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Review of Vulnerable Species List

Sonoran Desert Conservation Plan

April 2000

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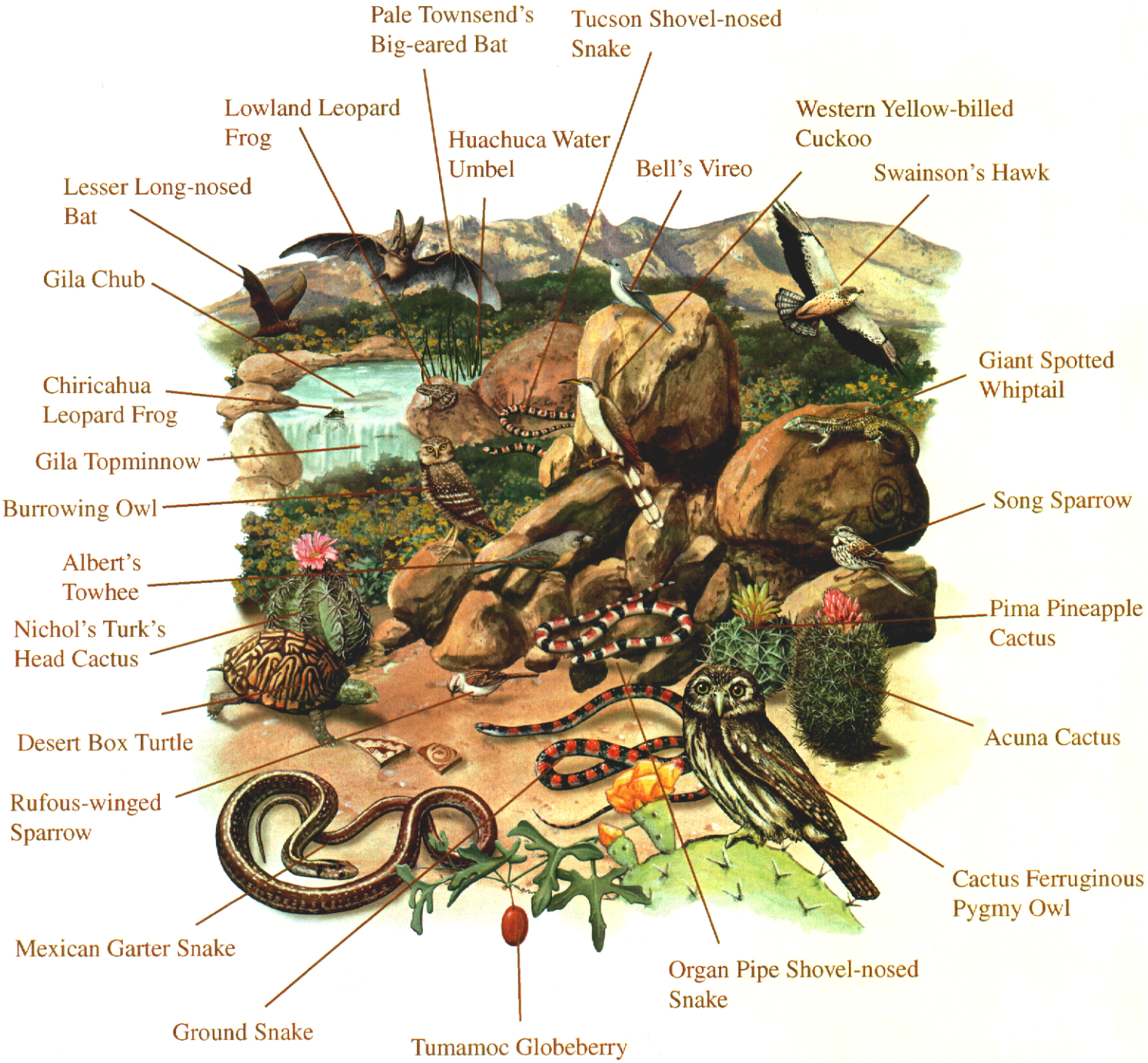
Some of the Vulnerable Species in Pima County

(species are not to scale)



MEMORANDUM

Date: April 17, 2000

To: The Honorable Chair and Members
Pima County Board of Supervisors

From: C.H. Huckelberry
County Administrator

Re: **Review of Vulnerable Species List**

Summary

The attached report submitted by Recon as part of the biological evaluation for the Sonoran Desert Conservation Plan is a companion to the study released today under separate cover, the *Biological Stress Assessment*. This document, the *Review of Vulnerable Species List*, analyzes the November document from the Science Technical Advisory Team and recommends which of the over 100 vulnerable species of concern in Pima County should be considered for coverage under the County's future permit. The report makes an initial recommendation that Pima County consider and further analyze approximately 50 animals and plants as potentially covered species under the multi-species conservation plan. In order to arrive at this recommendation, a review process was undertaken which essentially screened the larger list of vulnerable species by several criteria, including that:

- If insignificant or non-viable numbers of species occur in the planning area, and conservation is best accomplished elsewhere, then the species was recommended for removal from consideration for potential coverage;

- If the species does not occur in the study area, and it is not likely to occur in the study area within the planning horizon, the species was recommended for removal from consideration for potential coverage; and

- If it is unlikely that a species will occur on private, state, or county lands, then the species was recommended for removal from consideration for potential coverage.

After more than half of the vulnerable species were screened from the list of species recommended for coverage under the permit, sixteen species were added for consideration. As stated above, approximately 50 plants and animals are recommended for greater analysis and consideration by the Science Technical Advisory Team. The tables in the attached report summarize the species, stressors, and known distribution within Pima County, in the context of the screening criteria. This memorandum will briefly list the plants and animals, and general habitat element of species recommended for coverage. This memorandum will also summarize the species recommended for removal from consideration for potential coverage based on the above analytical standards.

Species Recommended for Potential Coverage

1. Mammals Recommended for Potential Coverage

Common Name	General Habitat / Element
Western Red Bat	Riparian
Southern Yellow Bat	
Lappet-eared Bat	
Lesser Long-nosed Bat	Saguaro, caves, mines
California Leaf-nosed Bat	
Pale Townsend's Big-eared Bat	Caves, mines
Mexican Long-tongued Bat	
Merriam's Mouse (Mesquite Mouse)	Mesquite

2. Birds Recommended for Potential Coverage

Common Name	General Habitat / Element
Western Yellow-billed Cuckoo	Riparian, Mesquite
Cactus Ferruginous Pygmy-Owl	Riparian, Mesquite
Song Sparrow	Riparian, Aquatic
Abert's Towhee	Riparian, Mesquite
Bell's Vireo	Riparian
Swainson's Hawk	Grasslands
Rufous-winged Sparrow	Grasslands
Burrowing Owl	

3. Reptiles Recommended for Potential Coverage

Common Name	General Habitat / Element
Tucson Shovel-nosed Snake	
Organ Pipe Shovel-nosed Snake	
Giant Spotted Whiptail	Riparian
Red-backed Whiptail Lizard	
Ground Snake	Grassland
Desert Box Turtle	Grassland
Mexican Garter Snake	Aquatic

4. Amphibians Recommended for Potential Coverage

Common Name	General Habitat / Element
Chiricahua Leopard Frog	Aquatic
Lowland Leopard Frog	Aquatic

5. Fish Recommended for Potential Coverage

Common Name	General Habitat / Element
Gila Chub	Aquatic
Gila Topminnow	Aquatic

6. Plants Recommended for Potential Coverage

Common Name	General Habitat / Element
Pima Pineapple Cactus	
Gentry Indigobush	
Nichol's Turk's Head Cactus	Limestone
Acuna Cactus	
Needle-spined Pineapple Cactus	Limestone
Huachuca Water Umbrel	Aquatic
Tumamoc Globeberry	

7. Invertebrates Recommended for Potential Coverage

The San Xavier Tallussnail, along with other snails and the invertebrate pseudoscorpion are recommended for further study and consideration.

Species Recommended for Removal from Consideration for Potential Coverage Because They are Not in the Planning Area:

If insignificant or non-viable numbers of species occur in the planning area, and conservation is best accomplished elsewhere, then the species is recommended for removal from consideration for potential coverage. The following species are discussed in the report in this context:

- Sonoran pronghorn;
- Masked bobwhite;
- Northern shrike;
- Jaguar;
- Arizona shrew;
- Blue silverspot butterfly;
- Le Conte's thrasher;
- Cincta rothschildia;
- Santa Rita water beetle;
- Mountain plover; and
- Gentry Indigobush.

If the species does not occur in the study area, and it is not likely to occur in the study area within the planning horizon, the species is recommended for removal from consideration for potential coverage. The following species are discussed in the report in this context:

- Northern aplomado falcon;
- Ocelot;
- Desert pupfish;
- Jaguarundi;
- Speckled dace;
- Desert tryonia (snail);
- Southwestern willow flycatcher;
- Desert sucker;
- Sonora sucker;
- California floater (clam);
- Mexican gray wolf; and
- Tarahumara frog.

If it is unlikely that a species will occur on private, state, or county lands, then the species is recommended for removal from consideration for potential coverage. The following species are discussed in the report in this context:

- Trelease agave;
- Sabino Canyon damselfly;
- Kearney's blue star;
- Saiya;
- Quitobaquito desert pupfish;
- Sonoyta mud turtle;
- Box Canyon muhly;
- Weeping muhly;
- Ajo rock daisy;
- Tarahumara frog;
- Quitobaquito tryonia (snail);
- Apache northern goshawk;
- Mexican spotted owl;
- Goodding onion;
- Bagnara's talussnail; and
- Mexican leaf-cutter ant.

Similarly, if all records of the species occur on Tohono O'odham Nation lands, then the species is recommended for removal from consideration for potential coverage. The following species are discussed in the report in this context: Kearney's blue star, Hohokam agave, Thurber mallow, and Papago talussnail.

Conclusion

It is likely that the list of covered species will be debated right up until the time of permitting. The attached report provides the analytical framework for conducting this discussion, and an initial recommendation about potential coverage. All species described in the November 1999 Science Team report as vulnerable are still recommended to be contemplated in the larger Sonoran Desert Conservation Plan, but it is suggested that many will not become compliance problems under the Endangered Species Act for private and local government parties.

Future reports from the biological consultant that provide (1) detailed species accounts, (2) vulnerable species goals, (3) vulnerable species habitat data analysis, (4) reserve design and management recommendations, and (5) adaptive management plan recommendations, will both refine the list and provide the parameters of coverage so that a conservation plan can be crafted that both meets the standards of the science community in protecting species and provides regulatory assurances to the community.

REVIEW OF VULNERABLE SPECIES LIST
PIMA COUNTY, ARIZONA

BY THE RECON BIOLOGICAL CONSULTING TEAM

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Review of Vulnerable Species List

A list of Vulnerable Species in Pima County, Arizona, was prepared and published in *Determining Vulnerable Species Within Pima County, Arizona* (draft dated 11/19/99). Species on that list were divided into four categories:

1. Species at risk in Pima County and for whom habitat in Pima County is crucial for their existence;

2. Species at risk in Pima County and/or are generally declining throughout their range;

3. Species that are rare in Pima County, but the overall status is unknown; and

4. Species at risk in Pima County, but are not at risk overall.

There are 37 species in category 1 and 38 in category 2. RECON, with the assistance of SWCA, was directed by the County to review the list of Vulnerable Species in the context of the development of reserve design alternatives and conservation plans for Pima County and to make recommendations for modifications to the list. Specifically, RECON was directed to review the species in subcategories 1 and 2, and to make recommendations for removal of species meeting certain criteria and additions of appropriate species. This document summarizes the review process, with a discussion of the criteria applied to the process. The results of the review are summarized in tables which identify:

- Species that are recommended for removal from further consideration in the development of the SDCP (but not from the Vulnerable Species List),

- Species entirely on Federal or Tohono O'odom lands,

- Species that are recommended to be added for further consideration in the development of the SDCP and the Vulnerable Species List, and

- Species that are recommended to be considered for coverage in the development of the SDCP.

The review resulted in the following general recommendations:

- The Vulnerable Species List, as reviewed, provides a comprehensive overview of species of conservation concern in Pima County, and no species are recommended from deletion from this list;

- A number of species of Sonorella snail and bats are recommended for addition to the Vulnerable Species List; and

- Based on the Vulnerable Species List (with proposed additions) and the review criteria discussed below, we are recommending a list of species for coverage in the development of the SDCP.

This list provides increased focus for subsequent analyses on species most likely to meet the criteria and need for coverage in the SDCP planning process.

I. The Review Process

Species in categories 1 and 2 of the vulnerable species list were reviewed, with the intention of recommending modifications to the list. In particular, we have focused on identifying those species which are not recommended for further evaluation for potential coverage under the SDCP based upon one or more of the following criteria:

1. Species conservation can be accomplished as a result of other species, habitat, or plant community protection afforded by the Sonoran Desert Conservation Plan (SDCP).

2. Insignificant or non-viable numbers of the species occur in the planning area and conservation is best accomplished elsewhere (accidentals, range peripherals, etc.).

3. The species is not known to occur in the study area, nor is it likely to occur in the study area within the planning horizon, or

4. The species is too broadly distributed to help differentiate among a range of plan alternatives.

To these, we add two additional review criteria for consideration:

5. Species known only from or predominantly within Pima County on lands managed by the U.S. Forest Service, the U.S. Fish and Wildlife Service, and/or the National Park Service.

6. Species known only from or predominantly within Pima County on the Tohono O'odham Reservation.

Species in these categories (5 and 6) are not as likely to be covered by the Pima County Habitat Conservation Plan because they are already being managed by Federal agencies with commitments to protect them or they occur on the Tohono O'odham Nation. It is possible that the habitat conservation plan (HCP) could result in benefits to these species, if actions defined and implemented through the HCP process are directed toward conservation of these species. The ultimate role of the SDCP in the conservation of these species has not been determined at this time.

The review process included examination of Arizona Game and Fish Department Species Abstracts, Heritage Data Management System records, species accounts in various formats, including *The Birds of North America* series published by the Philadelphia Academy of Natural Sciences and the American Ornithologists' Union, local and regional field guides, primary literature, notes from conversations with experts consulted during the process of compiling the original list and follow-up conversations with some of them, and the personal experience of the consultants.

II. Recommendations

The rationale for our recommended modifications to the Vulnerable Species categories 1 and 2 is discussed below, applying the six evaluation review criteria.

Criterion 1. Species conservation can be accomplished as a result of other species, habitat, or plant community protection afforded by the SDCP.

Whereas it might appear appropriate, economical, and effective to select a few "umbrella" species, habitats, or plant communities for protection, and then hold the expectation that protection of several to many others might follow, that may not be true. Because each species is unique in its habitat requirements, use of the umbrella species concept should be approached with caution. This approach may not be the most effective for the long-term protection of biodiversity in Pima County and the protection of the County from exposure under the Endangered Species Act for take of species that might become listed in the future. Examples of species considered in this review process that show the limitations of the application of the umbrella species or community concept include:

In Pima County, almost every song sparrow is located within the territory of an Abert's towhee. However, not all Abert's towhee territories have song sparrows. Protection of Abert's towhees would not necessarily result in protection of song sparrows unless all Abert's towhee habitat were protected. Both of these birds are common to abundant along flowing streams with dense brushy margins. Definition and protection of this type of habitat would result in the short-term protection of all of these species. However, the typical habitat of these species is at an early seral stage. Without specific management for maintaining this seral stage, it is likely that some, or all, of the optimum habitat for these species will be lost as vegetation grows. If flood protection is included as a method for protecting riparian woodland, to allow it to mature, for example, for the creation of habitat suitable for yellow-billed cuckoos, then it is likely that the abundance of suitable habitat for these other species would be reduced.

Another example involves three species that occur at Quitobaquito Springs in Organ Pipe Cactus National Monument, in a pond that is clearly an artificial environment. This pond is the only known habitat for an endangered species, the Quitobaquito pupfish, and a species of concern, the Sonoyta mud turtle. These species consume many of the same foods, and the conditions at the pond appear to be optimum for the fish. However, it has been postulated by Dr. Philip Rosen that one of the threats for the turtle is competition with the fish. If that is correct, then conservation actions directed to benefit the fish might be inimical to the survival of the turtle.

There is also an endemic snail, *Tryonia quitobaquiae*, that inhabits the shallow spring runs that lead into this pond. It is likely to be consumed by fish and turtles whenever their paths cross. Management of the pond for pupfish or turtles may be inimical to the survival of the snail.

We do not fully understand the habitat and life history requirements of any one species well enough to say with certainty that its conservation can be accomplished as a result of other species, habitat, or plant community protection afforded by the SDCP. Therefore, we are reluctant to recommend the removal of any species from further consideration for that reason alone.

Criterion 2. Insignificant or non-viable numbers of the species occur in the planning area and conservation is best accomplished elsewhere (accidentals, range peripherals, etc.).

Species recommended for deferral from further consideration because insignificant or non-viable numbers of the species occur in the planning area are listed in Table 1. This reason for removing species from further consideration appears to make a great deal of sense. We recommend the removal of several species for this reason, but do so with the following caveat. It is possible, even likely, that the cactus ferruginous pygmy-owl would be removed on this basis, if the decision had been made only a few years ago. Our knowledge of the abundance of this species has increased greatly as a result of intensive surveys done since the species was listed as endangered. Some scientists might still argue that the cactus ferruginous pygmy-owl is present in insignificant or non-viable numbers in Pima County. It is clearly inappropriate to remove this species from the HCP process. However, based on the best available information, we believe it is appropriate to remove the species listed in Table 1 from further consideration because insignificant or non-viable numbers of the species occur in the planning area.

Criterion 3. The species does not occur in the study area, nor is it likely to occur in the study area within the planning horizon.

Species recommended for deferral from further consideration because they do not occur in the study area and are not likely to occur in the study area within the planning horizon are listed in Table 2. There are no recent records of these species from Pima County in a natural situation. However, for some species introduction or reintroduction to Pima County has been proposed. Two species (spikedace and loach minnow) not included in this table or in *Determining Vulnerable Species Within Pima County, Arizona* have been proposed for introduction into the San Pedro River, an area in which the species do not presently occur. That portion of the San Pedro River within Pima County has been proposed as critical habitat for these species. If the species are introduced and the area included in final critical habitat designation, then the species should be included in the HCP process. Likewise, introduction/re-introduction of desert pupfish, speckled dace, Mexican gray wolf, and Tarahumara frog have been advocated. If any of these species are introduced to the County, then they should be included in the HCP process.

Criterion 4. The species is too broadly distributed to help differentiate among a range of plan alternatives.

No species are recommended for deferral from consideration for this reason.

Criterion 5. Species occurring only on land managed by the U.S. Forest Service, National Park Service, Fish and Wildlife Service.

Species occurring primarily or exclusively on Federal lands are listed in Table 3. If the HCP process includes a cooperative relationship with these agencies that might benefit these species, it would be appropriate to consider these species. However, each of the Federal agencies is actively involved in programs to preserve and protect the species, and it is unlikely that the SDCP would affect these species.

Criterion 6. Species occurring only on Tohono O'odham Nation lands.

Species known primarily or exclusively from Tohono O'odham Nation Lands are listed in Table 4. If the HCP process includes a cooperative relationship with the Nation that might benefit these species, it would be appropriate to consider this species.

Additions to the Vulnerable Species List

Species not included in the original categories 1 and 2 of the Vulnerable Species List that we recommend for continued study and evaluation for their potential inclusion are listed in Table 5. Most of these are snails of the genus *Sonorella*. Pima County is the center of known distribution of the genus, and there are many species, many of which are extremely restricted in their distribution, susceptible to disruption, poorly known, and whose locations may possibly be included in the proposed Mountain Parks. The only supporting information about them is the book: *The Mollusks of the Arid Southwest, with an Arizona Checklist*, by J. C. Bequaert and W. B. Miller, University of Arizona Press. 1973. The only other species recommended for potential inclusion are several species of bats that roost in caves and mines (including Colossal Cave). These species are highly susceptible to disturbance and are listed as "Red" or "imperiled or at high risk of imperilment" in this region by the Western Bat Working Group. These are the Mexican long-tongued bat, the California leaf-nosed bat, and the Lappet-eared bat.

Recommended Modifications to the Vulnerable Species List

Our recommended list of species to be considered for coverage by the SDCP is listed in Table 6. This list reflects the recommendations outlined above for additions and deferrals to the Vulnerable Species List (categories 1 and 2) of the SDCP, with a focus on those that are recommended for continued study and evaluation for their potential inclusion. The modifications reflect the suggestion that some species that were listed as subcategory 1 or 2 in the Vulnerable Species List may have been more appropriately listed as subcategory 3 or 4.

TABLE 1

SPECIES RECOMMENDED FOR REMOVAL FROM CONSIDERATION FOR POTENTIAL COVERAGE (CRITERION 2)

Insignificant or non-viable numbers of the species occur in the planning area and conservation is best accomplished elsewhere (accidentals, range peripherals, etc.).

Species	Sub-Category	Stressors and Threats	Distribution in Pima County HDMS Records and Notes
Antilocapra americana sonoriensis Sonoran pronghorn	1	Alleged loss of habitat (historic); drought; drying of major rivers; historic overgrazing. Population apparently has not increased, despite three large public land withdrawals, and the removal of cattle. In Mexico, it is believed that economic exploitation of habitat (grazing and agriculture) and poaching are still causing population and habitat losses. Military activities have been alleged to be a threat in a current lawsuit. Border patrol and illegal alien and smuggling activities may also be a threat. Present knowledge presents no clear means to increase either population densities or range.	Found only in Planning Unit 8 on Federal and Indian lands. Cabeza Prieta National Wildlife Refuge, Organ Pipe Cactus National Monument, Luke Air Force Barry M. Goldwater Gunnery Range, and possibly Tohono O'odham Indian Reservation. In Mexico: northwest part of the state of Sonora. Possibly this is a relict population that is naturally headed toward extinction.
Colinus virginianus ridgwayi Masked bobwhite	1	Extreme rarity. Historic overgrazing and drought. Predation. Fire suppression. Invasive non-native plant species. Unknown reasons for failure to become re-established after reintroductions.	Found only in Planning Unit 6A This species is found only on Buenos Aires NWR and is being reintroduced into the areas known to have supported this species historically.
Lanius excubitor Northern shrike	2	None apply in this area.	Accidental, not normally found in Pima Co., only a few records known.
Panthera (=Felis) onca Jaguar	2	Shooting, trapping. Extreme edge of species range, it should be considered an occasionally appearing accidental.	In 1988, a jaguar was observed in Altar Valley and in the Baboquivari Mountains. In March of 1996, a jaguar was observed and confirmed with video and photographs. Unconfirmed sightings have been reported in the Buenos Aires National Wildlife Refuge.

TABLE 1
SPECIES RECOMMENDED FOR REMOVAL FROM CONSIDERATION FOR CRITERION 2
(continued)

Species	Sub-Category	Stressors and Threats	Distribution in Pima County HDMS Records and Notes
Sorex arizonae Arizona shrew	2	Limited distribution, poorly known. Fires and floods. Recreational development and camping.	The records for this species from Pima County are apparently erroneous, as no land of suitable elevation and condition for the species occurs in the Santa Rita Mts. in Pima County. Potentially appropriate habitat has not been surveyed using the best available techniques. This species may or may not be present in montane areas in Pima County, but there is no evidence of a viable population. If present, it would be likely to occur only on Forest Service land.
Speyeria nokomis caerulescens Blue silverspot butterfly	2	Presumably, habitat destruction of the violet-laden meadows in the Santa Catalina Mountains resulted in the loss of this violet-dependent species.	In all probability, this species has been extirpated north of the Mexican border. Formerly, an isolated colony of this butterfly existed near the summit of the Santa Catalina Mountains, but it has not been seen since 1938.
Toxostoma lecontei Le Conte's thrasher	2	Shooting, pesticides, automobile collisions, entrapment in tar, land development, off-road vehicles, fires, especially	No HDMS records. A few records from the County, but a very rare bird in Pima Co., if
Rothschildia cincta Cincta rothschildia	1	No threats are known or speculated for this species.	This species may occasionally be found at Organ Pipe Cactus NM, the Tohono O'odham Reservation, and other lands close to the border. It is an occasional migrant from Mexico during years of exceptional rainfall or other unusual conditions and is probably not a part of Pima County's natural resident fauna.

TABLE 1
SPECIES RECOMMENDED FOR REMOVAL FROM CONSIDERATION FOR CRITERION 2
(continued)

Species	Sub-Category	Stressors and Threats	Distribution in Pima County HDMS Records and Notes
Zaitzevia parvula Santa Rita water beetle	1	Loss of habitat through drying of streams resulting from groundwater depletion and/or watershed changes. Climate change. Poisoning of streams by mine wastes?	This species is found in California, Washington, and Oregon in streams. Probably only occasionally found in Arizona.
Charadrius montanus Mountain plover	2	No specific threats likely to apply here.	Irregular and spotty, this species may occasionally be observed during winter in agricultural fields, but there are few observations in Pima County.
Dalea tentalculoides Gentry Indigobush	1	Very narrow distribution, susceptible to disturbance.	Apparently extirpated from Pima County.

TABLE 2
SPECIES RECOMMENDED FOR REMOVAL FROM CONSIDERATION FOR COVERAGE (CRITERION 3)

The species does not occur in the study area, nor is it likely to occur in the study area within the planning horizon.

Species	Sub-Category	Stressors and Threats	Distribution in Pima County HDMS Records and Notes
Falco femoralis septentrionalis Northern aplomado falcon	2	Historic overgrazing?	Does not occur in Pima County.
Felis pardalis Ocelot	2		Does not occur in Pima County.
Cyprinodon macularius macularius Desert pupfish			There are no natural populations of this subspecies remaining in Arizona. A reintroduced population exists at Cold Springs in Graham County. There are also several refugia populations in private ponds and aquariums.
Felis yagouraroundi tolteca Jaguarundi	2		Does not occur in Pima County.
Rhynicthys osculus Speckled dace	2	Non-native species, competition and predation. Habitat loss by groundwater pumping and channelization. Flooding. Drought. Dredging. Poor water quality. Livestock grazing (trampling by cattle, watershed changes).	Found upstream in Redfield Canyon, in Graham County, it is not known to occur in Pima County.
Tryonia protea Desert tryonia (snail)	2	Collected alive by Miller in an irrigation ditch N of Buckeye, 1962. Previously reported from the State only for dead shells in riparian drift of Santa Cruz River, 1915, as *Paludstrina protea*	Probably not a regular part of our fauna
Empidonax traillii extimus Southwestern willow flycatcher	2	Habitat destruction and alteration, historic and present. Groundwater pumping, channelization, urbanization, historic livestock grazing? Farming and agricultural uses? Nest parasitism by Brown-headed Cowbird.	Not recorded breeding in Pima County, but may come in to some riparian restoration areas. It may appear in Pima County as an occasional migrant.

TABLE 2
SPECIES RECOMMENDED FOR REMOVAL FROM CONSIDERATION FOR CRITERION 3
(continued)

Species	Sub-Category	Stressors and Threats	Distribution in Pima County HDMS Records and Notes
Catostomus clarki Desert sucker		Non-native species, competition and predation. Habitat loss by groundwater pumping and channelization. Flooding. Drought. Dredging. Poor water quality. Livestock grazing (trampling by cattle, watershed changes).	Upstream in Graham County and Cochise County, not known from Pima County.
Catostomus insignis Sonora sucker	2	Non-native species, competition and predation. Habitat loss by groundwater pumping and channelization. Flooding. Drought. Dredging. Poor water quality. Livestock grazing (trampling by cattle, watershed changes).	Upstream in Graham County and Cochise County, not known from Pima County.
Anodonta califomensis California floater (clam)	2	Drying of streams, loss of native fish which were a necessary host, water quality deterioration.	Extirpated from Pima County.
Canis lupus baileyi Mexican gray wolf	2		Extirpated from Pima County.
Rana tarahumarae Tarahumara frog	1	Heavy metal toxicity from mining operations, acidification, alteration of riparian habitat and/or predation by bullfrogs.	Extirpated from Pima County. It may be possible to reintroduce the species to some of the high mountain streams in the Santa Rita Mts. Formerly on State, Federal, and Private land.

TABLE 3
SPECIES IDENTIFIED UNDER CRITERION 5

All records of this species in Pima County are from lands managed by the U.S. Forest Service, the U.S. Fish and Wildlife Service, or the National Park Service, and it is unlikely that the species will occur on either Private, State, or County lands that will be covered by the SDCP.

Species	Sub-Category	Stressors and Threats	Distribution in Pima County HDMS Records and Notes
Agave schottii var. *treleasei* Trelease agave	1	Narrow endemic. Direct impacts by road or recreational facility construction may impact local populations..	Occurs in isolated, relatively secure locations in Coronado National Forest and Organ Pipe Cactus National Monument. This taxon appears to be a hybrid, and the disjunct populations are hybrids of different species. Possibly of hybrid origin between *A. schottii* var. *schottii* and *A. chrysantha* in the Santa Catalinas and between *A. schottii* var. *schottii* and *A. deserti* in Organ Pipe National Monument.
Argia sabino Sabino Canyon damselfly or Sabino dancer	1	Very narrow distribution. Predation by introduced and native fish and introduced crayfish. Drought. Habitat loss through groundwater use and upstream diversions.	Known only from USFS lands, Sabino Canyon and Molino Canyon USFS and (?) Jalisco, Mexico. Possibly may occur in Rincon Mts. Saguaro N.P.
Amsonia kearneyana Kearney's blue star	1	Extreme rarity, canyon bottom habitat vulnerable to flooding. Protection of populations from disturbance. Physical damage from livestock. Seed predation.	The original natural population was on the Tohono O'odham Nation land. An artificial population was established by transplants in Brown Canyon; Buenos Aires National Wildlife Refuge.
Amoreuxia gonzalezi Saiya	1	Very narrow distribution and small number of individuals. Grazing (plant is palatable to cattle). Degradation of habitat due to livestock grazing. Competition by introduced invasive plants. Javelina consume roots. Narrow endemic. Four to five micropopulations or one megapopulation of less than 65 plants are known in Arizona but the population trend is unknown.	Limestone endemic known only from USFS land.

TABLE 3
SPECIES IDENTIFIED UNDER CRITERION 5
(continued)

Species	Sub-Category	Stressors and Threats	Distribution in Pima County HDMS Records and Notes
Cyprinodon macularius eremus Quitobaquito desert pupfish	1	Narrow endemic. All in one pond, which is not in pristine condition. Non-native predators, parasites, diseases. Lowered groundwater resulting from pumping in Mexico. Illegal activities, e.g. dumping a load of illicit drugs to evade arrest, could harm the environment.	Found only at Quitobaquito Springs in Organ Pipe Cactus N.M. There are at least two artificially maintained refugia populations. Six reintroduction sites were tried, 5 in Organ Pipe Cactus NM, 1 in Salt River near Tempe. All have failed.
Kinosternon sonoriense longifemorale Sonoyta mud turtle	1	Very limited range. Possible groundwater pumping in Mexico. Water quality. Poor recruitment. Collecting. Disease, malnutrition? Competition with pupfish (*Cyprinodon macularis eremicus*) (Phil Rosen, personal communication, 03-04-99).	Found only at Quitobaquito Springs in Organ Pipe Cactus N.M.
Muhlenbergia dubioides Box Canyon muhly	1	Very narrow distribution.	Known only from USFS land.
Muhlenbergia xerophila Weeping muhly	1	Very narrow distribution.	Known only from USFS and NPS land and Buenos Aires NWR.
Perityle ajoensis Ajo rock daisy	1	Limited range. Little knowledge. Recently described species.	The only known locations are in Organ Pipe Cactus NM.
Rana tarahumarae Tarahumara frog	1	Extirpated from Pima County. Heavy metal toxicity from mining operations, acidification, alteration of riparian habitat and/or predation by bullfrogs.	Most, if not all, potentially suitable habitat for potential reintroduction is on USFS land.
Tryonia quitobaquitae Quitobaquito tryonia (snail)	1	Very limited range. Possible habitat loss by groundwater pumping in Mexico. Water quality.	Found only at Quitobaquito Springs in Organ Pipe Cactus N.M.

TABLE 3
SPECIES IDENTIFIED UNDER CRITERION 5
(continued)

Species	Sub-Category	Stressors and Threats	Distribution in Pima County HDMS Records and Notes
Accipiter gentilis apache Apache northern goshawk	2	Habitat destruction by logging and forest clearing. Possibly consequences of fire suppression leading to major timber fires. Organized recreational and sports use. Global climate change. Disturbance by recreationists, cattle grazing, mining, road building and other forest disturbances are site specific threats alleged by Center for Biodiversity.	Occurs only at high elevation areas, all of which are in USFS or NPS land. Petitioned for listing as endangered, 90-day finding determined that listing was not warranted 6/29/98. Suit filed 2/25/99 to list as endangered.
Strix occidentalis lucida Mexican spotted owl	2	Habitat destruction by logging. Possibly consequences of fire suppression leading to major timber fires. Organized recreational and sports use and recreational development. Global climate change.	Occurs regularly only at high elevation areas, all of which are in USFS or NPS land. Critical Habitat for this species had been designated in 1995, but rescinded in 1998. Most, if not all, of it was in Planning Unit 4. On 3/14/00 a federal judge ordered FWS to determine critical habitat by 1/15/01.
Allium gooddingii Goodding onion	2	Livestock grazing, logging/timber management, organized recreational and sports use.	The only known sites in Pima Co. are in Coronado National Forest.
Sonorella bagnarai Bagnara's talussnail	2	Limited range, may be susceptible to disruption and disturbance. Climate change.	Known only from Rincon Mts. NE side below summit of Rincon Peak, 8,000-8,200 ft, Saguaro National Park.
Atta mexicana Mexican leaf-cutter ant	2	No threats are known.	This is a common Mexican species that occurs in Organ Pipe Cactus NM and is not known from any other locations in Pima County.

TABLE 4
SPECIES IDENTIFIED UNDER CRITERION 6

All records of this species in Pima County are from Tohono O'odham Nation lands, and it is unlikely that the species will occur on either private, State, or County lands that will be covered by the SDCP.

Species	Sub-Category	Stressors and Threats	Distribution in Pima County HDMS Records and Notes
Amsonia kearneyana Kearney's blue star	1	Extreme rarity, canyon bottom habitat vulnerable to flooding. Protection of populations from disturbance. Physical damage from livestock. Seed predation.	The original natural population was on the Tohono O'odham Nation land. An artificial population was established by transplants in Brown Canyon; Buenos Aires National Wildlife Refuge.
Agave murpheyi Hohokam agave	2	Direct destruction of habitats.	In Pima County, the only known population is on the Tohono O'odham Reservation.
Abutilon thurberi Thurber Indian mallow	1	Narrow endemic.	Apparently restricted to Tohono O'odham Nation.
Sonorella papagorum Papago talussnail	1	Limited range, may be susceptible to disruption and disturbance. Climate change.	The only known location is on the Tohono O'odham Reservation. Black Mountain

TABLE 5
SPECIES RECOMMENDED FOR ADDITION TO THE LIST OF SPECIES TO BE COVERED IN THE HCP (AND TO THE VULNERABLE SPECIES LIST), OR AT LEAST FOR CONTINUED STUDY AND EVALUATION FOR THEIR POTENTIAL INCLUSION

Species	Sub-Category	Stressors and Threats	Distribution in Pima County HDMS Records and Notes
Choeroycteris mexicana Mexican Long-tongued Bat	4	Highly susceptible to disturbance of roosts, which are in caves and inactive mines.	Distribution poorly known, most roosts may be limited to USFS and NPS sites in Pima County, although this species is known from Colossal Cave. More information is needed.
Macrotis californicus California Leaf-nosed Bat		Highly susceptible to disturbance of roosts, which are in caves and inactive mines.	Distribution poorly known. More information is needed.
Idionycteris phyllotis Lappet-eared Bat		Highly susceptible to disturbance of roosts, which are in caves and inactive mines.	Distribution poorly known. More information is needed.
Sonorella sabinoensis buehmanensis Buehman Canyon talussnail		Limited range, may be susceptible to disruption and disturbance. Climate change.	Buehman Canyon near Korn Kobb Mine, 3,450 feet Santa Catalina Mts. Buehman Canyon USFS and TNC?
Sonorella sabinoensis tucsonica Tucson Mountains talussnail		Limited range, may be susceptible to disruption and disturbance. Climate change.	North section of Tucson Mts. Private?, NPS, or County?
Sonorella meadi Mead's talussnail		Limited range, may be susceptible to disruption and disturbance. Climate change.	Agua Dulce Mts., canyons south and west of Agua Dulce Pass Agua Dulce Mts., Bates and Granite Mts.? BLM? And NPS?
Sonorella ambigua ambigua Ambiguous talussnail		Limited range, may be susceptible to disruption and disturbance. Climate change.	Cababi Mts. ca 75 mi W of Tucson (aka Ko Vaya Hills), Roskruge Mts., Quinlan Mts. at Kitt Peak, Coyote Mts, Robles Hills, Comobabi Mts., hills 5 mi W of Kom Vo, Santa Rosa spur of Nariz Mts. Mostly on Tohono O'odham Nation lands, but some locations may be within proposed Mountain Parks.

TABLE 5
SPECIES RECOMMENDED FOR ADDITION TO THE LIST OF SPECIES TO BE COVERED IN THE HCP, OR AT LEAST FOR CONTINUED STUDY AND EVALUATION FOR THEIR POTENTIAL INCLUSION
(continued)

Species	Sub-Category	Stressors and Threats	Distribution in Pima County HDMS Records and Notes
Sonorella tortillita Tortillita talussnail		Limited range, may be susceptible to disruption and disturbance. Climate change.	Tortolita Mts. E side of Hog Canyon, Pinal Co. Tortolita Mts., Ruelas Canyon 3,050 ft. Private? May be possible to include in Park.
Sonorella rinconensis Rincon talussnail		Limited range, may be susceptible to disruption and disturbance. Climate change.	Rincon Peak Rincon Mts. Posa Quemada Canyon. Private, State, and County. May be possible to include in Park.
Sonorella imperatrix Empire talussnail		Limited range, may be susceptible to disruption and disturbance. Climate change.	Empire Mts., 1.5 mi N of Total Wreck Mine. May be possible to include in Park.
Sonorella imperialis Imperial talussnail		Limited range, may be susceptible to disruption and disturbance. Climate change.	Empire Mts. along road to Forty-nine Mining Camp, N slope of Mountain in gulch running N, S section of range. May be possible to include in Park.
Sonorella baboquivariensis baboquivariensis Baboquivari talussnail		Limited range, may be susceptible to disruption and disturbance. Climate change.	Baboquivari Mts. East side and N side of Saucito Mt. May be possible to include in Park.
Sonorella baboquivariensis berryi Roskruge talussnail		Limited range, may be susceptible to disruption and disturbance. Climate change.	Roskruge Mts. E side BLM or State? May be possible to include in Park.
Sonorella baboquivariensis depressa Sierrita talussnail		Limited range, may be susceptible to disruption and disturbance. Climate change.	Baboquivari Mts., Sierrita Mts., Tucson Mts. May be possible to include in Park.

TABLE 5
SPECIES RECOMMENDED FOR ADDITION TO THE LIST OF SPECIES TO BE COVERED IN THE HCP, OR AT LEAST FOR CONTINUED STUDY AND EVALUATION FOR THEIR POTENTIAL INCLUSION
(continued)

Species	Sub-Category	Stressors and Threats	Distribution in Pima County HDMS Records and Notes
Sonorella sitiens sitiens Las Guijas talussnail		Limited range, may be susceptible to disruption and disturbance. Climate change.	Las Guijas Mts., Quijotoa Mts, Comobabi Mts, Cabai Mts (Ko Vaya Hills), and SW section of Baboquivari Mts. also Pajarito Mts. in Santa Cruz Co. Mostly Tohono O'odham. May be possible to include in Park.
Sonorella magdalensis Magdalena talussnail		Limited range, may be susceptible to disruption and disturbance. Climate change.	Cerro Colorado; Roskruge Mts. Tucson Mts. Santa Rita Mts. Tumamoc Hill , also Sonora, Mexico, and Santa Cruz Co. May be possible to include in Park.

TABLE 6

SPECIES RECOMMENDED FOR INCLUSION IN THE LIST OF SPECIES TO BE COVERED IN THE HCP, OR AT LEAST FOR CONTINUED STUDY AND EVALUATION FOR THEIR POTENTIAL INCLUSION

Species		Previous Sub-Category
Mammals		
Choeroycteris mexicana	Mexican Long-tongued bat	4
Idionycteris phyllotis	Lappet-eared bat	*
Lasiuris borialis	Western Red Bat	2
Lasiurus ega	Southern Yellow Bat	2
Leptonycteris curasoae yerbabuenae	Lesser Long-nosed Bat	2
Macrotis californicus	California leaf-nosed bat	*
Peromyscus merriami	Merriam's Mouse (Mesquite Mouse)	2
Plecotus townsendii pallescens	Pale Townsend's Big-eared Bat	2
Birds		
Aimophila carpolis	Rufous-winged Sparrow	1
Athene cunicularia	Burrowing Owl	2
Buteo swainsoni	Swainson's Hawk	2
Coccyzus americanus occidentalis	Western Yellow-billed Cuckoo	2
Glaucicium brasilianum cactorum	Cactus Ferruginous Pygmy-Owl	1
Melospiza melodia	Song Sparrow (subspecies)	1
Pipilo aberti	Abert's Towhee	1
Vireo bellii	Bell's Vireo	2
Reptiles		
Chionactis occipitalis klauberi	Tucson Shovel-nosed Snake	1
Chionactis palarostris orgnica	Organ Pipe Shovel-nosed Snake	1
Cnemidophorus burti stictogrammus	Giant Spotted Whiptail	2
Cnemidophorus burti xanthonotus	Red-backed Whiptail Lizard	1
Sonora semiannulata	Ground Snake (ground form)	1
Terrapene ornata luteola	Desert Box Turtle	2
Thamnophis eques megalops	Mexican Garter Snake	2
Amphibians		
Rana chiricahuensis	Chiricahua Leopard Frog	1
Rana yavapaiensis	Lowland Leopard Frog	2

TABLE 6
SPECIES RECOMMENDED FOR INCLUSION IN THE LIST OF SPECIES TO BE COVERED IN THE HCP, OR AT LEAST FOR CONTINUED STUDY AND EVALUATION FOR THEIR POTENTIAL INCLUSION
(continued)

Fish		
Gila intermedia	Gila Chub	1
Poeciliopsis occidentalis occidentalis	Gila Topminnow	1
Invertebrates		
Albiorix anophthalmus	Pseudoscorpion (subspecies)	1
Sonorella ambigua ambigua	snail	*
Sonorella baboquivariensis b.	snail	*
Sonorella baboquivariensis berryi	snail	*
Sonorella baboquivariensis depressa	snail	*
Sonorella ermita	San Xavier Talussnail	1
Sonorella imperatrix	snail	*
Sonorella imperialis	snail	*
Sonorella magdalensis	snail	*
Sonorella meadi	snail	*
Sonorella pupela	Talussnail	2
Sonorella rinconensis	snail	*
Sonorella sabinoensis buehmanensis		*
Sonorella sabinoensis tucsonica	snail	*
Sonorella sitens sitens	snail	*
Sonorella tortillita	snail	*
Sonorella xanthenes	Kitt Peal Talussnail	1
Plants		
Coryphantha scheeri var. robustispina	Pima Pineapple Cactus	1
Dalea tentaculoides	Gentry Indigobush	1
Echinocactus horizonthalonius var. nicholii	Nichol's Turk's Head Cactus	1
Echinomastus erectocentrus acunensis	Acuna Cactus	1
Echinomastus erectocentrus var.	Needle-spined Pineapple Cactus	2
Lilaeopsis schaffneriana ssp. Recurva	Huachuca Water Umbrel	1
~~*Tumamoca macdougalii*~~	~~Tumamoc Globeberry~~	~~2~~