life cycle. Studies of feeding behavior should include variation in foraging by sex, age, time of year and locale. Determine and inventory plant species used and flight distances traveled to secure food.
2. Searches for other roost sites should be conducted and any that are found should be protected and monitored.
3. Conduct ground surveys in key locations to determine where and when species migrations occurs.

4. Estimate the number of flowering agave plants in BBNP park and determine how many bats could be sustained on that number.

Management Needs:

1. Because they are known to feed outside of BBNP, encourage landowners to preserve or plant agave plants.
2. Cooperate with Mexican counterparts in research and management efforts.
3. Investigate feasibility of propagating agave plants in BBNP.
4. Protect known or newly discovered roosts and foraging habitat.

Name
Scientific: *Mormoops megalophylla*
Common: Ghost-faced bat

Status: Federal: None
State: None/S2
Global: G4
Priority: Medium

Distribution: Trans-Pecos, southern edge of the Edwards Plateau and south Texas Plains.

Habitat Type: Generally found in lowland areas, especially desert scrub and riverine habitat. Has also been captured in mountainous regions.

Roosting and Foraging Ecology:
They roost in caves, mines, tunnels and buildings and forage along arroyos and canyons. They capture insects in flight and feed mainly on moths. Coleopteran, hemipteran, homopteran and neuropteran have also been found in stomach contents.

Reasons for concern:
1. Vulnerability of cave roosts in Texas.

Status needs:
1. Revisit historic known roost sites to assess current use.
2. Locate undocumented roost sites in West Texas.

Monitoring needs:
None at present.

Research needs:
1. Further investigate possible seasonal migrations between summer and winter roosts.
2. Further investigate reproductive activity in Texas.
3. Further investigate diet.
4. Investigation differential roost and habitat use by males and females.

Management needs:
None at present.

Name
Scientific: *Blarina carolinensis*
Common: Southern short-tailed shrew

Status: Federal: None
State: None
Global: G5N5
Priority: Low

Recovery Plan: None

Distribution: East Texas, as far west as Denton, Bastrop and Victoria counties with *B. c. carolinensis* from north of Nacogdoches County and *B. c. minima* from the south.

Habitat: Hardwood and pine forests and associated meadows and openings with adequate moist ground cover and leaf litter.
Community: Pineywoods and post oak savannahs.

Reasons for Concern:
Taxonomic confusion with similar species in genus, inadequate knowledge of spotty geographic distribution in Texas, potential low population density and lack of suitable habitat within total area of occurrence (George et al., 1981, George, 1999, Reilly et al., in press).

Status Needs:
1. Initiate surveys to determine range of this subspecies. Does it occur in suitable habitats in other counties adjacent to present known occurrence?
2. Initiate surveys in East Texas to find additional areas with suitable habitats for this shrew.

Monitoring Needs:
1. A protocol to monitor species presence over large geographic areas in East Texas.
2 Assess occupied areas within areas of occurrence.

Research Needs:
1. Determine range of species.
2. Determine if population is genetically continuous and/or genetically stable over whole range or isolated (Brant and Ortí, 2002, George, 1999, Reilly et al., in press).
3. Determine population levels in areas of occurrence, especially in areas other than Big Thicket where it is reported to be common (Schmidly 2004).

4. Develop a live-trapping technique or techniques that have low mortality of captured individuals.
5. Estimate life history parameters (litter size, survival, age at first reproduction, etc.) in a variety of locations throughout the range.
6. Assess resource requirements (food, habitat) in a variety of location throughout the state.

Management Needs:

1. Inform landowners of preferred habitats and encourage voluntary protection of the unique habitats that may also harbor other priority species.

Name
Scientific: *Thomomys bottae guadalupensis*
Common: Southern Pocket Gopher

Status: Federal: N2
State: S2
Global: G5T2
Priority: Medium

Distribution: Culberson County

Habitat: Arid grassland; desert scrub
Community: 1400 –2500m in shallow, rocky soil f the Guadalupe Mountains, often associated with lechuguilla, its preferred food plant.

Reasons for Concern:

1. This pocket gopher is dependent on its preferred food of Agave and lechuguilla and is thus sensitive to the adverse effects of overgrazing, conversion of rangeland to improved pastures and agriculture and to trapping and poisoning control efforts.

Status Needs:

1. Assess taxonomic status to determine validity of subspecies.
2. Using historic information and GIS mapping techniques determine preferred habitat.
3. Survey and trap historic locations where possible to determine current presence.

Monitoring Needs:

1. Periodically monitor population trends within GMNP.
2. Develop a method of estimating population density and trends.

Research Needs:

1. If valid subspecies, then determine minimum viable population.
2. Determine reproductive behavior.
3. Determine dispersal and movement patterns.

Management Needs:

1. Identify any threats to the GMNP population if the population is declining.
2. Identify preferred habitat with GMNP and protect and manage if needed.
3. Notify private landowners with proper habitat and provide information on life history and proper management techniques.

Name
Scientific: *Geomys streckeri*
Common: Strecker's (Carrizo Springs) Pocket Gopher

Status: Federal: C2
State: S1
Global: G4T1
Priority: Medium

Distribution: Rio Grande Plains
Restricted to northern Dimmit and southern Zavala counties (Williams and Genoway 1981) in the vicinity of Carrizo Springs and Crystal City.

Habitat: Riparian Community: Tamaulipan Biotic Province with predominate vegetation including thorny brush, mesquite (*Prosposis juliflora*) and grasses such as *Paspalum*, *Cynodon* and *Cenchrus* (Blair 1950, Davis 1974). Occupies in fluvial deposits (sandy soil) along watercourses and deep Carrizo sands on a western tributary of the Nueces River. Evidently absent from the silt loams of the flood plains of the Rio Grande or gravelly stony clay soils (Davis 1974); uses roadsides in areas of Antosa Bobillo soil association.

Faunal Association:
Hosts the louse *Geomydoecus truncataus*, which has not been discovered in populations of *G. personatus* that host other species of *Geomydoecus.* (Schmidly 1994*)*.

Reasons for Concern:
1. Limited distribution. Species is restricted to northern Dimmit and southern Zavala counties; changes to this species habitat could cause isolated populations as well as a decrease in the overall population due to loss of suitable habitat.
2. Little is known about the status of the Carrizo Springs pocket gopher and potential threats to its survival have not been determined.
3. Rare endemic whose life history, population dynamics and biology are poorly known.
4. Much of the appropriate habitat for this species has been converted to agricultural land use.
5. Preference for sandy soils limits this species ability to expand its range. As a result, it is not uncommon for populations to be effectively isolated from one another which would offer low recruitment.
6. Because the species has been relegated to highway rights of ways, mortality from vehicular traffic is probably common.
7. Species is considered destructive and control measures are often deemed necessary.

Status Needs:

1. Document full range of this species and population status.
2. Using historic information and GIS mapping techniques determine preferred habitat.
3. Survey and trap historic locations where possible to determine current presence of this species.
4. Identify new areas from GIS and ground truth for current presence.

Monitoring Needs:

1. Identify largest populations for monitoring population trends periodically.
2. Develop a method of estimating population density and trends.
3. Monitoring of habitat.

Research Needs:

1. Determine reproductive behavior.
2. Determine dispersal and movement patterns.
3. Document full range of this species and population status.
4. Document plant community associations within this species range

Management Needs:

1. Determine threats to population.
2. Notify private landowners with proper habitat and provide information on life history and proper management techniques.
3. Develop guidelines for management of populations occurring in highway rights of way.
4. Investigate alternatives to destroying individuals that occupy urban areas and golf courses (i.e. deterrents or translocations).
5. Identify potential areas for land acquisition to provide permanent long-term protection.

Name
Scientific: *Microtus ochrogaster*
Common: Prairie vole

Status: Federal: None
State: Threatened
Global: G5
Priority: Medium

Distribution: Known in Texas from Hardin County in southeastern Texas (Jones et al. 1988) and Carson, Dallam, Sherman, Hansford and Lipscomb counties in the Panhandle (McCaffrey et al. 2003). Its presence, outside of the Panhandle, is on the basis of a single specimen from 1902 (Hardin County, Jones et al. 1988, McCaffrey et al. 2003).

Habitat Type: Tallgrass prairie; short- and mid-grass prairies, on sites with taller grass cover (McCaffrey et al. 2003).
Community: Lives in upland herbaceous fields; grasslands, old agricultural lands and thickets; places where there is suitable cover for runways.

Reasons for Concern:

1. Loss of suitable habitat due to conversion of grasslands for cultivation (Caire et al. 1989).
2. Loss of suitable cover due to certain grazing practices (Caire et al. 1989).

Status Needs:

1. Further examination of taxonomic status between subspecies.
2. Determine distribution.

Monitoring Needs:

1. Conduct periodic literature review to determine new occurrences.

Research Needs:

1. Further examination of taxonomic status between subspecies.
2. Examination of habitat in the short and midgrass prairies of the Panhandle and elsewhere.

Management Needs:

1. Need to be developed.

Name
Scientific: *Geomys personatus personatus*
Common: Barrier Island Texas Pocket gopher

Status: Federal: NNR
State: SNR
Global: G4TNR
Priority: Medium

Distribution: South Texas
Occurs only on Mustang and Padre Islands in Texas. Also known from two barrier islands along the coast of Tamaulipas, Mexico.

Habitat: Grasslands.
Community: Coastal grasslands; most common in deep drift where the sand is moist enough to permit packing.

Reasons for Concern:

1. Loss of habitat due to urbanization and beach erosion.

Status Needs:

1. Provide support for continued research to determine stability of current population.

Monitoring Needs:

1. Monitor current populations to determine trends.

Research Needs:

1. Determine extent of present populations and determine status of habitat on Padre and Mustang Islands.

Management Needs:

1. Improve private landowner participation in monitoring efforts and prevention of loss of habitat by urban development.

Name
Scientific: *Cynomys ludovicianus*
Common: Black-tailed Prairie Dog

Status: Federal: None
State: None
Global: G5T3
Priority: Medium

Distribution: Trans-Pecos, Rolling Plains, High Plains, Western Edwards Plateau (Schmidly 2004, TPWD Unpubl. Data).

Habitat Type: Short grasslands

Status Needs:
1. Statewide prairie dog inventory TPWD.
2. Conduct surveys of occurrence and estimate populations using aerial photographs, GIS mapping and ground-truthing.
3. Compare historical county surveys to determine population trends over the past several decades.

Reasons for Concern:
1. Habitat alteration.
2. Converting prairie to cropland, pasture improvements and urban development.

Monitoring Needs:
1. Conduct population survey every three years in a portion of the Texas range.
2. Conduct population survey at 10 year intervals to determine population growth or decline.

Research Needs:
1. Affects of prairie dog on occurrence and invasion of woody species on rangelands.
2. Conduct a critical review of prairie dog literature to determine the economic effect of prairie dog on rangeland and agriculture.
3. Determine if management needs would be best served by designating prairie dogs as a game species.
4. Develop harvest recommendations to manage colonies at healthy densities to limit habitat degradation for dogs and associated species.

Management Needs:
1. Implement state management plan in cooperation with the Texas Black-tailed Prairie Dog Working Group.

2. Develop and implement a private landowner incentive package to encourage landowners to manage their lands for prairie dog in order to achieve the state acreage goal of 292,000 acres occupied by prairie dogs.
3. Education the public and private landowners concerning the benefits of prairie dogs to their community and the short grass prairie ecosystem.
4. Finalize and implement statewide plague monitoring protocol.
5. Develop a state protocol to facilitate relocation efforts by private organizations.

Name
Scientific: *Dipodomys elator*
Common: Texas Kangaroo Rat

Status: Federal: None
State: Threatened
Global: G2
Priority: Medium

Distribution: Central Plains
North central Texas; historically may have included 14 Texas and three Oklahoma counties, but presently are known from only Archer (2002), Cottle (1985), Childress (2002), Foard (1990), Hardemann (2002), Motley (2002), Wichita (1990) and Wilbarger counties (1990) of Texas.

Habitat: Open short grass
Community: Buffalo grass/mesquite on loam and clay loam soils

Reasons for Concern:

1. Destruction of mesquite grassland.
2. Prefers heavily grazed rangelands.
3. Limited distribution.

Status Needs:

1. Using the Shaw (1990) GIS report, map the likely-occupied habitat (areas with mesquite/grasslands, Premium Blaine geologic formation, Tillman-Vernon-Weymouth soil association) with a layer of current land use practices throughout the historic range of kangaroo rats (including Oklahoma) and ground truth potential areas to search for new Kangaroo rat locations.
2. Determine a population estimate with known current distribution.
3. Update the map of current locations of Kangaroo rats (Best Wahl 1985, Jones et. al. 1988, Stangl and Schafer 1990, Shaw 1990 and Martin 2002).

Monitoring Needs:

1. Identify a subset of the Kangaroo rat population (largest, smallest, easterly, westerly) to establish annual population trends using consistent methodologies.
2. Investigate techniques that would relate population size with number of burrows/other variable.
3. Visit each of the known populations periodically to monitor changes in activity.

Research Needs:

1. Determine minimum viable population.
2. Determine whether detrimental competition occurs between *D. elator*, *D. ordii*, or other sympatric rodents.
3. Determine the affects of prescribed burning and different grazing regimes on Kangaroo rat populations.
4. Determine how man-made alterations (e.g. dirt roads, fire breaks) influence populations.

Management Needs:

1. Establish a habitat demonstration and monitoring site at Caprock Canyons State Park.
2. Establish cooperative management agreements, conservation easements, or acquire public state land to ensure Texas Kangaroo rat existence based on minimum viable population and remaining suitable habitat.

Name
Scientific: *Peromyscus truei comanche*
Common: Palo Duro Mouse

Status: Federal: None
State: Threatened
Global: G5T3Q
Priority: Medium

Status Report: 1994, Jones, Yancey and Manning

Distribution: Rolling Plains/High Plains
Armstrong, Briscoe and Randall counties (Schmidly 2004).

Habitat Type: Rocky outcropping
Community: Escarpment of the Llano Estacado; rocky slopes with juniper, brush and short grasses.

Reasons for Concern:

1. The Palo Duro mouse is an endemic with restricted range. However, large amount of state land ensures species survival.

Status Needs:

1. Map the known recent capture sites.

Monitoring Needs:

1. Map the preferred habitat (using GIS methods) and identify populations and methods for a long-term periodical monitoring program.

Research Needs:

1. Initiate food habits study to determine if diet may be important factor in its distribution.
2. Determine competitive threats between *P. t. comanche* and *P. attwateri*.
3. Determine reproductive biology.
4. Determine whether this species of *Peromyscus* is a reservoir for hantavirus.

Management Needs:

1. In Palo Duro and Caprock Canyons State Parks, protect areas of known occurrence from human recreational disturbance; increase education efforts.
2. Identify potential preferred habitat on private property and inform landowners, providing them with information on the natural history and ecology of this rare species; request voluntary help in preservation of preferred habitat.

Name
Scientific: *Oryzomys couesi aquaticus*
Common: Coues Rice Rat

Status: Federal: None
State: Threatened
Global: G5T?
Priority: Medium

Status Report: None

Distribution: Gulf Coastal Prairies, Rio Grand Plains;
recorded from Kenedy, Willacy, Cameron, Hidalgo and Starr counties (Schmidly 2004).

Habitat Type: Resacas
Community: oxbow freshwater marshes along the Rio Grande bordered by bulrushes and cattails.

Reasons for Concern:

1. Habitat destruction due to overgrazing, conversion to agriculture, urbanization and channelization of existing watercourses.
2. Drying of resacas due to reduced flow in Rio Grande.
3. Limited distribution of species in US, the extreme northern extension of the range.

Status Needs:

1. Survey and trap historic locations where possible to determine current presence of this species which seems to occur now only in Cameron and Hildago counties (Rose 1999). Considered by Rose (1999:554) to potentially be one of the rarest rodents in the United States.
2. Using historic information and GIS mapping techniques, determine preferred habitat.
3. Identify new areas from GIS and ground truth for current presence.

Monitoring Needs:

1. Identify largest populations for monitoring population trends periodically.
2. Develop a method for estimating population density and trends.

Research Needs:

1. Determine reproductive biology.
2. Determine dispersal and movement patterns.

Management Needs

1. Protect wetland habitats along Rio Grande.
2. Management considerations that involve the black-spotted newt and the Rio Grande lesser siren should also include this species.

Name
Scientific: *Tamias canipes*
Common: Gray-footed Chipmunk

Status: Federal: None
State: S2S3
Global: G3
Priority: Medium

Distribution: Trans-Pecos; Confined to Culberson County, Sierra Diablo and Guadalupe Mountain ranges.

Habitat: Forested Community: Occurs at high elevation (1800-2500 m) in the following habitats: grassland-chaparral, 6%; woodland, 17%; mixed conifer, 72%; spruce-fir, 6% (Lomolino et al. 1989). Prominent vegetation in the coniferous habitat includes yellow pine, limber pine (*P. flexilis*), Douglas fir, barberry (*Berberis haematocarpa*), chiquapin oak (*Quercus muhlenbergii*) and buckthorn (*Rhamnus purshiana*) (Davis and Robertson 1944). In September, this species is more closely associated with shrubby oaks (*Quercus spp.*) (Bailey 1905) (Best et al. 1992). Descends to lower zones, such as lava habitats, in favorable conditions.

Reasons for Concern:

1. Restricted range and ecological requirements make this species vulnerable to land use changes and overgrazing.

Status Needs:

1. Document full range of this species and population status.
2. Survey and trap historic locations where possible to determine current presence of this species.
3. Identify new areas from GIS and ground truth for current presence.

Monitoring Needs:

1. Additional data needed to establish status.
2. Identify populations within GMNP and determine periodic population estimates and trends.

Research Needs:

1. Determine reproductive behavior.
2. Determine validity of species and subspecies. Fleharty (1960) analyzed specimens of this species from the Gallinas, Capitan, Sacramento and Guadalupe Mountains and concluded that those from the Sacramento were distinctive enough to be recognized as a separate subspecies, *T. c. sacramentoensis,* distinct from *T. c. canipes* from the Guadalupe Mountains (Bison 2004).
3. Determine dispersal and movement patterns.

4. Document full range of this species and population status.
5. Document plant community associations within this species range.

Management Needs:

1. Identify any threats to the population.
2. Protect and manage habitat if needed.
3. Provide private landowners with proper information on habitat, life history and proper management techniques for identifying the species and reducing threats.

Name
Scientific: *Chaetodipus nelsoni*
Common: Nelson's pocket mouse

Status:
- Federal: None
- State: None
- Global: G5
- Priority: Medium

Distribution: Trans-Pecos and South Texas;
Webb County in South Texas; Culberson Jeff Davis Brewster, Pecos, Val Verde, Upton and Terrell counties in Trans-Pecos.

Habitat: Desert Scrub
Community: Rocky soils on slopes where cactus, creosote, stool and lechugilla provide scattered cover.

Reasons for concern:
1. Destruction of grasslands for agricultural purposes has greatly reduced the extent of suitable habitat (Caire et al. 1989).

Status Needs:
1. Further examination of taxonomic status between subspecies.

Monitoring Needs:
1. Undetermined.

Research Needs:
1. Further examination of taxonomic status between subspecies.

Management Needs:
1.Undetermined.

Name
Scientific: *Dipodomys spectabilis*
Common: Banner-tailed kangaroo rat

Status: Federal: S5
State: S4
Global: G5
Priority: Medium

Distribution: Trans-Pecos and Plains, Western and central Trans-Pecos region north to Lubbock County.

Habitat Type: Arid grasslands; desert
Community: Prefers gravelly soils. Limited in distribution to sparsely brush-covered slopes and low hills at elevations usually between 1,200 and 1,500 m. In Trans-Pecos Texas, it is most abundant on slopes covered with scattered, mixed stands of creosote brush and acacias on hard and moderately gravelly soil.

Reasons for Concern:
1. Loss of habitat due to clearing for cropland, pastures and urban development.
2. Loss of habitat due to invasion of woody plants associated with grassland degradation.

Status Needs:
1. Provide support for continued research to determine extent of present populations.

Monitoring Needs:
1. Monitor current populations to determine trends.

Research Needs:
1. Determine extent of present populations and monitor population status periodically.

Management Needs:
1. Improve private landowner participation in monitoring efforts and prevention of loss of habitat by invasion of woody plants.
2. Encourage landowner participation in wise grazing practices that perpetuates grassland habitat.
3. Increase public education on detrimental environmental effects of urban development in arid regions of western Texas.

Name
Scientific: *Conepatus leuconotus*
Common: Hog-nosed Skunk

Status: Federal: None
State: None
Global: G5
Priority: Medium

Status Report: 1988. Dragoo J. W., G. D. Baumgardner, D. B. Fagre and D. J. Schmidley. Status of the Gulf Coast Hog-nosed Skunk.

Distribution: Southern Rolling Plains and Cross Timbers area, High Plains north to Lubbock, South Texas Plains, throughout the Edwards Plateau and the Trans-Pecos; and the southern areas of the Gulf Coast Prairies. Previously in the Pineywoods but now considered extirpated (Schmidly 2004).

Habitat: Brushland and Savannah
Community: Many habitats seem suitable, including semi-arid to arid brushland and desert and canyons, open plains and savannahs (Rosatte and Lariviere (2003)).

Reasons for Concern:

1. Extirpated in east Texas; status of other Texas populations not well documented.

Status Needs:

1. Determine possibility of relict populations in east Texas.

Monitoring Needs:

1. Periodic statewide survey to determine population trends.
2. Determine best methods for estimating population densities.

Research Needs:

1. Determine habitat associations.
2. Determine if populations are stable over range.

Management Needs:

1. Develop public awareness of this species, separate from other skunks.

Name
Scientific: *Mephitis macroura*
Common: Hooded skunk

Status: Federal: None
State: None
Global: None
Priority: Medium

Distribution: Trans-Pecos
Note: Occurs in Mexico and other border states (Rosatte and Lariviere 2003).

Habitat Type: Riparian.

Reasons for Concern:

1. Rarest of the Texas species of skunks; Schmidly (2004) reports they have not been sighted for almost two decades.

Status Needs:

1. Determine whether populations are stable in Texas.

Monitoring Needs:

1. Periodic statewide survey to determine population trends.
2. Determine best methods for estimating population densities.

Research Needs:

1. Determine habitat associations.
2. Determine if populations are stable or declining over range.
3. Basic ecological data on this species are minimal; any study of ecology would be of value.

Management Needs:

1. Develop public awareness of this species, separate from other skunks.
2. If populations are in decline, determine causes.
3. Determine if this species is present on any state wildlife management areas or state parks.

Name
Scientific: *Spilogale putorius*
Common: Eastern Spotted Skunk

Status:
Federal: None
State: None
Global: G4T
Priority: Medium

Distribution: Piney Woods, Cross Timbers, Blackland Prairie, Gulf Coast Prairies, Rolling Plains and High Plains, South Texas Plains and eastern Edwards Plateau.

Habitat Type:
Woodlands and Coastal Grassland
Community: Many habitats seem suitable, including wooded areas, coastal grasslands and rocky canyons.

Reasons for Concern:
Once considered common, eastern spotted skunks are now rare (Schmidly 2004). Several other states have listed this species and there is general concern for widespread decline. Some suggest that its reliance on insects has resulted in pesticide accumulations that have resulted in population declines.

Status Needs:
1. Determine status of populations throughout range.

Monitoring Needs:
1. Periodic statewide survey to determine population trends.
2. Determine best methods for estimating population densities.

Research Needs:
1. Determine habitat associations.
2. Determine if populations are stable over range.
3. Determine cause of decline in populations.

Management Needs:
1. Develop public awareness of this species, separate from other skunks.

Name
Scientific: *Spilogale gracilis*
Common: Western spotted skunk

Status: Federal: None
State: None
Global: None
Priority: Medium

Distribution: Western Texas south of the panhandle; Southernmost Rolling Plains and High Plains; western part of South Texas Plains, western Edwards Plateau and the Trans-Pecos

Habitat Type: Brushlands and Grasslands
Community: Many habitats seem suitable, including semi-arid to arid brushland and desert and canyons, open plains and savannahs; often found in rocky areas (Rosatte and Lariviere 2003).

Reasons for Concern:
1. Populations considered declining (Schmidly 2004)

Status Needs:
1. Determine status of populations in western Texas.

Monitoring Needs:
1. Periodic statewide survey to determine population trends.
2. Determine best methods for estimating population densities.

Research Needs:
1. Determine habitat associations.
2. Determine if populations are stable over range.
3. If declining, determine causes.

Management Needs:
1. Develop public awareness of this species, separate from other skunks.

Name
Scientific: *Taxidea taxus*
Common: American badger

Status: Federal: None
State: None
Global: None
Priority: Medium

Distribution: Statewide excepting East Texas (Schmidly 2004)

Habitat Type: Grasslands, deserts, mountains
Community: Prairie and desert type habitats
Occupy areas where ground squirrels, prairie dogs and other small prey occur (Goodrich and Buskirk 1998).

Reasons for Concern:

1. Status unknown.
2. Land clearing, conversion and habitat fragmentation are potential threats.

Status Needs:

1. Determine distributional limit in east and south.

Monitoring Needs:

1. Develop monitoring program.

Research Needs:

1. Determine distribution
2. Develop methodology for monitoring and estimating population.

Management Needs:

1. Protection of short grass prairie.

Name
Scientific: *Lutra canadensis*
Common: River otter

Status: Federal: None (CITES permit required for export and/or sales)
State: None
Global: Appendix II, CITES
Priority: Medium

Distribution: Pineywoods, Cross Timbers, Coastal Prairie and Marshes, Blackland Prairie, Edwards Plateau;
The most recent records indicate otter presence in the watersheds of eastern Texas, including coasts and estuaries (Jackson et al. 1998). Previously, the range extended into the Panhandle via the Red River drainage, as well as along the Brazos and Colorado rivers (Schmidly 2004). Although scientific evidence is lacking it is thought that river otter populations experienced some local extirpation in central Texas and the Panhandle. Some anecdotal reports indicate re-colonization may be occurring (Unpublished TPWD data - State Mammalogist, Wildlife Diversity Branch, Wildlife Division). The species is widely distributed in forested and coastal regions of North America, excluding the arctic tundra, arid southwest and central agricultural zones (Hill 1994).

Habitat: Pineywoods; Gulf Coast
Community: lakes, rivers, streams, ponds, coastal estuaries, wetlands, marshes (Melquist and Hornocker 1983, Jackson et al, 1998, Schmidly 2004).

Reasons for Concern:

1. River otters are listed on CITES Appendix II because of their similarity in appearance to other protected otter species. The apparent decline in Texas may have been due to a combination of factors (Schmidly 2004), e.g. heavy trapping in some localities, depredation control at aquaculture sites, incidental take and habitat alteration (e.g. water control and diversion, urbanization).
2. Potential stressors may include: barriers to dispersal (e.g. transportation corridors), parasites (Serfass et al. 1992), disease (Kimber and Kollias 2000) and pollutants (Mierle et al. 2000).

Status Needs:

1. Trends in local subpopulation dynamics need to be assessed to determine distribution of sources and sinks, as well as potential cumulative effects of stressors.
2. Coastal subpopulations may differ from inland. Subpopulations in each watershed may differ.

Monitoring Needs:

1. As a result of the inclusion on CITES Appendix II, the USFWS Office of Scientific Authority requires that state wildlife agencies provide objective information demonstrating that the international export of river otter pelts will not be detrimental to the survival of the species.

Research Needs:

1. Define subpopulations and the degree of connectivity between habitat fragments (i.e. autocorrelation issues (Cassens et al. 2000)
2. Calibrate monitoring protocol (presence/absence under bridges) currently used in Texas, compared to national and international standards (Breaux et al. 2002).
3. Determine relative risk of extirpation for distinct subpopulations on regional and local scales (Barbosa et al. 2003), including information and samples from carcasses and tagged pelts (Elliott et al. 1999).

Management Needs:

1. Refine and validate bridge survey method to be better able to make conclusions regarding population trends.

Name
Scientific: *Puma concolor*
Common: Mountain lion

Status: Federal: None
State: None
Global: None
Priority: Medium

Distribution: Statewide

Habitat Type: Forest, brushlands
Community: Hardwood forests, juniper-oak forests, thorn shrublands, desert scrub, rocky terrain, with preference for riparian areas (Beier 1995, Harveson 1997, Maehr 1997, Guzman 1998, Adams 2003).

Reasons for Concern:
1. Land conversion and habitat fragmentation (Meegan and Maehr 2002).
2. Potential human interactions (Ruth 1991).
3. Unregulated take (Harveson 1997).
4. Highway development (Beier 1996).

Status Needs:
1. Population estimate and distribution and harvest estimate.

Monitoring Needs:
1. Need a methodology for monitoring on a statewide basis.

Research Needs:
1. Determine impact on prey species and associated species.
2. Determine methodologies for population estimation and monitoring.

Management Needs:
1. Develop landowner incentives to work on maintaining a stable population.
2. Education and outreach to inform people of the role of mountain lions.
3. Develop a statewide management plan.
4. Develop better method for recording hunter/trapper take.
5. Review regulatory status.

Name
Scientific: *Ursus americanus*
Common: American Black Bear

Status: Federal: None
State: Threatened
Global: G5
Priority: Medium

Distribution: Trans-Pecos Region; Edwards Plateau (occasional).
Historically statewide currently resident breeding populations are known only from the Chisos and Dead Horse mountains (Big Bend) and Guadalupe Mountains of western Texas (Schmidly 2004). Regular disperser into the remainder of western Texas; infrequent disperser/vagrant in all other parts of Texas (TPWD unpublished data).

Habitat: Forested
Community: Prefers higher elevations where pinyon-oaks predominate; desert scrub of Trans-Pecos and Edwards Plateau in Juniper-oak habitat (http://www.tpwd.state.tx.us/nature/wild/vertebrate/mammals/bears/index.htm accessed Feb 2005).

Reasons for Concern:
1. Vulnerable to poaching, periodic drought, nuisance.

Monitoring Needs:
1. Statewide - Continued monitoring and assessment of sightings.
2. Big Bend and Guadalupe Mountains – Continued monitoring of population status, reproductive success, dispersal patterns and rate of range expansion.

Research Needs:
1. Identify and characterize potentially suitable habitat on a landscape scale.
2. Model metapopulation function and attributes.
3. Determine private landowners’ attitudes toward black bears.

Management Needs:
1. Develop a West Texas bear management plan and implementation strategies.
2. Identify blocks of suitable private land where translocated, nuisance black bears would be tolerated.

Name
Scientific: *Ursus americanus luteolus*
Common: Louisiana Black Bear

Status: Federal: Threatened
State: Endangered
Global: G5T3
Priority: Medium

Recovery Plan: Determine recovery plan status

Distribution: East Texas Pineywoods East 100^{th} meridian (Schmidly 2004).

Habitat: Forest
Community: Bottomland hardwoods, floodplain forests, upland hardwoods with mixed pine; marsh.

Reasons for Concern:
1. Habitat destruction and alteration through urbanization and conversion to agriculture and timbering.
2. Road mortalities.
3. Increasing human conflicts.
4. Genetics of small populations.

Status Needs:
1. None; reproductive population considered extirpated, although individuals have been sighted and are assumed to have dispersed from LA, OK or AR.

Monitoring Needs:
1. Document sightings.
2. Follow protocol for dealing with potential nuisance bears, including marking procedures for documenting movements.

Research Needs:
1. Assess suitable habitat in additional areas of East Texas using GIS techniques for reintroduction purposes.
2. Conduct surveys of local landowners to solicit opinions concerning cooperation to reintroduce bears to their area.
3. Determine subspecies status of bears wandering into East Texas using molecular genetic markers.
4. Other research needs as identified in the East Texas Black Bear Management Plan.

Management Needs:

1. Encourage the preservation of bottomland hardwoods by selective timbering instead of clear cutting.
2. Develop incentives for private landowners to maintain their hardwood forests.
3. In areas where timber harvest has occurred, encourage regeneration of the area back into hardwoods rather than a change of land use to residential or agriculture.
4. Encourage an increased harvest rotation of hardwoods to increase the diversity of food resources and availability of den sites: encourage small tract clear cuts rather than total area clear cuts to enhance some areas of herbaceous forage.
5. Acquire public lands around existing protected areas to increase size of contiguous habitat.
6. Identify and protect corridors between fragmented suitable habitats through private landowner incentives.
7. Other management needs as identified in the East Texas Black Bear Management Plan.

Name
Scientific: *Mustela nigripes*
Common: Black-footed ferret

Status: Federal: N1
State: SH
Global: G1
Priority: Medium

Distribution: Extirpated; once occurred west of a line from Dallas to Austin range encompassing the Trans-Pecos, Rolling Plains, High Plains and Western Edwards Plateau Ecoregions (Schmidly 2004).

Habitat Type: Grasslands
Community: Limited to grasslands, steppe and shrub steppe areas occupied by prairie dog. It is estimated that prairie dog colonies of about 40-60 ha are needed to support one ferret.

Reasons for Concern:

1. Extirpated from most of former large range mainly as a result of prairie dog and predator control programs.
2. Canine distemper and sylvatic plague are threats to natural populations.

Status Needs:

Not applicable; extirpated from Texas.

Monitoring Needs:

Not applicable; extirpated from Texas.

Research Needs:

1. Determine sites with sufficiently-sized colonies of black-tailed prairie dogs for potential reintroductions of ferrets in Texas.
2. Establish reintroduction protocols based on methods proven successful in other states.

Management Needs:

1. Improve private landowner participation in monitoring efforts and prevention of loss of habitat for black-tailed prairie dogs.
2. Encourage landowner participation in wise grazing practices that perpetuates grassland habitat.
3. Increase public education on detrimental environmental effects of loss of biodiversity.

Name
Scientific: *Vulpes velox*
Common: Swift fox (Kit Fox)

Status: Federal: None
State: None
Global: None
Priority: Medium

Distribution: High Plains, Trans-Pecos, Western Rolling Plains and Edwards Plateau (only known from two counties currently Sherman and Dallam).

Habitat: Open deserts or grasslands;
Community: sparsely vegetated areas including fencerows and moderately to heavily grazed short grass prairie.

Reasons for Concern:

1. Historically population numbers have declined due to predator control efforts including trapping, poisoning and shooting aimed principally at other targets such as coyotes.
2. Though their fur pelts are not highly prized, declines may also be due to human land use practices.
3. More recent areas of concern include depredation by coyotes and possible underutilization of prairie dog colonies.

Status Needs:

1. Contact and survey local TPWD, Texas Wildlife Damage Management Service (TWDMS) and NRCS biologists to assess population trends and locations.
2. Estimating population trends using scat, tracks, dens, etc.

Monitoring Needs:

1. Identify and map areas with existing populations and periodically estimate numbers.

Research Needs:

1. Determine availability of suitable habitat over historic range.
2. Determine if populations are fragmented or contiguous over historic range.
3. Determine level of competition with other canids.
4. Determine distributional limits.

Management Needs:

1. Inform landowners, hunters and trappers of preferred habitat and encourage voluntary protection.
2. Encourage species specific control methods that would not harm swift foxes.
3. Encourage creation of artificial den sites as studies by Texas Tech show increased survival rates when these are present.

Name
Scientific: *Antilocapra americana*
Common: Pronghorn

Status: Federal: N5
State: S5
Global: G5
Priority: Medium

Distribution: Trans-Pecos and Plains
Highly localized as managed populations in western half of Texas.

Habitat Type: Grasslands
Community: Grasslands, arid grasslands, steppe, deserts and foothills; avoids brushlands.

Reasons for Concern:

1. Loss of habitat due to clearing for cropland, pastures and urban development.
2. Loss of habitat due to invasion of woody plants associated with grassland degradation.
3. Extended drought in western Texas during period from 1992 – 2002 contributed to declining populations.

Status Needs:

1. Provide support for continued research to determine stability of managed populations.

Monitoring Needs:

1. Monitor current populations to determine trends.

Research Needs:

1. Determine extent of present populations and monitor population status periodically.

Management Needs:

1. Improve private landowner participation in monitoring efforts and prevention of loss of habitat by invasion of woody plants.
2. Encourage landowner participation in wise grazing practices that perpetuates grassland habitat.
3. Increase public education on detrimental environmental effects of urban development.

Name
Scientific: *Sylvilagus robustus*
Common: Davis Mountain Cottontail

Status: Federal: None
State: None
Global: G5TU
Priority: Medium

Distribution: Trans-Pecos
Restricted to elevations above 4,000 ft. in the Chisos, Davis and Guadalupe Mountains of the Trans-Pecos.

Habitat: Thick brush in mountain ravines.
Community: plant associations include sumac, mountain mahogany, white brush (*Lippia*) and scrub oak.

Reasons for Concern:
Populations considered rare (Schmidly 2004, Ruedas 1998). Ruedas (1998) suggested state listing and Redbook listing with IUCN. Reportedly not seen or collected in the Chisos or Guadalupe Mountains for 30 years. Jones (personal communication) reports numerous animals have recently been taken and are on deposit at the Texas Tech University Museum. (Note: Vestal, Dowler and Ammerman have documented occurrences and specimens of road-killed animals during 2003 and 2004 in the Chisos Mountain).

Status Needs:
1. Determine status of populations in Trans-Pecos mountains.

Monitoring Needs:
1. Periodic statewide survey to determine population trends.
2. Determine best methods for estimating population densities.

Research Needs:
1. Determine habitat associations.
2. Determine if populations are stable over range.
3. If declining, determine causes.

Management Needs:
1. Develop public awareness of this species.

Name
Scientific: *Mustela frenata*
Common: Long-tailed weasel

Status: Federal: None
State: None
Global: None
Priority: Medium

Distribution: Apparently statewide, except for panhandle north of Amarillo; however, no specimens are available for most of west-central Texas.

Habitat Type: Woodlands and Coastal Prairie
Community: Upland woods, bottomland hardwoods, brushland, arid mountains of the Trans-Pecos and coastal prairies. Surface water is likely a necessary part of the habitat.

Reasons for Concern:
Schimdly (2004) states that there is real concern for long-term status of weasels in Texas.

Status Needs:
1. Determine status of populations throughout range.

Monitoring Needs:
1. Periodic statewide survey to determine population trends.
2. Determine best methods for estimating population densities.

Research Needs:
1. Determine habitat associations.
2. Determine if populations are stable over range.

Management Needs:
1. Develop public awareness of this species.

Low Priority Species

Name
Scientific: *Peromyscus nasutus*
Common: Northern Rock Mouse

Status: Federal: None
State: None
Global: None
Priority: Low

Recovery Plan: None

Distribution: Trans-Pecos, from the Chisos Mountains (Brewster), Davis Mountains (Jeff Davis), Guadeloupe Mountains (Culberson) and Franklin Mountains (El Paso) (Bradley et al 1999, Schmidly 2004).

Habitat Type: Oak forest and madrone associations and bare rocky mountain slopes at highest elevations of mountains.
Community: Boulders on rocky mountain slopes, rock piles covered with layers of dead leaves and talus slopes.

Reasons for Concern:
Taxonomic confusion with similar species, inadequate knowledge of geographic distribution, potential low population density and lack of suitable habitat within area of occurrence (Bradley et al 1999, Planz 1999, Schmidly 2004).

Status Needs:
1. Initiate surveys to determine range of the two subspecies, *P. n. penicillatus* in Brewster, Presidio and El Paso counties and *P. n. nasutus* in Culberson County. Does it occur in suitable habitats in other counties adjacent to present known occurrence and which subspecies occurs in the Davis Mountains in Jeff Davis County (Bradley et al 1999)?
2. Initiate surveys in any suitable habitat in Hudspeth County.

Monitoring Needs:
1. A protocol to monitor species presence and local abundance over the Trans-Pecos region.
2. Assess occupied areas within areas of occurrence since suitable habitat in high mountains is limited.

Research Needs:
1. Determine geographic range of both subspecies and habitat preferences (Stangl et al 1994, Bradley et al 1999).

2. Determine if the geographically isolated populations are genetically continuous and/or genetically stable over whole range or isolated.
3. Determine population levels in areas of occurrence.
4. Estimate life history parameters (litter size, survival, age at first reproduction, etc.) in a variety of locations throughout the range.
5. Assess resource requirements (food, habitat) in a variety of locations throughout the state.

Management Needs:

1. Inform landowners of preferred habitats and encourage voluntary protection of the unique habitats.

Name
Scientific: *Geomys arenarius*
Common: Desert Pocket Gopher

Status: Federal: None
State: None
Global: None
Priority: Low

Distribution: Trans-Pecos
Only occurs in El Paso County

Habitat: Forest
Community: Cottonwood-willow association along the Rio Grande; common along irrigation ditches in sandy river bottom areas in friable soil. They apparently cannot tolerate the clay or gravel soils, a characteristic held in common with all other Geomys species (Schmidly 2004).

Reasons for concern:

1. Small isolated populations vulnerable to land use changes, overgrazing, desertification, fire suppression and increased shrub cover (Hafner et al.1998).

Status Needs:

1. Assess taxonomic status to determine validity of species *G. arenarius* from *G. knoxjonesi* and *G. bursarius*.
2. Using historic information and GIS mapping techniques, determine preferred habitat and amount present in Texas.
3. Survey and trap historic locations where possible to determine current presence of this species.
4. Identify new areas from GIS and ground-truth for current presence.

Monitoring Needs:

1. Identify largest populations for monitoring population trends periodically.
2. Develop a method of estimating populations density and trends.

Research Needs:

1. Assess taxonomic status to determine validity of species *G. arenarius* from *G. knoxjonesi* and *G. bursarius*.
2. If valid species, determine minimum viable population, reproductive behavior and dispersal and movement patterns.
3. Evaluate the effect of grazing and fire suppression on populations.

Management Needs:

1. Determine threats to population.

Name
Scientific: *Geomys personatus maritimus*
Common: Maritime Pocket Gopher

Status: Federal: None
State: None
Global: G4T2
Priority: Low

Distribution: Gulf Prairies and Marshes
Known only from type locality: Flour Bluff, Nueces County (Schmidly 2004).

Reasons for Concern:
Habitat loss (i.e. street, housing and other hard structures over burrow areas), alteration of vegetative cover.

Habitat: Sandy Soils
Community: Sandy soils which are sufficiently moist to permit burrowing; it may inhabit isolated Aeolian or alluvial sands along south Texas streams and rivers such as the Nueces and the Rio Grande in the sand sheet belt of Kenedy and Brooks counties.

Status Needs:

1. Assess taxonomic status to determine validity of subspecies.
2. Using historic information and GIS mapping techniques, determine preferred habitat.
3. Survey and trap historic locations where possible to determine current presence of this species.
4. Identify new areas from GIS and ground-truth for current presence.

Monitoring Needs:

1. Identify largest populations for monitoring population trends periodically.
2. Develop a method of estimating population density and trends.

Research Needs:

1. If valid subspecies, determine minimum viable population
2. Determine reproductive behavior.
3. Determine dispersal patterns and movement patterns.

Management Needs:

1. Determine threats to population.
2. Investigate alternatives to destroying individuals that occupy urban areas and golf courses (i.e. deterrents or translocation).
3. Identify potential areas for land acquisition to provide permanent long-term protection.
4. Notify private landowners with “proper” habitat and provide information on life history and proper management techniques.

Name
Scientific: *Geomys texensis bakeri*
Common: Frio pocket gopher

Status: Federal: N2
State: S2
Global: G2QT2
Priority: Low

Distribution: Occurs in two isolated populations along separated drainages of the Frio River in southern Texas; one population occurs along the Sabinal and Frio rivers in Uvalde and Zavala counties; the other population, in Medina County, is restricted to soils along Seco and Parker creeks, tributaries of the Frio River; there may be additional populations in the intervening area (Schmidly 2004).

Habitat Type: Arid grasslands
Community: Grasslands, arid grasslands. Associated with nearly level Atco soil which is well drained and consists of sandy surface layers with loam extending to as deep as two m; fossorial.

Reasons for Concern:

1. Loss of habitat due to clearing for cropland, pastures and urban development.
2. Loss of habitat due to invasion of woody plants associated with grassland degradation.

Status Needs:

1. Provide support for continued research to determine stability of managed populations.
2. Assess taxonomic status to determine validity of subspecies.
3. Develop historic information and GIS mapping techniques determine preferred habitat.
4. Survey and trap historic locations where possible to determine current presence.

Monitoring Needs:

1. Monitor current populations to determine trends.

Research Needs:

1. Determine extent of present populations and monitor population status periodically.
2. Identify any threats to the population if the population is declining.
3. Identify preferred habitat and protect and manage if needed.

Management Needs:

1. Improve private landowner participation in monitoring efforts and prevention of loss of habitat by invasion of woody plants.
2. Encourage landowner participation in wise grazing practices that perpetuates grassland habitat.
3. Notify private landowners with proper habitat and provide information on life history and proper management techniques.

Name
Scientific: *Geomys texensis texensis*
Common: Llano Pocket Gopher

Status:
Federal: None
State: None
Global: G3T2
Priority: Low

Distribution: Edwards Plateau
This includes parts of Kimble, McColloch, Mason, San Saba, Llano Gillespie and Blanco counties.

Habitat: Sandy soils
Community: Brown loamy sands or gravelly sandy loam surfaces to 33cm. Isolated from other species of pocket gophers by intervening shallow stony to gravel clay soils.

Reasons for Concern:

1. Small isolated populations, restricted distribution, making it vulnerable to land use changes (Hafner et al. 1998). Distribution dependent on soil type.

Status Needs:

1. Assess taxonomic status to determine validity of subspecies.
2. Survey and trap historic locations where possible to determine current presence of this species.
3. Identify new areas from GIS and ground truth for current presence.
4. Using historic information and GIS mapping techniques determine preferred habitat.

Monitoring Needs:

1. Identify largest populations for monitoring population trends periodically.
2. Develop a method of estimating population density and trends.

Research Needs:

1. If valid subspecies, then determine minimum viable population.
2. Determine reproductive behavior.
3. Determine dispersal and movement patterns.

Management Needs:

1. Determine threats to population.
2. Notify private landowners with proper habitat and provide information on life history and proper management techniques.
3. Investigate alternatives to destroying individuals that occupy urban areas and golf courses (i.e. deterrents or translocations).
4. Identify potential areas for land acquisition to provide permanent long-term safety.

Name
Scientific: *Thomomys bottae texensis*
Common: Limpia Creek Pocket Gopher

Status: Federal: N2
State: S2
Global: G5T2
Priority: Low

Distribution: Trans-Pecos
Occurs as a single isolated population from the head of Limpia Creek, in the Davis Mts, Jeff Davis Co., Texas.

Habitat Type: Grasslands.
Community: Arid grasslands

Reasons for Concern:
1. Loss of habitat due to grazing practices.

Status Needs:
1. Provide support for continued research to determine stability of current population.

Monitoring Needs:
1. Monitor current populations to determine trends.

Research Needs:
1. Determine extent of present populations and determine status of habitat in the Davis Mts.

Management Needs:
1. Improve private landowner participation in monitoring efforts and prevention of loss of habitat by invasion of woody plants.
2. Encourage landowner participation in wise grazing practices that perpetuates grassland habitat.

Name
Scientific: *Thomomys bottae limpia*
Common: Limpia southern pocket gopher

Status: Federal: C2
State: S2
Global: G5T2
Priority: Low

Distribution: Trans-Pecos
Jeff Davis County

Habitat: Woodlands
Community: 5,000 ft. and above in juniper and yellow-pine belts of the Davis Mountains, in the transition zone and in at least the upper edge of the Chihuahuan desert region. Endemic plants include Livermore paintbrush (*Castilleja livermorensis*) and Davis Mountain's horse nettle (*Solanum davisense*).

Reasons for Concern:

1. Endemic with a narrowly restricted range that is not under any form of special protection; of possible competition with the yellow-faced pocket gopher (*Cratogeomys castanops*); overgrazing, which has taken place in the Davis Mountains since the 1870's and caused changes in the environment leading to dramatic plant community conditions which may be more favorable to the yellow-faced pocket gopher.

Status Needs:

1. Assess taxonomic status to determine validity of subspecies.
2. Using historic information and GIS mapping techniques determine preferred habitat.
3. Survey and trap historic locations where possible to determine current presence, Possibly still common in the highlands, whereas *T.b.texensis* may have been locally extirpated by competition with the larger yellow-faced gophers.

Monitoring Needs:

1. Periodically monitor population trends within GMNP.
2. Develop a method of estimating population density and trends.

Research Needs:

1. If valid subspecies, determine the minimum viable population.
2. Determine reproductive behavior.
3. Determine dispersal and movement patterns.

Management Needs:

1. Identify any threats to the GMNP population if the population is declining. Notify private landowners with proper habitat and provide information on life history and proper management techniques.
2. In cultivated areas, pocket gophers may be destructive and require control by trapping or poisoning, but on natural lands they are of decided benefit as soil builders. They are the chief natural cultivators of soils and the maximum thrift of wild vegetation is dependent upon their continued activity (Schmidly 1994).

Name
Scientific: *Microtus mogollonensis*
Common: Mogollon vole

Status: Federal: None
State: None
Global: None
Priority: Low

Distribution: Trans-Pecos
Only one known occurrence: Guadalupe Mountains National Park (GMNP) in Culberson County (Schmidly 2004).

Habitat: Mountain forest
Community: Islands of grassy meadows in yellow pine forest, shinnery oaks (Schmidly 2004).

Reasons for Concern:

1. Limited overall distribution of species (Frey 1999 & 2004) and in Texas, endemic subspecies found only in dry conditions in grassy meadows in montane forests in Guadalupe Mountains (Schmidly 2004).
2. Lack of suitable habitat in Texas and isolation of meadow islands (Frey 1999, Schmidly 2004).
3. Dry grassy meadow habitats affected by livestock overgrazing, droughts and stream and wetland degradation.
4. Populations affected by low birth rate of this vole, at average 2.4/litter, among lowest of any North American vole species and seasonality of reproduction, occurring only during warmer, wetter months and ceasing during the cooler months.

Status Needs:

1. Provide support for continued research to determine extent of present populations in Texas.
2. Continue to evaluate population status and current threats in New Mexico and Arizona.

Monitoring Needs:

1. Identify largest populations for monitoring population status and trends periodically.
2. Develop a method of estimating population density and trends.

Research Needs:

1. Assess taxonomic status to determine validity of subspecies as distinct and the species as distinct from *M. mexicanus*.
2. Careful inventory of other areas of similar altitude and habitat in region.

Management Needs:

1. Control any livestock or large wild ungulate, especially exotics, overgrazing in meadows in GMNP.

Name
Scientific: *Notiosorex crawfordi*
Common: Desert Shrew

Status: Federal: None
State: None
Global: None
Priority: Low

Distribution: Trans-Pecos, High Plains and Rio Grande region, edge of Llano Estacado (Schmidly 2004).

Habitat: In West Texas and Rio Grande Region it does not appear to be restricted to a particular set of habitats (Schmidly 2004).

Reasons for Concern:

1. Poorly studied species, little is known of population dynamics and distribution throughout its range in Texas.

Monitoring Needs:

1. A protocol to monitor species presence over large geographic areas.

Research Needs:

1. A live-trapping technique or techniques that have low mortality.
2. Estimate life history parameters (litter size, survival, age at first reproduction, etc.) in a variety of locations throughout the state.
3. Assess resource requirements (food, habitat) in a variety of locations throughout the state.

Management Needs:

1. Coordination with New Mexico and Mexico in assessing status of species throughout its range.

Name
Scientific: *Cratogeomys castanops*
Common: Yellow-faced Pocket Gopher

Status: Federal: None
State: None
Global: None
Priority: Low

Distribution: West Texas (Plains and Trans-Pecos)

Habitat: Affinity for deep soils (Schmidly 2004) with rocks (per com. Clyde Jones).

Reasons for Concern:

1. Poorly studied species.

Status Needs:

1. Identify taxonomic status of *C. c. angusticeps* and *C. c. tamaulipensis* using DNA Techniques.

Monitoring Needs:

1. Periodically monitor two subspecies (*C. c. angusticeps* and *C. c. tamaulipensis*) with restricted ranges to identify population status.

Research Needs:

1. Identify taxonomic status of *C. c. angusticeps* and *C. c. tamaulipensis* using DNA Techniques.

Management Needs:

1. None at this time.

Name
Scientific: *Onychomys arenicola*
Common: Mearns's Grasshopper Mouse

Status: Federal: None
State: None
Global: G4G5
Priority: Low

Status Report: None

Distribution: Trans-Pecos
Crockett, Ward and Winkler counties east of the Pecos River (Davis 1994).

Habitat: Desert Shrubland, Grasslands, Swales
Community: Bajada (Piedmont) soil sites having a gravelly or rocky substrate (NatureServe 2004) at elevations of 1,340 to 1,580 m. (Lautzenheiser 2003). Clary et. al. (1999) documented in habitats ranging from creosote, yucca and grama grasslands to swales and *Chilopsis* arroyos.

Reasons for Concern:
1. Limited distribution.
2. Does not occur at high densities.

Monitoring Needs:
1. Identify largest populations for monitoring population trends periodically.
2. Develop a method of estimating population density and trends.

Research Needs:
1. Determine minimum viable population.
2. Determine reproductive behavior.

Management Needs:
1. Determine threats to population.
2. Identify strategies to abate threats.

Name
Scientific: *Sigmodon fulviventer dalquesti*
Common: Tawny-bellied Cotton Rat (Texas population)

Status:
Federal: None
State: None
Global: G? (*S. f. dalquesti*)
Priorty: Low

Status Report: None

Distribution: Trans-Pecos
Isolated population near Fort Davis in Jeff Davis County (Davis and Schmidly 1994).

Habitat: Grasslands and Woodlands
Community: Mesquite grassland vegetation or grassy sites within pinyon-juniper-live oak woodland (Davis and Schmidly 1994).

Reasons for Concern:

1. Isolated population (subspecies) in Texas; species not common anywhere in the U.S. (NatureServe 2004).
2. Habitat degradation due to overgrazing (LaRoche, 2004).

Status Needs:

Work indicates it is not there. Clyde Jones.

Monitoring Needs:

1. Identify largest populations for monitoring population trends periodically.
2. Develop a method of estimating population density and trends.

Research Needs:

1. Assess taxonomic status to determine validity of subspecies.
2. Determine minimum viable population.
3. Determine reproductive behavior.
4. Determine dispersal and movement patterns.

Management Needs:

1. Determine threats to population.
2. Identify potential areas for land acquisition to provide permanent long-term protection.

Name
Scientific: *Geomys personatus davisi*
Common: Texas (Davis') Pocket Gopher

Status: Federal: None
State: None (on Special Animal List)
Global: G4T2
Priority: Low

Status Report: None

Distribution: South Texas
Western Zapata and Webb counties.

Habitat: Riparian
Community: Little information is available for the subspecies; information presented here is for the species. Prefers deep sandy soils and may use roadsides (Schmidly 2004).

Reasons for Concern:

1. Small disjunct and isolated population vulnerable to land use changes.

Status Needs:

1. Assess taxonomic status to determine validity of subspecies.
2. Using historic information and GIS mapping techniques, determine preferred habitat.
3. Survey and trap historic locations where possible to determine current presence of this species.
4. Identify new areas from GIS and ground-truth for current presence.

Monitoring Needs:

1. Identify largest populations for monitoring population trends periodically.
2. Develop a method of estimating population density and trends.

Research Needs:

1. If valid subspecies, determine minimum viable population.
2. Determine reproductive behavior.
3. Determine dispersal patterns and movement patterns.

Management Needs:

1. Determine threats to population.
2. Investigate alternatives to destroying individuals that occupy urban areas and golf courses (i.e. deterrents or translocation).
3. Identify potential areas for land acquisition to provide permanent long-term protection.
4. Notify private landowners with “proper” habitat and provide information on life history and proper management techniques.
5. Develop guidelines for management of populations occurring in highway rights-of-way.

Name
Scientific: *Anmospermophilus interpres*
Common: Texas Antelope Squirrel

Status:
Federal: None
State: None
Global: None
Priority: Low

Distribution: Trans-Pecos

Habitat: Desert mountain
Community: The species is restricted to rocky habitats on and around desert mountain ranges. Most common between 1,050 and 1,650 m. Prefer hard-surfaced, gravelly washes or rocky hill slopes.

Reasons for Concern:
1. Restricted range.
2. Vulnerable to land use changes and overgrazing (in some cases different species of antelope ground squirrels are being displaced by farms and settlements, which alter their habitat, forcing them to shift their range to non-traditional areas) (Tamaska, G., Per. Comm.).

Status Needs:
1. Document full range of this species and population status.
2. Survey and trap historic locations where possible to determine current presence of this species.
3. Identify new areas from GIS and ground truth for current presence.

Monitoring Needs:
1. Periodically monitor population trends.
2. Develop a method of estimating population density and trends.

Research Needs:
1. Determine reproductive behavior.
2. Determine dispersal and movement patterns.
3. Document full range of this species and population status.
4. Document plant community associations within this species range.

Management Needs:
1. Identify any threats to the population.
2. Protect and manage habitat if needed.
3. Notify private landowners with proper habitat and provide information on life history and proper management techniques.

Name
Scientific: *Erethizon dorsatum*
Common: Porcupine

Status: Federal: None
State: None
Global: None
Priority: Low

Distribution: Trans-Pecos, Edwards Plateau, High and Rolling Plains

Habitat: Woodland Shrubland and Forested
Community: Forested rocky ridges and slopes.

Reasons for Concern:

1. Little known about them in Texas however appear to be spreading.

Status Needs:

1. In decline in other parts of the US.
2. Loss of habitat.

Monitoring Needs:

1. Monitor distribution and change in distribution.

Research Needs:

1. Determine population estimate, range and distributional limits.
2. Develop techniques for documenting range expansion.
3. Determine economic importance of increased range expansion (e.g. what negative impacts on agriculture forestry etc if any).

Management Needs:

1. Develop management recommendations.

Name
Scientific: *Sylvilagus aquaticus*
Common: Swamp Rabbit

Status: Federal: None
State: None
Global: G5
Priority: Low

Status Report: None

Distribution: East Texas
From Montague County on the Red River south to Refugio County on the Gulf Coast; southwest to Bexar and Travis counties (Davis and Schmidly 1994).

Habitat: Marshes and Rivers
Community: Swampy creek and river bottoms in flood plains; coastal marshes (Davis and Schmidly 1994), canebrakes (Whitaker 1980).

Reasons for Concern:
1. Habitat loss/degradation as swamps and marshes are drained.
2. Sometimes hunted as a game animal or an agricultural pest in some areas (Burt 1976); excessive hunting could be a threat (Animal Diversity Web 1999).
3. Individuals are restricted to a specific local range and are not found in uplands (Davis and Schmidly 1994).

Monitoring Needs:
1. Identify largest population for monitoring population trends periodically.
2. Develop a method of estimating population density and trends.

Research Needs:
1. Determine minimum viable population.

Management Needs:
1. Determine threats to population(s).
2. Investigate alternatives to destroying individuals that threaten crops (i.e. deterrents or translocation).
3. Identify potential areas for land acquisition to provide permanent long-term protection.
4. Develop outreach and education programs to abate threats.

Name
Scientific: *Herpailurus yagouaroundi*
Common: Jaguarundi

Status: Federal: Endangered
State: Endangered
Global: G4
Priority: Low

Recovery Plan: In Press. Listed Cats of Texas and Arizona.

Distribution: Rio Grande Plains

Habitat: Shrubland
Community: Tamaulipan thornshrub and grassy openings (Caso 1994).

Reasons for Concern:

1. Loss of habitat due to brush clearing for cropland, pastures and urban development.
2. Unknown population status in Texas; last documented in 1986 (Anonymous 1986).

Status Needs:

1. Document and confirm sightings using a systematic method.

Monitoring Needs:

1. None at this time. Look for opportunities to develop partnerships with Mexico to monitor this species.

Management Needs:

1. Compile and summarize information on restoration of thornshrub habitat in south Texas.
2. Develop partnerships with Mexico to share biological information.

Name
Scientific: *Trichechus manatus*
Common: West Indian Manatee

Status: Federal: Endangered
State: Endangered
Global: None
Priority: Low

Recovery Plan: US Fish and Wildlife Service. 2001. Florida Manatee Recovery Plan (*Trichechus manatus latirostris*) Third Revision. [http://ecos.fws.gov/docs/recovery_plans/2001/011030.pdf]

Status Needs: Come from Recovery Plan.

Distribution: Gulf and Coastal Estuaries/Tributaries (Gould, 1962)
Note: Sightings from Galveston County to Cameron County. Documentations from late 1800's to present.

Habitat Type: Saltwater and brackish water
Community: Nearshore waters.

Reasons for Concern:

1. Frequency of manatee "visits" to Texas waters not well known. Source of individuals not well known (i.e. Caribbean or Florida individuals).
2. Human-manatee interactions can be detrimental to animal (i.e. boat strikes; "holding" individuals in an area with a fresh water and/or food source can result in harm to individual if weather changes and temperature decreases occur).

Status Needs:

1. In Texas develop a network for gathering and reporting sighting information from the public (Recovery Plan).

Monitoring Needs:

1. Log all manatee sightings in Texas waters in the USFWS database.

Research Needs:

1. In Texas catalog/map sighting locations.

Management Needs:

1. Minimize causes of manatee disturbance, harassment, injury and mortality.
2. Facilitate manatee recovery through public awareness and education.

Name
Scientific: *Myotis velifer*
Common: Cave myotis

Status: Federal: None
State: None
Global: G5
Priority: Low

Distribution: Occurs in most of Trans-Pecos, south Texas, eastern parts of the panhandle, north central Texas and the Edwards Plateau.

Habitat Type: Use a wide variety of habitats, mainly near water ways in arid or semi-arid areas.

Roosting and Foraging Ecology:
They roost in caves, rock crevices, culverts, buildings, carports, bridges, bat houses and cliff swallow nests. They feed mainly on small moths, but also small beetles, weevils and ant lions.

Reasons for concern:
1. Abandonment of historical roosts.
2. Vulnerability of cave roosts.
3. Are in decline in other parts of their range such as California and Arizona.

Status needs:
1. Investigate use of gypsum caves in panhandle as hibernacula.
2. Identify current and historic maternity caves in Edwards Plateau and Trans-Pecos.

Monitoring needs:
1. Initiate regular monitoring or most significant maternity caves and hibernacula.

Research needs:
1. Investigate abandonment of historical roosts.
2. Investigate use of Mexican free-tailed bat caves.

Management needs:
1. Protect known roost sites.
2. Promote use of bat houses as artificial roosts.

Name
Scientific: *Lasiurus xanthinus*
Common: Western yellow bat

Status: Federal: None
State: None
Global: G5
Priority: Low

Distribution: Recorded from Big Bend National Park, Black Gap Wildlife Management Area, Davis Mountains and Del Rio.

Habitat Type: Typically associated with desert oasis type habitat, but have also found in Spanish dagger in upland habitat in Texas.

Roosting and Foraging Ecology:
Roost in dead palm fronds, in yucca plants and in the foliage of hackberry and sycamore trees. Also roost in Spanish dagger in upland habitat. Feed on true bugs, flies, ants, moths, beetles and grasshoppers.

Reasons for Concern:
1. Newly recorded in Texas (1990).
2. Not much is known about the habits of this species in Texas.

Monitoring Needs:
1. Continue monitoring of bat species in the Trans-Pecos region.

Research Needs:
1. Studies on the habits and dietary needs of this species.

Management Needs:
1. Desert riparian management to maintain roosting habitat.
2. Discourage the trimming of palm fronds and yuccas within the species range.

Name
Scientific: *Lasiurus ega*
Common: Southern Yellow Bat

Status:
Federal: None
State: Threatened
Global: G5
Priority: Low

Distribution: South Texas Plains and Gulf Prairies and Marshes

Habitat Type: Native and ornamental palm trees

Roosting and Foraging Ecology:

It primarily roosts under dead fronds of both native and ornamental palms. Active year round. Foraging ecology mostly unknown, likely feeds on small insects captured in flight.

Reasons for Concern:

1. Destruction of roost site by the landscape practice of trimming dead palm fronds.
2. Increased likelihood of human encounter due to trimming of palm fronds.
3. Little is known about this species.
4. Pesticides used in mosquito control are a major cause for concern.

Population Status Needs:

1. Conduct field surveys to identify roosting areas and habitat availability.

Monitoring Needs:

1. Visit known and potential roost areas to determine presence and population trends.

Research Needs:

1. Determine spatial use of roost site.
2. Conduct ecological studies comparing use of native and ornamental palms by this species.
3. Research foraging ecology.

Management Needs:

1. Encourage leaving dead fronds on palms whenever possible, esp. when females are pregnant or raising young and during hibernation.
2. Protect and restore naturally occurring palms along the Rio Grande.
3. Work with landscapers, TxDOT and other resource professionals to education public about bat use of dead palm fronds.

Name
Scientific: *Myotis yumanensis*
Common: Yuma myotis

Status: Federal: None
State: None
Global: G5
Priority: Low

Distribution: Southern Trans-Pecos eastward to Val Verde County, with a disjunct record from Starr County.

Habitat Type: Desert regions. Most commonly found in lowland habitats near open water.

Roosting and Foraging Ecology:
They roost in caves, abandoned mines and buildings. They eat moths, frog hoppers, leaf hoppers, June beetles, ground beetles, midges, muscid flies, caddis flies and crane flies.

Reasons for concern:
1. They congregate in large colonies in caves so they are susceptible to human disturbance.
2. Renovation/loss of old buildings as roosting sites.

Status needs:
1. Identify roosting sites.

Monitoring needs:
1. Monitor major roosting sites.

Research needs:
1. Identify major roosting sites.
2. Basic behavior and ecology.

Management needs:
1. Protect roost sites.
2. Protection of desert riparian areas in the Rio Grande corridor.
3. Encourage the use of artificial roosts.

Name
Scientific: *Myotis thysanodes*
Common: Fringed myotis

Status:
Federal: None
State: None
Global: G5
Priority: Low

Distribution: Trans-Pecos in the summer. Two specimens captured in northwest Texas in Crosby County, but were probably seasonal migrants.

Habitat Type: Mountainous pine, oak and pinyon juniper to desert scrub, but seems to prefer grassland areas at intermediate elevations.

Roosting and Foraging Ecology:
They roost in caves, mines, rock crevices and buildings. No information available on food habits in Texas. In other regions, known to eat small beetles and moths.

Reasons for concern:
1. They roost in caves so they are susceptible to human disturbance.
2. renovation/loss of old buildings as roosts.

Status needs:
1. Identify major roosting sites.

Monitoring needs:
1. Monitor major roosting sites.

Research needs:
1. Identify winter habitat.
2. Study their food habits in Texas.
3. Investigate the use of bat house by this species.

Management needs:
1. Protect major roosts.

Name
Scientific: *Eumops perotis californicus*
Common: Greater western mastiff Bat

Status:
Federal: None
State: None
Global: G5T4
Priority: Low

Distribution: Trans-Pecos. Brewster, Presidio and Val Verde counties; maybe along Rio Grande canyon.

Habitat Type: Arid Canyons; roosts in crevices in rock walls of desert canyons, old buildings, hollow trees.

Roosting and Foraging Ecology:
Roosts in rocky crevices in vertical or near vertical cliffs. Roost entrances are horizontally oriented, have relatively large openings and face downwards so they can be entered from below. Roost site must allow for a three m fall in order for bats to take flight. Feed on moths, crickets, grasshoppers, bees, dragonflies, leaf bugs, beetles and cicadas.

Reasons for Concern:
1. Little is known of this species in Texas.
2. Loss of large open bodies of water used as drinking sites poses a threat to this species.

Status Needs:
1. Identify, map and revisit all known roost sites and recent capture sites to determine current occurrences.
2. Conduct field surveys to identify new roost sites.

Monitoring Needs:
1. Visit known roost sites periodically to determine presence and population estimate/trends.
2. Monitor occurrences at regular sites using audible echolocation calls.

Research Needs:
1. Basic behavior and ecology.

Management Needs:
1. Protect large open bodies of water in their range.
2. Educate landowners about cliff roosting bats and cliff-face management.

Name
Scientific: *Nyctinomops femorosaccus*
Common: Pocketed free-tailed bat

Status: Federal: None
State: None
Global: G4
Priority: Low

Distribution: Known in Texas only from Big Bend National Park.

Habitat Type: Inhabits semi-arid desert lands.

Roosting and Foraging Ecology:
Uses day roosts in caves, crevices in cliffs and under roof tiles of buildings. Nothing is known about the winter habits of these bats. Pursues insects on the wing such as moths, crickets, flying ants, stinkbugs, froghoppers and leafhoppers, lacewings and unidentified insects.

Reasons for Concern:
1. Is rare throughout its range and little is known about the species.
2. Requires large bodies of water for drinking because they are one of the least maneuverable fliers. Such sites are declining.

Status Needs:
1. Continue surveys in Big Bend National Park and surrounding Trans-Pecos region.

Monitoring Needs:
1. Continue surveys in Big Bend National Park and surrounding Trans-Pecos region.

Research Needs:
1. Investigation of summer and winter roosts and habits of this species in Texas.

Management Needs:
1. Inventory and protection of large bodies of water in the region the species would use for drinking.
2. Educate landowners about cliff roosting bats and cliff-face management.

Name
Scientific: *Nyctinomops macrotis*
Common: Big free-tailed bat

Status: State: None
Federal: None
Global: G5
Priority: Low

Distribution: Known in Texas from scattered localities in the Trans-Pecos panhandle and southeastern portion of the state.

Habitat Type: Inhabits rugged, rocky country in both lowland and highland habitats. Most abundant at elevations below 1,800 m in rugged areas where there are high rocky cliffs.

Roosting and Foraging Ecology:
Prefer cliff-face crevices, but also roost in buildings, caves and holes in trees. Nothing is known about the winter habits of these bats in Texas. Only single winter record of the species in Texas. Large moths are the primary food source; also feed on crickets, grasshoppers, flying ants, stinkbugs, beetles and leafhoppers.

Reasons for Concern:
1. Is rare in collection and little is known about its species.
2. Requires unobstructed large bodies of water for drinking because they are one of the least maneuverable fliers. Such sites are declining.

Status Needs:
1. Continue surveys in Big Bend National Park and surrounding Trans-Pecos region, as well as the panhandle and eastern locations where individuals have been found.

Monitoring Needs:
1. Continue surveys in Big Bend National Park and surrounding Trans-Pecos region, as well the panhandle and eastern locations where individuals have been found.

Research Needs:
1. Investigate roosting and foraging behavior in Texas.
2. Investigate reproductive behavior and development of young.

Management Needs:

1. Inventory and protection of large bodies of water in the region the species is found.
2. Educate landowners about cliff roosting bats and cliff-face management.

Name
Scientific: *Antrozous pallidus*
Common: Pallid bat

Status:
Federal: None
State: None
Global: G5
Priority: Low

Distribution: Western half of Texas.

Habitat Type: Rocky outcrops near water and riparian areas at elevations below 1,800 m. Have been found in a wide variety of habitat from lowland desert scrub and grasslands through oak and pine forests. Prefer areas where open ground is plentiful, typically in arid or semi-arid lands.

Roosting and Foraging Ecology:
Roost in rock crevices of cliff faces, caves, mines, houses, barns, behind signs, in hollow trees, beneath the bark of old snags, bridges, in buildings including abandoned building and bat houses. They are terrestrial foragers to some extent, capturing prey on the ground and taking it back to a feeding station where it is consumed. 54 different types have prey have been documented for this bat, but large night-flying insects and ground-dwelling arthropods are most prevalent in their diets.

Reasons for concern:
1. Because they often live in buildings, or night-roost on porches, they are susceptible to human harassment and needless killing.
2. The species has undergone a major decline in coastal areas of western states.
3. Their winter habits are poorly known.

Status needs:
1. Identify major roosting sites.

Monitoring needs:
1. Monitor major roosting sites periodically.

Research needs:
1. Investigate winter habits.

Management needs:
1. Education about the wide variety of crop and other insect pests they consume.
2. Education about proper methods for discouraging bat use of porches/buildings when necessary.

Name
Scientific: *Tadarida brasiliensis*
Common: Brazilian free-tailed bat

Status: Federal: None
State: None
Global: None
Priority: Low

Distribution: Statewide

Habitat Type: Statewide

Roosting and Foraging Ecology:
Roost in caves, mines, wells, hollow trees, bridges, old tunnels, buildings, behind signs and bat houses. However, the vast majority of population roosts in relatively large caves and mines. They feed mainly on moths, but also beetles, leaf beetles, weevils, water boatman, stink-bugs, green blow-flies, flying ants and dragonflies.

Reasons for concern:
1. Vulnerability of limited cave roosts in the southwestern U.S. and winter roosts in Mexico, used by millions of bats. Human disturbance and vandalism of key roosting sites in caves is the single most serious cause of decline.
2. Because they feed in towns and over agricultural areas, they are especially vulnerable to chemical pesticides used on crops or in mosquito fogging.
3. Building-roosting colonies are often destroyed as pests or when buildings are modified or razed.

Status needs:
1. Use of thermal imaging or other techniques to determine population size at summer roosts in Texas.
2. Determine winter roost status in Mexico.

Monitoring needs:
1. Continue monitoring key roosts.

Research needs:
1. Available knowledge suggests great value of this species in consuming crop pests, but further documentation of this impact is needed.
2. Further define roosting requirements.
3. Further document foraging ranges.
4. Develop genetic markers for major pest species to aid in determination that these pests are actually prey for these bats.

5. Identify timing of use at major roost sites.
6. Investigate toxicology at declining roost sites.

Management needs:

1. Work with private land owners to protect major roosting sites.
2. Educate the public about the ecological importance of this species.
3. Encourage use of artificial roosts and bat-friendly exclusions from buildings when necessary.
4. Continue to work with TxDOT agencies to encourage provision of bat-friendly bridge designs.
5. Work with landowners to maintain unobstructed drinking sites.
6. Work with landowners to restore abandoned roost sites.
7. Work with farmers to document the types of insect pests eaten by these bats.

Name
Scientific: *Euderma maculatum*
Common: Spotted bat

Status: Federal: None
State: Threatened
Global: G4
Priority: Low

Distribution: Known in Texas from the Big Bend National Park area

Habitat Type: Little is known in Texas but habitat requirements appear to be limited to the presence of broken canyons and/or cliffs.

Roosting and Foraging Ecology:
Little is known about this species in Texas but the few observations suggest that the bat roosts in cracks and crevices of cliff walls. Emerges late in evening to forage on moths, their primary food source.

Reasons for Concern:
1. Rare in collection and little is known about this species in Texas.

Status Needs:
1. Continued surveys in Big Bend National Park and surrounding Trans-Pecos region.
2. Acoustic monitoring may prove useful, as this species is difficult to capture via mist-nets.

Monitoring Needs:
1. Continued surveys in Big Bend National Park and surrounding Trans-Pecos region.
2. Acoustic monitoring may prove useful, as this species is difficult to capture via mist-nets.

Research Needs:
1. Investigate roosting and foraging behavior in Texas.
2. Investigate reproductive behavior and development of young.

Management Needs:
1. Inventory and protection of water resources in the Big Bend region.
2. Educate landowners about cliff roosting bats and cliff-face management.

Supplemental Herptile Information

High Priority Species

Name

Scientific: *Bufo houstonensis*

Common: Houston Toad

Status: Federal: FE

State: SE

Global: G1

Priority: High

Distribution:

The known range includes parts of 10 counties Austin, Bastrop, Burleson, Caldwell, Colorado, Fayette, Lee, Leon, Milam and Robertson) in southeastern Texas. Extirpated from Fort Bend, Harris and Liberty counties.

Habitat:

Sandy soils in post-oak woodlands, gulf coastal prairies and the "Lost Pines" in Bastrop County.

Abundance:

Robust in Bastrop County. Apparently common historically in Harris and Fort Bend counties. Unknown throughout the remainder of its range; most locations based on limited breeding call surveys at a single point that have not been reconfirmed in over a decade.

Life History:

Apparently restricted to the immediate vicinity of geologic soil formations consisting of deep sands (e.g. "sugar" sands) between the Colorado and Trinity rivers in east-central Texas and along the upper Gulf Coastal Prairie in Austin, Colorado and Fayette counties. An explosive late-winter early-spring breeder, breeding choruses form for one to several nights with intervals between choruses commonly a week or more. Factors promoting chorus formation include warm overnight temperatures and high humidity typified by the passage of warm fronts, along with moonless nights. Historically well-adapted to breed in temporary ponds, also uses shallow or the shallow portions of permanent ponds where fish are functionally absent. The tadpole stage is relatively short, lasting from one to several weeks depending on water temperatures. Males reach sexual maturity by the spring following metamorphosis, females typically the following year. Generational turnover is about three years, although individual toads may live to be five or six years old. Prone to desiccation, toads disperse into the surrounding habitat and remain largely inactive the remainder of the year. Most surviving adults return to the same breeding site the following year, but some move up to one km to different sites and occasionally into different drainages. Some females apparently do not breed every year during droughts.

Potential Threats:

- Conversion of native post-oak woodland and coastal prairie to agricultural and other uses, including destruction of individual breeding sites by draining and filling and similar activities.
- Concomitant changes to water quality and/or quantity, or other hydrological aspects.
- Habitat fragmentation.
- Hybridization with sympatric congeners resulting from habitat modification.
- Impediments to the terrestrial migration of toads, including roads, urban and suburban developments, little kids with plastic jars in their hands, etc.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Define potential habitat by utilizing GIS-based technology to map the extent of required soils supporting breeding sites, current land uses and other relevant characteristics.
- Use the results to find existing toads.
- Resurvey sites where toads were recently known to exist.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Eurycea spp*. Complex

Common: Central Texas Spring and Cave Salamanders

Status: Federal: Refer to the Texas Priority Species List

State: Refer to the Texas Priority Species List

Global: Refer to the Texas Priority Species List

Priority: High

Distribution:

The Edwards Plateau of central Texas.

Habitat:

Springs, spring-runs and subterranean waters of the Edwards Aquifer.

Abundance:

No population estimates are available. Those in the southwestern portion of the range appear to be large, whereas those in the northern portion of the Edwards Aquifer appear very small.

Life History:

Very little is known. Neoteric except for a handful of populations in the Sabinal River drainage and obligatorily aquatic. Thermally constant environments. Reproductively active year-round; females may hold eggs for extended periods of time awaiting environmental cues for oviposition. Females in some populations may enter springheads and/or go underground to lay eggs. Prey consists of amphipods, gastropods and similar aquatic invertebrates. Epigean populations may survive underground during droughts for extended periods (2 years documented) prior to the resumption of surface flow.

Potential Threats:

- Bad water.
- No water.
- Physical destruction of springs and caves.

- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Define and map potential habitat by utilizing GIS-based and other relevant technologies where appropriate.
- Continue and expand efforts to find previously unknown occupied sites.
- Continue research to identify the taxonomic entities within the complex.
- Study the population ecology at several protected sites, monitor as many others as possible.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Phrynosoma cornutum*

Common: Texas Horned Lizard

Status: Federal: SC

State: ST

Global: G4G5

Priority: High

Distribution:

Historically statewide except for the east Texas Piney Woods, although introduced populations have existed there and may still be extant. Currently extirpated east of the I-35 corridor and spotty throughout the Edwards Plateau (where it apparently was never common) and north central Texas (where it historically was common). Reports of isolated populations within the former east Texas range occur occasionally but have not been verified.

Habitat:

A variety of habitats including desert shrublands, open grasslands, juniper woodlands on sandy to gravelly soils.

Abundance:

Generally common where it occurs.

Life History:

A lizard of open habitats with high insolation, background coloration and pattern render individuals relatively inconspicuous in native habitats unless they move. Clutches of up to 40 eggs are laid during the summer in a chambered burrow the female digs herself. Females rarely have more than one clutch a season. Activity season from April through October depending upon annual weather patterns and latitude. Lizards shelter overnight in shallow burrows, beneath organic debris near or under vegetation, or other similar circumstances.

Potential Threats:

- Conversion of native habitat to agricultural, residential and other uses.
- Cats, dogs, vehicular traffic and other similar hazards accompanying human incursion into occupied habitats.
- Red Imported Fire Ants and the indiscriminate use of pesticides to combat them, which eliminates native ant prey as well.
- Commercial collecting and incidental take.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Define potential habitat by utilizing GIS-based technology to map the extent of historic and current land uses and other relevant characteristics.
- Use the results to find existing populations.
- Continue the study the population ecology in protected areas such as National Wildlife Refuges or Texas public lands if they exist.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Mexican, Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Terrapene spp.*

Common: Box Turtles

Status: Federal: SC

State: SC

Global: G5T4

Priority: High

Distribution:

Historically statewide.

Habitat:

A variety of habitats from arid deserts and shortgrass prairies to longleaf pine and bottomland hardwood forests.

Abundance:

No abundance estimates are available.

Life History:

Sedentary and long-lived, adults 50 years old are not uncommon. These are classic K-selected species, however, very few turtles reach sexual maturity. Because of these characteristics many years may be required before population declines are evident and such declines can likewise only be halted or reversed over extended periods of time if ever.

Potential Threats:

- Fire Ants.
- Commercial exploitation.
- Spread of human population centers and supporting activities such as traffic into box turtle habitat.
- Long-term declines in recruitment of juveniles into breeding populations.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Statewide sighting surveys to resolve uncertainties about current distributions.
- Focused surveys in selected areas to quantify abundance.
- Determine the extent of commercial harvest.
- Study the population ecology of several sites in protected areas such as National Wildlife Refuges or Texas public lands if they exist.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Mexican, Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation plans.

Name

Scientific: *Pituophis ruthveni*

Common: Louisiana Pine Snake

Status: Federal: FC

State: ST

Global: G5T3

Priority: High

Distribution:

Eastern Texas and western Louisiana.

Habitat:

Longleaf and Loblolly Pine forests.

Abundance:

Populations appear to be disjunct; no abundance estimates are available.

Life History:

Commonly found on sandy soils in clearings or open understory subhabitats supporting pocket gopher populations. Individuals are nevertheless uncommonly encountered despite intensive search and trapping efforts, possibly because they spend relatively little time aboveground. Clutches consist of a small number of relatively large eggs, apparently an adaptation to minimize the time necessary for hatchlings to reach the appropriate size to subsist on pocket gophers.

Potential Threats:

- Fire suppression leading to woody encroachment of fire-maintained habitats and decline of Baird's Pocket Gopher (*Geomys breviceps*) populations.
- Habitat loss and fragmentation due to land use change and alteration of fire regimes.
- Decline of primary prey (Geomys breviceps).
- Increasing road network and vehicle use resulting in increased mortality.

- Commercial exploitation.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Define potential habitat by utilizing GIS-based technology to map the extent of required soils supporting viable populations, current land uses and other relevant characteristics.
- Use the results to find existing snakes.
- Continue studying the population ecology in protected areas.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.
- Explore the conservation relevance of ongoing captive breeding efforts.

Medium Priority Species

Name

Scientific: *Lepidochelys kempii*

Common: Kemp's Ridley Sea Turtle

Status: Federal: FE

State: SE

Global: G1

Priority: Medium

Distribution:

Texas coastal waters.

Habitat:

Largely pelagic, juveniles utilize shallow coastal and inshore waters for foraging and shelter from extreme weather conditions in the Gulf of Mexico.

Abundance:

No abundance estimates are available.

Life History:

Mostly transient along the Texas coast. As with most turtles, adults are long-lived and most juveniles do not survive to enter the breeding population. Increased nesting activity has occurred along the beaches south of Corpus Christi perhaps as a result of the long-term but now defunct headstarting program where eggs and hatchlings were taken from the primary nesting beach in Tamaulipas, Mexico and hatchlings released from South Padre Island. Sex of hatchlings is temperature-dependent in this species, so eggs in natural nests require specific incubation regimes to produce the ratio of males to females to sustain the breeding population.

Potential Threats:

- Incidental take by offshore and inshore fishing activities.
- Physical disturbance of nesting turtles and/or their nests.
- General pollution and point-source events on individual turtles.

- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Increase monitoring activities to find and protect nests during the breeding season.
- Continue and support the Sea Turtle Stranding Network.
- Develop cooperative efforts with Mexican, Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Malaclemys terrapin*

Common: Diamondback Terrapin

Status: Federal: SC

State: SC

Global: G4

Priority: Medium

Distribution:

Texas coast from the Louisiana border south to Corpus Christi Bay.

Habitat:

Bays, estuaries, shallow inshore waterways and other similar habitats.

Abundance:

No abundance estimates are available, although subjective surveys suggest that populations are spotty.

Life History:

Primarily aquatic, comes ashore in coastal wetlands to lay eggs. Feeds on crabs, mollusks and similar prey. Other life-history parameters unknown.

Potential Threats:

- Elimination or fragmentation of coastal marshes and other wetlands from urbanization, resort and secondary development, dredging and other anthropogenic sources of habitat alteration and degradation.
- Concomitant changes to water quality and/or quantity, including interruption of freshwater input from the rivers and streams necessary to maintain the brackish environment upon which this species depends.
- Mortality from crab traps, gill nets and other fishing devices.
- Commercial exploitation.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Define potential habitat by utilizing GIS-based technology to map the extent of coastal marshes, current land uses and other relevant characteristics.
- Use the results to survey for and determine the extent of existing populations.
- Study the population ecology of several sites in protected areas such as National Wildlife Refuges or Texas public lands if they exist.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Rana areolata*

Common: Crawfish Frog

Status: Federal: SC

State: SC

Global: G4

Priority: Medium

Distribution:

Historically east Texas generally east of the Brazos River and southward along the Texas coast to Corpus Christi Bay. Current distribution unknown.

Habitat:

Freshwater; temporary or permanent ponds, roadside ditches, quiet pools of small streams, lakes, swamps, bayous, or similar aquatic habitats

Abundance:

No abundance estimates are available.

Life History:

Other than general characteristics of anurans, aspects specific to this species are unknown.

Potential Threats:

- Conversion of native forest and woodland habitats to agricultural and other uses, including destruction of individual breeding sites by draining and filling, silviculture and similar activities.
- Concomitant changes to water quality and/or quantity, or other hydrological aspects.
- Impediments to the terrestrial and/or aquatic migration of adults, including roads, reservoirs of all sizes, urban and suburban developments, little kids with plastic jars in their hands, etc.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Define potential habitat by utilizing GIS-based technology to map the extent of characteristics supporting breeding sites, current land uses and other relevant characteristics.
- Use the results to survey for and determine the extent of existing populations.
- Study the population ecology of several sites in protected areas such as National Wildlife Refuges or Texas public lands if they exist.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Crotalus horridus*

Common: Timber Rattlesnake

Status: Federal: SC

State: ST

Global: G4

Priority: Medium

Distribution:

Forested habitats of eastern North America in the United States and southern Canada. Within Texas the historical distribution included forested portions on the eastern third of the state west along major rivers to San Patricio, Bexar and Eastland, Wise counties. Currently occurs throughout most of the historic range in Texas as increasingly isolated populations associated with areas of low road densities.

Habitat:

Inhabits closed canopy hardwood and mixed hardwood-pine forests throughout its extensive range. In Texas generally associated with bottomland hardwood forests of all types, but also extending into upland habitats. Perhaps occurred more extensively in upland habitats in Texas prior to extensive development of road systems and associated development. Generally absent from areas historically dominated by open, fire-maintained longleaf pine forests.

Abundance:

No population estimates are available. Probably moderately abundant, for a large snake, prior to colonization and development of eastern Texas by Europeans. Now much reduced in density and distribution within the state. Populations are increasingly isolated, generally in association with larger drainages. Extirpation and isolation of remaining populations due to most types of development including roads, reservoirs, short-rotation silviculture and urbanization.

Life History:

The timber rattlesnake is a classic sit-and–wait predator that depends on infrequent capture of relatively large prey items. In eastern Texas, tree squirrels (*Sciurus spp.*) predominate in the diet of adults, supplemented by rabbits (*Silvilagus spp.*), woodrats (*Neotoma spp.*) and other appropriate sized mammals. Relatively few non-mammalian prey are taken. Juveniles feed primarily on a diverse array of small mammals. Timber rattlesnakes in Texas are generally surface active from late March through early November. Hibernation generally takes place in armadillo burrows, stump holes and associated root channels and other sites that allow the snakes to access sites 10-30 cm below the soil surface. Timber rattlesnakes exhibit late maturity, high survival of adults and delayed reproduction. Limited data suggest that in eastern Texas females reach sexual maturity at 5-6 years of age and reproduce at a 4-5 year interval. Litters generally consist of 8-12 young approximately 30 cm in total length. The resulting low recruitment to the adult population makes the species vulnerable to added mortality resulting from anthropogenic impacts. In the absence of human impacts, adult survival is high and ages approaching or exceeding 30 years are possible.

Potential Threats:

- Increasing road network and vehicle use resulting in increased mortality.
- Habitat alteration and conversion from silvicultural and other land uses, reservoir construction and other activities.
- Direct human related mortality.
- Reduced squirrel (*Sciurus* spp.) populations in remaining forested habitat due to silvicultural impacts.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Gather and publish available grey literature data and technical report documentation for the species in order to direct and facilitate research directions and prioritization.
- Define potential habitat by utilizing GIS-based technology to map the extent of soils, vegetation, etc. where snakes are currently found, current land uses and other relevant characteristics.
- Use the results to find other populations.
- Study the population ecology of several sites in protected areas such as National Wildlife Refuges, or Texas public lands, if they exist.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Nerodia harteri*

Common: Brazos Watersnake

Status: Federal: SC

State: ST

Global: G2

Priority: Medium

Distribution:

Endemic to the Brazos River from the Vicinity of Fort Griffin on the Clear Fork and Proffitt on the Main Fork downstream to the vicinity of Lake Whitney. Populations within this range are spotty.

Habitat:

A mosaic of shallow rocky riffles separated by deeper pools of clear water in areas were the stream channel is essentially devoid of vegetation. The exposed portions of the stream bed gravelly to rocky with many medium-sized to large rocks scattered about.

Abundance:

No abundance estimates are available.

Life History:

Snakes rarely leave the stream channel except to bask on overhanging vegetation or to hibernate in burrows in the stream bank or underneath exposed tree roots and similar situations. Males reach sexual maturity at about one year of age whereas females require two or three years to do so. The many rocks in the stream channel are essential refuge spots and serve as birthing areas were pregnant females can shelter and incubate their litters utilizing the warmth of the rocks in relative safety. Litters range from seven to 23 young; in general larger females produce larger litters. The shallow riffles serve as nurseries for the young, usually born in September or October, where they can more easily catch fish and seek shelter in immediately accessible refuges. Adults typically prefer the deeper pools supporting larger fish as prey. Snakes can and do live in reservoirs provided there is plenty of riprap or other shelter along the banks and sufficient shallow areas in which to fish. Lifespan is unknown; however, individuals of the closely related Concho Watersnake rarely live more than five or six years in the wild.

Potential Threats:

- Interruption/cessation of streamflow, leading to reductions in prey populations and /or siltation and subsequent invasion of vegetation into the stream channel.
- Concomitant changes to water quality or other hydrological aspects.
- Terrestrial input of pesticides, fertilizer and other nutrients and siltation from agricultural, mining and other anthropogenic sources within the watershed, leading to algal blooms and situations likely to negatively impact prey populations and/or the snakes themselves.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Define potential habitat by utilizing GIS-based technology to map the extent of suitable habitats supporting breeding sites, current land uses and other relevant characteristics.
- Use the results to survey for and determine relative abundance of existing populations.
- Study the population ecology of several sites in protected areas such as Texas public lands if they exist.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Siren sp.*

Common: Rio Grande Lesser Siren

Status: Federal: SC

State: ST

Global:

Priority: Medium

Distribution:

The Lower Rio Grande Valley of Texas and perhaps adjacent Tamaulipas.

Habitat:

A variety of permanent and semi-permanent bodies of water, including resacas, farm ponds, ditches, canals, sloughs and sluggish, vegetation-choked creeks, with deep sediments for burrowing.

Abundance:

No abundance estimates are available, but apparently can be locally common.

Life History:

Perennibranchiate and obligatorily aquatic. May breed year-round. Primarily active at night. Feeds on aquatic invertebrates as varied as snails, ostracods, mayflies and crayfish. When intermittent habitats dry, sirens burrow into bottom sediments and aestivate, secreting a mucus membrane around themselves which dries into a parchment-like cocoon; are capable of remaining inactive for several months.

Potential Threats:

- Conversion of native thorn forest and native grassland to agricultural and other uses, including destruction of individual breeding sites by draining and filling and similar activities.
- Concomitant changes to water quality and/or quantity, or other hydrological aspects.

- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- *Siren intermedia texana* is considered invalid. The sirens in the Rio Grande Valley belong to two taxa: *Siren intermedia nettingi*, the Western Lesser Siren and an as yet undescribed species. The initial focus of conservation activities should be to describe it.
- Define potential habitat by utilizing GIS-based technology to map the extent of required soils supporting breeding sites, current land uses and other relevant characteristics.
- Use the results to find existing newts.
- Study the population ecology of several sites in protected areas such as National Wildlife Refuges or Texas public lands if they exist.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Mexican, Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Graptemys spp.*

Common: Map Turtles

Status: Federal: FC

State: ST

Global: G5

Priority: Medium

Distribution:

Major rivers of central and southeastern Texas. two species are endemic to single river systems within this distribution: the Texas Map Turtle to the Colorado River and Cagle's Map Turtle to the Guadalupe River.

Habitat: Free-flowing aquatic environments within major stream and river channels.

Abundance:

No abundance estimates are available except for Cagle's Map Turtle, which reaches its highest density in the Guadalupe River from Seguin downstream to the vicinity of Cuero.

Life History:

As with most turtles, adults are relatively long-lived and relatively few juveniles survive to enter the breeding population. These animals require ample emergent rocks, logs, or other objects upon which to bask. Map turtles rarely leave the river channels except to lay eggs in nearby river banks or adjacent terrestrial habitats. Sex is temperature-dependent in these species, which means that specific temperature regimes are necessary for eggs clutches to produce an adequate ratio of hatchling males to females. Species are more or less sexually dimorphic in body size and morphology, leading to divergence in feeding habits: males forage in shallow habitats around sandbars and gravel banks for trichopteran and other aquatic invertebrates, whereas females forage in deeper water for mollusks and gastropods.

Potential Threats:

- Interruption or cessation of instream flows necessary to maintain physical habitat requirements.
- Concomitant changes to water quality and/or quantity, or other hydrological aspects, directly affecting turtles or their prey base.
- Fire Ants.
- Commercial exploitation.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Define potential habitat by utilizing GIS-based technology to map the extent of suitable river sections supporting breeding sites, current land uses and other relevant characteristics.
- Use the results to survey for and characterize existing populations.
- Study the population ecology of several sites in protected areas such as National Wildlife Refuges or Texas public lands if they exist.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Low Priority Species

Name

Scientific: *Chelonia mydas*

Common: Green Sea Turtle

Status: Federal: FT

State: ST

Global: G3

Priority: Low

Distribution:

Texas coastal waters.

Habitat:

Largely pelagic, juveniles utilize shallow coastal and inshore waters for foraging and shelter from extreme weather conditions in the Gulf of MX.

Abundance:

No abundance estimates are available.

Life History:

Transient along the Texas coast. As with most turtles, adults are long-lived and most juveniles do not survive to enter the breeding population. No breeding on Texas beaches is known.

Potential Threats:

- Incidental take by offshore and inshore fishing activities.
- General pollution and point-source events on individual turtles.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Continue and support the Sea Turtle Stranding Network.
- Develop cooperative efforts with MX., Federal, State, local government and private entities to promote conservation.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Nerodia clarkii*

Common: Saltmarsh Snake

Status: Federal: SC

State: SC

Global: G4Q

Priority: Low

Distribution:

The Texas coastline from the Sabine River to Corpus Christi Bay.

Habitat:

Almost entirely restricted to brackish coastal marshes, although nearby freshwater marshes or lagoons may be utilized.

Abundance:

No abundance estimates are available.

Life History:

A habitat specialist, inhabiting areas where closely related congeners are rare or absent. Feeds on finfish, crayfish and crabs; utilizes behavioral and physiological means to maintain the internal water/salt balance necessary for survival. Gives birth to 2-14 young in August or September.

Potential Threats:

- Elimination or fragmentation of coastal marshes and other wetlands from urbanization, resort and secondary development, dredging and other anthropogenic sources of habitat alteration and degradation.
- Concomitant changes to water quality and/or quantity, including interruption freshwater input from the rivers and streams necessary to maintain the brackish environment upon which this species depends.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Define potential habitat by utilizing GIS-based technology to map the extent of coastal marshes, current land uses and other relevant characteristics.
- Use the results to survey for and determine the extent of existing populations.
- Study the population ecology of several sites in protected areas such as National Wildlife Refuges or Texas public lands if they exist.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Macroclemys temminckii*

Common: Alligator Snapping Turtle

Status: Federal: SC

State: ST

Global: G3G4

Priority: Low

Distribution:

Alligator Snapping Turtles are most common in the southeastern United States, from southern Georgia and northern Florida west to eastern Texas and Oklahoma, although they can be found as far north as Illinois, Indiana and Kansas. They are confined largely to river systems that drain into the Gulf of Mexico.

Habitat: The habitat of Alligator Snapping Turtles tends to be the deeper water of large rivers with well-defined channels, but they can also be found in lakes, ponds, swamps and bayous, as well as in brackish costal waters. Juveniles and adults have also been found in small, shallow mud and gravel-bottom streams. However, access to deeper permanent water is essential for adults.

Life History:

The Alligator Snapping Turtle is the largest freshwater turtle in North America and is one of the largest freshwater turtles found in the world, with only the Asiatic softshell turtles *Chitra* and *Pelochelys* attaining larger sizes. Alligator Snapping Turtles are sometimes confused with the smaller and more abundant Common Snapping Turtle, *Chelydra serpentina* (which is the only other member of the family Chelydridae), but the former can be readily identified by their size, the prominent three keels on the carapace, large head with a strongly hooked beak, long tail and by their small eyes situated on either side of the head. The Alligator Snapping Turtle also has a much more restricted range. It possesses a pink, fleshy, worm-like projection located on the floor of the mouth. When wriggled, this process acts as a lure to attract fish or other potential prey items.

Sexual dimorphism is pronounced in this species. Male Alligator Snapping Turtles can reach weights of 110 kg., while females are smaller and usually do not exceed 28 kg. Size is not the only sexually dimorphic trait, although it is the most obvious; precloacal tail length increases rapidly with body size in males but not in females.

In terms of reproduction in the wild, ovulation usually occurs in early April, with egg-laying taking place in April, May and June. Incubation periods may vary, but typically exceed 80 days. Clutch sizes range from 16 up to 52, with an average of about 25. Sexual maturity is attained between the ages of 11 and 13 years. As a rule, females will lay one clutch per year, but some may only nest every other year. Nesting is diurnal and nests tend to be close to water, but are high and well-drained.

Although no distinct subspecies have been described, there are several factors that suggest that these possibilities should be examined. Several morphometric characters appear to be different between river drainage populations. More recently, utilizing mtDNA differences between 12 river drainages, substantial phylogeographic structuring and population-level separations among river drainages have been found. Of 11 haplotypes, eight were found to be river specific. Interestingly, only one haplotype was found in the three westernmost river drainages. The correlation between morphometric populational variations and mtDNA differences has yet to be examined, but could prove to have some significant management implications, especially since both captive-bred and wild caught animals are being released across different river drainage systems.

Conservation Status:

At one time it was thought that Macroclemys was a species of little economic importance. Since that time, however, the species has been experiencing a dramatic decline in numbers throughout its entire range. Loss of available habitat from stream channelization and siltation is one reason for the decline, as is incidental take, primarily from trot lines. These are less significant than the extensive collection for the commercial meat market, especially in Louisiana. Adults and juveniles are also collected for pets and display as well as for their carapaces and skulls. The number of animals removed from the wild has quickly become unsustainable and has also altered the demographic structure in remaining populations. Furthermore, increasing numbers of live Alligator Snapping Turtles are being exported each year; a significant domestic trade also exists. Currently, all states within its range except Louisiana offer some level of protection. However, regulations are quite varied from state to state and there currently is little to no management of this species by state agencies. The Alligator Snapping Turtle is considered to be threatened in most of the northern areas of its range and was recommended for threatened species status under the Endangered Species Act in 1983. This request was denied, although the USFWS is now recommending listing Macroclemys as a CITES Appendix III species, which will help to monitor legal international commerce, but will do nothing to regulate inter- and intrastate traffic. The World Conservation Union (IUCN) lists Macroclemys as “vulnerable”. In 1997, the United States submitted a proposal to include this species in CITES II, but the proposal was withdrawn. The Chelonian Advisory Group of the American Zoological Association has recommended this species be designated a priority species for both in-situ and ex-situ conservation measures and considered as one of three North American turtle species most in need of management. Recent surveys in Texas have demonstrated that the Alligator Snapping Turtle still occurs throughout most of its historic range in the state.

However, data on age structure and abundance are lacking. Although protected in Texas, substantial anthropogenic mortality occurs, primarily of individuals caught on trotlines. There was some indication in the survey data that incidental capture on trotlines was altering age structure and reducing abundance. The reported existence of commercial capture for sale in Louisiana has not been substantiated. These issues require more detailed investigation.

Conservation recommendations:

- Expand surveys of existing populations in Texas. Define potential habitats.
- Assess the impact of incidental take in Texas, especially through the use of trotlines.
- Assess demographic, genetic and morphometrics of wild population for inter-drainage system relationships.
- Develop cooperative efforts with Federal government, other range state governments, local governments and private institutions to promote the conservation of this species.
- Protect areas supporting existing populations.
- Discourage stream channelization where populations occur.
- Integrate activities with overall regional ecosystem conservation planning.

Name

Scientific: *Alligator missisippiensis*

Common: American Alligator

Status: Federal: SC

State: SC

Global: G5

Priority: Low

Distribution:

The Atlantic Coastal Plain from northeastern North Carolina to the Florida Keys and westward to the Lower Rio Grande Valley in southern Texas. The range extends upstream in numerous river valleys into Arkansas and Oklahoma. There are specimen records and other observations for 86 Texas counties.

Habitat:

Water bodies of all sizes, including fresh, brackish and salt water marshes, fresh water swamps, bayous, lakes, reservoirs and rivers.

Abundance:

Abundant throughout its range; estimates of 81-257 alligators/mi^2 and a minimum population 45-102 juveniles for a 5,000 acre Wildlife Management Area marsh complex have been given in Texas. USFWS reclassified to legal to hunt in Texas in 1983 and the first managed harvest was conducted the following year. Texas Parks and Wildlife Department issued permits for the collection of American Alligator eggs for the first time in 1990; there were at least 25 farming operations in the state two years later.

Life History:

The American Alligator is a keystone species wherever it occurs. Alligators may live 50 years or more. Individuals dig "gator holes" in which they spend much of the inactive season of early October to late March and these frequently serve as refuges for many species that depend upon aquatic habitats during dry seasons. Individuals migrate between sites via irrigation canals and similar habitats and can and do frequently travel overland between aquatic habitats, sometimes for great distances. Typical clutches vary from 30-50 eggs. Females build nests of organic debris that they gather with their tails or carry from nearby areas in their mouths and guard the eggs incubating in them. Nevertheless, nests are frequently predated and the Red Imported Fire Ant (*Solenopsis invicta*) severely reduces egg survival in a number of areas. Although juvenile farm-raised alligators released into the wild exhibit similar movements and home ranges as wild juveniles, they have significantly lower survival rates. Multiple paternity occurs in wild populations.

Potential Threats:

- Environmental pollutants such as endocrine-disruptors and heavy metals which negatively affect hatching, growth, survival and reproduction.
- The accumulation of pollutants in alligator meat and chemical and other factors involved in poor health, reproductive failures and other pathologies in captive alligators and the real or perceived threat to human health and the sociopolitical consequences thereof.
- Fire ants.
- Illegal or unsustainable commercial harvest and potential environmental costs and consequences of farming operations.
- Alteration or destruction of wetlands.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Gather and publish available grey literature data and technical report documentation for the species in order to direct and facilitate research directions and prioritization.

- Define potential habitat by utilizing GIS-based technology to map the extent of habitats supporting breeding sites, current land uses and other relevant characteristics.
- Use the results to define existing populations.
- Resurvey sites where alligators have been known to exist.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name°

Scientific: *Trachemys gaigeae*

Common: Big Bend Slider

Status: Federal: SC

State: SC

Global: G4

Priority: Low

Distribution:

In Texas, the Big Bend Slider occurs in a restricted area of the Rio Grande River drainage, west of the Pecos River confluence, centered on Big Bend National Park. Virtually no populations remain outside of either state or federally owned properties along the Rio Grande River in Texas.

Habitat: The Rio Grande River and one Mexican tributary, the Rio Conchos. Also inhabiting ponds and impoundments adjacent to the Rio Grande.

Abundance:

A range-wide survey was conducted in 1997-1998, but the survey was not designed to explicitly generate accurate population estimates. Hence estimates are not robust, but what estimates there are, put the entire extant population of the species at less than five thousand individuals across its range.

Life History:

Strongly aquatic, comes ashore seasonally to lay eggs. Feeds on aquatic vegetation as an adult and juveniles are more carnivorous, particularly of aquatic insects, often invertebrate riffle species.

Potential Threats:

- Elimination of in-stream flow and consequent changes to the Rio Grande River system, alongside other anthropogenic sources of habitat alteration and degradation, which have already led to the loss of the species in greater than half its historical habitat in the state.

- Concomitant changes to water quality and/or quantity, including interruption of seasonal flooding from the summer monsoons.
- Competition from introduced Red-eared Sliders (*Trachemys scripta elegans*) and changes to the habitat as above more suitable to the introduced species than the historical system allowed.
- Direct human predation in "incidental" rifle target practice and more directed commercial collection.
- Inadequate educational outreach regarding the species within the stakeholders in its range.

Conservation Recommendations:

- Design and implement a census study, complete with funded monitoring program collaboratively with Mexican authorities and New Mexico state biologists to document the range wide status of the species.
- Insure monitoring of take in the species by modifying current commercial collection or nongame guidelines to set harvest guidelines.
- Evaluate the success of removal of introduced species competing with the taxon in its current range in Texas.
- Determine the needs of the juveniles and of female nest site preference to evaluate the long term effects of changes to the in-stream flows of the Rio Grande system.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning within the Rio Grande basin.

Name

Scientific: *Deirochelys reticularia*

Common: Chicken Turtle

Status: Federal: Sc

State: SC

Global: G5

Priority: Low

Distribution:

The Atlantic and Gulf Coastal plains from east central North Carolina through South Carolina, Georgia, all of Florida, Alabama, Mississippi, all of Louisiana and northward in the Mississippi River alluvial plains of the eastern half of Arkansas and into eastern Texas and south-central Oklahoma. Specimen records exist for approximately 50 counties within its range in Texas.

Habitat:

Still or sluggish waters of ponds, ditches, lakes, marshes, swamps and stream backwaters with abundant vegetation, rarely entering streams or rivers. Hibernates on land.

Abundance:

Reportedly declining in Texas; however, no quantitative estimates exist. Locally common; turtles inhabited (and may still) a large concrete drainage ditch on the south side of the University of Texas at Arlington campus a decade ago. Densities of up to 40 turtles per acre have been reported in South Carolina.

Life History:

Males reach sexual maturity in 2-4 years, females in 6-8. Mostly carnivorous, eats primarily arthropods such as crayfish. Females may lay as many as four clutches annually averaging about nine eggs each. Nesting occurs from September through March. Individuals, especially males, often wander overland.

Potential Threats:

- Conversion of native habitats to agricultural and other uses, including destruction of individual breeding sites by channelization, draining and filling and similar activities.
- Concomitant changes to water quality and/or quantity, or other hydrological aspects.
- Habitat fragmentation.
- Fire ants.
- Impediments to the terrestrial migration of turtles, including roads, urban and suburban developments and similar activities.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Gather and publish available grey literature data and technical report documentation for the species in order to direct and facilitate research directions and prioritization.
- Define potential habitat by utilizing GIS-based technology to map the extent of areas supporting breeding sites, current land uses and other relevant characteristics.
- Use the results to find existing populations.
- Resurvey sites where turtles have been known to exist.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Trimorphodon vilkinsonii*

Common: Chihuahuan Desert Lyresnake

Status: Federal: SC

State: ST

Global: G4

Priority: Low

Distribution:

Texas: known only from five counties in west Texas: Brewster, El Paso, Hudspeth (sight records only), Jeff Davis and Presidio. Also found in Mexico (Chihuahua and Coahuila), but distributional records are not well known. Recognized as a subspecies for 30+ years, the taxonomy of the Chihuahuan Desert lyresnake was recently reviewed, resulting in the elevation back to species status.

Habitat:

Rocky, arid Chihuahuan Desert foothills and mountains (to 1,600 m); microhabitats include talus slopes, rock piles, rock cuts and outcroppings.

Abundance:

Unknown; most locations known only from road collected specimens (mainly in Brewster, El Paso and Presidio counties).

Life History:

A slender snake with a pale gray ground color with about 20 and 10 dark body blotches on the body and tail, respectively. The interspaces between the blotches are usually twice as wide as the blotches themselves. The body blotches have pale borders about one scale wide and faint pale interiors; they narrow laterally and are usually no more than bands posteriorly. The head pattern varies from almost immaculate to a small median dark blotch and two smaller and paler lateral blotches at the rear of the head, a dark chevron mark on the parietals with its apex on the rear of the frontal and a dark mark centered along the lateral edge of each prefrontal. This is a secretive, nocturnal species that is regularly encountered by snake collectors in the Trans-Pecos, but rarely collected because of its protected status in the state. Consequently, little is known about the natural history of this species; much of what is known is based upon salvaged road-killed specimens deposited into natural history collections. The largest of these road-killed collections is found in the Laboratory for Environmental Biology (UTEP): dead specimens have been collected from roads surrounding and bisecting the Franklin Mountains over the past 40 years, with a large pulse during construction of Trans-Mountain Road. Nocturnal, the lyre snake likely finds its prey sleeping in rock crevices. *Trimorphodon vilkinsonii* primarily eat lizards, but will take bats and small rodents as prey. It possesses mild venom toxic to prey but harmless to humans and a primitive delivery system of grooved teeth at the back of the mouth. Snakes have to chew in order to envenomate their prey.

Potential Threats:

- Conversion of native habitat to agricultural, residential and other uses.
- Cats, dogs, vehicular traffic and other similar hazards accompanying human incursion into occupied habitats.
- Commercial collecting and incidental take.
- Habitat fragmentation.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Define potential habitat by utilizing GIS-based technology to map the extent of required soils supporting breeding sites, current land uses and other relevant characteristics.
- Use the results to find existing populations.
- Initiate natural history studies in protected areas such as National Parks or Texas public lands.
- Encourage documentation of field sightings, either through publishing or deposition of field notes into natural history museums.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Mexican, Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Kinosternon hirtipes*

Common: Chihuahuan Mud Turtle

Status: Federal: SC

State: ST

Global: G3

Priority: Low

Distribution:

Widespread in Mexico from the Rios Santa Maria, Carmen and Conchos in Chihuahua southward and eastward on the Mexican Plateau to the Chapala, Zapotlan, San Juanico, Patzcuaro and Valle de Mexico basins of the Sierra Volcanica Transversal of southern Mexico. In the United States known only from six or eight sites in the Alamito Creek drainage of Presidio County, Texas.

Habitat:

Spring-fed tanks and creeks.

Abundance:

Common in Mexico. Recently common at several sites in the U.S.; at one site 40 turtles were trapped and released in two hours using two baited hoop-traps. Current abundance unknown.

Life History:

Aquatic, carnivorous; apparently does not wander overland as does a sympatric congener, the Yellow Mud Turtle. Lays eggs. Further life-history characteristics are unknown.

Potential Threats:

- Changes to water quality and/or quantity, or other hydrological aspects.
- Habitat fragmentation.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Gather and publish available grey literature data and technical report documentation for the species in order to direct and facilitate research directions and prioritization.
- Define potential habitat by utilizing GIS-based technology to map the extent of required habitats supporting breeding sites, current land uses and other relevant characteristics.
- Use the results to find existing populations.
- Resurvey sites where turtles have been known to exist.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Eumeces anthracinus*

Common: Coal Skink

Status: Federal: SC

State: ST

Global: G4

Priority: Low

Distribution:

Isolated populations from New York state south to the Florida panhandle and westward to the Mississippi Valley. A broad continuous range west of the Mississippi River extends from central Missouri southward through eastern Oklahoma and much of Arkansas to eastern Texas and western Louisiana. There are specimen records from 20 Texas counties east of the Trinity River and north of the Gulf Coastal Plain.

Habitat:

Damp wooded areas with plenty of leaf litter and other organic debris, rocky bluffs near streams and creeks, abandoned quarries and dump sites, ravines within hardwood forests, clearcuts and highway rights-of-way.

Abundance:

Can be locally common. No quantitative estimates exist for Texas.

Life History:

Secretive. Emerge in late winter and egg laying occurs in April and May. Clutch size varies from 5 to 10 and females guard their eggs as do other skinks, although no nests have been observed in the wild in Texas.

Potential Threats:

- Conversion of native habitats to agricultural and other uses.
- Habitat fragmentation.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Gather and publish available grey literature data and technical report documentation for the species in order to direct and facilitate research directions and prioritization.
- Define potential habitat by utilizing GIS-based technology to map the extent of required soils supporting breeding sites, current land uses and other relevant characteristics.
- Use the results to find existing populations.
- Resurvey sites where lizards have been known to exist.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Nerodia paucimaculata*

Common: Concho Watersnake

Status: Federal: SC

State: ST

Global: G2

Priority: Low

Distribution:

Originally described as a subspecies of the Brazos River Watersnake (*Nerodia harteri*). The holotype was collected from the Colorado River south of the city limits of Robert Lee, Coke County, Texas. Endemic to Texas, the species occurs in suitable habitat throughout the Colorado and Concho River systems from the vicinity of E.V. Spence Reservoir and San Angelo downriver to the vicinity of Bend, just above Lake Buchanan. Differences in mtDNA restriction sites and other morphological and biochemical characteristics have established Nerodia paucimaculata and Nerodia harteri as distinct, closely related, species.

Current knowledge about the biology of this species led the Upper Colorado Municipal Water District to petition the state of Texas and the Federal Government to remove this species from protected status. Review of this petition induced the state of Texas to delist the species entirely. The UCMWD and the U.S. Fish and Wildlife Service are currently engaged in negotiations to downlist the species from Endangered to Threatened status under the Federal Endangered Species Act.

Habitat:

Rarely found more than two meters from water. Snakes bask on exposed roots, overhanging vegetation and fallen trees, usually less than one meter above the water's surface. Rocks were not used for basking. Can inhabit shorelines of reservoirs with abundance riprap, but fluctuations of water levels in such environments profoundly affect the spatial distribution of individuals. Preferred sites of occupation mimic those found in riverine systems: turbid water, minimal wave action, gentle gradients, silt substrates and rocky shorelines. Unshaded shallow rocky riffles with abundant flat rocks are important features of juvenile habitat.

Abundance:

Can be locally abundant; however populations are more or less isolated by intervening stretches of unsuitable riverine habitat.

Life History:

A small, slender snake (male holotype 652 mm SVL). The dorsal pattern consists of four parallel rows of irregularly arranged dark blotches on a light brown ground color, often with a reddish tinge and extending onto the proximate 2/3 of the tail. The dorsal surface of the head is plain with a small dark spot at the anterior corner of each parietal. Ventral surface cream to reddish with a broad light orange central wash. Ventral spots when present are small and indistinct; they occur on the anterolateral edge of the ventral scales and may be hidden by the overlapping posterior margin of the immediately preceding scale. Ventral surface of the tail is more strongly marked with black spots or stippling near the antero-central part of each scale.

All size classes feeding in riffles; even adults feeding in water greater than 0.2 m deep were feeding in adjacent parallel channel. Foraging behavior consisted of actively foraging among structural features of riffle habitat, including in crevices and cavities beneath stones and remaining motionless while partially or wholly submerged and anchored on immovable objects, waiting for schools of fish to approach close enough for an attack. Neonates feed almost exclusively on minnows and were the only size class to eat cricket frogs. Adult snakes feed on fish as large as catfish and carp; in general, larger snakes eat larger fish regardless of species. Snakes in impoundments ate other species of fish, including introduced species; these snakes take twice as long to reach reproductive size because the suboptimal foraging habitats available make it more difficult to feed.

The minimum size at maturity 380 mm SVL for males and 460 mm SVL for females. Mating occurs primarily in the spring, but some fall mating occurs as well. Gestation takes about three months and litter size is typically 11-14 young. Birth occurs during time of low water levels, maximal prey numbers and high ambient temperatures, thereby enhancing chances of neonatal survival. As is typical with many snake species, litter size is correlated with female body size. Approximately 85% of the females in a given population are gravid each year. Gravid females are extremely sedentary, sometimes remaining in the same place for weeks at a time. Adult males typically have linear activity ranges on the order of 300 meters, whereas those of females are smaller.

Predators include raccoon, great blue heron, eastern racer, coachwhip, common kingsnake and diamondback watersnake. Parasites include coccidians.

Potential Threats:

- Declines in water quality and changes to or interruptions of the amount and timing of instream flows required to sustain viable populations.
- Habitat fragmentation leading to population declines and/or extinctions.
- Incidental take by fisherman, recreational boaters and similar recreational uses.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Gather and publish available grey literature data and technical report documentation for the species in order to direct and facilitate research directions and prioritization.
- Define potential habitat by utilizing GIS-based technology to map the extent of required areas supporting breeding sites, current land uses and other relevant characteristics.
- Use the results to refine knowledge concerning existing snake populations.
- Resurvey sites where snake populations were recently known to exist.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Sceloporus arenicolus*

Common: Dune Sagebrush Lizard

Status: Federal: SC

State: SC

Global: G2

Priority: Low

Distribution:

Occurs as disjunct populations in southeastern New Mexico and adjacent Texas (Andrews, Crane, Ward and Winkler counties). In southeastern New Mexico, it has been found only on the Mescalero Sands, which extend in a broad arc from the vicinity of San Juan Mesa in northeastern Chaves County southward and eastward through eastern Eddy County and southern Lee County

Habitat:

Sceloporus arenicolus is restricted to the vicinity of active dunes with ample blowouts on the Mescalero and Monahans Sand Dunes of New Mexico and Texas. These dunes occur to an elevation of 1,190 m above sea level and support scattered stands of *Q. havardii* and *A. filifolia* as co-dominant plant species. Significant reductions of lizard population sizes are associated with removal of the former species. Herbicide spraying in New Mexico resulted in disappearance of *S. arenicolus* from sprayed areas within four years; moreover, the sprayed areas show no signs of recovery after18 years.

Abundance:

Locally common. This species has been listed by the New Mexico Department of Game and Fish as endangered in New Mexico and by the U.S. Fish and Wildlife Service as a candidate for listing under the Endangered Species Act.

Life History:

This is a small species of *Sceloporus*. Females reach a maximum of 70 mm SVL and males a maximum of 63 mm SVL. The dorsal scales are keeled and pointed, but do not greatly overlap. In lizards from southeastern New Mexico the dorsum is light brown. They lack a pattern except for a poorly defined grayish-brown band, extending from the upper margin of each ear opening posteriorly onto the tail. The blue coloration of the chin and throat is reduced to scattered flecking or is absent altogether and that of the ventral body surface is reduced and widely separated. Females develop a lateral yellow-orange suffusion from the throat posteriorly onto the tail during vitellogenesis.

Specimens in New Mexico have been collected between 27 April and 15 September. Lizards are active from 0800 until dusk during May, June and July, but confine their activity during midday (1200-1400) to shaded areas beneath vegetation. Individuals are extremely wary and are quick to seek shelter in burrows, beneath leaf litter or by burrowing in loose sand.

Vitellogenesis begins in late April reported that female *S. arenicolus* can reach sexual maturity during the first spring following hatching. The smallest female containing oviductal eggs reported was 49 mm SVL. There are two distinct size classes of reproductively active females in the spring, suggesting that some individuals reach at least two years of age. Individual females produce one or two clutches a year averaging about five (range 3-6) eggs each, with the first clutch laid in late June and the second in late July to early August. Clutch size is positively correlated with female body size. Hatchlings appear between the end of July and the end of September. Sexually mature males (at least 49 mm SVL) emerge in April with testes at maximum size. Mature sperm are present throughout the reproductive tract through June, although significant testicular regression occurs at this time. Testes reach minimum size in

July, with significant testicular recrudescence occurring prior to hibernation in September.

These lizards eat ants and their pupae, small beetles (including ladybirds) and their larvae, crickets, grasshoppers, spiders and ticks. Most feeding appears to take place within or immediately adjacent to patches of vegetation.

Potential Threats:

- Conversion or destruction of Shinnery Oak habitat.
- Oil and gas exploration and development.
- Habitat fragmentation.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Gather and publish available grey literature data and technical report documentation for the species in order to direct and facilitate research directions and prioritization.
- Define potential habitat by utilizing GIS-based technology to map the extent of required soils supporting populations, current land uses and other relevant characteristics.
- Use the results to find existing populations.
- Resurvey sites where lizards have been known to exist.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Heterodon nasicus gloydi*

Common: Dusty Hognosed Snake

Status: Federal: SC

State: ST

Global: G5T3T4Q

Priority: Low

Distribution:

Blackland and coastal prairies, the eastern Cross Timbers and eastern edge of the Edwards Plateau and the oak-hickory pines forests of east Texas. Specimen records exist for 19 counties within this broad region.

Habitat:

Dry sandy grasslands, oak woodlands and deciduous forests.

Abundance:

Populations appear to be localized and more or less isolated, but no quantitative estimates are available. Intergrades broadly with the nominate subspecies to the north.

Life History:

A relatively short but stout snake carrying the characteristic upturned snout of members of this genus, individuals are diurnal and/or crepuscular, rarely active at night. Individuals excavate a variety of tunnels in loose soil, rarely sheltering under surface objects such as rocks, logs and other debris. Its diet is more catholic than its eastern relative and includes a wide variety of lizards and small mammals, the eggs and nestlings of birds and occasionally turtle and other reptile eggs. This species possesses a mildly toxic saliva harmless to humans and a pair of enlarged teeth at the rear of the upper jaw which are used to grab and immobilize prey. Males and females reach sexual maturity in about two years. Mating takes place during the spring and eggs are laid in June or July. Typical clutch size is about 10; the eggs are buried in loose soil and hatch in August and September, depending upon incubation temperatures and rainfall.

Potential Threats:

- Conversion of native post-oak woodland and prairie to agricultural and other uses.
- Habitat fragmentation.
- Impediments to snake movements, including roads, urban and suburban developments and similar activities
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Gather and publish available grey literature data and technical report documentation for the species in order to direct and facilitate research directions and prioritization.
- Define potential habitat by utilizing GIS-based technology to map the extent of required soils supporting habitat, current land uses and other relevant characteristics.
- Use the results to find existing populations.
- Resurvey sites where this species was known to occur.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Aspidocelis dixoni*

Common: Gray-checkered Whiptail

Status: Federal: SC

State: SC

Global: G3G4

Priority: Low

Distribution:

The lower southwestern slopes of the Chinati Mountains in Presidio County, Texas, at elevations between 909 and 1,515 m and a similarly small area in southwestern New Mexico. The type specimen, an adult female, was collected 24.5 mi NW Presidio (16.9 mi from Jct US 67 and FM 170, then 7.6 mi NE) on the Ireneo Gonzales Ranch on Independence Day, 1970. Much of the Texas range occurs on the Chinati Mountains Wildlife Management Area.

Habitat:

In west Texas, *A. dixoni* occurs on generally rocky soils in desert shrublands and degraded grasslands on alluvial benches and canyon bottoms, with characteristic vegetation such as *Larrea sp., Acacia sp., Prosopis sp., Lycium berlandieri, Condalia sp., Jatropha dioica, Fouquieria splendens, Opuntia leptocaulis, Erioneuran pulchellum, Aristida ternipes* and *Setaria leucopila*.

Abundance:

This lizard is abundant throughout its range in Texas.

Life History:

Aspidocelis dixoni is a boldly marked lizard with granular dorsal scales. Hatchlings have 10-14 dorsal longitudinal light stripes, cream to yellow, on a dark brown or black ground color. There are three well-defined lateral light stripes on each side of the body. The remaining dorsolateral and paravertebral light stripes are well-defined anteriorly, but begin to lose definition at midbody and disintegrate completely at the base of the tail. This pattern is modified ontogenetically to a greater or lesser degree, depending on geographic location, by (1) appearance and/or spreading of the light spots in the dark fields, sometimes fusing with one or both longitudinal light stripes bordering the field and (2) spreading and fusion of segments of the dark fields, disrupting the light stripes. The result is a finely vermiculated dorsal pattern of small squarish blotches obscuring the original lined pattern. Many individuals have a conspicuous orange-brown coloration on the posterior half of the body dorsally which extends onto the tail.

This is a diploid parthenogenetic species of hybrid origin belonging to the *Aspidocelis tesselata* species group. The parental species are *A. septemvittata* and *A. tigris marmorata*. Lizards with a maximum SVL of 103 mm. Lizards are active throughout the day from May through July, with most lizards active before 1,445 hrs. and again after 1,645 hrs. Average body temperature of active lizards is about 40^{0}C. The smallest reproductive female recorded in west Texas was 67 mm SVL. The reproductive season lasts from May through July and clutch size is about three eggs. Larger females produced larger clutches and many individuals produce more than one clutch a year. Individuals may live to be three years of age.

Potential Threats:

- Given the remote area and desolate habitats that this species inhabits and the fact that every individual is the potential founder of a new population, it is difficult to imagine any beyond stochastic population fluctuations beyond the ability of humans to manage.

Conservation Recommendations:

- Gather and publish available grey literature data and technical report documentation for the species in order to direct and facilitate research directions and prioritization.
- Define potential habitat by utilizing GIS-based technology to map the extent of required soils occupied habitats, current land uses and other relevant characteristics.
- Map the nature and extent of possibly isolated colonial populations within the occupied range using the results of the above analyses combined with sophisticated molecular genetic technologies.
- Resurvey sites where lizards were known to exist.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Eretmochelys imbricata*

Common: Hawksbill Sea Turtle

Status: Federal: FE

State: SE

Global: G3

Priority: Low

Distribution:

Texas coastal waters.

Habitat:

Largely pelagic, juveniles utilize shallow coastal and inshore waters for foraging and shelter from extreme weather conditions in the Gulf of Mexico. Relative condition of the key habitat (Gulf of Mexico) is good.

Abundance:

No abundance estimates are available.

Life History:

Mostly transient along the Texas coast. As with most turtles, adults are long-lived and most juveniles do not survive to enter the breeding population. Through 2004, only one nest has been documented on Texas beaches, at Padre Island National Seashore on North Padre Island.

Potential Threats:

- General pollution and point-source events on individual turtles.
- Incidental take by offshore and inshore fishing activities.
- Collision with boat propellers.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Continue and support the Sea Turtle Stranding and Salvage Network.
- Develop cooperative efforts with Mexican, Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Monitoring:

- Monitoring of stranded individuals should be continued through the Sea Turtle Stranding and Salvage Network.
- Monitoring of nesting should be continued through patrols to detect nesting by Kemp’s ridley turtles at Padre Island National Seashore.

Name

Scientific: *Scaphiopus hurterii*

Common: Hurter's Spadefoot

Status: Federal: SC

State: SC

Global: G5

Priority: Low

Distribution:

Central Louisiana westward to the Balcones Escarpment of the Edwards Plateau and from the Lower Rio Grande Valley northward through eastern Oklahoma and western Arkansas. There are specimen records for more than 60 counties in Texas.

Habitat:

Wooded bottomlands, upland forests, grasslands and cultivated farmland with friable sandy to gravelly soils.

Abundance:

Common, but quantitative estimates for Texas are lacking. Very large breeding choruses have been observed in the Blackland Prairies and Post-Oak Woodlands of Central Texas. Densities of 1,500 toad per hectare in favorable habitat have been recorded elsewhere.

Life History:

These toads spend most of their lives burrowed beneath the ground's surface, emerging in numbers to breed following mild temperatures and heavy rainfall primarily in the spring. Up to several thousand eggs are laid by individual females in shallow temporary puddles or small ponds and stock tanks. They hatch within a few days and metamorphose as quickly as two weeks later, depending on ambient temperature. Individuals attain sexual maturity in two years and longevities of 12 years have been recorded.

Potential Threats:

- Conversion of native post-oak woodland and coastal prairie to agricultural and other uses, including destruction of individual breeding sites by draining and filling and similar activities.
- Concomitant changes to water quality and/or quantity, or other hydrological aspects.
- Habitat fragmentation.
- Impediments to the terrestrial migration of toads, including roads, urban and suburban developments and similar situations.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Gather and publish available grey literature data and technical report documentation for the species in order to direct and facilitate research directions and prioritization.
- Define potential habitat by utilizing GIS-based technology to map the extent of required soils supporting breeding sites, current land uses and other relevant characteristics.
- Use the results to find existing populations.
- Resurvey sites where toads were recently known to exist.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Holbrookia propinqua*

Common: Keeled Earless Lizard

Status: Federal: SC

State: SC

Global: G3?

Priority: Low

Distribution:

Known from 28 southern Texas counties and northeastern coastal Mexico to Vera Cruz on sandy soils, including the barrier islands, the Coastal Sand Plain natural region in coastal southern Texas and the Carrizo Sands geologic formation in southwestern Texas.

Habitat:

Sparsely vegetated sandy soil; coastal dunes; barrier islands.

Abundance:

Common on barrier islands. Less common on the mainland where it may be declining.

Life History:

Found on sparsely vegetated, loose sandy soils where it is a very efficient burrower; also uses the burrows of small mammals. The species is territorial and sexually dimorphic in color and social behavior. Males can distinguish resident from non-resident females, which are courted more intensely. Breeding may occur from March through August; females may lay up to four clutches per year which vary from 3-7 eggs depending on environmental conditions; hatchlings are about 1.5 inches and appear during June. Grasshoppers, beetles, beetle larvae and spiders made up 76% of stomach contents in one study; some hatchling stomachs contained only ants.

Potential Threats:

- Fairly secure in Texas on the barrier islands but threatened on the mainland by modification and destruction of habitat for coastal development, conversion of habitat to agriculture, insecticide use and habitat fragmentation due to roads. There is no current information on the status of this species in Mexico.

Conservation Recommendations:

- Develop more complete distribution data from inland areas and from Mexico.
- Discourage development, road building and conversion of habitat to agriculture.
- Discourage use of insecticides near known populations.
- Make public aware of this species.

Name

Scientific: *Dermochelys coriacea*

Common: Leatherback Sea Turtle

Status: Federal: FE

State: SE

Global: G2

Priority: Low

Distribution:

Texas coastal waters.

Habitat:

Pelagic. Relative condition of the key habitat (Gulf of Mexico) is good.

Abundance:

No abundance estimates are available.

Life History:

Transient along the Texas coast. As with most turtles, adults are long-lived and most juveniles do not survive to enter the breeding population. Nesting was documented on Texas beaches, all at Padre Island National Seashore on North Padre Island, during the 1920's and 1930's, but SC have been found subsequently.

Potential Threats:

- Incidental take by offshore and inshore fishing activities.
- General pollution and point-source events on individual turtles.
- Collision with boat propellers.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Continue and support the Sea Turtle Stranding and Salvage Network.
- Develop cooperative efforts with Mexican, Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Monitoring:

- Monitoring of stranded individuals should be continued through the Sea Turtle Stranding and Salvage Network.
- Monitoring of nesting should be continued through patrols to detect nesting by Kemp’s ridley turtles at Padre Island National Seashore.

Name

Scientific: *Caretta caretta*

Common: Loggerhead Sea Turtle

Status: Federal: FT

State: ST

Global: G3

Priority: Low

Distribution:

Texas coastal waters.

Habitat:

Largely pelagic, juveniles utilize shallow coastal and inshore waters for foraging and shelter from extreme weather conditions in the Gulf of Mexico. Relative condition of the key marine and nesting habitat in Texas ranges from poor to good.

Abundance:

No abundance estimates are available.

Life History:

Mostly transient along the Texas coast, with some residency at Flower Garden Banks and around oil and gas platforms. As with most turtles, adults are long-lived and most juveniles do not survive to enter the breeding population. From 1-5 nests were recorded on the Texas coast annually from 1996-2004. Nesting occurs statewide, but is concentrated in south Texas. Sex of hatchlings is temperature-dependent in this species, so eggs in natural nests require specific incubation regimes to produce the proper ratio of males to females to sustain the breeding population.

Potential Threats:

- Incidental take by offshore and inshore fishing activities.
- Physical disturbance of nesting turtles and/or their nests.
- General pollution and point-source events on individual turtles.
- Collision with boat propellers.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Increase monitoring activities to find and protect nests during the breeding season.
- Continue and support the Sea Turtle Stranding Network.
- Develop cooperative efforts with Mexican, Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Monitoring:

- Monitoring of stranded individuals should be continued through the Sea Turtle Stranding and Salvage Network.
- Monitoring of nesting should be continued through public education and patrols conducted on the Texas coast.

Name

Scientific: *Gambelia wislizenii*

Common: Long-nosed Leopard Lizard

Status: Federal: SC

State: SC

Global: G5

Priority: Low

Distribution:

The Leopard lizard occurs throughout the Great Basin, Mojave and Sonoran deserts, southward from southeastern Oregon and southern Idaho to northern Sonora, Mexico and the length of the Baja California peninsula except for the southern tip. It also occurs on Isla Tiburon in the Sea of Cortez. It ranges eastward into the Chihuahuan Desert of northern Chihuahua, MX and down the Rio Grande to the Big Bend region of Texas and adjacent Coahuila. There are apparently disjunct populations in central Coahuila (Cuatro Cienegas), northwestern Durango and adjacent Coahuila (Bolson de Mapimi). It also ranges up the Colorado River Basin to the western edge of Colorado. It is found in suitable habitat throughout Trans-Pecos Texas, in the shifting Monahans Sand Dunes and areas east and northeast of the Pecos River, south of the NM border.

Habitat:

This species is found in sandy flatlands, loose sandy basins, or low, gently rolling sand dunes, all with sparse vegetative cover of plants such as *Prosopis, Larrea, Acacia, Quercus havardii, Gutierrezia sarothrae, Yucca glauca* and *Ephedra*. These lizards include packrat middens as shelters.

Abundance:

Densities are lower than most sympatric lizard species because of the trophic position of this one within the lizard community in a given area. Having said that, it is relatively abundant in suitable habitat; however, quantitative estimates for Texas are lacking.

Life History:

This is a large species with a maximum SVL of 132 mm. The head is large and distinctly set off from the body by a narrow neck. Body scales are minute and not imbricate. The basic ground color of the dorsal surface of the body is tan, grayish-brown, or dark brown. There are up to six longitudinal rows of as many as nine reddish-brown spots each on the back, arranged in bilaterally symmetrical pairs. The spots are largest in the row on either side of the midline and the transverse rows of spots produced by this arrangement alternate with the light-colored transverse bars. As these lizards grow this pattern fades and becomes obscured as new dorsal spots are added irregularly to the dorsal pattern and the black-and-white head pattern disappears altogether except on the throat. The normal ground color of ovulating and gravid females is supplanted by a suffusion of red-orange coloration on the sides of the face, body and ventral surface of the tail. This change is temporary and under the control of hormones associated with the reproductive cycle.

Adults and hatchlings first appear in May and early August, respectively, in west Texas. Daily activity is bimodal in southern New Mexico, with peak activity around 1,000 and 1,800. The activity season in southwestern New Mexico extends from April to October. New Mexico specimens have been collected between 16 March (Bernalillo Co.) and 24 October (Dona Ana Co.). Lizards are active at high body temperatures, averaging about 37°C. These lizards can be active foragers depending on season and year and may move up to two m/min while foraging. Juvenile males may disperse distances of 1-2 km. Lizards are apparently not territorial.

Females are sexually mature at 95 mm SVL. One annual clutch averaging 7.3 eggs is laid between late May and early July and larger females produce larger clutches. This species produces small eggs relative to other lizards of similar body size. Hatchlings appear in August and are 38-46 mm SVL. Individual females may live to be eight years old, but most reproduction in a population is accomplished by females three or four years old. Communal nesting may occur. Males are reproductively mature by the time they reach 85 mm SVL. Spermatogenesis is underway by mid-May and testes are completely regressed by the end of June.

A wide variety of large invertebrates like grasshopper and beetles and small vertebrates such as lizards (including their own kind), are eaten by this species. The common name of this species may derive from its propensity to include lizards of other species as a significant component of the diet.

Potential Threats:

- Given the remoteness, desolation and vastness of the area this species inhabits, it is difficult to imagine any beyond stochastic population fluctuations beyond the ability of humans to manage.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Gather and publish available grey literature data and technical report documentation for the species in order to direct and facilitate research directions and prioritization.
- Define potential habitat by utilizing GIS-based technology to map the extent of required habitats supporting viable populations, current land uses and other relevant characteristics.
- Use the results to find existing populations.
- Resurvey sites where lizards have been known to exist.
- Protect sites supporting robust populations through acquisition/other.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Sistrurus catenatus*

Common: Massasauga

Status: Federal: SC

State: SC

Global: G3G4

Priority: Low

Distribution:

Poorly understood, but includes southern portions of the Rio Grande Plains and Coastal Prairies, eastern portions of the Trans-Pecos and High Plains and much of the Rolling Plains ecoregions.

Habitat:

Variable, but sand prairies, meadows and mesic or wetland habitats seem to be preferred.

Condition of Current Habitat:

Much of the habitat within the distribution of the massasauga has undergone considerable fragmentation. Unfragmented shrubland and rangeland within the range appears to be in fair to good condition. Because of dropping water tables and increased uses of water for non-wildlife uses, the mesic and wetland habitats used by this species are rapidly disappearing, particularly in the High and Rolling Plains ecoregions.

Abundance:

Locally common, but overall abundance uncertain and apparently declining.

Life History:

A small rattlesnake that feeds primarily on small mammals and lizards. The active season usually extends from mid-April to late October. Daily movements tend to be of a magnitude of only about 30 ft. Small mammal burrows, crevices and crayfish tunnels are used for retreats. Massasaugas usually mature in 3-4 years of age and have litters of 2-19 young in later summer or early fall.

Potential Threats:

- Conversion of native habitat to agricultural, residential and other uses and habitat fragmentation.
- Dropping water tables and drainage of wetlands and mesic prairies.
- Vehicular traffic and other similar hazards accompanying human incursion into occupied habitats.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Define potential habitat by utilizing GIS-based technology to map the extent of woodlands, wetlands, current land uses and other relevant characteristics.
- Use the results to find existing populations.
- Resurvey sites where massasaugas have been previously documented.
- Develop monitoring programs concomitant with ecological research in protected areas such as National Wildlife Refuges or Texas public lands, particularly as it pertains to the influences of management practices.
- Rehabilitate perturbed wetlands and mesic prairies where possible.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Ambystoma talpoideum*

Common: Mole Salamander

Status: Federal: SC

State: SC

Global: G5

Priority: Low

Distribution:

The Mole Salamander occurs throughout much of the Coastal Plain of the southeastern United States from South Carolina to eastern Texas northward to southern Illinois. Disjunct populations outside of the Coastal Plain occur in Alabama, Arkansas, Georgia, Kentucky, North Carolina, South Carolina, Tennessee and Virginia. Specimens have been recorded from eight Texas counties, all east of the Angelina River.

Habitat:

Extensive bottomland hardwood forests and other low-lying wooded areas near floodplains with heavy vegetative cover and loose wet soils.

Abundance:

Abundant in suitable habitat elsewhere in parts of its range. Unknown in Texas; difficult to census because of secretive habits.

Life History:

Subterranean, emerging only during the breeding season in December, January and February in cold weather following rains. May migrate overland to nearby aquatic habitats such as shallow ponds and flooded bottomlands to form breeding congregations. The larval period lasts for 3-4 months, but larvae may not transform until the following year. Reproductive maturity occurs at two years of age for both sexes, followed by a maximum reproductive lifetime of three years for females and five years for males. Females average production of 100-200 eggs annually.

Potential Threats:

- Conversion of native mature forests to agricultural, silvicultural and urban areas and other uses, including destruction of individual breeding sites by draining and filling and similar activities.
- Concomitant changes to water quality and/or quantity, or other hydrological aspects.
- Habitat fragmentation.
- Impediments to the terrestrial migration of adults, including roads, urban and suburban developments.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Gather and publish available grey literature data and technical report documentation for the species in order to direct and facilitate research directions and prioritization.
- Define potential habitat by utilizing GIS-based technology to map the extent of required soils supporting breeding sites, current land uses and other relevant characteristics.
- Use the results to find existing salamanders.
- Resurvey sites where salamanders were recently known to exist.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Phrynosoma hernandesi*

Common: Mountain Short-horned Lizard

Status: Federal: SC

State: ST

Global: G5

Priority: Low

Distribution:

Texas range limited to four counties in extreme West Texas.

Habitat:

Montane forests and semi-arid grasslands at high elevations.

Condition of Current Habitat:

The majority of the habitat of this species is found on large private ranches and is primarily in good condition. However, habitat fragmentation and conversion of habitat to residential use is increasing at a rapid rate.

Abundance:

Uncommon through much of its Texas range.

Life History:

A lizard of open habitats with high insolation, background coloration and pattern render individuals relatively inconspicuous in native habitats unless they move. Differs from other horned lizards within its range by having a single row of fringe scales along its sides and with all head horns being short. A live-bearing species with young born in mid- to late summer. Activity season from late spring through early fall depending upon annual weather patterns. Lizards shelter overnight in shallow burrows, beneath organic debris near or under vegetation, or other similar circumstances.

Potential Threats:

- Conversion of native habitat to residential and other uses.
- Cats, dogs, vehicular traffic and other similar hazards accompanying human incursion into occupied habitats.
- Commercial collecting and incidental take.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Define potential habitat by utilizing GIS-based technology to map the extent of historic and current land uses and other relevant characteristics.
- Use the results to find existing populations.
- Initiate studies on population ecology on private, state and federal lands.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Mexican, Federal, State, local government and private entities to promote the conservation of the species.
- Investigate the possibility of introductions into suitable unoccupied montane habitats through the Trans-Pecos.
- Integrate these activities with regional ecosystem conservation planning.

Monitoring:

- Initiate monitoring on state and federal properties.

Name

Scientific: *Rana grylio*

Common: Pig Frog

Status: Federal: SC

State: SC

Global: G5

Priority: Low

Distribution:

The Gulf Coastal Plain from southern South Carolina to extreme eastern Texas and throughout the Florida Peninsula. In Texas, specimens have been recorded only from Hardin, Jefferson and Newton counties.

Habitat:

This frog requires permanent aquatic habitats with dense vegetation as found in permanent roadside ditches, swamps, marshes, cypress bogs, bayous, ponds and lakes. It has been reported to tolerate moderate salinities within marshland habitats.

Abundance:

Locally common. Louisiana manages the Pig Frog as a game species because of its resemblance to the Bullfrog.

Life History:

Never leaves the vicinity of water. Breeding occurs from March through September and, like many large Rana, tadpoles take one or two years to metamorphose. Individual clutches vary from 8,000 to 15,000 eggs.

Potential Threats:

- Destruction of wetlands by draining and filling and other means.
- Concomitant changes to water quality and/or quantity, or other hydrological aspects.
- Habitat fragmentation.
- Pollution and the introduction or emergence of pathogenic diseases.
- Competition with Bullfrogs.
- Commercial or recreational take.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Gather and publish available grey literature data and technical report documentation for the species in order to direct and facilitate research directions and prioritization.
- Define potential habitat by utilizing GIS-based technology to map the extent of areas supporting breeding sites, current land uses and other relevant characteristics.
- Use the results to find existing populations.
- Resurvey sites where frogs haven been known to exist.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Crotalus viridis*

Common: Prairie Rattlesnake

Status: Federal: SC

State: SC

Global: G5

Priority: Low

Distribution:

Throughout the High Plains, western portions of the Rolling Plains and some portions of the Trans-Pecos ecoregions.

Habitat:

Uplands of shortgrass plains, particularly those associated with black-tailed prairie dogs. To a lesser extent, prairie rattlesnakes also utilize canyonlands and rocky hills.

Condition of Current Habitat:

Much of the High Plains and Rolling Plains has been extensively modified for agriculture. Continued persecution of black-tailed prairie dogs in the remaining grasslands has also resulted in reductions of habitat quality. Remaining shrublands throughout much of the western Rio Grande Plains are in fair to good condition. With an increased emphasis on wildlife management on private lands, detrimental mechanical treatments such as root plow are becoming less common as land managers are using prescribed fire and more selective mechanical treatments, which maintain woody plant diversity.

Abundance:

Locally common, but largely undocumented. Many populations have declined because of human persecution of both rattlesnakes and prairie dogs.

Life History:

A medium-sized rattlesnake of grassland habitats, the prairie rattlesnake generally has distinctive brown blotches down the back with a yellowish, tannish, or slightly greenish background color. Generally hibernate in burrows or cavities from November through March, but activity can occur even during the winter under favorable conditions. Mating can occur throughout the year, but young are most often born in the late summer. Some modest parental care consisting female guarding or tending may occur; in such cases females return to one of more "rookery" areas nearby existing dens and neonates follow adults into the dens at hibernation time. Movement distances of >2 mi are possible and home ranges can exceed 100 acres, but females are more sedentary than males. Diet consists mostly of small mammals, but birds, large invertebrates and reptiles are also consumed.

Potential Threats:

- Conversion of native habitat to agricultural, residential and other uses and habitat fragmentation.
- Declines in black-tailed prairie dog abundance.
- Vehicular traffic and other similar hazards accompanying human incursion into occupied habitats.
- Commercial collecting, incidental take and human consumption and persecution, including destruction of den sites.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Define potential habitat by utilizing GIS-based technology to map the extent of shrubland habitat, current land uses and other relevant characteristics.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Monitoring:

- No long-term monitoring programs are known to exist on public lands in Texas. A good place to start would be on the Gene Howe WMA near Canadian, where robust populations are known to have existed in the late 1980's.

Name

Scientific: *Sistrurus miliarius*

Common: Pygmy Rattlesnake

Status: Federal: SC

State: SC

Global: G5

Priority: Low

Distribution:

Restricted to the upper Gulf Prairies and Marshes and wooded habitats of the Pineywoods and Post Oak Savannah, with an extension into the northern Cross Timbers and Prairies region.

Habitat:

Upland pine and hardwood forests, bottomland hardwood forests and coastal habitats in close proximity to surface water.

Condition of Current Habitat:

Much of historic habitat has been lost to urban sprawl and common agricultural practices such as pine plantations and Bermuda grass pasture. Suitable habitats on Federal and State lands are in good condition.

Abundance:

Uncommon through much of its Texas range. However, can be locally abundant where ideal habitat exists.

Life History:

A small chunky rattlesnake, which is typically 15-20 inches in length. The rattle at the end of the tail is extremely small and inconspicuous. Home ranges are typically small and they can be active throughout the year in southern latitudes depending on weather patterns. Little data is available on reproduction but sperm storage by females is suspected. The natural history of the western subspecies is largely unknown.

Potential Threats:

- Conversion of native habitat to residential use and other land uses.
- Vehicular traffic and other similar hazards accompanying human incursion into occupied habitats.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Define potential habitat by utilizing GIS-based technology to map the extent of historic and current land uses and other relevant characteristics.
- Use the results to find existing populations.
- Initiate studies on population ecology, biology and response to common land use practices on state and federal lands.
- Promote silvicultural and other land use practices that protect and enhance suitable habitats.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Monitoring:

- Initiate monitoring on state and federal properties.

Name

Scientific: *Coleonyx reticulatus*

Common: Reticulated Banded Gecko

Status: Federal: SC

State: ST

Global: G3

Priority: Low

Distribution:

Texas range limited to two counties (Brewster and Presidio) in West Texas.

Habitat:

Rocky Chihuahuan desert habitats.

Condition of Current Habitat:

The majority of the habitat of this species is typical Chihuahuan Desert, found on federal and state lands and is primarily in good condition. However, habitat fragmentation and conversion of habitat to residential use is increasing on private lands.

Abundance:

Unknown. Very secretive in its habits; the type-specimen was taken in a mammal snaptrap. Infrequently encountered throughout its Texas range.

Life History:

A recently described species of terrestrial gecko. Differs from similar terrestrial geckos within its range by its greater size and presence of enlarged tubercles along with the fine scales on the dorsum. This nocturnal lizard prefers rocky habitats, which provide shelter during daylight hours. It is apparently active on the surface under restrictive environmental conditions which include warm nights with high humidity; most specimens have been found following rainshowers. Little else is know of its behavior.

Potential Threats:

- Conversion of native habitat to residential use.
- Vehicular traffic and other similar hazards accompanying human incursion into occupied habitats.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Define potential habitat by utilizing GIS-based technology to map the extent of historic and current land uses and other relevant characteristics.
- Use the results to find existing populations.
- Initiate studies on population ecology and biology on state and federal lands.
- Develop cooperative efforts with Mexican, Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Monitoring:

- Initiate monitoring on state and federal properties.

Name

Scientific: *Pseudemys gorzugi*

Common: Rio Grande River Cooter

Status: Federal: SC

State: SC

Global: G4

Priority: Low

Distribution:

In Texas, the Rio Grande River cooter occurs in the lower Rio Grande, Pecos and Devils River drainages in the southwestern portion of the state, primarily in a narrow range of the Rio Grande from near Del Rio and adjacent Devils and Pecos rivers.

Habitat:

Generally these turtles occur in riverine habitats, primarily in deep pools of high flow areas. Aquatic vegetation is preferred for foraging and protection but the lack of macrophytic vegetation does not explicitly preclude the species from an area.

Abundance:

Survey data indicates low population numbers and a conspicuous lack of juveniles in all locations in Texas.

Life History:

Primarily aquatic, but will bask on rocks and logs near the waters edge. Females come onto the shore seasonally to lay eggs. The adults primarily consume macrophytic vegetation but juveniles feed more often on insects and invertebrates.

Potential Threats:

- Modification to the flow rates of Texas rivers through the construction of dams, flood-control practices, channelization, water diversions and the introduction of tamarisk (salt cedar) have caused the Rio Grande River to become increasingly intermittent.
- Untreated sewage and runoff from agriculture and mining activities alongside atmospheric deposits are some of the point and non-point sources that contribute to the declining water quality in the Rio Grande River basin.
- Increased rates of juvenile mortality due to nest predation by introduced fire ants.
- Incidental rifle target practice, commercial exploitation by the pet trade and turtle meat industry without any state harvest regulations and a general lack of public education regarding the species.

Conservation Recommendations:

- Evaluate the consequences impoundments, low-flow rates and introduced tamarisk each have on the species.
- Evaluate the consequences of fire ants on nest success and juvenile survival rates.
- Develop state harvest regulations and complementary regulations or guidelines for preventing the incidental take of the species.
- Work towards the habitat planning and in situ conservation within the context of ecosystem recovery planning in the Rio Grande and Pecos drainages.

Name

Scientific: *Syrrhophus cystignathoides*

Common: Rio Grande Chirping Frog

Status: Federal: SC

State: SC

Global: G4

Priority: Low

Distribution:

Lower Rio Grande Valley of Texas southward to central Nuevo Leon, Tamaulipas, eastern San Luis Potosi and central Vera Cruz, Mexico. In Texas, it is native to Cameron and Hidalgo counties. The species has been introduced to Bexar, Fayette, Grimes, Harris, Liberty, Nueces, San Patricio, Smith, Tarrant and Walker counties to date via the potted plant trade.

Habitat:

Mesic microhabitats of palm groves, thornscrub, resacas; also abundant in urban and suburban areas where it can be found on well-watered lawns, flower beds and gardens, rain gutters, irrigation ditches, rubbish piles and similar ersatz habitats.

Abundance:

Abundant during the breeding season and apparently in colonized areas, although quantitative population estimates do not exist. Some introduced populations are known to have extant for at least 10 years.

Life History:

Spends the day hidden beneath loose boards, rocks, moist vegetative debris and other damp shelters during drier periods of the year. Females lay a handful of eggs in secluded moist microhabitats, such as potting soil and they hatch directly into miniature adults; the tadpole stage is omitted. Reproductive activity is most likely continuous in its native range and probably in the humid microhabitats (such as greenhouses) introduced frogs occupy.

Potential Threats:

- Conversion of native coastal prairie to agricultural and other uses, including destruction of individual breeding sites by draining and filling and similar activities.
- Pollution, especially insecticides and compounds associated with human industrial activities.
- Habitat fragmentation.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Gather and publish available grey literature data and technical report documentation for the species in order to direct and facilitate research directions and prioritization.
- Define potential habitat by utilizing GIS-based technology to map the extent of required soils supporting breeding sites, current land uses and other relevant characteristics.
- Use the results to find existing populations.
- Resurvey sites where frogs were recently known to exist.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Crotaphytus reticulates*

Common: Reticulated Collared Lizard

Status: Federal: SC

State: ST

Global: G3

Priority: Low

Distribution:

Western portions of the Rio Grande Plains.

Habitat:

Relatively open, semi-arid thornscrub, but specific habitat requirements are poorly understood.

Abundance:

Uncommon, but largely undocumented.

Life History:

Reticulate collared lizards are large, robust lizards with a distinctive honeycomb like network of light line along the back. These lizards are highly predatory on invertebrates and small vertebrates. In suitable habitat, reticulate collared lizards are usually active from March to November. They have been observed to use small mammal burrows as retreats in both rocky habitats and relatively rockless thornscrub, but their ecology and natural history are virtually unknown.

Potential Threats:

- Conversion of native habitat to agricultural, residential and other uses
- Habitat fragmentation and brush manipulation of native thornscrub to increase herbaceous vegetation for livestock grazing.
- Vehicular traffic and other similar hazards accompanying human incursion into occupied habitats.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Define habitat requirements and utilize GIS-based technology to map the extent of these requirements, current land uses and other relevant characteristics.
- Use the results to find existing populations.
- Resurvey sites where reticulate collared lizards have been previously documented.
- Develop monitoring programs concomitant with ecological research in protected areas such as National Wildlife Refuges or Texas public lands, particularly as it pertains to the influences of management practices.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Monitoring:

- No long-term monitoring programs are known to exist on public lands in Texas.

Name

Scientific: *Phrynosoma modestum*

Common: Round-tailed Horned Lizard

Status: Federal: SC

State: SC

Global: G5

Priority: Low

Distribution:

Mostly the High Plains and Trans-Pecos ecoregions, but some populations have in documented in the western Rio Grande Plains in Webb, Zapata and Jim Hogg counties.

Habitat:

Mostly desert and relatively sparsely vegetated prairie sites with gravelly soil.

Condition of Current Habitat:

Much of the habitat within the distribution of the round-tailed horned lizard has undergone considerable fragmentation. Many grassland and savannah habitats are being converted to shrublands through overgrazing and fire suppression. Unfragmented shrubland and rangeland within the geographic range appears to be in fair to good condition.

Abundance:

Uncommon, but poorly documented.

Life History:

A small (<4 inches total length), dorso-ventrally flattened lizard adapted to avoid predation by using cryptic coloration and behavior. In particular, round-tailed horned lizards commonly exhibit postural changes to mimic rocks or pebbles. As with nearly all horned lizards, round-tailed horned lizards specialize on eating ants, but other invertebrates, such as beetles, are also consumed. Clutches of approximately 12 eggs are laid in nest cavities dug by the female. Overall, little is known about the ecology of this species.

Potential Threats:

- Conversion of native habitat to agricultural, residential and other uses and habitat fragmentation.
- Overgrazing and the use of pesticides, both of which negatively impact the round-tailed horned lizard's major food source (i.e. ants).
- Commercial collection and incidental take.
- Cats, dogs, vehicular traffic and other similar hazards accompanying human incursion into occupied habitats.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Define potential habitat by utilizing GIS-based technology to map the extent of woodlands, wetlands, current land uses and other relevant characteristics.
- Use the results to find existing populations.
- Resurvey sites where round-tailed horned lizards have been previously documented.
- Determine the extent of commercial take, evaluate the potential impacts of such take and adjust regulations and enforcement accordingly.
- Develop monitoring programs concomitant with ecological research in protected areas such as National Wildlife Refuges or Texas public lands, particularly as it pertains to the influences of management practices.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.

- Integrate these activities with regional ecosystem conservation planning.

Monitoring:

- No long-term monitoring programs for this species are known to exist on public lands in Texas.

Name

Scientific: *Necturus beyeri*

Common: Gulf Coast Waterdog

Status: Federal: SC

State: SC

Global: G4

Priority: Low

Distribution:

The Angelina, Calcasieu and Sabine River drainages in Texas and Louisiana east of the Mississippi River. The Mississippi River and other Gulf Coastal drainages in Louisiana, Mississippi, Alabama, Georgia and the Florida panhandle. Specimens are known from 14 Texas counties within the Angelina and Sabine River drainages.

Habitat:

Rivers, backwaters, spring-fed creeks and streams with sandy bottoms and abundant organic debris.

Abundance:

Common. Quantitative estimates for Texas populations are lacking.

Life History:

Strictly aquatic. Nocturnal and active throughout the year. Breeding takes place from April to June and fertilization is internal. About 50 eggs are deposited by each female in a shallow depression under various objects on the stream bottom and she attends the nest until they hatch.

Potential Threats:

- Conversion of native aquatic habitats to agricultural and other uses, including destruction of individual breeding sites by draining, filling of wetlands and similar activities.
- Concomitant changes to water quality and/or quantity, or other hydrological aspects.
- Habitat fragmentation.

- Commercial exploitation and other aquacultural issues.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Gather and publish available grey literature data and technical report documentation for the species in order to direct and facilitate research directions and prioritization.
- Define potential habitat by utilizing GIS-based technology to map the extent of aquatic habitats supporting breeding sites, current land uses and other relevant characteristics.
- Use the results to find existing populations.
- Resurvey sites where waterdogs have been known to exist.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Hypopachus variolosus*

Common: Sheep Frog

Status: Federal: SC

State: SC

Global: G5

Priority: Low

Distribution:

Southern Texas and northern Mexico (Sonora state) southward to Costa Rica. Native range in Texas extends from Cameron, Hidalgo and Starr counties in the Lower Rio Grande Valley westward to Duval County and northward to Aransas and Goliad counties.

Habitat:

Arid scrublands, ranchland, grasslands, savannahs, agricultural areas and suburban habitats. Largely subterranean, requires moist microhabitats such as those provided by rodents and other burrowing animals, beneath fallen and/or partially buried tree trunks and similar situations.

Abundance:

Unknown; gather in significant numbers during the breeding season.

Life History:

Active on the surface at night during or after heavy rainfall. Breeds from March through September in pools created by rain or irrigation, where eggs are laid and hatch within a day. Tadpoles transform in about a month.

Potential Threats:

- Conversion of native coastal prairie, grasslands and savannahs to agricultural and other uses, including destruction of individual breeding sites by draining and filling and similar activities.
- Pollution, especially insecticides and compounds associated with human industrial activities.

- Habitat fragmentation.
- Impediments to the terrestrial migration of toads, including roads, urban and suburban developments and similar activities.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Gather and publish available grey literature data and technical report documentation for the species in order to direct and facilitate research directions and prioritization.
- Define potential habitat by utilizing GIS-based technology to map the extent of required soils supporting breeding sites, current land uses and other relevant characteristics.
- Use the results to find existing populations.
- Resurvey sites where frogs were recently known to exist.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Ophisaurus attenuatus*

Common: Slender Glass Lizard

Status: Federal: SC

State: SC

Global: G5

Priority: Low

Distribution:

Virginia south throughout Florida and west through the southern half of Kentucky to eastern Texas, Oklahoma and western Kansas, northwest through parts of Nebraska and Iowa to southern Wisconsin and south throughout the Mississippi Valley (except the floodplain) including the northwestern corner of Illinois. In Texas from the Lower Rio Grande Valley northward through the eastern half of the Edwards Plateau to the Red River; may also occur in the Texas Panhandle. Specimens are known from about 60 Texas counties.

Habitat:

Dry grasslands, old fields, open woodlands (e.g. Turkey-Oak and Longleaf Pine) and other similar habitats with loose, sandy soils.

Abundance:

Common in other states. Probably common in suitable habitat, although its secretive nature precludes quantitative estimates and qualitative ones for Texas do not exist.

Life History:

A diurnal but secretive lizard, often mistaken as a snake because it is limbless although it possesses eyelids, external ear openings and other saurian features. Can be active all year in coastal Texas as it tolerates relatively cool temperatures. Although it burrows, they are probably shallow as individuals have been found dead after grass fires. Perhaps also intolerant of warm temperatures, lizards are active mid-April to early

June and again early October to mid-November. The first period coincides with breeding activities and the latter with preparation for winter inactivity. Abundant enough to be prey for a wide variety of vertebrates. Reproductive maturity is attained during the second spring of life for both sexes and females lay a single clutch of 7-16 eggs that they guard throughout incubation. Lizards are frequently parasitized by ticks and chiggers, perhaps because of its relatively sedentary habits and the warm moist microhabitats that it occupies.

Potential Threats:

- Conversion of native habitats by agricultural, ranching, urbanization and other causes.
- Habitat fragmentation.
- Wildfires.
- Impediments to the terrestrial migration of lizards, including roads, urban and suburban developments.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Gather and publish available grey literature data and technical report documentation for the species in order to direct and facilitate research directions and prioritization.
- Define potential habitat by utilizing GIS-based technology to map the extent of required soils supporting breeding sites, current land uses and other relevant characteristics.
- Use the results to find existing populations.
- Resurvey sites where lizards have been known to exist.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Drymobius margaritiferus*

Common: Speckled Racer

Status: Federal: SC

State: ST

Global: G5

Priority: Low

Distribution:

Within the United States, restricted to Cameron and extreme southeastern Hidalgo counties.

Habitat:

Mesic subtropical woodlands in the Lower Rio Grande Valley.

Condition of Current Habitat:

Much of the subtropical woodland habitat in the Lower Rio Grande Valley has been extensively modified for agriculture. The remaining habitat is highly fragmented.

Abundance:

Uncommon to rare.

Life History:

Speckled racers are medium-sized, active foraging, diurnal colubrids, with a largely undocumented ecology. Usually encountered in areas with abundant groundcover near resacas or other wetland habitats. Primary diet consists of amphibians, although eggs, small mammals and reptiles are occasionally consumed. Nesting is thought to occur primarily in the spring.

Potential Threats:

- Conversion of native habitat to agricultural, residential and other uses and habitat fragmentation.
- Drainage or contamination of resacas and other freshwater wetlands.
- Amphibian decline.
- Vehicular traffic and other similar hazards accompanying human incursion into occupied habitats.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Define potential habitat by utilizing GIS-based technology to map the extent of woodlands, wetlands, current land uses and other relevant characteristics.
- Use the results to find existing populations.
- Resurvey sites where speckled racers have been previously documented.
- Develop monitoring programs concomitant with ecological research in protected areas such as National Wildlife Refuges or Texas public lands, particularly as it pertains to the influences of management practices.
- Rehabilitate perturbed wetlands and subtropical woodlands where possible.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Monitoring:

- No long-term monitoring programs are known to exist on public lands in Texas.

Name

Scientific: *Holbrookia lacerata lacerata* and *H. l. subcaudalis*

Common: Spot-tailed Earless Lizard

Status: Federal: SC

State: SC

Global: G3G4

Priority: Low

Distribution:

Holbrookia lacerata lacerata (plateau earless lizard) occurs on the Edwards Plateau; *H. l. subcaudalis* (southern earless lizard) occurs discontinuously in southern Texas and not in three southernmost counties in the Rio Grande Valley.

Habitat:

Plateau earless lizard: Usually found in association with caliche soils of the Edwards plateau in moderately open prairie-brushland; also oak-juniper woodlands and mesquite associations.

Southern earless lizard: Usually found in association with dark clay and clay-loam soils; includes mesquite-prickly-pear associations; flatter areas.

Abundance:

Rare and declining; populations along the flatland, eastern coastal areas are apparently extirpated; populations on western periphery of range and along southern Texas near the Rio Grande are declining. Following is a tabulation of museum specimen records by decade; the upturn in the 1990s is solely attributable to extensive field work for six years during the Concho watersnake project conducted by Texas A&M University personnel in the vicinity of O.H. Ivie Reservoir.

Life History:

Little is known of the life history of this species. Four to 12 eggs are probably laid underground in May-June and again in July-August. Eggs probably hatch in 4-5 weeks. Hatchlings are about 1.5 inches. Diet includes grasshoppers, crickets, small beetles, spiders and other arthropods. Diurnal.

Potential Threats:

- Agricultural herbicides and insecticides have probably severely impacted this species, though conversion of habitat to agriculture may be equally to blame for its decline; it has apparently been extirpated from the eastern portions of its historical range where most of its habitat has been converted to agriculture.

Conservation Recommendations:

- Very little is known about this species which has already apparently disappeared from much of its historical range. Much work is needed, beginning with:
- Perform an update of this species' current and historical status: Use GIS to identify habitat and historical populations; perform systematic surveys for extant populations; perform museum and literature surveys; create new GIS database.
- Identify secure populations and perform ecological studies.
- Discourage use of insecticides near known populations.
- Discourage conversion of habitat to agriculture near known populations.
- Discourage road building and development near known populations.
- Make the public aware of this species.

Name

Scientific: *Drymarchon corais*

Common: Western Indigo Snake

Status: Federal: SC

State: ST

Global: G4

Priority: Low

Distribution:

Throughout the Rio Grande Plains, the western Coastal Prairies and the southern edge of the Hill Country region.

Habitat:

Primarily semi-arid shrublands on a variety of soil types.

Condition of Current Habitat:

Much of the shrublands in the Lower Rio Grande Valley have been lost to agricultural practices. Shrublands throughout remainder of range are in fair to good condition. With an increased emphasis on wildlife management on private lands, detrimental mechanical treatments such as root plow are becoming less common as land managers are using prescribed fire and more selective mechanical treatments, which maintain woody plant diversity.

Abundance:

Generally uncommon throughout much of range.

Life History:

Our longest colubrid with a maximum length exceeding eight feet. Generally blue-black in coloration with copper tones around the head and occasionally a reddish hue to ventral portions of the throat. Primarily an inhabitant of shrubland habitats. An active diurnal forager, which can be active year-round. Packrat middens provide important refugia. Large home ranges, which frequently exceed 500 acres in size. Diet consists of a wide range of vertebrates, especially other snakes, as well as other reptiles, amphibians, large invertebrates, small mammals, eggs and occasionally carrion.

Potential Threats:

- Conversion of native habitat to agricultural, residential and other uses
- Habitat fragmentation and brush manipulation of native thornscrub to increase herbaceous vegetation.
- Vehicular traffic and other similar hazards accompanying human incursion into occupied habitats.
- Commercial collecting and incidental take.
- Human persecution and ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Define potential habitat by utilizing GIS-based technology to map the extent of historic and current land uses and other relevant characteristics.
- Continue the study the population ecology in protected areas such as National Wildlife Refuges or Texas public lands if they exist, especially the influence of common habitat management practices.
- Protect sites supporting robust populations through acquisition or other means.
- Enhance our understanding of regional variation in ecology and demography.
- Develop cooperative efforts with Mexican, Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with ecosystem conservation planning.

Monitoring:

- Continue long-term monitoring on public lands.

Name

Scientific: *Cemophora lineri*

Common: Texas Scarlet Snake

Status: Federal: SC

State: ST

Global: G5

Priority: Low

Distribution:

C. lineri is rarely encountered. Its known distribution in the state is spotty and appears restricted to coastal areas in south Texas from Aransas to south of Corpus Christi.

Habitat:

Coastal areas of loose sandy soil, associated with both open and canopied woodlands on the mainland and open areas on the barrier islands.

Abundance:

There are no abundance estimates for *C. lineri* available. *C. lineri* is listed as threatened by the State of Texas.

Life History:

Little is known about *C. lineri*. It is a semi-fossorial species, which may be why individuals are rarely encountered. They feed primarily upon squamate eggs, although their diet is known to include insects, small reptiles, amphibians and mammals. They are oviparous, but their mating and reproductive behaviors are unknown.

Potential Threats:

- Development and land conversion in coastal regions of south Texas.
- Wholesale lack of biological knowledge of the species.
- Agricultural practices (disc plows, etc.).
- Imported fire ants likely to be detrimental but no studies have been conducted.

- Unfounded human fear of coral snakes, with which they may be confused.

Conservation Recommendations:

- Intensive study of *C. lineri* must be undertaken to further define its distribution and life history. This will enlighten us to any other threats this species may be facing. Currently a study is being conducted by M. R. J. Forstner and J. T. Jackson, Texas State University, to evaluate the genetic composition of Cemophora.

Name

Scientific: *Gopherus berlandieri*

Common: Texas Tortoise

Status: Federal: SC

State: ST

Global: G4

Priority: Low

Distribution:

Throughout the Rio Grande Plains and into the western Coastal Prairies region.

Habitat:

Primarily semi-arid shrublands on a variety of soil types.

Condition of Current Habitat:

Much of the shrublands in the Lower Rio Grande Valley have been lost to agricultural practices. Shrublands throughout remainder of range are in fair to good condition. With an increased emphasis on wildlife management on private lands, detrimental mechanical treatments such as root plow are becoming less common as land managers are using prescribed fire and more selective mechanical treatments, which maintain woody plant diversity.

Abundance:

Generally common in suitable habitat, especially in the western Rio Grande Plains.

Life History:

A Testudinid of shrubland habitats with a tan to brown domed carapace, thick heavily scaled front legs and elephantine rear legs. Clutches of 1-6 eggs are laid during the summer in a nest cavity dug by the female. Primary activity season from April through October depending upon annual weather patterns, but may be active year round, particularly in more southern portions of their geographic range. Tortoises typically hibernate at the base of shrubs in pallets or buried just below the surface. Size of adults decreases from east to west across their range. Home ranges can be large (>100 acres). Compared to most other tortoise species, individuals can reach sexual maturity at a younger age (5 yrs.), but adult survival is much lower (~70-80% annually). Appear to exhibit male-biased natal dispersal, with dispersal distances that can exceed eight miles. Diet consists primarily of forbs, grasses and cacti but will consume mammal scat.

Potential Threats:

- Conversion of native habitat to agricultural, residential and other uses and brush manipulation of native thornscrub to increase herbaceous vegetation for livestock grazing.
- Vehicular traffic and other similar hazards accompanying human incursion into occupied habitats.
- Upper respiratory tract disease (URTD).
- Commercial collecting, incidental take and human consumption.
- Increases in exotic predators (i.e., dogs, feral hogs) and native mesocarnivores (i.e., raccoons) as a result of human activities.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Define potential habitat by utilizing GIS-based technology to map the extent of historic and current land uses and other relevant characteristics.
- Use the results to find existing populations.
- Enhance our knowledge of regional variation in ecology and demography.
- Continue the study the population ecology in protected areas such as National Wildlife Refuges or Texas public lands if they exist, especially the influence of common habitat management practices.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Mexican, Federal, State, local government and private entities to promote the conservation of the species.
- Evaluate existence of URTD in wild populations and develop a strategy for the long term monitoring of this disease.
- Integrate these activities with ecosystem conservation planning.

Monitoring:

- Continue long-term monitoring on public lands with expansion of monitoring to private lands.

Name

Scientific: *Amphiuma tridactylum*

Common: Three-toed Amphiuma

Status: Federal: SC

State: ST

Global: G4

Priority: Low

Distribution:

The Coastal Plain from eastern Texas to western Alabama and northward in the Mississippi River alluvial plain to southeastern Missouri and extreme southwestern Kentucky. Specimen records exist for 26 Texas counties in and east of the Trinity River Basin.

Habitat:

Permanent or semipermanent aquatic habitats with abundant vegetation such as oxbow lakes, ponds, swamps, sloughs, bayous, sluggish streams, floodplain pools, roadside and irrigation ditches, borrow pits and freshwater marshes, in clear or muddy water.

Abundance:

Locally common and can co-exist with fish.

Life History:

A long, eel-like, aquatic salamander that lacks external gills and has four tiny legs each with three toes. Mostly aquatic, individuals have been found around the edges of occupied habitats during heavy rains. The breeding season is from December through June. Females lay eggs in a shallow depression excavated in the bottom of the body of water they occupy or in burrows and brood their eggs until they hatch. Clutches average about 100 eggs each and females breed only once every other year.

Potential Threats:

- Conversion of native habitats by means including destruction of individual breeding sites by draining and filling and similar activities.
- Concomitant changes to water quality and/or quantity, or other hydrological aspects.
- Habitat fragmentation.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Gather and publish available grey literature data and technical report documentation for the species in order to direct and facilitate research directions and prioritization.
- Define potential habitat by utilizing GIS-based technology to map the extent of areas supporting breeding sites, current land uses and other relevant characteristics.
- Use the results to find existing populations.
- Resurvey sites where amphiumas were recently known to exist.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Name

Scientific: *Agkistrodon contortrix pictigaster*

Common: Trans-Pecos Copperhead

Status: Federal: SC

State: SC

Global: G5T4

Priority: Low

Distribution:

In Texas, found across the southern portions of the Trans-Pecos and Chihuahuan Desert in Brewster, Crockett, Edwards, Jeff Davis, Pecos, Presidio, Terrell, Upton, Val Verde counties. Also known from adjacent Mexican states of Chihuahua and Coahuila. Thought to integrade with *A. c. laticinctus* in western Val Verde and Edwards counties.

Habitat:

Typically within one km of canyons or seeps (sources of water); these areas may include dry or wet river bottoms, desert flats, permanent streams, riparian woodlands and canebrakes. Moist riparian woodlands surrounded by dry desert habitats (flats/mountains) likely provide ideal refugia for larger populations.

Abundance:

May be locally abundant, though more likely widely distributed throughout suitable habitats. No demographic studies have been conducted on *A. c. pictigaster* populations and one "abundant" location mentioned previously has been tremendously altered since observations and no longer exists. Santa Elena Canyon in Big Bend National Park) may be susceptible to invasive plant species and low and/or intermittent flow of the Rio Grande.

Life History:

Feed on variety of vertebrate and invertebrate prey (invertebrate prey when young). Vertebrate prey includes mammals, snakes, birds, lizards and frogs. Primarily a nocturnal animal, moving after dusk until early morning (peak time for initiation of June activity for one population was 2300-0100 hrs, with movements between 2245-0400 hrs, temps 27-29 ºC; movements may be during the day where habitat sheltered from sun (by heavy vegetation or cliffs) and temperatures are lowered. Reproductive effort per year is low, typically with three young born in late August-early September (neonates measuring 220-270 mm) following copulation the year before (September - October).

Potential Threats:

- Conversion of native habitat to agricultural, residential and other uses.
- Pumping of underground aquifers diminishing spring and stream flows.
- Commercial collecting and incidental take.
- Habitat fragmentation.
- Human ignorance of general biological principles and the specific biological characteristics of this species.

Conservation Recommendations:

- Define potential habitat by utilizing GIS-based technology to map the extent of required soils supporting breeding sites, current land uses and other relevant characteristics.
- Use the results to find existing populations.
- Initiate natural history studies in protected areas such as National Parks or Texas public lands.
- Encourage documentation of field sightings, either through publishing or deposition of field notes into natural history museums.
- Protect sites supporting robust populations through acquisition or other means.
- Develop cooperative efforts with Mexican, Federal, State, local government and private entities to promote the conservation of the species.
- Integrate these activities with regional ecosystem conservation planning.

Strategy Plant List

Species Name	Common Name
Abronia angustifolia	verbena, narrowleaf sand
Abronia fragrans	verbena, sweet sand
Acacia berlandieri	guajillo
Acacia constricta	acacia, whitethorn
Acacia farnesiana	huisache
Acacia greggii	acacia, catclaw
Acacia rigidula	blackbrush
Acacia tortuosa	huisachillo
Acalypha rhomboidea	copperleaf, rhomboid
Acer grandidentatum	maple, bigtooth
Acer rubrum	maple, red
Agave lechuguilla	lechuguilla
Agropyron smithii	wheatgrass, western
Agrostis spp.	bentgrass spp.
Aloysia gratissima	whitebrush
Ambrosia confertiflora	ragweed, field
Ambrosia psilostachya	ragweed, western
Ambrosia trifida	ragweed, giant
Amorpha canescens	leadplant
Ampelopsis cordata	ampelopsis, heartleaf
Andropogon glomeratus	bluestem, bushy
Andropogon hallii	bluestem, sand
Andropogon virginicus	bluestem, broomsedge
Anthericum torreyi	anthericum, Torrey
Arbutus xalapensis	madrone, Texas
Aristida longiseta	three-awn, red
Aristida purpurea	three-awn, purple
Aristida roemeriana	three-awn, Roemer
Aristida spp.	three-awn
Artemisia filifolia	sandsage
Arundo donax	reed, giant
Ascyrum hypericoides	St. Andrew's Cross
Aster spinosus	devilweed, Mexican
Atriplex canescens	saltbrush, fourwing
Atriplex semibaccata	saltbush, Australian
Avicennia germinans	mangrove, black
Azolla caroliniana	fern, water
Baccharis glutinosa	seepwillow
Baccharis salicina	groundsel tree
Baccharis spp.	baccharis
Baptisia australis	indigo, wild blue
Batis maritima	vidrillos
Berberis trifoliolata	agarito
Berchemia scandens	supplejack
Bidens discoidea	beggar-ticks
Bignonia capreolata	crossvine

Blepharoneuron tricholepsis	dropseed, pine
Boehmeria cylindrica	hemp, bog
Bothriochloa barbinodis	bluestem, cane
Bothriochloa sacchariodes	bluestem, silver
Bouteloua breviseta	grama, gyp
Bouteloua curtipendula	grama, sideoats
Bouteloua eriopoda	grama, black
Bouteloua gracilis	grama, blue
Bouteloua hirsuta	grama, hairy
Bouteloua ramose	grama, chino
Bouteloua rigidiseta	grama, Texas
Bouteloua trifida	grama, red
Bouteloua uniflora	grama, Neally
Brachiaria ciliatissima	signalgrass, fringed
Brickellia spp.	brickellbush
Bromus unioloides	rescuegrass
Brunnichia ovata	eardrop vine
Buchloe dactyloides	buffalograss
Buddleja scordioides	butterfly bush
Bumelia lanuginosa	bumelia, woollybucket
Cabomba caroliniana	cabomba
Caesalpinia jamesii	rushpea, James
Cakile fusiformis	sea rocket
Calamovilfa gigantea	sandreed, big
Callicarpa americana	beautyberry, American
Callirhoe involucrata var. lineariloba	poppymallow, slimlobe
Calylophus serrulatus	evening primrose, yellow
Campsis radicans	trumpet creeper
Carex planostachys	sedge, cedar
Carex spp.	sedge, spike spp.
Carpinus caroliniana	hornbeam, American
Carya aquatica	hickory, water
Carya illinoinensis	pecan
Carya spp.	walnut spp.
Carya texana	hickory, black
Cassia roemeriana	senna, two-leaved
Castela texana	goatbush
Celtis pallida	granjeno
Celtis reticulata	hackberry, netleaf
Celtis spp.	hackberry
Cephalanthus occidentalis	buttonbush
Ceratophyllum demersum	coontail
Cercidium texanum	paloverde
Cercis canadensis	redbud
Cercocarpus montanus	mahogany, mountain
Chamaesaracha sordida	nightshade, false
Cheilanthes spp.	fern, lip
Chilopsis linearis	willow, desert
Chloris cucullata	windmillgrass, hooded
Chloris spp.	windmillgrass

Chrysothamnus pulchellus	rabbitbrush, southwest
Cladium spp.	sawgrass
Clematis virginiana	virgin's bower
Cnidoscolus texanus	bull nettle
Coldenia spp.	coldenia
Colubrina texensis	colubrina, Texas
Commelina erecta	hierba del pollo
Commelina spp.	dayflower
Condalia ericoides	javelina bush
Condalia hookeri	bluewood
Cornus drummondii	dogwood, rough-leaf
Cornus florida	dogwood, flowering
Crataegus spathulata	haw, pasture
Crataegus spp.	hawthorn spp.
Croton dioicus	croton, grassland
Croton spp.	croton spp.
Cynodon dactylon	bermudagrass
Cyperus spp.	sedge, flat
Dalea formosa	feather plume
Dasylirion spp.	sotol
Desmanthus illinoensis	bundleflower, Illinois
Desmanthus velutinus	bundleflower, velvet
Desmodium spp.	tickclover
Diospyros texana	persimmon, Mexican
Diospyros virginiana	persimmon, common
Distichlis spicata	saltgrass
Dithyrea wizlizenii	spectacle pod
Echinocereus enneacanthus	pitaya
Eichornia crassipes	hyacinth, water
Elymus canadensis	wildrye, Canada
Elymus virginicus	wildrye, Virginia
Elyonurus tripsacoides	balsamscale, Pan American
Engelmannia pinnatifida	daisy, Engelmann
Ephedra spp.	mormon tea
Equisetum kansanum	horsetail
Eragrostis curtipedicellata	lovegrass, gummy
Eragrostis secundiflora	lovegrass, red
Eragrostis sessilispica	lovegrass, tumble
Eragrostis trichodes	lovegrass, sand
Eriogonum spp.	buckwheat, wild
Erioneuron pilosum	tridens, hairy
Erioneuron pulchellum	fluffgrass
Eryngium leavenworthii	eryngo, Leavenworth
Eucnide bartonioides	rock-nettle, yellow
Euphorbia serpens	euphorbia, mat
Euphorbia spp.	spurge
Evax prolifera	rabbit tobacco
Evolvulus alsinoides	evolvulus, slender
Eysenhardtia texana	kidneywood
Fagus grandifolia	beech

Fallugia paradoxa	plum, Apache
Fendlera rupicola	fendlerbush, cliff
Florensia cernua	tarbush
Forestiera acuminata	privit, swamp
Forestiera angustifolia	olive, desert
Forestiera pubescens	elbowbush
Fouquieria splendens	ocotillo
Fraxinus caroliniana	ash, Carolina
Fraxinus pensylvanica	ash, red
Fraxinus veluntina	ash, velvet
Fuirena spp.	sedge, umbrella spp.
Gaillardia spp.	firewheel
Garrya lindheimeri	silktassel, Lindheimer
Garrya wrightii	silktassel, Wright's
Gaura coccinea	gaura, scarlet
Gelsemium sempervirens	jessamine, yellow
Gleditsia triacanthos	locust, honey
Grindelia lanceolata	gumweed, spinytooth
Halodule beaudettei	shoalgrass
Haploesthes greggii	broomweed, false
Hedeoma spp.	pennyroyal, false spp.
Hedyotis acerosa	neddleleaf, bluet
Helenium amarum	sneezeweed bitter
Helianthus annuus	sunflower, common
Helianthus argophyllus	sunflower, silverleaf
Helianthus maximiliani	sunflower, Maximilian
Helianthus petiolaris	sunflower, plains
Heteropogon contortus	tanglehead
Hilaria belangeri	mesquite, curly
Hilaria mutica	tobosa
Hoffmanseggia drepanocarpa	rushpea, sickle-pod
Hoffmanseggia spp.	rushpea
Hydrocotyle spp.	pennywort, water
Hymenoclea monogyra	burrobush
Hymenopappus spp.	woollywhite
Hymenoxys spp.	bitterweed
Hypericum walteri	St. John's wort
Ilex decidua	holly, possum haw
Ilex vomitoria	holly, yaupon
Ilex vomitoria	yaupon, holly
Indigofera miniata	scarlet pea
Ipomoea leptophylla	morning glory, bush
Ipomoea pes-caprae	morning glory, goatfoot
Ipomoea stolonifera	morning glory, beach
Isocoma wrightii	jimmyweed
Iva xanthifolia	sumpweed, coarse
Jatropha dioica	leatherstem
Juglans microcarpa	walnut, little
Juncus roemerianus	black rush
Juncus torreyi	rush, Torrey

Juniperus ashei	juniper, ashe
Juniperus deppeana	juniper, alligator
Juniperus virginiana	cedar, eastern red
Karwinskia humboldtiana	coyotillo
Koeberlinia spinosa	allthorn
Krameria glandulosa	range ratany
Krameria glandulosa	ratany, range
Lantana horrida	lantana, Texas
Larrea tridentata	creosote
Lemna spp.	duckweed
Leptochloa spp.	spranglegrass
Lespedeza spp.	bushclover
Leucophyllum frutescens	ceniza
Leucophyllum frutescens	ceniza, whitebrush
Liatris spp.	gayfeather
Liquidambar styraciflua	sweetgum
Lupinus texensis	bluebonnet, Texas
Lycium berlandieri var. berlandieri	wolfberry, Berlandier
Lycium spp.	wolfberry
Maclura pomifera	bois d'arc
Magnolia grandiflora	magnolia, southern
Menodora scabra	rough menodora
Mentzelia spp.	sandlily
Mikania scandens	hempweed, climbing
Monarda pectinata	beebalm, plains
Muhlenbergia dubia	muhly, pine
Muhlenbergia lindheimeri	muhly, Lindheimer
Muhlenbergia polycaulis	muhly, cliff
Muhlenbergia porteri	muhly, bush
Munroa squarrosa	buffalograss, false
Myrica cerifera	myrtle, wax
Nyssa sylvatica var. biflora	blackgum, swamp
Nama spp.	namas
Neptunia lutea	neptunia, yellow
Nolina erumpens	beargrass
Nymphaea odorata	waterlily, white
Opuntia imbricata	cactus, cholla
Opuntia leptocaulis	tasajillo
Opuntia spp.	cactus, grassland prickly pear
Opuntia spp.	cactus, prickly pear
Ostrya knowltonii	hornbeam, western hop
Oxalis amplifolia	oxalis, largeleaf
Oxalis berlandieri	oxalis, shrubby
Oxalis spp.	woodsorrel
Panicum anceps	panicum, beaked
Panicum hallii	panicum, Halls
Panicum obtusum	mesquite, vine
Panicum virgatum	switchgrass
Pappophorum bicolor	pappusgrass, pink
Parietaria pensylvanica	pellitory

Parkinsonia aculeata	retama
Parthenium icanum	mariola
Parthenocissus quinquefolia	Virginia creeper
Paspalum dilatatum	dallisgrass
Paspalum fluitans	paspalum, water
Paspalum monostachyum	paspalum, single-spike
Paspalum plicatulum	paspalum, brownseed
Paspalum stramineum	paspalum, sand
Paspalum vaginatum	paspalum, seashore
Penstemon cobaea	foxglove
Perityle spp.	daisy, rock spp.
Persea borbonia	bay, red
Petrophyton caespitosum	rockmat, tufted
Philadelphus spp.	mock orange
Phragmites communis	reed, common
Phyllanthus polygonoides	leafflower, knotweed
Physalis hederaefolia	groundcherry, heartleaf
Physalis virginiana	groundcherry, spearleaf
Pinus cembroides	pine, pinyon
Pinus echinata	pine, shortleaf
Pinus ponderosa	pine, ponderosa
Pinus strobiformis	pine, southwestern (white)
Pinus taeda	pine, loblolly
Piptochaetium fimbriatum	ricegrass, pinyon
Planera aquatica	elm, water
Platanus occidentalis	sycamore, American
Polygonum cristatum	buckwheat, false climbing
Polytaenia nuttallii	prairie parsley
Populus deltoides	cottonwood
Porlieria angustifolia	guayacan
Proboscidea spp.	devil's claw
Prosopis glandulosa	mesquite
Prosopis glandulosa	mesquite, honey
Prunus angustifolia	plum, Chickasaw
Prunus serotina	chokecherry, southwestern
Prunus serotina var. eximia	cherry, escarpment
Pseudotsuga menziesii	fir, Douglas
Psoralea spp.	scurfpea
Quercus alba	oak, white
Quercus buckleyi	oak, Texas
Quercus emoryi	oak, Emory
Quercus falcata	oak, southern red
Quercus falcata var. pogodaefolia	oak, cherrybark
Quercus gambelii	oak, Gambel's
Quercus grisea	oak, gray
Quercus havardii	oak, shin Harvard
Quercus hypoleucoides	oak, silverleaf
Quercus incana	oak, sandjack
Quercus laurifolia	oak, swamp laurel
Quercus lyrata	oak, overcup

Quercus marilandica	oak, blackjack
Quercus nigra	oak, water
Quercus phellos	oak, willow
Quercus prinus	oak, chestnut
Quercus sinuata	oak, shin
Quercus stellata	oak, post
Quercus virginiana	oak, live
Quercus, muhlenbergii	oak, chinkapin
Rhus copallinum	sumac, flameleaf
Rhus kearneyi	sumac, desert
Rhus spp.	sumac spp.
Rhus spp.	sumac, spp.
Rhus trilobata	sumac, skunkbush
Rhus virens	sumac, evergreen
Ribes leptanthum	currant, trumpet
Rosa bracteata	Macartney rose
Rubus louisianus	blackberry
Rubus spp.	dewberry
Rubus trivialis	dewberry, southern
Ruppia maritima	widgeongrass
Sabal minor	palmetto, bush
Sabal texana	palm, sabal
Salicornia spp.	glasswort
Salix nigra	willow, black
Salix nigra var. lindheimeri	willow, Lindheimer's black
Salvia spp.	salvia spp.
Sambucus canadensis	elderberry, common
Samolus spp.	brookweed
Sapindus saponaria	soapberry
Sassafras albidum	sassafras
Schaefferia cuneifolia	yaupon, desert
Schedonnardus paniculatus	tumblegrass
Schizachyrium scoparium	bluestem, little
Schizachyrium tenerum	bluestem, slender
Schrankia uncinata	sensitive briar, catclaw
Scirpus spp.	bulrush
Scleropogon brevifolius	burrograss
Sesuvium portulacastrum	cenicilla
Sesuvium portulacastrum	purslane, sea
Setaria macrostachya	bristlegrass, plains
Sida filicaulis	sida, spreading
Simsia calva	sunflower, brush
Smilax spp.	greenbriar
Solanum elaeagnifolium	nightshade, silverleaf
Solidago spp.	goldenrod
Sophora secundiflora	mescal bean
Sorghastrum nutans	Indiangrass
Sorghum halepense	Johnsongrass
Spartina cynosuroides	cordgrass, big
Spartina pectinata	cordgrass, prairie

Spartina spartinae	sacahuista
Sphenopholis obtusata	wedgegrass, prairie
Sporobolus airoides	sacaton, alkali
Sporobolus asper var. hookeri	dropseed, meadow
Sporobolus compositus	dropseed, tall
Sporobolus contractus	dropseed, spike
Sporobolus flexuosus	dropseed, mesa
Sporobolus giganteus	dropseed, giant
Sporobolus indicus	smutgrass
Sporobolus wrightii	sacaton, Wright's
Sporobolus, cryptandrus	dropseed, sand
Stachys bigelovii	betony, rock
Stipa leucotricha	wintergrass, Texas
Stipa pringlei	needlegrass, Pringle
Stipa tenuissima	needlegrass, finestem
Strophostyles leiosperma	slickseed wild bean
Symphoricarpos orbiculatus	coral-berry
Symphoricarpos oreophilus	snowberry, mountain
Tamarix spp.	saltcedar
Taxodium distichum	cypress, bald
Tecoma stans	esperanza
Tephrosia lindheimeri	tephrosia, Lindheimer
Tiquilia hispidissima	tiquilia
Toxicondendron diversilobum	oak, poison
Trachypogon secundus	crinkleawn
Tragia ramosa	noseburn
Trichachne californica	cottontop, Arizona
Trichloris crinita	trichloris, two-flowered
Tridens flavus	tridens, purple-top
Tridens muticus var. muticus	tridens, slim
Tripsacum dactyloides	gamagrass, eastern
Typha spp.	cattail
Ulmus alata	elm, winged
Ulmus americana	elm, American
Ulmus crassifolia	elm, cedar
Ungnadia speciosa	buckeye, Mexican
Utricularia spp.	bladderwort
Verbesina virginica	frostweed
Vernonia spp.	ironweed
Viburnum dentatum	arrowoood, southern
Viguiera stenoloba	skeletonleaf, goldeneye
Vitis acerifolia	grape, panhandle
Vitis arizonica	grape, Arizona
Vitis mustangensis	grape, mustang
Xanthocephalum spp.	broom snakeweed
Yucca angustifolia	yucca, narrowleaf
Yucca elata	palmella
Yucca rupicola	yucca, twistleaf
Yucca spp.	yucca spp.
Yucca torreyi	yucca, Torrey

Zanthoxylum fagara	pricklyashe, lime
Zinnia spp.	zinnia
Ziziphus obtusifolia	lotebush

Texas Native Plant Conservation Plan

Preface

Due to the production for the Texas Comprehensive Wildlife Conservation Strategy (CWCS), several of the Texas' botanists and plant ecologist determined that it would be good timing to develop an outline or proposal for the development of a statewide plant conservation strategy. The following was drafted as a beginning to that process and should be considered a start to future, fully developed ideas and actions. While this draft does not directly relate to the eight required elements associated with the CWCS it should be noted that it is considered important to the maintenance, conservation and future enhancement of Texas habitat which will directly impact endemic Texas fauna.

Introduction

Texas is home to more than 5,000 native vascular plant taxa (species, subspecies and varieties of ferns, fern allies, gymnosperms and angiosperms) (Correll and Johnston 1970, Hatch et al. 1990, Jones et al. 1997, Turner et al. 2003) and as many, if not more, non-vascular plants (mosses, liverworts, algae) and organisms usually considered with plants (lichens, fungi, blue-green algae). The sheer size of the state (267,339 sq. mi.) combined with the diversity of climate, geology, soil, hydrology and topography overlain by the meeting of six North American ecosystems (Great Plains, Southeastern Pine Forests, Gulf Coast, Tamaulipan Thornscrub, Chihuahuan Desert and Rocky Mountains) provides the basis for an extremely diverse and unique flora. There are almost 300 vascular plants that occur only in Texas (endemic), 29 federally and state listed endangered and threatened species, almost 250 plants of special concern (fewer than 20 populations world-wide) and dozens of plant communities of special concern.

Plant conservation has a relatively brief history in Texas (less than 40 years). Although various aspects of plant conservation have been instigated (rare species lists developed, species listed, recovery plans written and implemented, sites conserved, species delisted, etc.), there has not been a statewide overview of all the native species and communities as to their distribution, abundance, health, viability and long-term persistence. This plan, that TPWD and partners have chosen to associate with the Comprehensive Wildlife Conservation Strategy, is the first step in laying the framework to identify, assess, conserve and preserve the incredible native plant diversity within Texas.

Step One: What comprises Texas native plant diversity - identification and prioritization of Texas native plant diversity for conservation purposes.

Texas flora appears to be well studied. There are dozens of site and county level floral surveys and inventories; several dozen statewide and regional floras, checklists and field guides; and hundreds of thousands of specimens cataloged, stored and in some cases electronically available on the Internet. However, new species are described every year and new locations are found almost daily. Before we can mourn what we have lost and determine what we should fix, we must access what we have now as completely and quickly as possible. No attempts have been made to produce a statewide floral inventory that provides distribution as well as abundance and trend data. While Turner et al. (2003) and the University of Texas at Austin and the Texas A&M University online databases do provide an indication of abundance, many taxonomic groups are under-represented in herbaria due to difficulty in collecting, taxonomic problems, or both (i.e., cacti). Non-vascular plants have even less locational data, let alone abundance figures or trend information. A systematic, statewide survey, both in the field and out (via herbaria, floras, surveys, etc.), needs to be conducted to determine the present distribution and abundance (including trends) of Texas native plants, both vascular and non-vascular. This present snapshot could be compared with past distribution and abundance when sufficient information is available to help determine the loss, extent and trend of any changes that have occurred.

Texas native plant diversity is not just confined to the taxonomic level. There may be populations or genetically unique groups that are worthy of noting. Likewise assemblages of species such as plant communities, vegetation associations, unique or relictual habitats, wetland and riparian areas, botanical “hotspots” (concentrations of interesting or unusual species), spectacular wildflower displays, urban remnants, etc., need to be identified, mapped and evaluated as to quality, abundance and importance. Also less obvious features of botanical diversity such as big trees or natural processes such as plant-animal interactions (pollination, dispersal, feeding and habitat areas, corridors), hydrologic features, natural disturbances, etc. need to be recognized and their significance evaluated.

Though it would be ideal to conserve all aspects of native plant diversity, it may not be realistic to assess, monitor, preserve and manage it all, particularly at a species or population level. Due to human shortages of time, money and personnel, a method of prioritizing the conservation of native plant diversity needs to be developed. Past methods have usually dealt with the rarest and most endangered species or communities whether at a global, national, state or local level (see Attachment for the current list of the rare plants of Texas). Strategies to conserve high quality examples of all plant communities have been seen as a way to protect the more common native plants. Such strategies may have overlooked endemics, disjuncts, peripherals and other types of native plant diversity previously mentioned. Also the examples of common species that are being protected may not be the best examples or most viable populations. There may be common widespread species with serious downward population trends. A review of the past methods, especially in light of new conservation priorities, should reveal how well these strategies are working. Depending on the review results, older methods may be honed, or new innovative methodologies developed.

Step Two: Threat assessment – What stands in the way of achieving protection for Texas native plant diversity?

Once Texas native plant diversity is identified and prioritized as to conservation needs, the threats that stand in the way of achieving conservation can be identified, analyzed and prioritized as to risk, immediacy and ease of control or elimination. There are several well-recognized threats to Texas native plant diversity. The destruction, alteration and fragmentation of habitat top the list. Destruction or conversion of habitat to home sites, businesses, industrial complexes, transportation and utility corridors and associated infrastructure forever changes the landscape by removing native vegetation, striping or compacting the soil, creating impervious cover, introducing or encouraging non-native vegetation, changing hydrology and adding air, water and light pollution. Agricultural cropland and improved (i.e., non-native) pastures also remove native vegetation through mechanical or chemical means, irrevocably alter the soil structure, increase erosion, change hydrology, introduce non-native species and add excessive amounts of nutrients, pesticides and herbicides to the ecosystem. Forestry practices such as clear-cutting and the planting and management of monoculture stands ravage native plant diversity. Dams and impoundments inundate and destroy habitat while flood control deprives entire plant communities of nutrient-depositing flood waters. Alternately the draining of wetlands also eradicates habitat. Oil and gas exploration and development, subsurface mining (including water) and in particular surface mining (coal, gravel, etc.) through many of the same mechanisms mentioned previously, also irreversibly change the habitat. Lowering of water tables and cessation of spring flow either eliminate plant communities or alter them dramatically. The lack of a conservation ethic towards these finite resources only aggravates their depletion and concomitant habitat destruction. Although restoration may reintroduce some of the formerly dominant species, species occurring at lower frequencies and smaller organisms such as pollinators, mycorrhizae, decomposers, etc., are usually not included in the process. Often the damage done to soils and hydrology does not encourage their recolonization.

While more subtle, habitat alteration can also lead to species extirpation, lack of regeneration, or reduction in population size or number. Over-grazing, over-browsing and rooting often causes changes in plant species composition and numbers and sometimes results in the extirpation of the most edible species. Domestic livestock stocked beyond carrying capacity, feral animals escaped and reproducing outside of human control, exotic game animals freed from the pests and diseases of their homelands, or native herbivores over-abundant due to predator and disease elimination or habitat loss, all contribute to the herbivory problem. Mechanical or chemical brush and weed control often removes more than just target organisms. Other vegetation management practices such as fire or mowing can alter plant species composition as much as fire suppression when conducted too frequently or in the wrong habitat or season. While non-native species may destroy habitat by changing soil structure, chemistry or hydrology, most often non-natives quietly outcompete (usually due to a selection for aggressive characteristics and a lack of their native diseases and predators) and replace native species. For as much disturbance as humans cause, there are many natural disturbances that humans suppress: fire, flood, pests, diseases, etc. Suppression of these disturbances also alters plant community composition. Even native plants may sometimes become invasive and crowd out other natives, particularly when natural processes are altered.

Although plant populations often occur in isolated random patches, gene flow, whether by pollination or dispersal, occurs across these distances. Habitat fragmentation may be caused by habitat destruction or alteration, or even the division of larger land tracts into many smaller ones whether by fence or by deed. Fragmentation breaks the ties of gene flow by separating populations greater distances than pollinators or prevailing winds can travel, or the amount of unsuitable habitat between populations may be too great for propagules to traverse. Such newly isolated populations could perhaps evolve into new species, but most are too small to attract pollinators or lack the genetic diversity or number of individuals necessary to withstand climatic variation, disease, herbivory or random catastrophic events. Although some species occur in naturally small populations, the populations of many species have been recently reduced or fragmented, making them susceptible to the above threats.

Additional threats to Texas native plant diversity include recreation, collection, genetic contamination and global warming. Threats from recreation vary from habitat fragmentation (foot or vehicle trails trampling plants and dividing populations) to habitat alteration (non-native invasive species brought in via animal feed or on clothing or vehicles) to habitat destruction (building of recreational facilities). Collection may range from the casual picking by the home gardener to the focused harvesting by cactus and orchid fanciers, or the commercial exploitation of wild plants for landscaping, herbal, or medicinal use. While the collections of the occasional gardener do not seem harmful, when multiplied by hundreds or thousands of individuals, the problem becomes apparent. While the nursery trade's interest in native plants solves some problems (i.e., introducing fewer non-native invasive species and supplying the home gardener's demand with propagated rather than wild-collected material), massive propagation from few genetic sources or selective breeding of native plants to suit human desires (larger and/or more flowers, flower and/or leaf color, plant size, etc.) may dilute or detrimentally alter native gene pools if natives and cultivars come in contact. Populations of widespread species are often locally adapted to climate, pests and diseases, pollinators and dispersers, etc. Thus if all the source material is from south Texas, it may die in north Texas, discouraging home gardeners from using native plants, or it may do poorly, but pass along its maladapted genes to nearby wild populations which dilutes and damages the gene pool.

In a state as large and diverse as Texas, global warming could present some challenges. Certainly increased aridity and warmer temperatures would alter plant communities in much of the state. Relict communities such as high elevation forests in the mountains of west Texas or mesic, sheltered canyons in the western two-thirds of the state would be the hardest hit.

Lack of adequate laws to protect Texas native plant diversity is an additional concern. Plants do not have as much protection as animals under the state and federal endangered species acts. However, there is much misinformation circulating on this subject and landowners are particularly leery of having to deal with listed plants as well as state and federal regulation. The federal and state endangered plant laws protect few species and protection is primarily on public land. However approximately 97% of Texas is private land, most rare plant species occur on private land. For these species, few laws prohibit the private landowner from destroying entire populations. Only listed plants receive any Federal or state protection on private land and then only from unauthorized or unpermitted collection, or potentially from federally funded or regulated activities. While the vast majority of private landowners would only destroy a rare species due to a lack of knowledge, some corporations and agencies do not comply with the letter or spirit of environmental laws, thus diminishing what limited regulation the Endangered Species Act has for plants. As for the unlisted species, there are essentially no regulations to prevent their loss or collection.

There is a general shortage of funding for conservation and in particular, for botanical projects. Biologists and botanists in particular are not adequately valued by a society where there is limited appreciation of environmental processes and a lack of a conservation ethic. Perhaps due to the lack of funding and societal recognition, there are fewer trained botanists particularly in the field of conservation. There seems to be a lack of coordination and communication among botanists at all levels. This is especially true across state or national borders. Previous work is often disregarded, ignored, forgotten, or lost and effort is often duplicated. Although there are some centralized information repositories at state and federal levels, these are not widely contributed to or recognized. There is no accepted centralized source of plant conservation information within the state. While general plant education and appreciation is needed in schools, colleges and universities, agencies and among the general public, the serious shortage of trained botanists reduces the content and quality of the education provided. A limited number of courses are taught in plant conservation, consequently botanists and biologists have to piece together information from many different fields. Even with sufficient funding, there are not enough trained professionals to carry out the tasks. While volunteers and conservation groups do help, they must be trained by professionals.

Because most research done by agencies and conservation groups is rarely published, especially inventory and monitoring studies, a communication gap exists and studies are often repeated. There is also little standardization, or at least little published information available, on how to conduct inventories, set up monitoring plots, etc. Finally, aside from basic taxonomic and a few other studies, nothing has been done with non-vascular plants. Threat identification is the easy part. Determining how to control or eliminate threats is much harder. Just as we prioritize what pieces of Texas native plant diversity to save, we also need to prioritize which threats are the most severe, the most imminent and the most likely to control.

Step Three: Threat alleviation, management and restoration – How do we conserve, preserve and manage what we have and how do we enhance the current situation (i.e., restore species and sites to viability and stability).

Once decisions are made as to what constitutes Texas native plant diversity and what threatens it and as priorities are assigned as to what to tackle first, conservation, preservation, threat alleviation and management of the most important parts can begin. The highest priority elements of Texas native plant diversity should have some sort of recovery plan that elucidates threats and their alleviation, maintenance and management and restoration to long-term viability. For some species, communities, or other elements, their habitats will need to be preserved for the long-term either through agreements or easements with landowners and managers, or through acquisition by a conservation group or agency. Early identification of threatened resources and proper development planning could prevent a great deal of habitat destruction. Lack of funding is often a problem in acquiring conservation easements or outright purchases therefore new funding sources need to be explored as well as new approaches to site preservation. Economic incentives, tax breaks, nature based tourism, awards and recognition can also work to preserve certain elements of botanical diversity. Where conflicts are unavoidable, various mitigation measures such as protection of other populations or similar sites, relocation, seed or propagule banking, reintroduction, funding for research, etc., should be carefully evaluated and applied where appropriate and necessary. Mitigation banks could be proactively established for those elements of native plant diversity that are most likely to be threatened. All rare and/or endemic species should be seedbanked or held in cultivation as backup should all native populations be destroyed. For those sites already held by conservation-minded individuals, agencies, or groups, management practices may need to be initiated or reviewed and perhaps modified to address the needs of target species, communities and elements of Texas native plant diversity.

Herbivore populations, whether native, domestic, feral, or introduced, should conform to long-term sustainable carrying capacities. In the short-term, exclosures could protect high priority elements of native plant diversity. Determination of carrying capacities will require research, partnerships and a good deal of understanding and cooperation between diverse groups. Management practices for animals should be carefully evaluated as to their effects on target as well as non-target organisms, particularly sensitive species. Management is often conducted at the community or ecosystem level. This may ignore the needs of sensitive species within microhabitats that may have entirely different management needs than the broader level. Also management is often done to meet human needs and desires, such as game species or livestock management, safety issues (flooding, fire), recreation, etc. Natural disturbances such as fire, flood, drought, freezes, wind storms, native animal mediated soil disturbance and browsing/grazing need to be evaluated as to their impact on the native flora. Negative impacts should be lessened while neutral and positive actions should be allowed to occur. Vegetation management practices such as chemical or mechanical control, prescribed fire, hydrological alteration, grazing prescriptions, etc., should be subjected to the same scrutiny as that for natural processes and similarly evaluated. All management practices should carefully scrutinized as to their effects on native plant diversity and best management practices developed for all high priority elements of Texas native plant diversity.

At the same time that the statewide inventory of native plant diversity is happening, a similar inventory of the locations, abundance and trends of non-native plant species could be accomplished. A website with identification and control information as well as locations would provide much-needed education concerning these species. Screening new species introductions for potential harm to native species should be expanded and rigorously applied. For those non-native species already established, they should be evaluated as to their threat, rate of expansion, history in other locations and ease of control or elimination. Work should be done to educate various agencies about the use of native species rather than invasive, resource-consuming non-natives. However until acceptable native substitutes are identified and made widely available, little progress is likely to be made. A statewide plan and policy should be developed for control and eradication of non-native invasive species by a committee composed of stakeholders from the various land management agencies, the agriculture and horticulture industry, the aquarium trade, garden clubs, conservation groups, academics and landowners. Management plans for the worst non-native invasives should be developed and implemented. In addition to the website, field guides, posters and/or brochures should be developed for distribution to landowners, homeowners, land managers and others that need to recognize and control non-native invasive plants.

Threats from habitat fragmentation and small population size should be carefully studied before remedies such as augmentation and reintroduction are attempted. Often pollinators and dispersal agents will also need to be reintroduced, or the habitat may already be at carrying capacity. When habitat fragmentation has resulted from small tracts with multiple owners, coordination of threat alleviation, management activities and perhaps restoration will be required.

It is doubtful that any sites in Texas remain in pristine, natural condition. Thus restoration will be necessary to maintain and conserve Texas native plant diversity. Entire communities may require restoration, which will be a difficult, if not impossible task. Many communities however will require minimal species additions or management, or reinstatement of natural disturbance cycles. Corridors may also need to be reestablished or restored to provide pathways for dispersal. Species restoration includes both augmentation of existing populations that are vulnerable to extirpation in their current state or reintroduction of new populations within their historic range. Research from demographic, genetic and minimum viable population studies will help in determining augmentation and reintroduction needs and goals. Augmentation and reintroduction plans should be developed for the species most in need and restoration strategies should be developed for the rarest communities or common communities without viable examples.

A clearing house for information on Texas native plant diversity and conservation should be established. Also a website with identification and county-level distribution information along with conservation and management suggestions should be developed, maintained and frequently updated. An inventory of all the past and present scientific, technical and observational data and studies should be complied and made available on the website and updated frequently. Both the lack of trained conservation botanists and the lack of recognition for them could be addressed through a conservation botany course aimed at agency personnel, land owners and managers, academics, conservation groups, garden clubs and volunteer organizations.

Accessible populations of species sought by collectors should be monitored. Educational materials should be developed and provided to nurseries and trade shows detailing the detrimental nature of wild-collected plants. Sustainably grown plants should be introduced into the trade and their use encouraged. No species should be threatened by collection.

While additional laws and regulations may offer more protection for our flora, incentives, recognition and trust may do more to foster conservation. A great deal work needs to be done correcting the misconceptions concerning the current endangered species laws and regulations. Conservation of native plants needs to be seen as the solution to the problem rather than the cause.

While there are some problems such as global warming whose solution may seem beyond our grasp, the knowledge of potential outcomes of such a threat allows us time to plan for the future. It also allows us to realize that many of these threats are global in scope and that every individual contribution, no matter how small, can make a difference.

Step Four: Research needs – What do we need to know to make the best conservation choices, alleviate threats, preserve and manage native plant diversity.

Our lack of a thorough knowledge of the state's native plant diversity, of the methods to eliminate threats and of the management requirements needed to maintain this diversity, need to be addressed. Gaps in our knowledge of the distribution and abundance of Texas native plant diversity need to be identified. Careful review of herbarium collections, the literature, various databases and knowledgeable individuals should indicate high priority sites or taxonomic groups (i.e., cacti, non-vascular plants) for on-the-ground surveys. GIS techniques should also be used to identify potential survey sites as well as to determine long-term trends. Both qualitative and quantitative data should be gathered as most information currently available is little more than presence/absence data. Common protocols need to be established so that data collected from different sites by different workers is similar and comparable. Basic research in demography, habitat characteristics and requirements, life history, reproductive biology (in particular pollination and dispersal) and ecology is essential for management and restoration decisions and is lacking for most species. Even taxonomic research is still needed for some species. A statewide plant community classification needs to be chosen or perhaps fashioned, accepted by land management agencies, conservation groups and academia and made widely available for use throughout the state. Selected species/communities/other elements of Texas native plant diversity will require monitoring at regular intervals to assure that they are being maintained and benefiting from management and conservation actions. This could be done either at an intensive, individual level or through photo-monitoring or remote sensing. Long-term demographic data will provide information for minimum viable population analysis as well as population structure that can be used to guide augmentation and reintroduction plans. Population viability analysis should be carried out for the most important species and recovery goals as to the number and size of populations should be set. Genetic research would also provide guidance for reintroduction as well as insight into difficult taxonomic problems. We also need to know the genetic effects of habitat fragmentation, inbreeding within small or recently isolated populations and outcrossing among geographically distant populations of the same species. Horticultural research such as germination, propagation, establishment and maintenance requirements should be undertaken both in and ex situ. Propagated and stored material at botanical gardens and seed banks should be available for research, reintroduction, education and human use, to avoid depleting the wild populations. Horticultural research could also provide information for various management decisions. Reintroduction is a relatively new field and needs to be approached in a scientifically sound manner with sufficient planning, implementation and follow-up. Likewise threat alleviation and management actions need to be researched, with collection of baseline data, statistically sound methodology and reliable and repeatable results. Although many management decisions are made based on observation and common sense, research to substantiate their efficacy is needed to avoid wasting time and money.

Step Five: Communication, education and promotion – How can we get the message of conserving native plant diversity out to the public, landowners, agencies, conservation community, academics and decision makers

Perhaps of all the tasks we face in conserving Texas native plant diversity, none is more important and more daunting than communicating and promoting the importance of Texas native plant diversity to decision makers, landowners and the general public. Although it may seem obvious to botanists, the essential roles that plants play in everyday human existence (food, shelter, clothing, medicine, ecosystem functions, aesthetics, etc.) need to be stressed. Education, both for school children and the general public, needs to be expanded. The what and why of native plant conservation should be emphasized as well as how to protect it and what an individual can do to help. Special emphasis should be placed on educating professionals involved with plants, such as the horticultural and agricultural trades, land management agencies and organizations, etc. Workshops and classes aimed at these professionals should include more than just information on identification, survey and monitoring techniques, but also include data on population biology, genetics, management, restoration, etc. A website devoted to Texas native plant conservation should be developed and contain lists and photographs or illustrations of native and non-native plants by ecoregion and county along with other educational material. While presentations, displays, publications and websites are good, working in person, one-on-one is usually the most effective communication method. Landowners and communities need to be encouraged to take pride in the ownership of their parts of Texas native plant diversity and to get involved in the monitoring and management of it. All stakeholders need to be included in any discussion or process. Regional and local native plant groups would probably be more effective than statewide efforts in garnering and maintaining interest in native plant diversity in their geographic areas. Better relationships need to be fostered between agency personnel and landowners and between researchers and land managers. Landowners need to be presented with the facts in an open, non-adversarial manner. Researchers do not often see their results directly applied and thus are unaware of the functional results and land managers are often unaware of the latest research. Both groups need to work on maintaining lines of communication with the other in order to manage the resource most appropriately. Working together to develop, implement and assess management techniques, researchers and managers can maintain and restore the elements of native plant diversity most effectively. Present-day partnerships between federal and state agencies, conservation organizations, academic institutions and interested lay people need to be sustained and strengthened. Partnerships across the state border with adjacent states as well as Mexico need to be sustained and strengthened as well as much of our native plant diversity recognizes no political boundaries. Communication within the state conservation botany community needs to be encouraged. Texas conservation botanists need to present a focused front to decision makers and the general public. Consensus or disagreement resolution needs to be reached on issues before going public. A clearing house, workshops, list serves and newsletters would provide open lines of communication between botanists in the state as well as across borders. A database of the botanists throughout the state and region along with their recognized expertise would be helpful to more than just the botanical community; it would provide a statewide network of experts. By providing more information and services, demand for knowledge and appreciation of native plant diversity will increase. Newspapers, radio and television should all be provided with materials concerning the importance of native plant diversity. Public service announcements or even paid advertisements promoting native plant diversity could be placed in various media outlets as well. Brochures and fliers could be sent to nurseries, garden clubs, conservation groups, chambers of commerce, visitor centers and other organizations for distribution. Through promotion (advertising, marketing, websites, statewide and regional festivals, etc.), the importance of native plant diversity can be known by all Texans.

Conclusions: While all of this may seem like an overwhelming task or one that will take decades to achieve, the different steps may be addressed concurrently thus reducing the time required to reach the goal. While it is logical to begin with the identification of Texas native plant diversity and the threats to it, research, threat alleviation, management, restoration and conservation are already occurring and should not stop. However, as priorities are assigned to the preservation of Texas native plant diversity, actions may shift within these areas. At the annual Texas Plant Conservation Conference interested parties can review what has been done in the past and determine which steps to take in the future. Protection of the native plant diversity of Texas is a long-term project, achievable through perseverance, dedication and understanding.

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