



February 16, 2010

Public Comments Processing
Attn: FWS-R6-ES-2008-0130
Division of Policy & Directives Management
U.S. Fish & Wildlife Service
4401 N. Fairfax Drive Suite 222
Arlington, VA 22203

VIA Federal Rule-Making Portal: <http://www.regulations.gov>

Re: Docket No. FWS-R2-ES-2008-0130, Comments on Status Reviews for 67 Southwestern Species

Dear Fish and Wildlife Service,

I hereby submit comments on behalf of WildEarth Guardians and our members, regarding Endangered Species Act (ESA) status reviews for 67 southwestern species. In the bibliography, we provide website addresses for almost all of the sources cited. For the convenience of the U.S. Fish and Wildlife Service (FWS), we will also be providing these sources on CDs by postal mail.

For each of the species below, we discuss FWS's finding in terms of the Listing Factors the agency recognizes, as well as additional listing factors we urge FWS to consider in its status reviews for each of these species. To be clear, ESA Section 4 (16 U.S.C. § 1533(a)(1)) sets forth listing factors under which a species can qualify for ESA protection (see also 50 C.F.R. § 424.11(c)):

- A. The present or threatened destruction, modification, or curtailment of habitat or range;
- B. Overutilization for commercial, recreational, scientific, or educational purposes;
- C. Disease or predation;
- D. The inadequacy of existing regulatory mechanisms; and
- E. Other natural or manmade factors affecting its continued existence.

A taxon needs to meet just one of these listing factors to qualify for ESA listing, as threatened or endangered.

Herptiles (6 species)

1. **Arizona Striped Whiptail** (*Aspidoscelis arizonae*) is a lizard ranked by scientists as imperiled. It is found only in Cochise and Graham counties, Arizona, in relatively open grasslands. There are 12 known occurrences in 3 general areas: Willcox, Cochise County; Hackberry Ranch in Whitlock Valley, Graham County; and Bonita, Graham County (NatureServe 2009). However, recent surveys did not find the species in Whitlock Valley (Sullivan et al. 2005). In its 90-day finding, FWS recognized potential threats to the species from habitat loss and degradation due to development and improper grazing (Listing Factor A). 74 Fed. Reg. 66866, 66885.

The Arizona Game and Fish Department (2006b) describes the species as “fairing badly,” and in decline, citing NatureServe. The agency attributes the decline to degradation of its grassland habitat, in part due to shrub encroachment. *Id.* In its Comprehensive Wildlife Conservation Strategy, Arizona Game and Fish describe the following list of threats: habitat degradation, shrub invasions, unnatural fire regimes, habitat conversion, livestock management, rural development, and off-road vehicles (AZGFD 2006). The State of Arizona considers this lizard to be a Species of Greatest Conservation Need. *Id.*

This species has apparently been extirpated from one historic location, approximately 13 km north of Willcox, due to a housing development (Sullivan et al. 2005). At another location, only hybrids between *A. arizonae* and *A. uniparens* were found. *Id.* FWS should consider hybridization (Listing Factor E) as another potential threat to the species. In addition, given the association between the Arizona Striped Whiptail and grasslands, FWS should consider whether shrub encroachment of grassy habitats, whether caused by livestock grazing, drought, climate change, or a combination therefore, is a threat to this lizard (Listing Factor E). We discuss this problem at length in our 2008 petition to list the white-sided jackrabbit (WildEarth Guardians 2008). Given the numerous threats this lizard faces and the lack of adequate regulations to reduce these threats, FWS should consider inadequate regulatory mechanisms an additional threat (Listing Factor D).

In short, scientists have recognized a multitude of threats to the Arizona Striped Whiptail, some of which – e.g., shrub encroachment and altered fire regimes – will likely be tremendous challenges. To face those challenges, FWS should promptly list this species.

2. **Black-spotted Newt** (*Notophthalmus meridionalis*) is a salamander ranked by scientists as critically imperiled. It is listed by IUCN as endangered and declining (Flores-Villela et al. 2008). Its range is the Gulf Coastal Plain from Texas to Tamaulipas, Veracruz, and San Luis Potosi, Mexico. The newt’s habitat is permanent and temporary ponds, roadside ditches, and quiet stream pools. It was once rather common. But in the 1980s, FWS reported 5 element occurrences out of 221 surveyed sites; 2 occurrences were in Texas and 3 in Mexico. It now appears to be absent from 2 out of 3 sites in Mexico. Scientists describe it as declining in both Texas and Mexico. Scientists recognize threats from habitat alteration, insecticide and herbicide use, and water pollution (NatureServe 2009). In its 90-day finding, FWS

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recognized potential threats from insecticide and herbicide use (Listing Factor E). 74 Fed. Reg. 66866, 66886.

FWS should also consider habitat alteration (ESA Listing Factor A) to be a significant threat. Its reasoning in the 90-day finding – that “no information is provided concerning the potential for alteration of currently occupied habitats” is flawed. The best available information indicates extensive destruction of habitat in the newt’s range, as reflected in both NatureServe (2009) and Flores-Villela et al. (2008). FWS itself acknowledges that over 95% of Tamaulipan brushland has been eliminated, and that this destruction continues (USFWS 2009). FWS should also consider small population size (Listing Factor E) to be a threat, considering that there are only 3 known populations of the newt remaining – 2 in Texas and 1 in Mexico. In addition, the newt’s coastal range is vulnerable to increasingly severe drought and hurricanes caused by climate change (Karl et al. 2008, 2009). Climate change should be considered an additional threat (Listing Factor E). The Texas Comprehensive Wildlife Conservation Strategy enumerates a list of threats to this species, which FWS should consider during its status review (TPWD 2005).

Moreover, while FWS cites the newt’s Texas state-threatened status under the adequacy of regulatory mechanisms, this designation does not provide any protection for the species’ habitat. As FWS indicates, it does not occur in protected areas in Mexico. FWS should therefore further recognize the inadequacy of regulatory mechanisms as a threat to this species (Listing Factor D).

This species was previously a Category-2 candidate for ESA listing. It was dropped from the candidate list in 1996, along with more than 2,000 other species. The newt has waited long enough: it is time for FWS to list the species under the ESA.

3. **Blanco Blind Salamander** (*Eurycea robusta*) is a salamander ranked by scientists as critically imperiled. It is unclear whether it is distinct from the Texas Blind Salamander (*E. rathbuni*), which is listed as endangered under the ESA (NatureServe 2009). Whether a distinct taxon or merged with the currently listed taxon, all occurrences should be protected under the ESA. The Blanco Blind Salamander is known from four specimens from a single site (San Marcos Pool, Texas). Two of the specimens were eaten by a heron and one was lost, leaving only one preserved (Hammerson and Chippindale 2004). Its subterranean aquatic habitat is susceptible to degradation and depletion from groundwater pumping (*Id.* and NatureServe 2009). In its 90-day finding, FWS recognized potential threats to this species from habitat loss and degradation due to groundwater pumping and water pollution (Listing Factor A). 74 Fed. Reg. 66866, 66886.

Given the consumption of 2 of the 4 specimens by a heron, FWS should consider Predation (ESA Listing Factor C) as an additional threat. Moreover, because the Blanco Blind Salamander is sympatric with the Texas Blind Salamander, FWS should consider threats to the latter as threats to the former. The Texas Blind Salamander’s recovery plan recognized a range of threats, including water depletion, nonnative species, recreational activities, predation, activities and factors that decrease water quality (USFWS 1996) (Listing Factors A, C, and E). The Texas Comprehensive Wildlife Conservation Strategy enumerates many

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threats to this species, which FWS should consider during its status review (TPWD 2005). Given the numerous threats this salamander faces and the lack of adequate regulations to reduce these threats, FWS should consider inadequate regulatory mechanisms an additional threat (Listing Factor D).

This species is associated with the Edwards Aquifer. The Nature Conservancy (2004) discusses the many and severe threats facing species in this area. FWS is aware of these threats, given the federal protected status of several species in this area that are impacted by aquifer drawdown, such as the San Marcos Salamander (*Eurycea nana*), Texas Wild-rice (*Zizania texana*), and Texas Blind Salamander (*Typhlomolge rathbuni*). FWS should consider all information in its possession on the threats to the Edwards Aquifer when conducting status review for each of the Edwards Aquifer-associated species in these comments.

Moreover, because the Blanco Blind Salamander is an Edwards Plateau species, FWS could list it under the ESA in an efficient, multiple-species listing rule with those species below that also occur on the Edwards Plateau. This highly endangered salamander should be promptly listed under the ESA.

4. **Comal Blind Salamander** (*Eurycea tridentifera*) is a salamander ranked by scientists as critically imperiled. It is ranked as vulnerable by the IUCN. It is known from underground waters of several caves in central Texas. A total of 7 element occurrences have been recorded. Scientists consider habitat destruction (including development) and pollution to be threats and recommend that all of its occurrences be protected (Hammerson and Chippindale 2004; NatureServe 2009). In its 90-day finding, FWS recognized potential threats to this species from habitat loss and degradation due to groundwater withdrawal and contamination (Listing Factor A). 74 Fed. Reg. 66866, 66886.

This species is listed as threatened by the state of Texas.¹ This designation does not address threats to this species, as it provides no habitat protection, which is the leading threat it faces. FWS should therefore consider inadequate regulatory mechanisms (Listing Factor D) to be a threat. The Texas Comprehensive Wildlife Conservation Strategy enumerates many threats to this species, which FWS should consider during its status review (TPWD 2005).

This highly endangered salamander should be promptly listed under the ESA.

5. **Comal Springs Salamander** (*Eurycea sp. 8*) is a salamander ranked by scientists as critically imperiled. It is known only from Comal Springs in Landa Park and Landa Lake, Texas. Some scientists question whether it is distinct from *E. nana* (San Marcos Salamander), which is federally listed as threatened. Whether it is distinct from the San Marcos Salamander or separate, the Comal Springs Salamander deserves federal protection. Scientists cite threats to the species from groundwater withdrawal and contamination (NatureServe 2009). In its 90-day finding, FWS recognized potential threats to this species from habitat loss and degradation due to groundwater withdrawal and contamination (Listing

¹See <http://www.tpwd.state.tx.us/huntwild/wild/species/cblindsalamander/> [Accessed February 2010].

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Factor A). 74 Fed. Reg. 66866, 66886.

In a previous 90-day finding, in 1995, FWS rejected a petition from the Director of Parks and Recreation of New Braunfels, Texas, to list this species. FWS stated that its taxonomy needed to be resolved. FWS wrote that until these uncertainties were resolved, the species would remain a Category-2 candidate for listing (USFWS 1995). However, that category, and the Comal Springs Salamander's candidacy, were terminated the following year. Moreover, the only taxonomic uncertainty is whether this is the same species as the San Marcos Salamander, a federally threatened species. As indicated above, whether the Comal Springs population is separate from San Marcos is immaterial: either way, both species (or populations) deserve federal protection.

This highly endangered salamander should be promptly listed under the ESA.

6. **Texas Salamander** (*Eurycea neotenes*) is a salamander ranked by scientists as critically imperiled. It has only three known occurrences, in Bexar and Kendall counties, Texas (NatureServe 2009). The IUCN ranks it as vulnerable (Hammerson and Chippindale 2004). In its 90-day finding, FWS recognized potential threats to this species from habitat loss and degradation due to drought (Listing Factor A). 74 Fed. Reg. 66866, 66886-87.

The species' distribution is "limited and patchy" (AmphibiaWeb 2010). Scientists consider water quality degradation, aquifer loss, and small population numbers as threats to the species (Listing Factors A, E) (Hammerson and Chippindale 2004). Moreover, given that climate change is leading to more extended and severe droughts within this species' range, climate change should be considered an additional threat (Listing Factor E). FWS should consider recent reports that discuss climate change effects in the U.S. during the status review for this species.

The Texas Comprehensive Wildlife Conservation Strategy enumerates many threats to this species, which FWS should consider during its status review (TPWD 2005). In addition, because it lacks either state or federal protection, FWS should consider inadequacy of regulatory mechanisms as a threat to the Texas Salamander (Listing Factor D).

This highly endangered salamander should be promptly listed under the ESA.

Fishes (9 species)

7. **Arkansas River Speckled Chub** or **Peppered Chub** (*Macrhybopsis tetranema*) is a fish ranked by scientists as critically imperiled. It is native to the upper Arkansas River drainage in Oklahoma, Kansas, Texas, New Mexico, and Colorado. However, it has been extirpated from 90% of its historic range. It currently exists in only two river areas: the Ninnescah River and association portion of the Arkansas River in Kansas and the South Canadian River between Ute and Meredith reservoirs in New Mexico and Texas. Scientists describe threats as dewatering of streams, groundwater depletion, dams and other diversions, with resultant loss and fragmentation of habitat. Drought and pollution (from oil development, feedlots,

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and pesticides) are additional threats (NatureServe 2009). Scientists recommend reestablishment of the species to the Cimarron River and upper Salt Fork of the Arkansas River. *Id.* In its 90-day finding, FWS recognized potential threats to this species from habitat loss and degradation due to water impoundment and diversion projects, and other natural or manmade factors restricting recolonization (Listing Factors A and E). 74 Fed. Reg. 66866, 66887.

This chub is listed as endangered by the state of Kansas. Kansas issued a recovery plan for the species in 2005 (Layher and Brinkman 2005). The plan reports threats to the species as: habitat degradation from irrigation and reservoir construction, dewatering, pollution, drought, and inability to recolonize areas due to obstructions. It describes the two extant populations as widely disjunct and states,

The Texas-New Mexico population will likely be extirpated. Hemmed in by two reservoirs, it is in danger of being decimated by a severe drought. If flows in the South Canadian River fall below sustainable levels the peppered chub will be extirpated since reestablishing populations are blocked by reservoirs, dams, and long distances. *Id.* at pp. 4-5.

Regarding the Kansas population, which these scientists consider more viable, Layher and Brinkmann (2005: 5) write, “if water levels in the Arkansas, South Fork Ninescah, and Ninescah River systems are not maintained to provide sufficient habitat, these fish could also be lost.” Hubbs et al. (2008: 21) describe the species as “apparently declining throughout much of its natural range.”

Scientists describe this species as closely associated with the Arkansas River Shiner (*Notropis girardi*), which is listed as threatened under the ESA. Not only do these fish share habitat, they share threats. FWS should therefore consider the threats it recognizes for the Arkansas River Shiner in its status review for the Arkansas River Speckled Chub, including aquifer depletion, channel modification, pollutants, inadequate regulatory mechanisms, and other factors (Listing Factors A, D, and E) (USFWS 1998, 2009). However, Wilde et al. (2001) found that the chub may be more vulnerable than the shiner to drought, as isolation in pools appeared to cause more stress for the chub.

FWS should consider drought a threat to the chub, as well as the likelihood of more extended, severe droughts due to climate change (Listing Factor E) (Xenopoulos et al. 2005; Karl et al. 2008, 2009). The Texas Comprehensive Wildlife Conservation Strategy enumerates many threats to this species, which FWS should consider during its status review (TPWD 2005).

The Arkansas River Speckled Chub was formerly a Category-2 candidate for ESA listing but was removed from the list along with over 2,000 other species in 1996. 59 FR 58982. Listing of this species under the ESA is long overdue.

8. **Chihuahua Catfish** (*Ictalurus sp. 1*) is a fish ranked by scientists as critically imperiled or imperiled. It occurs in the Rio Grande from New Mexico, south to Texas and Mexico

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(NatureServe 2009). In its 90-day finding, FWS recognized potential threats to this species from habitat loss and degradation due to pollution, dewatering, and non-native species (Listing Factor A). 74 Fed. Reg. 66866, 66887.

Hubbs et al. (2008: 29) describe this species as:

Restricted to the Rio Grande basin from New Mexico south through Texas and into Mexico as far as the Río San Fernando. In Texas, this undescribed species was native to the Rio Grande and Big Aguja Creek (Davis Mountains) in west Texas. Irrigation and indiscriminant stockings of *I. punctatus* were likely factors in its extirpation from the state. It may still occur in the ríos Conchos, Salado and San Fernando in Mexico. Freshwater. Special Concern.

FWS should consider drought and climate change as an additional threat (Listing Factor E), given the threat posed to this catfish by dewatering and extended droughts in its range (Xenopoulos et al. 2005; Karl et al. 2008, 2009). The Texas Comprehensive Wildlife Conservation Strategy enumerates many threats to this species, which FWS should consider during its status review (TPWD 2005). In Texas, its designation is Special Concern. The lack of state or federal protections for this species render it threatened by inadequate regulatory mechanisms (Listing Factor D).

The Chihuahua Catfish was formerly a Category-2 candidate for ESA listing but was removed from the list along with over 2,000 other species in 1996. 59 FR 58982. Listing of this species under the ESA is long overdue.

9. **Nueces Shiner** (*Cyprinella sp. 2*) is a fish ranked by scientists as critically imperiled or imperiled. It is restricted to the Nueces River, Texas. Threats include dewatering, habitat degradation from cattle grazing, and possible pollution from pesticides and other agricultural chemicals (NatureServe 2009). According to scientists, it has “[d]eclined appreciably since 1975-1980.” *Id.* Warren et al. (2000) consider this species to be vulnerable. In its 90-day finding, FWS recognized potential threats to this species from habitat loss and degradation due to reduced water flow, livestock grazing, and pollution (Listing Factor A). 74 Fed. Reg. 66866, 66887.

This species is designated of Special Concern in Texas. Given the lack of state or federal protections, inadequate regulatory mechanisms (Listing Factor D) should be considered a threat. An additional threat is its narrow range, given its limitation to the Nueces River (Listing Factor E). Given that FWS recognizes reduced water flow as a threat, it should further recognize drought and climate change (Listing Factor E) as threats (Xenopoulos et al. 2005; Karl et al. 2008, 2009). The Texas Comprehensive Wildlife Conservation Strategy enumerates many threats to this species, which FWS should consider during its status review (TPWD 2005).

Given the long list of threats this narrowly distributed fish faces, it should be promptly listed under the ESA.

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10. **Pecos Pupfish** (*Cyprinodon pecosensis*) is a fish ranked by scientists as critically imperiled. Its range is much reduced, and it is now restricted to limited areas within the Pecos River in New Mexico and Texas. Scientists report only a few unhybridized populations and few occurrences that are properly managed (NatureServe 2009). It is ranked by IUCN as critically endangered (Giminez 1996). Scientists have recognized threats from hybridization with Sheepshead Minnow (*C. variegatus*); piscicides; dewatering from damming and groundwater pumping; habitat degradation; pollution from oil spills; predatory fishes; algal blooms; and large-scale fish kills (NatureServe 2009). In its 90-day finding, FWS recognized potential threats to this species from habitat loss and degradation due to water quality and quantity issues (Listing Factor A) and hybridization with the Sheepshead Minnow (Listing Factor E). 74 Fed. Reg. 66866, 66887-88.

There is a federal/state conservation agreement for this species. As FWS notes, the agreement expired in 2004 and has not been renewed. *Id.* FWS should consider inadequate regulatory mechanisms (Listing Factor D) as a threat to this pupfish. Climate change and drought are additional potential threats (Listing Factor E) (Xenopoulos et al. 2005; Karl et al. 2008, 2009). The Texas Comprehensive Wildlife Conservation Strategy enumerates many threats to this species, which FWS should consider during its status review (TPWD 2005).

Hubbs et al. (2008) describe this species as “nearly extirpated in Texas,” citing hybridization with *C. variegatus* as the cause. Boeing and Swaim (2007) write that the only non-hybridized populations of the Pecos Pupfish in significant concentrations are on Bitter Lake National Wildlife Refuge in New Mexico. FWS should therefore consider small population size and restricted range as a threat to this species (Listing Factor E).

This fish faces a litany of threats. While conservation agreements can provide protections for species on the brink, they cannot be used as a substitute for listing. ESA protection for the Pecos Pupfish should come swiftly.

11. **Plateau Shiner** (*Cyprinella lepida*) is a fish ranked by scientists as critically imperiled or imperiled. It occurs only in the Frio and Sabinal rivers in central Texas. According to scientists it has “declined appreciably over the past two decades.” Threats are habitat alteration, dewatering, cattle grazing, and stream pollution from agricultural chemicals (NatureServe 2009). Warren et al. (2000) consider this species to be vulnerable. In its 90-day finding, FWS recognized potential threats to this species from habitat loss and degradation due to dewatering, livestock grazing, and stream pollution (Listing Factor A). 74 Fed. Reg. 66866, 66888.

This species is ranked by Texas as Special Concern (Hubbs et al. 2008). The Texas Comprehensive Wildlife Conservation Strategy enumerates many threats to this species, which FWS should consider during its status review (TPWD 2005). The lack of state or federal protection should be considered a threat from inadequate regulatory mechanisms (Listing Factor D).

Edwards et al. (2004) discuss the decline of this species in past decades. Climate change and drought are additional potential threats (Listing Factor E) FWS should consider (Xenopoulos

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et al. 2005; Karl et al. 2008, 2009). The Texas Comprehensive Wildlife Conservation Strategy enumerates many threats to this species, which FWS should consider during its status review (TPWD 2005).

This fish is declining and faces multiple threats. It should be promptly listed under the ESA.

12. **San Felipe Gambusia** (*Gambusia clarkhubbsi*) is a fish ranked by scientists as critically imperiled. It is found in only one creek, San Felipe Creek, in Del Rio, Texas. Its habitat has been modified for bank stabilization, flood control, public access, road bridges, and diversion for irrigation. Potential threats to water quality include use of fertilizers and other chemicals for golf course and other adjacent land uses. Additional threats include groundwater depletion and non-native fish species that may prey on, compete, or hybridize with this gambusia (NatureServe 2009). In its 90-day finding, FWS recognized potential threats to this species from habitat loss and degradation due to development and pollution (Listing Factor A). 74 Fed. Reg. 66866, 66888.

WildEarth Guardians' staff visited San Felipe Creek in 2009 and observed people fishing in the very stream where the San Felipe Gambusia occurs, despite a sign indicating that fishing was not allowed. FWS should consider whether fishing (Listing Factor B) and the possible lack of enforcement of fishing prohibitions (Listing Factor D) are threats to this species. FWS should further consider its restricted range (Listing Factor E) to be a threat to this species. Climate change and drought are additional potential threats (Listing Factor E) FWS should consider (Xenopoulos et al. 2005; Karl et al. 2008, 2009). The Texas Comprehensive Wildlife Conservation Strategy enumerates many threats to this species, which FWS should consider during its status review (TPWD 2005).

The San Felipe Gambusia co-occurs with the Devils River Minnow in San Felipe Creek. FWS should consider whether threats to the Devils River Minnow, as detailed in its recovery plan (USFWS 2005), also imperil the San Felipe Gambusia. Examples are threats to water quality and quantity, habitat destruction, and non-native fishes (such as armored catfish, which are now found in San Felipe Creek) (Listing Factors A and C).

We are pleased that FWS is conducting a status review on this species. We believe the San Felipe Gambusia deserves federal listing.

13. **Toothless Blindcat** (*Trogloglanis pattersoni*) is a fish ranked by scientists as critically imperiled or imperiled. This species is the only member of its genus and is described as a “[h]ighly distinctive valid taxon.” It occurs only in subterranean waters of the San Antonio Pool, within the Edwards Aquifer in Texas. It has only one occurrence, which is not appropriately protected or managed. Threats include aquifer depletion and pollution. (NatureServe 2009). The species is designated vulnerable by the IUCN (Gimenez 1996). Warren et al. (2000) consider this species to be endangered. In its 90-day finding, FWS recognized potential threats to this species from habitat loss and degradation due to water drawdown and pollution (Listing Factor A) as well as competition (Listing Factor E). 74 Fed. Reg. 66866, 66888.

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Scientists describe threats to the species as substantial and of high severity. Aquifer depletion is an important threat (NatureServe 2009). Scientists write that, “Depletion of the aquifer poses a threat to the toothless blindcat by possibly allowing the poor-quality anaerobic water of the ‘bad water’ zone to replace good-quality water where the fish now resides” (Longley, cited in NatureServe 2009). In addition, NatureServe (2009) states that the Toothless Blindcat may be preyed upon by the Widemouth Blindcat (discussed above). FWS should therefore consider the threat from predation (Listing Factor C).

In its finding, FWS mentioned the rapidly expanding human population in San Antonio, Texas, with consequent increased water (aquifer) demands. 74 Fed. Reg. 66866, 66888. This should be considered a threat under Listing Factor E. See graph under entry for *Ursia furtiva*, below, which shows exponential human population growth in this area. Climate change and drought are additional potential threats (Listing Factor E) FWS should consider (Xenopoulos et al. 2005; Karl et al. 2008, 2009). The Texas Comprehensive Wildlife Conservation Strategy enumerates many threats to this species, which FWS should consider during its status review (TPWD 2005).

This species is listed as threatened in the state of Texas, but this does not provide shields for its habitat (Hubbs et al. 2008). In light of the many threats it faces to its habitat, the lack of state or federal regulatory protections indicate the species is threatened by inadequate regulatory mechanisms (Listing Factor D).

With only one occurrence and multiple threats, this fish deserves prompt ESA listing. It could be listed in the same listing rule as the Widemouth Blindcat.

14. **White Sands Pupfish** (*Cyprinodon tularosa*) is a fish ranked by scientists as critically imperiled. It is restricted to a four isolated spring systems in the Tularosa Basin in New Mexico (NatureServe 2009). This species is ranked by IUCN as Vulnerable (Gimenez 1996). In its 90-day finding, FWS recognized potential threats to this species from exotic ungulates, missile-firing, water withdrawal, and non-native tamarisk (Listing Factor A). 74 Fed. Reg. 66866, 66888-89.

Scientists describe threats as habitat alteration, dewatering, exotic fishes, and extremely limited range (NatureServe 2009). NatureServe (2009) states:

Threats have been reduced by implementation of a conservation agreement involving all appropriate agencies, but extremely limited range extent and area of occupancy makes this species vulnerable to extinction from natural and anthropogenic causes (White Sands Pupfish Conservation Team 2006, cited in NatureServe 2009).

As such, FWS should consider the “extremely limited range” (NatureServe 2009) of this species as a threat (Listing Factor E). Introductions of non-native species such as mosquitofish and crayfish would be harm this species (Rogowski and Stockwell 2006, cited in NatureServe 2009) (Listing Factor C). Climate change and drought are additional potential threats (Listing Factor E) FWS should consider (Xenopoulos et al. 2005; Karl et al. 2008, 2009).

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FWS notes that an interagency agreement for this species was issued in 2006. 74 Fed. Reg. 66866, 66889. In 2003, FWS developed a policy for evaluating whether a conservation plan provides a basis for not listing a species under the ESA, or for listing it as threatened versus endangered species, called its “Policy for Evaluation of Conservation Efforts When Making Listing Decisions” or “PECE” 68 Fed. Reg. 15100-15115. Using PECE’s criteria, the White Sands Pupfish agreement (White Sands Pupfish Plan 2006) is not a substitute for ESA listing. It does not provide assured funding (See reference to “Subject to the availability of funds” at p. 4 and “This instrument is neither a fiscal nor a funds obligation document. Nothing in this Agreement shall obligate any party to obligate or transfer any funds” at p. 11). Nor is it certain to prevent current and future threats to the species. For example, it allows some vehicular activity within the pupfish’s range. In addition, the agreement may be terminated by any of the signatories upon 30 days notice. FWS should therefore consider inadequacy of regulatory mechanisms (Listing Factor D) as a threat to the White Sands Pupfish.

This range-restricted fish faces multiple threats and should be provided with prompt federal protection. Conservation plans are not an adequate substitute for ESA listing.

15. **Widemouth Blindcat** (*Satan eurystomus*) is a fish ranked by scientists as critically imperiled or imperiled. This species is the only member of its genus and is described as a “[h]ighly distinctive valid taxon.” It occurs only in subterranean waters of the San Antonio Pool, within the Edwards Aquifer in Texas. It has only one occurrence (NatureServe 2009). This species is ranked by IUCN as Vulnerable (Gimenez 1996). Warren et al. (2000) consider this species to be endangered. In its 90-day finding, FWS recognized potential threats to this species from habitat loss and degradation due to water drawdown and pollution (Listing Factor A) as well as competition (Listing Factor E). 74 Fed. Reg. 66866, 66889.

In its finding, FWS mentioned the rapidly expanding human population in San Antonio, Texas, with consequent increased water (aquifer) demands. 74 Fed. Reg. 66866, 66888. This should be considered a threat under Listing Factor E, as discussed in Toothless Blindcat and *Ursia furtiva* entries in these comments. Climate change and drought are additional potential threats (Listing Factor E) FWS should consider (Xenopoulos et al. 2005; Karl et al. 2008, 2009). The Texas Comprehensive Wildlife Conservation Strategy enumerates many threats to this species, which FWS should consider during its status review (TPWD 2005).

This species is listed as threatened in the state of Texas (Hubbs et al. 2008). This designation does not provide protection for the species habitat. The lack of state or federal regulatory protections indicate the species is threatened by inadequate regulatory mechanisms (Listing Factor D).

With only one occurrence and multiple threats, this fish deserves prompt ESA listing. It could be listed in the same listing rule as the Toothless Blindcat.

Mollusks
(20 species)

16. **Louisiana Pigtoe** (*Pleurobema riddellii*) is a mussel ranked by scientists as critically imperiled or imperiled. It was historically known from the San Jacinto and Trinity rivers in Texas, east through the Neches and Sabine river systems, to the Red River and Bayou Pierre of north-central Louisiana. Scientists describe it as generally rare and estimate declines at 50-75%. In Texas, only 2 living and 2 recently dead shells have been found in the past decade; in Louisiana, no recent individuals have been found, with one possible exception in Rapides County (NatureServe 2009). Williams et al. (2003) consider this species to be of special concern. In its 90-day finding, FWS recognized potential threats to this species from habitat loss and degradation due to general habitat modification, siltation, impoundments and water pollution (Listing Factor A). 74 Fed. Reg. 66866, 66889.

Scientists describe the following threats: timber cutting, sand and gravel removal, and general habitat modification (NatureServe 2009). FWS should also consider the very small number of known extant populations as a threat (Listing Factor E). The Texas Comprehensive Wildlife Conservation Strategy enumerates many threats to this species, which FWS should consider during its status review (TPWD 2005).

This species is listed as threatened by the state of Texas. This designation does not provide protection for the species' habitat. The lack of state or federal regulatory protections indicate the species is threatened by inadequate regulatory mechanisms (Listing Factor D).

Howells (2009) recommends listing this species as federally endangered. Where NatureServe information conflicts with Howells (2009), FWS should rely on the latter.

We urge prompt listing of this mussel, which could be jointly listed with the nine mussels for FWS issued positive petition findings on December 15, 2009. 74 Fed. Reg. 66260-71.

17. **Sangre de Cristo Peaclam** (*Pisidium sanguinichristi*) is a clam ranked by scientists as critically imperiled. It is known from a single cirque lake (Middle Fork Lake) in Taos County, New Mexico. The lake is less than 6 hectares, and the total population estimate for this species is less than 1,000 individuals. A survey of eight other nearby lakes failed to find the species (NatureServe 2009). According to the New Mexico Department of Game and Fish (which petitioned for this species to be federally listed in 1985), "This peaclam can be considered the most narrowly restricted of all known North American pisidia and perhaps worldwide" (Lang 2002, cited in NMDGF 2008). In its 90-day finding, FWS recognized potential threats to this species from habitat loss and degradation due to water pollution (Listing Factor A). 74 Fed. Reg. 66866, 66889-90.

Scientists have identified the following potential threats: mining (common in the area), water pollution, dewatering due to nearby skiing and human population increase (NatureServe 2009). NMDGF (2008) report threats from recreation, shoreline destabilization, contamination from chemicals used in fish stocking and fire suppressants, fire, drought, invasive species, and climate change. Effects of climate change relevant to this species are

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discussed by Xenopoulos et al. (2005); Karl et al. (2008, 2009); and (Enquist and Gori 2008). FWS should consider all of these threats during the course of its status review for this species.

This species is listed as threatened by the state of New Mexico. This designation does not provide protection for the species habitat. The lack of state or federal regulatory protections indicate the species is threatened by inadequate regulatory mechanisms (Listing Factor D).

This species was previously a Category-2 candidate for ESA listing, until FWS removed it and more than 2,000 other species from the candidate list in 1996. It's time to list it under the ESA, without further delay.

18. **Southern Purple Lilliput** (*Toxolasma corvunculus*) is a mussel ranked by scientists as critically imperiled. It is known from limited areas in Georgia and Alabama. Scientists consider it to be “very rare within its limited range” with global long-term declines of 25-75%. Most alarming, it has not been seen in several years. It likely only exists in small, localized populations (NatureServe 2009). In its 90-day finding, FWS recognized potential threats to this species from habitat loss and degradation due to impoundments and poor water quality (Listing Factor A). 74 Fed. Reg. 66866, 66890.

Scientists consider limited distribution, rarity, and reduction of habitat quality as threats to the species (NatureServe 2009). Part of this species' range overlaps that of three mollusks proposed for listing. 74 Fed. Reg. 31114. FWS should consider threats to the proposed mollusks as threats to the Southern Purple Lilliput and should list the Lilliput under the ESA as well.

19. **Triangle Pigtoe** (*Fusconaia lananensis*) is a mussel ranked by scientists as critically imperiled. It is described as a highly restricted endemic from the Neches and San Jacinto rivers in eastern Texas. Its populations have declined by 30-70% (NatureServe 2009). Williams et al. (1993) rank this as a species of Special Concern. In its 90-day finding, FWS recognized potential threats to this species from habitat loss and degradation due to sand deposition, and poor land and water management (Listing Factor A). 74 Fed. Reg. 66866, 66890-91.

The Texas Comprehensive Wildlife Conservation Strategy enumerates many threats to this species, which FWS should consider during its status review (TPWD 2005).

This species is listed as threatened by the state of Texas. This designation does not provide protection for the species habitat. The lack of state or federal regulatory protections indicate the species is threatened by inadequate regulatory mechanisms (Listing Factor D).

Given its range restriction, declines, and multiple threats, this mussel should be promptly listed under the ESA.

20. **Bylas Springsnail** (*Pyrgulopsis arizonae*) is a snail ranked by scientists as critically imperiled. It occurs in only a few sites in the Upper Gila River drainage in Graham County,

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Arizona (NatureServe 2009). In its 90-day finding, FWS recognized potential threats to this species from habitat loss and degradation due to water modification and livestock grazing (Listing Factor A). 74 Fed. Reg. 66866, 66891.

Scientists describe the following threats: groundwater depletion; climate change; drought; water developments, including pond construction; habitat degradation from livestock grazing; pollution; restricted geographic distribution, and consequent potential for extinction from stochastic events (AZGFD 2006; NatureServe 2009). The Arizona Game and Fish Department (2003) recommends fencing to protect springs from livestock grazing, along with other conservation measures (AZGFD 2006). The State of Arizona considers this snail to be a Species of Greatest Conservation Need. *Id.* FWS should therefore consider this species to be threatened under at least three listing factors: Listing Factors A, D, and E.

This species was previously a Category-2 candidate for ESA listing, until FWS removed it and more than 2,000 other species from the candidate list in 1996. It should be promptly listed under the ESA.

21. **Cooke's Peak Woodlandsnail** (*Ashmunella macromphala*) is a snail ranked by scientists as critically imperiled. It is known only from two rockslides on Cook's Peak in Luna County, New Mexico; and an isolated population in OK Canyon in northern New Mexico. It occupies less than 100 acres. Scientists describe it as declining (NatureServe 2009). In its 90-day finding, FWS recognized potential threats to this species from habitat loss and degradation due to fire, rockslides, and mining (Listing Factor A) and climate change (Listing Factor E). 74 Fed. Reg. 66866, 66891.

Scientists describe the following threats: drought and climate change; mining; livestock grazing; wildfire; logging; prescribed burning (NMDGF 2008; NatureServe 2009). In particular, its currently narrow range is attributed to drying climate:

Range contraction is attributed to drying of the climate since the Pleistocene (Metcalf and Smartt, 1997) and suggests that the range will continue to contract with continued warming of the climate (NatureServe 2009).

See Karl et al. (2008, 2009); Enquist & Gori (2008) for descriptions of climate change effects in southwestern U.S. and New Mexico.

This snail is listed as endangered by the state of New Mexico. This designation does not provide protection for its habitat, however. This species was previously a Category-2 candidate for ESA listing, until FWS removed it and more than 2,000 other species from the candidate list in 1996. FWS should therefore consider it threatened by inadequate regulatory mechanisms (Listing Factor D). FWS should list it under the ESA.

22. **Dona Ana Talussnail** (*Sonorella todsoni*) is a snail ranked by scientists as critically imperiled. It is known only from 2 small sites (on the north and east slopes) in the Dona Ana Mountains. There are likely fewer than 1,000 individuals that likely occupy only 1 acre. Scientists describe it as declining (NatureServe 2009). In its 90-day finding, FWS

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recognized the potential threat to this species from climate change (Listing Factor E). 74 Fed. Reg. 66866, 66891-92.

This species is designated as threatened by the state of New Mexico. In addition, its habitat is included within a Bureau of Land Management Area of Critical Environmental Concern (ACEC), which scientists recommend reviewing for adequacy in addressing habitat threats (NatureServe 2009). ACECs do not provide a valid substitute for ESA listing, as their management prescriptions or enforcement may be deficient vis-à-vis this species. In addition, ACECs can be terminated with amendments to land management plans.

More importantly, as FWS recognizes, this species is threatened by climate change, which the ACEC does not address. As scientists write,

Range contraction is attributed to drying of the climate since the Pleistocene and suggests that the range will continue to contract with continued warming of the climate (NatureServe 2009).

This species therefore merits ESA listing under Listing Factor E. In addition, NMDGF (2008) recognizes threats from restricted range, easy public access, fragile habitat, and shrub removal (Listing Factors A and E).

The Dona Ana Talussnail species was previously a Category-2 candidate for ESA listing, until FWS removed it and more than 2,000 other species from the candidate list in 1996. With such a small global population, limited range and multiple threats, this snail should be afforded protections under the ESA.

23. **Gila Tryonia** (*Tryonia gilae*) is a snail ranked by scientists as critically imperiled. It occurs only in the Upper Gila River basin in Graham County, Arizona (NatureServe 2009). In its 90-day finding, FWS recognized the potential threat to this species from habitat loss and degradation due to groundwater depletion and reduction of spring flows (Listing Factor A). 74 Fed. Reg. 66866, 66892.

FWS should consider an additional threat to be its restricted range, which makes it vulnerable to extinction from stochastic events (Listing Factor E). The Arizona Game and Fish Department (2003) considers the following to be threats: “restricted distribution with associated potential for extinction due to chance events; groundwater depletion, reduction of spring flow.” Other threats include: water diversions and catchments, and pollution (AZGFD 2006). This agency advocates a number of conservation measures to protect this snail’s spring sources, as well as monitoring and research. *Id.* The State of Arizona considers this snail to be a Species of Greatest Conservation Need (AZGFD 2006).

Moreover, FWS should consider the threat to the snail’s habitat and the snail from climate change (Listing Factor E). *See* Karl et al. 2008, 2009 for descriptions of climate change effects in the southwestern U.S.

FWS should therefore consider this species as threatened by at least three listing factors: A,

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D, and E.

This snail was previously a Category-2 candidate for ESA listing, until FWS removed it and more than 2,000 other species from the candidate list in 1996. It's time to finally grant it federal protection.

24. **Grand Wash Springsnail** (*Pyrgulopsis bacchus*) is a snail ranked by scientists as critically imperiled. It is found only within the Grand Wash in Mohave County, Arizona; and possibly in extreme southeastern Nevada (AZGFD 2001; NatureServe 2009). It is ranked by IUCN as vulnerable (Mollusc Specialist Group 2000). In its 90-day finding, FWS recognized the potential threat to this species from habitat loss and degradation due to groundwater depletion, loss of spring flows, and livestock use (Listing Factor A). 74 Fed. Reg. 66866, 66892.

The IUCN cites threats to the species from habitat disturbance and restricted range (Listing Factors A and E) (Mollusc Specialist Group 2000). The Arizona Game and Fish Department (2001; 2006) recognizes threats to the snail from: groundwater depletion, loss of spring flows, water diversions and catchments, climate change, drought, pollution, and habitat degradation from livestock use. This agency recommends protecting its sites from livestock and other conservation measures. *Id.* The State of Arizona considers this snail to be a Species of Greatest Conservation Need (AZGFD 2006).

Moreover, FWS should consider the threat to the snail's habitat and the snail from climate change (Listing Factor E). *See* Karl et al. 2008, 2009 for descriptions of climate change effects in the southwestern U.S.

FWS should therefore consider this species as threatened by at least three listing factors: A, D, and E.

This snail was previously a Category-2 candidate for ESA listing, until FWS removed it and more than 2,000 other species from the candidate list in 1996. It's time to finally grant it federal protection.

25. **Huachuca Woodlandsnail** (*Ashmunella levettei*) is a snail ranked by scientists as critically imperiled or imperiled. It is known from Arizona and New Mexico (NatureServe 2009). In its 90-day finding, FWS recognized the potential threat to this species from inbreeding (Listing Factor E). 74 Fed. Reg. 66866, 66892.

The type locality for this species is Tanner's Canyon in the Huachuca Mountains in Cochise County, Arizona (Mollusk Type Locality Database 2010).

26. **Kingman Springsnail** (*Pyrgulopsis conica*) is a snail ranked by scientists as critically imperiled. Its only known locations are Dripping, Cool, and Burns Springs in the Black Mountains in Mohave County, Arizona (NatureServe 2009; AZGFD 2010). In its 90-day finding, FWS recognized the potential threat to this species from habitat loss and degradation due to groundwater depletion, loss of spring flows, and development (Listing Factor A). 74

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Fed. Reg. 66866, 66892-93.

The Arizona Game and Fish Department cites threats from: restricted geographic distribution with associated potential for extinction due to chance events; human development; groundwater depletion with loss of spring flow; water diversions and catchments; climate change; drought; and pollution (AZGFD 2003; 2006). FWS should therefore consider Listing Factors A, D, and E as threats. The State of Arizona considers this snail to be a Species of Greatest Conservation Need (AZGFD 2006).

Given its range restriction and multiple threats, this snail deserves federal protection.

27. **Mimic Cavesnail** (*Phreatodrobia imitata*) is a snail ranked by scientists as critically imperiled. It is known only from two wells in the Edwards Aquifer in Texas (NatureServe 2009; TPWD). This snail is ranked by the IUCN as vulnerable (Bogan 1996). In its 90-day finding, FWS recognized the potential threat to this species from habitat loss and degradation due to groundwater withdrawal and groundwater contamination (Listing Factor A). 74 Fed. Reg. 66866, 66893.

This cavesnail could likely be included in a multiple-species ESA listing rule for Edwards Aquifer species.

28. **Mineral Creek Mountainsnail** (*Oreohelix pilsbryi*) is a snail ranked by scientists as critically imperiled. It is known from a single occurrence on a single limestone outcrop along Mineral Creek in the Black Range on the Gila National Forest in Sierra County, New Mexico (NatureServe 2009). In its 90-day finding, FWS recognized the potential threat to this species from habitat loss and degradation due to habitat disturbance (Listing Factor A). 74 Fed. Reg. 66866, 66893.

Scientists describe the following as threats to this species: narrow range, mining, fire, rockslides, and climate change (NatureServe 2009). Regarding climate change, scientists write:

Range contraction is attributed to drying of the climate since the Pleistocene, which suggests that the range will continue to contract with continued warming of the climate. *Id.*

The total area it occupies is likely less than 1 acre. *Id.* The New Mexico Department of Game and Fish describes threats as follows:

Considering this species apparent affinity for moist soils on well-shaded north- and east-facing slopes, any form of canopy removal, whether by cutting or forest fire, would likely dry the forest floor and potentially render edaphic condition unsuitable to *O. pilsbryi*. This species is vulnerable to any form of soil disturbance or mining activity within the immediate vicinity of occupied habitat. While cattle may not graze regularly at the type locality, cows do travel the narrow stream corridor and rest along shaded canyon walls. Soil disturbance from such foot traffic and trampling could adversely affect *O. pilsbryi* if downstream grazing intensity increases so as to push

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cattle into marginal habitats upstream in search of forage (NMDGF 1988, Lang 2001, cited in NMDGF 2008).

FWS should consider all of the above threats to this species under at least three listing factors: A, D, and E.

This snail is listed as threatened by New Mexico (NMDGF 2008). This designation does not provide protection for its habitat, however. This snail was previously a Category-2 candidate for ESA listing, until FWS removed it and more than 2,000 other species from the candidate list in 1996. It is time to provide it with federal protection.

29. **Pecos Springsnail** (*Pyrgulopsis pecosensis*) is a snail ranked by scientists as critically imperiled. It is known only from Blue Spring, in the Black River watershed in Eddy County, New Mexico. It occurs on less than 3 stream miles. The species historically occurred at Castle Spring, but was extirpated from that location (NatureServe 2009). In its 90-day finding, FWS recognized the potential threat to this species from habitat loss and degradation due to dewatering, pollution, and flood scouring (Listing Factor A). 74 Fed. Reg. 66866, 66893.

Scientists cite threats from water diversions and impoundments, groundwater pumping, livestock grazing, drought, water contamination, non-native species, and other threats (NMDGF 2008; NatureServe 2009).

This snail is listed as threatened by New Mexico (NMDGF 2008). This designation does not provide protection for its habitat, however. This species was previously a candidate for ESA listing, but FWS removed it from the candidate list in 1996 on the basis that it was more abundant and widespread than previously thought. 40 Fed. Reg. 7596, 7608. Writes the New Mexico Department of Game and Fish (2008: 28):

Acquisition of Blue Spring surface water rights (72-5-28 NMSA 1995) and the ‘...lack of oil and gas reserves in the area...’ prompted reclassification of *P. pecosensis* from a candidate for listing under the Endangered Species Act to a species of concern (Federal Register 1996). The acquisition of surface water rights from Blue Spring was a temporary state lease. Contrary to this reclassification, the Black River valley has experienced repeated problems of ground water depletion and contamination.

Despite FWS’s removal of the species from the candidate list in 1996 on the basis of its “abundance,” this species continues to have an extremely narrow range and is subject to a multitude of threats within that range. It should therefore be promptly listed under the ESA.

30. **Pinaleno Talussnail** (*Sonorella grahamensis*) is a snail ranked by scientists as critically imperiled. It is known only from rockslides from the northeast slope of Mount Graham, south to the vicinity of Arcadia Campground in the Pinaleno Mountains in Graham County, Arizona (AGFD 2003; NatureServe 2009). In its 90-day finding, FWS recognized the potential threat to this species from habitat loss and degradation due to fire (Listing Factor

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A). 74 Fed. Reg. 66866, 66894.

In addition to the risk from fire, the Arizona Game and Fish Department cites threats from: logging, recreation, restricted and declining distribution with potential for extirpation by stochastic events, and replacement by the Mimic Talussnail (*S. imitator*) (AGFD 2003, 2006). FWS should therefore consider Listing Factors A, D, and E as threats. The State of Arizona considers this snail to be a Species of Greatest Conservation Need. *Id.*

This snail was previously a Category-2 candidate for ESA listing, until FWS removed it and more than 2,000 other species from the candidate list in 1996. It should be promptly listed under the ESA.

31. **Quitobaquito Tryonia** (*Tryonia quitobaquिताe*) is a snail ranked by scientists as critically imperiled. It is found only in the Quitobaquito Springs, in the Rio Sonoyta Basin in Pima County, Arizona (NatureServe 2009). In its 90-day finding, FWS recognized the potential threats to this species from habitat loss and degradation due to groundwater pumping and loss of free flowing water (Listing Factor A). 74 Fed. Reg. 66866, 66894.

This species is known to occur at only three sites and has been extirpated from portions of its range. *Id.* In addition to the risk from groundwater depletion and loss of free-flowing water, the Arizona Game and Fish Department cites threats from: unauthorized roads and trails, water use and contamination, altered river flows, streambank alteration and channelization, climate change, drought, invasive species, and restricted distribution and consequent vulnerability to extirpation by stochastic events (AGFD 2003, 2006). FWS should – at minimum - therefore consider Listing Factors A, D, and E as threats. The State of Arizona considers this snail to be a Species of Greatest Conservation Need. *Id.*

This snail was previously a Category-2 candidate for ESA listing, until FWS removed it and more than 2,000 other species from the candidate list in 1996. It should be promptly listed under the ESA.

32. **San Xavier Talussnail** (*Sonorella eremita*) is a snail ranked by scientists as critically imperiled. It is known from one location, San Xavier Hill, in the Mineral Hills in Pima County, Arizona. The land is privately owned (AGFD 2003; NatureServe 2009). In its 90-day finding, FWS recognized the potential threats to this species from habitat loss and degradation due to mining activities (Listing Factor A). 74 Fed. Reg. 66866, 66894.

State scientists: “There is only one population of this species and it is located in an area of growing urban development and active mining” (NatureServe 2009). In addition to the threat from mining, scientists cite development and over-collection as threats. *Id.* Arizona Game and Fish Department also describe the following threats: climate change, motorized vehicles, unauthorized roads and trails, restricted distribution and consequent potential for extinction due to stochastic events, herbicides, and predation by rodents (AGFD 2003, 2006). FWS should therefore consider Listing Factors A, B, D, and E as threats. The State of Arizona considers this snail to be a Species of Greatest Conservation Need. *Id.*

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Due to a September 1998 conservation agreement, a proposal to list this species was withdrawn by FWS in October 1998 (USFWS 1998). The withdrawal was inappropriate for many reasons: the conservation agreement was voluntary; its funding was not assured; and it was subject to termination by any of the parties with a 30-day notice (San Xavier Talussnail Conservation Agreement 1998). Its original term was ten years, but it was renewed for another ten years in May 2008. No changes were made to the original agreement. In addition, this agreement does not address the threat from climate changes and possibly other threats scientists and Arizona Game and Fish have recognized. This agreement does not meet the requirements of FWS's PECE policy and should not be used as a substitute for ESA listing.

33. **Squaw Park Talussnail** (*Maricopella allynsmithi*) is a snail ranked by scientists as critically imperiled. It is known only from Squaw Peak Park and Mummy Mountain in Maricopa County, Arizona (NatureServe 2009). In its 90-day finding, FWS recognized the potential threats to this species from habitat loss and degradation due to residential development and recreational activities (hiking and climbing off trails) (Listing Factor A). 74 Fed. Reg. 66866, 66894-95.

Arizona Game and Fish Department has recognized threats from: restricted range and consequent potential for extirpation due to stochastic events, habitat conversion, urban growth, and unauthorized roads and trails (AGFD 2006, 2009). FWS should therefore consider Listing Factors A, D, and E as threats. The State of Arizona considers this snail to be a Species of Greatest Conservation Need (AGFD 2006).

FWS should also consider the exponential human population growth in the Phoenix area as a threat to this species (Listing Factor E) (Figure 1), given that such population increase drives additional development and recreation pressure.

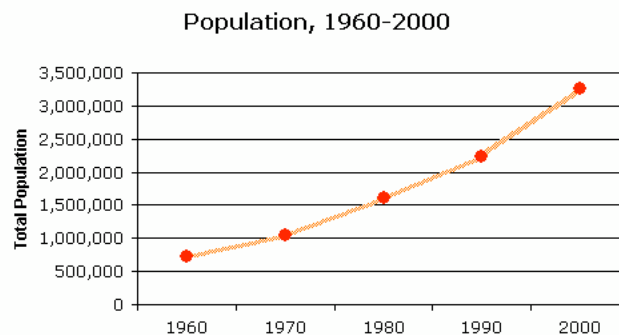


Figure 1: Human Population Growth in Phoenix, Arizona.

Source: http://www.censusscope.org/us/m6200/chart_popl.html [Accessed February 2010].

This snail was previously a Category-2 candidate for ESA listing, until FWS removed it and more than 2,000 other species from the candidate list in 1996. It should be promptly listed under the ESA.

34. **Verde Rim Springsnail** (*Pyrgulopsis glandulosa*) is a snail ranked by scientists as critically imperiled. It is known only from the Nelson Place Spring complex, which consists of 2

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springs separated by 150 m, which form Sycamore Creek's headwaters in Yavapai County, Arizona (NatureServe 2009). In its 90-day finding, FWS recognized the potential threats to this species from habitat loss and degradation due to water development and groundwater depletion (Listing Factor A). 74 Fed. Reg. 66866, 66895.

In addition to the threats recognized by FWS, the Arizona Game and Fish Department describes threats from: highly restricted geographic distribution with associated potential for extinction due to chance events, water diversions and catchments, climate change, drought, and pollution (AGFD 2003, 2006). Scientists write that no occurrences are appropriately protected and managed (NatureServe 2009). FWS should therefore consider Listing Factors A, D, and E as threats. The State of Arizona considers this snail to be a Species of Greatest Conservation Need (AGFD 2006).

This snail was previously a Category-2 candidate for ESA listing, until FWS removed it and more than 2,000 other species from the candidate list in 1996. It should be promptly listed under the ESA.

35. **Wet Canyon Talussnail** (*Sonorella macrophallus*) is a snail ranked by scientists as critically imperiled. It is known only from a 1-mile length within Wet Canyon in the Pinaleno Mountains in Graham County, Arizona (NatureServe 2009). In its 90-day finding, FWS recognized the potential threats to this species from habitat loss and degradation due to recreation and fire (Listing Factor A). 74 Fed. Reg. 66866, 66895.

Scientists describe threats as any disturbance that alters or removes talus, causes sedimentation, or depletes stream flow (NatureServe 2009). The Arizona Game and Fish Department describes threats from: highly restricted distribution with associated potential for extinction due to chance events, recreation, fire, potential removal or infilling of talus, habitat fragmentation or barriers, soil erosion, roads and motorized vehicles (AGFD 2004, 2006). In addition, the U.S. Forest Service indicates that its narrow distribution may be the result of a climatic drying trend (Wet Canyon Talussnail Conservation Assessment and Strategy 1999). Given the increased length and severity of droughts in the southwestern U.S. (Karl et al. 2008, 2009), FWS should therefore consider the threat from drought and climate change to this species (Listing Factor E). FWS indicated that the species' narrow distribution makes it particularly vulnerable to other threats (Listing Factor E) (USFWS 2007).

A conservation agreement for this species was signed by the U.S. Forest Service, FWS, and Arizona Game and Fish Commission in December 1999 (Wet Canyon Talussnail Conservation Agreement 1999). The duration of the agreement was 5 years. Any portion of the agreement can be cancelled by any party with 30 days notice. *Id.* Funding of the agreement is not assured; rather, the accompanying Conservation Assessment and Strategy (Wet Canyon Talussnail Conservation Assessment and Strategy 1999) states only that, "Cooperators in this agreement commit to seek funding sources to implement all aspects of this Conservation Agreement" (p. iii). This agreement does not meet the requirements of FWS's PECE policy and should not be used as a substitute for ESA listing. In addition, USFWS (2007) indicated that this agreement expired in 2004.

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This species was a candidate for ESA listing until it was removed due to the 1999 conservation agreement. 66 Fed. Reg. 54808, 54814. As USFS noted, as of 1999 there was adequate information to promulgate a listing proposal for this species (Wet Canyon Talussnail Conservation Assessment and Strategy 1999). This snail should be listed under the ESA without further delay.

Insects
(12 species)

36. **Colorado Tiger Beetle or Great Sand Dunes Tiger Beetle** (*Cicindela theatina*) is a terrestrial, predatory tiger beetle ranked by scientists as critically imperiled and facing “substantial, imminent” threats (NatureServe 2009). In its 90-day finding, FWS recognized the potential threats to this species from habitat loss and degradation due to off-site depletion of groundwater (Listing Factor A). 74 Fed. Reg. 66866, 66895-96.

This species occurs only in Great Sand Dunes National Monument. According to scientists, it is imperiled because it is:

A narrow endemic with only a single occurrence that, while protected on-site by the Great Sand Dunes National Monument, is seriously threatened by the continuing, and possibly increasing, depletion of ground water in the valley (NatureServe 2009).

FWS should therefore consider restricted range as an additional threat (Listing Factor E).

This species has only been encountered in shifting sand blowouts with early successional vegetation within this area (Rondeau et al. 1998, Rotger 1994). Pineda and Kondratief (2003) report a current range of 238.7 square km. The species requires permanent and relatively stable dunes and is associated with moist substrate microhabitats (B. Kondratief, pers. comm.). According to NatureServe (2009), “Most commonly burrows are on northern aspects of the crests of dune blowouts with more apparent vegetation, but sometimes on more barren sand (Pineda and Kontratieff (2002)).” Thus, the survival of larvae, which take two to three years to complete development, is probably the life stage in which individuals of this species is most imperiled. Their need for stable, and moist microhabitat is threatened:

Off-site depletion of ground water in the San Luis Valley is an imminent threat that is likely to change the hydrology of the sand dunes, possibly altering moisture gradients in the sand and decreasing the stability of the dunes themselves. Such effects would be detrimental to this species. (NatureServe 2009).

NatureServe (2009) cites an additional threat from trampling due to recreational use (Listing Factors A and E).

The current population is estimated to be between 1,000 and 10,000 individuals (NatureServe 2009). The Colorado Natural Heritage Program has this to say regarding information needs: “Need to determine the effects of altered hydrology and water development on the Great Sand Dunes ecosystem. The roles that fire and grazing play in this ecosystem also need to be

studied” (Rondeau et al. 1998: 3).

The Colorado Comprehensive Wildlife Conservation Strategy Report (2006), The Nature Conservancy’s Southern Rocky Mountain Assessment (2001), and Southern Rockies Wildlands Network Vision Report (2003) all cite human population growth and agricultural demand for water as threats to the region. Cooper et al. (2006) provide some data on the decreasing water table in the San Luis Valley. The abstract of the paper includes these results:

Evapotranspiration (ET) rates at the site were first measured in 1985–1987 (pre-drawdown) when the mean water table depth was 0.92 m. Regional ground water pumping has since lowered the water table by 1.58 m, to a mean of 2.50 m. We measured ET at the same site in 1999–2003 (post-drawdown), and assessed physical and biological factors affecting the response of ET to water table drawdown. Vegetation changed markedly from the pre-drawdown to the post-drawdown period as phreatophytic shrubs invaded former wetland areas, and wetland grasses and grass-like species decreased.

This study demonstrates both the significant drawdown of the water table in recent years, as well as associated vegetational changes, both of which could have an impact of the survival of the San Luis Valley tiger beetle. Recent acquisition by Great Sand Dunes of the water rights beneath the park is certainly beneficial, but agriculture and development surrounding the park affects the whole area.

Baumann (2001) provides a good history and shows the truly astonishing growth of agriculture in the area.

The limited range of this species coupled with the agricultural development and human population growth of the San Luis Valley puts this species at risk. Listing would help assure that it has the protection of its range and resources it needs to survive.

37. **Edwards Aquifer Diving Beetle** (*Haideoporus texanus*) is a beetle ranked by scientists as critically imperiled. It is a cave obligate beetle found only in the San Marcos pool of the Edwards Aquifer in Hays County, Texas (NatureServe 2009). In its 90-day finding, FWS recognized the potential threats to this species from habitat loss and degradation due to water drawdown and loss of water quality due to development (Listing Factor A). 74 Fed. Reg. 66866, 66895.

According to scientists, this species is critically imperiled due to limited range (only one site), threat of drawdown and loss of water quality. There are no good population estimates. This species is seen only when it is caught in the artesian waters, drawn to the surface, and sampled in nets. The Texas Comprehensive Wildlife Conservation Strategy enumerates many threats to this species, which FWS should consider during its status review (TPWD 2005).

Edwards Aquifer is used as a source of water by three large Texas cities. Population growth

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and development threaten flows and increase pollution in the area. Efforts to protect flows and water quality of the Edwards Aquifer have been ongoing since at least 1983. A brief history of the struggle is chronicled in Longley (2006: p. 51-55). Longley also lists aspects of the hydrology and current threats to the system that are not being adequately addressed:

- Less storage in aquifer (1ft of head = approx. 35,000 acre feet)
- Low flows of San Marcos Springs occur sooner during critical dry periods
- Greater potential for saline water intrusion during critical periods
- Historic lows vs. recent time (recharge & discharge)
- Increasing water use
- Aquifer storage & recovery
- Proposed policy to raise pumping caps
- Proposed policy to limit minimal pumping required during drought (pp. 56-57).

Notice that the San Marcos Springs, the only site known for *H. texanus*, is particularly threatened by drought. FWS should consider whether climate change will increase the magnitude of the danger of drought to this beetle (Karl et al. 2008, 2009) under Listing Factor E.

Progress is slow and conservation plans have been continually drafted and redrafted without being implemented (Hicks & Company/RECON 2005; Peace and Gulley 2009). According to Dr. Glenn Longley (personal communication), who has worked on the Edwards Aquifer for many years, as long as flow is maintained, there should be adequate water for the beetle. However, he feels that the threat of pollution, especially in recharge zones, some of which are exposed to heavy highway traffic, is a major threat. The aquifer is not adequately protected from oil, chemical, and other spills that occur along the highways.

There is a great need to put in place adequate protections for this aquifer. Several other species in these comments are also threatened by Edwards Aquifer drawdown. This species is vulnerable to a single pollution event or a sustained drought because it lacks adequate protections for the water flow in the springs. Although such protections have been discussed for over 15 years, listing of this species would help cement these plans and get them put into action. FWS should consider this species as imperiled under Listing Factors A and E.

38. **Ferris's Copper** (*Lycaena ferrisi*) is a butterfly ranked by scientists as critically imperiled or imperiled. It only occurs in the White Mountains of Apache County in Eastern Arizona (NatureServe 2009). In its 90-day finding, FWS recognized the potential threat to this species from fire suppression (Listing Factor A). 74 Fed. Reg. 66866, 66896.

Scientists indicate that this butterfly's small range (40-100 square miles) also threatens this species (NatureServe 2009). According to the Arizona Game and Fish Department (2002) there are only a few known populations. According to NatureServe (2009), it may have just one metapopulation. Its restricted range and small population numbers should be considered a threat under Listing Factor E.

It is found in mountain meadows near its food plant, *Rumex hymeospalus*. Coppers do not

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generally move much between patches, so the extinction of the butterflies in one location might well be permanent. According to Arizona Department of Game and Fish:

Fire suppression results in the invasion of meadow habitats and other openings by dense conifer forests. Eventual warm season intense fires could be overly intense and eliminate some populations or permanently alter previously suitable habitats. (AGFD 2002)

This species deserves to be listed because of its extremely restricted range and threats to its specialized habitat.

39. *Astylis sp. 1* is a notodontid moth (with no common name) ranked by scientists as critically imperiled. It is known from a single specimen and locality: on private land in Ash Canyon in the Huachuca Mountains in Cochise County, Arizona (NatureServe 2009). In its 90-day finding, FWS recognized the potential threat to this species from fire (Listing Factor A). 74 Fed. Reg. 66866, 66896.

Scientists indicate that it may be susceptible to extirpation from a single event (NatureServe 2009) (AGFD 2005). Private housing developments surround the private land on which the species occurs. An additional threat is fire. *Id.* FWS should consider Listing Factors A (fire, development) and E (restricted range) as threats to this moth.

This is the type of species that may go extinct while FWS waits for more information. Instead, we urge FWS to take a precautionary approach and list this moth.

40. *Heterocampa sp. 1 nr. amanda* is a notodontid moth (with no common name) ranked by scientists as critically imperiled or imperiled. It is known from Ash and Garden canyons in the Huachuca Mountains in Cochise County, Arizona and at 2 locations in the Atascosa Mountains (NatureServe 2009). In its 90-day finding, FWS recognized the potential threat to this species from fire (Listing Factor A). 74 Fed. Reg. 66866, 66896.

Scientists cite its limited range and the threat of fire as threats (Listing Factors A and E) (AGFD 2005). FWS should consider both listing factors in its status review.

This is the type of species that may go extinct while FWS waits for more information. Instead, we urge FWS to take a precautionary approach and list this moth.

41. *Litodonta sp. 1 nr. alpina* is a notodontid moth (with no common name) ranked by scientists as critically imperiled or imperiled. It is known only from Upper Pinery Canyon on the west slope of the Chiricahua Mountains in Cochise County, Arizona (NatureServe 2009). In its 90-day finding, FWS recognized the potential threat to this species from fire (Listing Factor A). 74 Fed. Reg. 66866, 66896.

Scientists cite its limited range and the threat of fire as threats (Listing Factors A and E) (AGFD 2005). FWS should consider both listing factors in its status review.

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This is the type of species that may go extinct while FWS waits for more information. Instead, we urge FWS to take a precautionary approach and list this moth.

42. *Ursia furtiva* is a notodontid moth (with no common name) ranked by scientists as critically imperiled or imperiled. This moth is known from 2 disjunct locations in Texas: San Antonio in Bexar County and Pine Canyon in Big Bend National Park. It may also occur at sites in between its known locations (NatureServe 2009). In its 90-day finding, FWS recognized the potential threats to this species from habitat loss and degradation due to fire and development (Listing Factor A). 74 Fed. Reg. 66866, 66897.

This moth relies on mixed and hardwood woodlands (NatureServe 2009). FWS recognizes the threat from development around San Antonio. Indeed human population growth in San Antonio has been exponential (Figure 2), which FWS should consider as a threat under Listing Factor E.

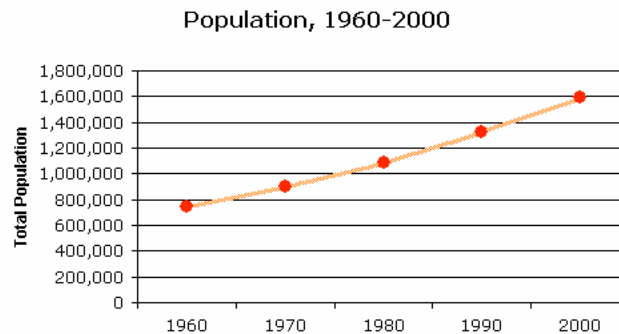


Figure 2: San Antonio Human Population Growth, 1960-2000.

Source: http://www.censusscope.org/us/m7240/chart_popl.html [Accessed February 2010].

Given the limited number of populations of this moth and the several threats it faces, it should be provided with prompt federal protection.

43. **Rattlesnake-master Borer Moth** (*Papaipema eryngii*) is a noctuid moth ranked by scientists as critically imperiled or imperiled. While it has a wide historic range, including portions of Arkansas, Illinois, Indiana, Iowa, Kentucky, North Carolina, and Oklahoma, scientists state that the species is “very reduced and widely scattered” (NatureServe 2009). In its 90-day finding, FWS recognized the potential threat to this species from fire (Listing Factor A), overutilization (Listing Factor B), and loss of genetic variability and inability to colonize former habitat (Listing Factor E). 74 Fed. Reg. 66866, 66897.

This moth is restricted to boring in the roots of a single host plant, rattlesnake master (*Eryngium yuccifolium*). This plant is restricted to mesic and wet mesic silt and sandy loam tall-grass prairie, a native habitat that is currently reduced to 0.1% of its original range (NatureServe 2009; Panzer 2009).

It is considered critically imperiled throughout its range, which is now principally in Indiana and Illinois. Populations discovered in North Carolina may now be extinct, population trends

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in Oklahoma and Kentucky are poorly known (NatureServe). Most of the remaining tall-grass prairie patches are small in extent and have little or no protection. For instance, most of the half dozen sites in Illinois and Oklahoma, three of which are along railroad tracks, are “doomed by lack of attention” (Panzer, pers. comm.). This species is threatened primarily by extreme fragmentation of its range and by invasion of its range by exotic grasses and forbs. Grazing, mowing, and trampling may pose additional threats to this species (USFS 2003).

The host, rattlesnake master, is extremely fire sensitive. Host populations can be severely depleted by intense fires, resulting in declines in root-borer populations, and sometimes their extinction at a site. If there are not patches nearby for repopulating, this extinction is likely to be permanent. On the other hand, both host and insect are threatened by lack of fire. The host plant is extremely fire dependant and needs to be burned every 3–4 years to maintain healthy populations that can then support populations of rattlesnake master root-borer (Panzer 2009).

Listing of this species is warranted. Ron Panzer (pers. comm.), who has worked with prairie ecosystems in Illinois and Indiana for 31 years, remarked “Listing is desperately needed and would help from the first day; there is no way our work will have meaning unless they are listed.” Panzer (2009) comments:

P. eryngii is profoundly imperiled in this region. This species will almost certainly be lost from the tiny, unmanaged, unprotected railroad prairies, all of which have deteriorated substantially within the last 15 years. Unfortunately, the large population that inhabits the Goose Lake sites is imperiled as well. This site receives (has always received) minimal management and is being overrun with ecosystem -altering exotics, including *Phragmites australis*, *Phalaris arundinacea*, *Lythrum salicaria* and *Cirsium arvense*, and will almost certainly have minimal value as a sanctuary for native plants and insects within the next 20 or so years.

Listing would allow protection and management of currently unprotected sites where this species occurs and allow critical research to be performed before many of these populations become extinct. The USDA conservation assessment (2003) cites the following research needs:

- 1) The colonization through space and time of *Papaipema eryngii* to new areas should be researched to determine recolonization potential.
- 2) Research is needed on population genetics, including studies of such topics as gene flow and diversity. Population genetics of this species are unknown.
- 3) Research is needed on the effects of grazing and mowing on this species.
- 4) Research is needed on the differential effects of spring vs fall burns.
- 5) Sampling techniques need to be developed so that populations of this species can be measured more easily.

This moth was previously a Category-2 candidate for ESA listing, until FWS removed it and more than 2,000 other species from the candidate list in 1996. This moth should receive a

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prompt listing proposal, followed by a prompt listing rule. There is more than sufficient information to list this species.

44. ***Sphingicampa blanchardi*** is a royal moth (no common name) ranked by scientists as critically imperiled. It occurs in only a few locations in Cameron and Hidalgo counties in Texas (Lower Rio Grande Valley) and may also occur in Mexico (NatureServe 2009). In its 90-day finding, FWS recognized the potential threat to this species from habitat loss and degradation due to agricultural clearing (Listing Factor A). 74 Fed. Reg. 66866, 66897.

Scientists indicate there are additional threats, as well: from pesticides, development, and activities and artificial lighting and disturbance related to U.S./Mexico border enforcement (NatureServe 2009; BMNA 2010). FWS should consider these threats as well as the limited range of this species (Listing Factor E) in its status review.

45. **Tamaulipan Agapema** (*Agapema galbina*) is a giant silkworm moth ranked by scientists as critically imperiled. It historically occurred in the Lower Rio Grande Valley in Texas but has apparently been extirpated from the U.S. It is known to currently occur in Tamaulipas, Mexico. Scientists describe it as declining (NatureServe 2009). In its 90-day finding, FWS recognized the potential threat to this species from habitat loss and degradation due to conversion to agriculture (Listing Factor A). 74 Fed. Reg. 66866, 66898.

This species occurred in the Lower Rio Grande Valley but has been extirpated from Texas due to agricultural crops such as cotton. Its levels in Mexico are unknown but it continues to lose its Tamaulipan thornscrub habitat there to crop agriculture. It is considered to be declining by 10-30% (NatureServe 2009). The Texas Comprehensive Wildlife Conservation Strategy identifies this species as a species of concern and lists the following threats: development; human disturbance (land or drainage alteration, land-use changes); and lack of protection (TPWD 2005).

Scientists recommend reintroducing this species to the U.S. portion of its range (NatureServe 2009).

In addition to Listing Factor A, FWS should consider its narrow range and small populations as a threat to this species (Listing Factor E), as well as the lack of protections cited by TPWD (2005) (Listing Factor D). This moth should be promptly listed under the ESA.

46. **Sabino Dancer or Sabino Canyon Damselfly** (*Argia sabino*) is a damselfly ranked by scientists as critically imperiled or imperiled. It only occurs in Sabino Canyon in the Santa Catalina Mountains in Arizona and perhaps Jalisco, Mexico (NatureServe 2009). In its 90-day finding, FWS recognized the potential threat to this species from habitat loss and degradation due to “hydrological alteration resulting in reduced water flow, to disease and predation resulting from pool contraction that allows increased predation, or to natural or manmade factors affecting its continued existence resulting from decreased time for larval development” (Listing Factors A, C, and E). 74 Fed. Reg. 66866, 66897-98.

Scientists have described declines of 25-75 percent (NatureServe 2009) and note that this

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species range has constricted over the past 35 years: it used to occur in Lower and Upper Sabino Creek, but now only occurs in Upper Sabino Creek. The species has also suffered population decline. Threats include hydrological alteration, pool contraction, predation, and intraspecific fighting (AGFD 2001). According to the U.S. Forest Service, threats to this species² include: “Use of fish toxicants to remove non-native fish, mosquito abatement, exotic crayfish, non-native fish, stream drying, flash floods, channelization” (USFS 2007).

Although this species occurs on the Coronado National Forest, the U.S. Forest Service’s plan does not provide specific conservation measures for the Sabino Dancer, nor is it a management indicator species (USFS 1986, 2009).

Given the danger from pool contraction, FWS should also consider climate change and drought as threats to this damselfly (Listing Factor E). *See* Karl et al. 2008, 2009 for descriptions of climate change effects in the southwestern U.S.

This damselfly was previously a Category-2 candidate for ESA listing, until FWS removed it and more than 2,000 other species from the candidate list in 1996. This damselfly is in distress and needs immediate rescue through listing under the ESA.

47. **Redrock Stone** (*Anacroneuria wipukupa*) is a stonefly ranked by scientists as critically imperiled. It is known only from Oak Creek in Yavapai County, Arizona. It may also occur in Sonora, Mexico (AGFD 2004; NatureServe 2009). In its 90-day finding, FWS recognized the potential threat to this species from habitat loss and degradation due to pollution (Listing Factor A). 74 Fed. Reg. 66866, 66898.

Given that it is only known from its type locality (NatureServe 2009), FWS should consider its restricted range as an additional threat (Listing Factor E). In addition, given that this is an aquatic species occurring in the arid southwest, FWS should consider climate change and drought as potential threats. *See* Karl et al. 2008, 2009 for descriptions of climate change effects in the southwestern U.S.

This is the type of species that may go extinct while FWS waits for more information. Instead, we urge FWS to take a precautionary approach and list this stonefly.

Arachnid
(1 species)

48. **Grand Canyon Cave Scorpion** (*Archeolarca cavicola*) is a pseudoscorpion ranked by scientists as critically imperiled or imperiled. It is known only from one site: Cave of the Domes, Grand Canyon National Park, in Arizona (AGFD 2003; NatureServe 2009). In its 90-day finding, FWS recognized the potential threat to this species from habitat loss and degradation due to groundwater pollution and from recreational impacts (Listing Factor A) and from unregulated visitation (Listing Factor D). 74 Fed. Reg. 66866, 66898-99.

²The USFS Sensitive Species List includes the “Sabino Canyon Damselfly” but uses an incorrect scientific name (*Argia sabomp*). We assume this is just a clerical error.

This species was previously a Category-2 candidate for ESA listing, until FWS removed it and more than 2,000 other species from the candidate list in 1996. It should be listed without further delay.

Crustaceans
(4 species)

49. **Delaware County Cave Crayfish** (*Cambarus subterraneus*) is a crayfish ranked by scientists as critically imperiled. It is known from three caves in Delaware County, Oklahoma. Its total population is thought to number less than 50 individuals (NatureServe 2009). It is ranked endangered by the IUCN and the American Fisheries Society (American Fisheries Society 1996). In its 90-day finding, FWS recognized the potential threat to this species from habitat loss and degradation due to pollution from untreated animal waste (Listing Factor A). 74 Fed. Reg. 66866, 66899.

While The Nature Conservancy and FWS have pursued conservation measures, nothing has been done to improve the water quality of the watershed in which these caves are located (NatureServe 2009). FWS should therefore consider inadequate regulatory mechanisms (Listing Factor D). In addition, FWS should consider small number of populations and low population numbers (less than 50) as an additional threat to the species (Listing Factor E).

In light of its imperilment, and the continued threat from habitat degradation, Graening and Fenolio (2005) recommend that this species be listed under the ESA. We agree; and that listing should occur promptly.

50. **Kiamichi Crayfish** (*Orconectes saxatilis*) is a crayfish ranked by scientists as imperiled. It only occurs in the Upper Kiamichi River and its tributaries above Whitesboro, Oklahoma (NatureServe 2009). It is ranked as critically endangered by the IUCN and as endangered by the American Fisheries Society (American Fisheries Society 1996). In its 90-day finding, FWS recognized the potential threat to this species from habitat loss and degradation due to impoundment, channelization, water quality degradation, and dewatering (Listing Factor A). 74 Fed. Reg. 66866, 66899.

Logging and water management on the Ouachita National Forest by the U.S. Forest Service (USFS) appear to be significant threats to this crayfish (Jones and Bergey 2007; NatureServe 2009). However, this Forest does not include the crayfish as a management indicator species (USFS 2008). Nor does the revised forest plan even mention this species (USFS 2005). This is despite recognition in a report to USFS that “*Orconectes saxatilis* is the most rare crayfish on the entire ONF and deserves immediate protection in future management decisions” (Robison 2000). FWS should therefore consider inadequate regulatory mechanisms as a threat to this species (Listing Factor D).

NatureServe (2009) notes that the species’ restricted range and habitat specialization magnify the effects of threats. In addition, because dewatering is a threat to this species, FWS should also consider the threat from drought and climate change. See Karl et al. 2008, 2009 for

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descriptions of climate change effects in the U.S. All of these should be considered by FWS under Listing Factor E.

Bergey et al. (2005) warn that the pet trade may be an emerging threat to crayfish. FWS should consider the impact of the pet trade and other utilization of this species under Listing Factor B.

Given its rarity and many threats, including federal land management, this species should be promptly listed under the ESA.

51. **Oklahoma Cave Crayfish** (*Cambarus tartarus*) is a crayfish ranked by scientists as critically imperiled. It is known to occur at only two caves at Spavinaw Creek in Delaware County, Oklahoma. It may potentially occur at three additional caves. Its total abundance is only 80 individuals (NatureServe 2009). It is ranked as critically endangered by the IUCN and as endangered by the American Fisheries Society (American Fisheries Society 1996). In its 90-day finding, FWS recognized the potential threat to this species from habitat loss and degradation due to water pollution and habitat transformation (Listing Factor A). 74 Fed. Reg. 66866, 66899.

Its extremely small population numbers and restricted range make it more susceptible to extirpation, which FWS should consider under Listing Factor E.

While The Nature Conservancy and FWS have undertaken conservation measures that provide a degree of protection to this species, scientists “Recommend that the species receive further protection under state and federal laws” (Graening et al. 2006; NatureServe 2009). Spavinaw Creek is an impaired stream under the Clean Water Act due to pollution. *Id.* FWS should consider this species as threatened by inadequate regulatory mechanisms (Listing Factor D).

This crayfish was previously a Category-2 candidate for ESA listing, until FWS removed it and more than 2,000 other species from the candidate list in 1996. Given its extremely small population numbers and the many threats it faces, this crayfish should be promptly listed under the ESA.

52. **Texas Troglobitic Water Slater** (*Lirceolus smithii*) is an isopod ranked by scientists as critically imperiled or imperiled. It is known only from the Edwards Aquifer in central Texas (NatureServe 2009). In its 90-day finding, FWS recognized the potential threat to this species from habitat loss and degradation due to aquifer draw-downs and decreasing water quality (Listing Factor A). 74 Fed. Reg. 66866, 66899-900.

Scientists write that, “No occurrences [are] appropriately protected and managed” (NatureServe 2009). FWS should therefore consider this species as additionally threatened by inadequate regulatory mechanisms (Listing Factor D).

The limited range of this species should also be considered a threat under Listing Factor E. Lewis (2001) includes maps indicating its range. Additionally under Factor E, FWS should

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consider the rapid human population growth on the Edwards Plateau (The Nature Conservancy 2004).

See discussion under Blanco Blind Salamander on threats to species associated with the Edwards Plateau. Because *Lirceolus smithii* is an Edwards Plateau species, FWS could list in under the ESA in an efficient, multiple-species listing rule.

Plants

(15 species)

53. **Navasota False Foxglove** (*Agalinis navasotensis*) is a plant ranked by scientists as critically imperiled. It is known from a single sandstone outcrop in Grimes County, Texas. Its sole population has just 330 individuals (NatureServe 2009). In addition, Poole et al. (2007) note that a second population has been found in a disjunct location, in Tyler County, Texas. In its 90-day finding, FWS recognized the potential threats to this species from habitat loss and degradation due to road-widening, human trampling, and off-road vehicle use (Listing Factor A). 74 Fed. Reg. 66866, 66900.

With the small number of populations and individuals, FWS should consider limited range and population an additional threat to the species (Listing Factor E).

FWS should obtain this article for use in its status review: Reed, M. D., J. F. Hays, J. M. Canne-Hilliker, D. Price, and J. R. Singhurst. 2005. A second population of *Agalinis navasotensis* (Scrophorulaceae) from Tyler County, Texas. *Sida* 21: 1927-1929.

54. **Santa Rita Yellowshow** (*Amoreuxia gonzalezii*) is a plant ranked by scientists as critically imperiled. It is known from 2 subpopulations in Pima and Santa Cruz counties, Arizona and extending south to 4 populations in northern Mexico. It may also occur in Baja California (AGFD 2003; NatureServe 2009). In its 90-day finding, FWS recognized the potential threats to this species from habitat loss and degradation due development and mining; predation by cattle and javelina; and competition from non-native plants (Listing Factors A, C, and E). 74 Fed. Reg. 66866, 66900.

Scientists describe an additional threat: “With so few populations and individuals, stochastic and naturally occurring events are also threats to *Amoreuxia gonzalezii*” (NatureServe 2009). Furthermore, the Desert Botanical Garden (2010) writes that “Repeat visits to the population in the Santa Catalina Mountains confirm the low reproductivity of plants in the U.S.” See also Center for Plant Conservation (2010). FWS should consider these dynamics to be threats under Listing Factor E.

The Santa Rita Yellowshow occurs on the Coronado National Forest. However, it is not a management indicator species on the Forest, nor are there specific protective measures for it (USFS 1986, 2009). Given the extensive occurrence of livestock grazing and other threats on the Forest, FWS should consider this plant to be threatened by inadequate regulatory mechanisms (Listing Factor D).

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This plant was previously a Category-2 candidate for ESA listing, until FWS removed it and more than 2,000 other species from the candidate list in 1996. 58 Fed. Reg 51144-51190; 61 Fed. Reg. 7596-7613. This plant deserves prompt federal listing.

55. **Tharp's Blue-star** (*Amsonia tharpii*) is a plant ranked by scientists as critically imperiled. It is known from Eddy County, New Mexico and Pecos County, Texas. There are 3 New Mexico populations and 1 Texas population. The Texas population is more than 160 km from the New Mexico populations. One of the New Mexico populations numbers fewer than 100 plants, and the other two populations in the state total a few thousand plants (NatureServe 2009). In its 90-day finding, FWS recognized the potential threats to this species from habitat loss and degradation due to erosion, gas development, mowing, and competition from non-native plants (Listing Factors A and E). 74 Fed. Reg. 66866, 66900.

Poole et al. (2007: 79) report that there have been “intensive, wide-ranging searches” with no additional populations detected. The small number of populations should be considered an additional threat under Listing Factor E. Additional information on threats is presented by the Center for Plant Conservation (2010), which states that the plants are “merely checked every year” on Bureau of Land Management lands.

This species is designated endangered by the state of New Mexico and a species of concern by FWS (New Mexico Rare Plant Technical Council 1999). State listing does not provide any protection to the plant's habitat, which is suffering from a multitude of threats. The BLM does not provide protection for this species, indeed it is not even mentioned in the Pecos District's Special Status Species Amendment (BLM 2008). While the Carlsbad BLM's revised Resource Management Plan (BLM 1997) includes the species in a list of sensitive species in Appendix 4, this appears to provide it with little, if any, protection. FWS should therefore consider inadequate regulatory mechanisms as a threat to this species.

This plant was previously a Category-2 candidate for ESA listing, until FWS removed it and more than 2,000 other species from the candidate list in 1996. 58 Fed. Reg 51144-51190; 61 Fed. Reg. 7596-7613. This plant deserves prompt federal listing.

56. **Prostrate Milkweed** (*Asclepias prostrata*) is a plant ranked by scientists as critically imperiled or imperiled. It is known from less than 10 locations in Starr and Zapata counties in south Texas, as well as Tamaulipas, Mexico (NatureServe 2009). In its 90-day finding, FWS recognized the potential threats to this species from roadside mowing and plant of an exotic grass (Listing Factor E). 74 Fed. Reg. 66866, 66900-01.

This species is endemic to grasslands or openings in Tamaulipan thornscrub (Poole et al. 2007).

This plant was previously a Category-2 candidate for ESA listing, until FWS removed it and more than 2,000 other species from the candidate list in 1996. 58 Fed. Reg 51144-51190; 61 Fed. Reg. 7596-7613. It deserves federal protection given multiple threats.

57. **Huachuca Milk-vetch** (*Astragalus hypoxylus*) is a plant ranked by scientists as critically

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imperiled. Its known range is the Patagonia and Huachuca Mountains in extreme southeastern Arizona. There are only a few known populations (NatureServe 2009). In its 90-day finding, FWS recognized the potential threats to this species from habitat loss and degradation from recreation and livestock grazing, as well as adverse effects from pesticides and trampling (by cattle) to the plant's bee pollinators (Listing Factors A and E). 74 Fed. Reg. 66866, 66901.

This plant occurs on the Coronado National Forest, which continues to allow cattle grazing in the allotments where the species is present (NatureServe 2009). The Forest itself lists threats as recreation trampling, vehicle damage, livestock trampling, soil compaction, and erosion (USFS 2010). However, it is not a management indicator species on the Forest, nor are there specific protective measures for it in the Forest plan (USFS 1986, 2009). Given the occurrence of livestock grazing and other threats within its habitat on the Forest, FWS should consider this plant to be threatened by inadequate regulatory mechanisms (Listing Factor D).

Additionally, scientists describe:

Certain natural threats could also have an impact on populations. These include the predation of seeds by a small CHALCID wasp and climatic fluctuations. Wasp predation was found to occur on 25% of the fruits in 1988. Mortality rates showed 50% during years of drought. (NatureServe 2009).

FWS should consider this additional threat under predation (Listing Factor C), and drought (Listing Factor E). Given the substantial mortality during drought, and given that drought is exacerbated by climate change, FWS should consider the effects of climate change on this plant. See Karl et al. 2008, 2009 for descriptions of climate change effects in the southwestern U.S. The Arizona Game and Fish Department further notes that, "Limited range and small numbers of plants make this species susceptible to human disturbance" (AGFD 1999). FWS should consider this an additional threat under Listing Factor E.

This plant was previously a Category-2 candidate for ESA listing, until FWS removed it and more than 2,000 other species from the candidate list in 1996. 58 Fed. Reg. 51144-51190; 61 Fed. Reg. 7596-7613. It should be listed without further delay.

58. **Glowing Indian-paintbrush** (*Castilleja ornata*) is a plant ranked by scientists as critically imperiled. It is currently known from a single site in southwestern New Mexico (Hidalgo County). While it historically occurred in western Chihuahua and west-central Durango, it may be extinct in Mexico (NatureServe 2009). In its 90-day finding, FWS recognized the potential threats to this species from habitat loss and degradation due to improper grazing and conversion to cropland. 74 Fed. Reg. 66866, 66901.

This species' habitat is seasonally wet areas in arid, level grasslands. It prefers less disturbed areas. It is threatened by livestock grazing and crop agriculture. As of 2002, there was a single known location in New Mexico. It is apparently extirpated from Mexico. Searches of historical sites in Chihuahua failed to detect any extant populations and found that the species' habitat had been converted to agriculture (NatureServe 2009).

The New Mexico Rare Plant Council (1999) states,

This may be a globally endangered species. Until other Mexican populations can be located, the New Mexican site should be considered the only extant population.

Clearly this species warrants ESA protection. FWS should consider the small number of populations (1) to be an additional threat to the species under Listing Factor E.

Given that this plant depends on seasonally wet areas, FWS should consider whether drought and climate change are a threat, under Listing Factor E. *See* Karl et al. 2008, 2009 for descriptions of climate change effects in the southwestern U.S.

Bodner et al. (undated) include the species within their report on the Peloncillo Mountain Region. That report discusses the biological richness and threats that this region is experiencing.

59. **Fish Creek Fleabane** (*Erigeron piscaticus*) is a plant ranked by scientists as critically imperiled. While historically known from Graham and Maricopa counties in Arizona, it is currently known only from one site, Oak Grove Canyon in the Galiuro Mountains in Graham County. Surveys in 1993-1994 found only 79 plants (NatureServe 2009). In its 90-day finding, FWS recognized the potential threats to this species from habitat loss and degradation due to recreational activities, poor watershed conditions, and flooding (Listing Factor A). 74 Fed. Reg. 66866, 66901-02.

Given the small population numbers, FWS should consider this species to be additionally threatened by Listing Factor E. Indeed, the Arizona Game and Fish Department (2001) writes, "Greatest problem: only one population known with 80 plants."

This species occurs on the Tonto National Forest. However, this species is not a management indicator species on the Forest (USFS 1985). FWS should consider whether inadequate regulatory mechanisms are a threat to this plant (Listing Factor D).

This plant was previously a Category-2 candidate for ESA listing, until FWS removed it and more than 2,000 other species from the candidate list in 1996. 58 Fed. Reg. 51144-51190; 61 Fed. Reg. 7596-7613. It should be promptly listed.

60. **Morton's Wild Buckwheat** (*Eriogonum mortonianum*) is a plant ranked by scientists as critically imperiled. It is known from a single site on the Kaibab-Paiute Indian Reservation in Mohave County, Arizona, where it is restricted to the gypsum rich red clays at that location. The single population (and thus the global population) is just 750 plants (NatureServe 2009). In its 90-day finding, FWS recognized the potential threats to this species from habitat loss and degradation due to road maintenance and livestock use (Listing Factor A). 74 Fed. Reg. 66866, 66902.

The Arizona Game and Fish Department (2001) considers restricted range to be a threat to

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this plant. FWS should consider this a threat under Listing Factor E.

This plant was previously a Category-2 candidate for ESA listing, until FWS removed it and more than 2,000 other species from the candidate list in 1996. 58 Fed. Reg 51144-51190; 61 Fed. Reg. 7596-7613. It's time to list it.

61. **Brush-pea** (*Genistidium dumosum*) is a plant ranked by scientists as critically imperiled. Only 6 occurrences are known: 3 from Brewster County, Texas (between Terlingua and Lajitas) and 3 in Coahuila, Mexico. The total population in Texas is less than 50 individuals (NatureServe 2009). In its 90-day finding, FWS recognized the potential threats to this species from habitat loss and degradation due to highway construction and recreation (Listing Factor A), overutilization from collection (Listing Factor B), and lack of recruitment (Listing Factor E). 74 Fed. Reg. 66866, 66902.

Scientists call this species “exceedingly rare” (NatureServe 2009). Its low population numbers should be considered a threat under Listing Factor E. This species is the only member of its genus. *Id.* Its protection from extinction is therefore even more urgent. Moreover, this pea co-occurs with a rare cactus, *Escobaria albicolumnaria*, which would benefit from the Brush-pea's listing (Poole et al. 2007).

Scientists also indicate that drought may be a threat (Center for Plant Conservation 2010), which FWS should consider Listing Factor E. *See* Karl et al. 2008, 2009 for descriptions of climate change effects in the southwestern U.S.

This plant was previously a Category-2 candidate for ESA listing, until FWS removed it and more than 2,000 other species from the candidate list in 1996. 58 Fed. Reg 51144-51190; 61 Fed. Reg. 7596-7613. It should be promptly listed.

62. **Chisos Coralroot** (*Hexalectris revoluta*) is a plant ranked by scientists as critically imperiled or imperiled. It is known from Texas, Arizona, and Mexico (NatureServe 2009). In its 90-day finding, FWS recognized the potential threats to this species from habitat loss and degradation due to mining development (Listing Factor A). 74 Fed. Reg. 66866, 66902-903.

According to scientists “[v]ery few individuals have been seen” (perhaps due to drought), and the species is “[v]ery rare” (NatureServe 2009). Morey (2008: 235) describes it as “probably the rarest of seven coral root species found in the mountains of Trans-Pecos Texas and northern Mexico.” USFS (2010) also recognizes “[e]xtreme rarity” as a threat. Further, the Arizona Game and Fish Department (2004) states,

Hexalectris revoluta has not been observed in one of the four known locations since 1981, despite repeated recent searches (Coleman 2002). The 3 known remaining populations from Arizona are small, with less than 100 individuals in each and usually less than 30 plants appearing above ground in any given year. *It is extremely rare throughout its range and should be nominated for federal consideration as an endangered species* (Coleman 2002). (emphasis added)

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See also Coleman (undated). FWS should consider its rarity as a threat under Listing Factor E.

While NatureServe (2009) reports that collection and maintenance activities are threats, FWS disregards this information. This is despite USFS (2010) and NBII (2010) also recognizing collection as a threat. NBII (2010) also recognizes maintenance activities as a threat.

Poole et al. (2007: 260) describe this species' range as "Mountains of West Texas in Brewster and Culberson counties, New Mexico, and Arizona; the Sierra Madre Oriental in Nuevo León and San Luis Potosí." The New Mexico Rare Plant Technical Council (2009) describe it as occurring in Eddy County within New Mexico but states,

The absence of a verifying specimen has always cast doubt on the presence of *H. revoluta* in New Mexico. The inclusion of *H. revoluta* as a New Mexico rare plant is based on a photograph with precise location information held at the headquarters of Guadalupe Mountains National Park and observed by Tom Todsén, an orchid expert.

FWS should investigate during its status review whether there are occurrences of this species in New Mexico.

This plant was previously a Category-2 candidate for ESA listing, until FWS removed it and more than 2,000 other species from the candidate list in 1996. 58 Fed. Reg 51144-51190; 61 Fed. Reg. 7596-7613. It should be promptly listed under the ESA.

63. **Kaibab Bladderpod** (*Lesquerella kaibabensis*) is a plant ranked by scientists as critically imperiled or imperiled. It occurs on the Kaibab Plateau on the Kaibab National Forest in Coconino County, Arizona. There are 6-12 occurrences of this plant (AGFD 2001; NatureServe 2009). In its 90-day finding, FWS recognized the potential threats to this species from habitat loss and degradation due to highway widening and maintenance and off-road vehicle use (Listing Factor A) or to disease or predation resulting from grazing (Listing Factor C). 74 Fed. Reg. 66866, 66903.

The best available information (AGFD 2001; NatureServe 2009) indicates that USFS is allowing overgrazing of areas occupied by this plant, which should be considered by FWS to be a threat from inadequate regulatory mechanisms (Listing Factor D).

This plant was previously a Category-2 candidate for ESA listing, until FWS removed it and more than 2,000 other species from the candidate list in 1996. 58 Fed. Reg 51144-51190; 61 Fed. Reg. 7596-7613. It should be promptly listed under the ESA.

64. **Bushy Whitlow-wort** (*Paronychia congesta*) is a plant ranked by scientists as critically imperiled. It occurs on the Bordas Escarpment in Jim Hogg County, Texas, from the vicinity of Thompsonville. It has only 2 known populations, both of which are on private land. One population has approximately 2,000 plants and the other, 100 plants (Poole et al. 2007; NatureServe 2009). In its 90-day finding, FWS recognized the potential threats to this species from habitat loss and degradation due to right-of-way construction and maintenance,

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pipeline installation, oil and gas exploration, and well pad construction (Listing Factor A), and droughts and freezes (Listing Factor E). 74 Fed. Reg. 66866, 66903.

This species was removed from the candidate list in September 2006 on the following basis:

We have determined that listing is not warranted because insufficient information exists on biological vulnerability and threats to support a proposal to list this species. 71 Fed. Reg. 53756, 53768

The species should not have been removed from the candidate list. FWS's refusal to protect this plant is concerning given its many threats, small number of populations, and small population numbers:

Oil and gas development is occurring in the immediate vicinity [of the plant's populations]. Other threats include right-of-way construction and maintenance, brush clearing and herbicide use, and the introduction of non-native grasses. (NatureServe 2009)

Paronychia congesta is primarily threatened by right-of-way construction and maintenance, pipeline installation, oil and gas exploration, and well-pad construction. Both populations occur on private rangeland that overlays oil fields, and are dissected by rights-of-way (USFWS 2005). *Paronychia congesta* is also threatened by brush clearing, herbicide use, and replanting to nonnative forage grasses such as buffelgrass (*Pennisetum ciliare*) (Cobb 2004); however, this practice may be declining (USFWS 2005). Other potential threats include browsing by grazing animals (Cobb 2004). The small populations are also vulnerable to effects of natural stochastic factors or catastrophic events. *Id.*

We are pleased that FWS is reconsidering whether this species warrants listing and urge the agency to promptly list this plant.

65. **Chihuahua Scurfpea** (*Pediomelum pentaphyllum*) is a plant ranked by scientists as critically imperiled (NatureServe 2009). In its 90-day finding, FWS recognized the potential threat to this species from herbicide use (Listing Factor E). 74 Fed. Reg. 66866, 66903-04.

WildEarth Guardians filed a single-species listing petition for this species on October 9, 2008 (WildEarth Guardians 2008). Upon request, we subsequently provided numerous sources to FWS to consider in preparing their petition finding on this species. FWS should consider all of these sources in the course of its status review for the Chihuahua Scurfpea. The petition identifies a number of threats to this species in addition to herbicide use.

This plant was previously a Category-2 candidate for ESA listing (with a declining trend), until FWS removed it and more than 2,000 other species from the candidate list in 1996. 58 Fed. Reg. 51144-51190; 61 Fed. Reg. 7596-7613. It should be promptly listed under the ESA.

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66. **Big Red Sage** (*Salvia pentstemonoides*) is a plant ranked by scientists as critically imperiled. It is found in creekbeds within the Edwards Plateau in Texas. It was thought extinct until the late 1980s. There are 6 known locations totaling a few hundred individuals along with additional historic locations (NatureServe 2009). In its 90-day finding, FWS recognized the potential threats to this species from aquifer drawdown (Listing Factor A), overutilization as a result of commercial uses (Listing Factor B), and flooding (Listing Factor E). 74 Fed. Reg. 66866, 66904.

The Center for Plant Conservation (2010) points to additional threats from erosion and herbicides.

FWS should consider whether altered flooding regimes as a result of climate change are a threat to this species (Listing Factor E). See Karl et al. (2008, 2009) for descriptions of climate change effects in the southwestern U.S.

This plant was previously a Category-2 candidate for ESA listing, until FWS removed it and more than 2,000 other species from the candidate list in 1996. 58 Fed. Reg 51144-51190; 61 Fed. Reg. 7596-7613. This species urgently requires federal listing.

67. **Donrichardsia macroneuron** is a moss (with no common name) ranked by scientists as critically imperiled. It currently only occurs at the Seven Hundred Springs in Edwards County, Texas (NatureServe 2009). In its 90-day finding, FWS recognized the potential threats to this species from drought or changes in hydrology (Listing Factor A). 74 Fed. Reg. 66866, 66904-905.

The moss – perhaps just a single clone – has survived at its sole spring because the spring has never dried up. It is threatened by drought or other factors that cause spring-drying. As of 1998, a single clone remained at this site, and NatureServe (2009) reported that the prognosis for its survival was “not good.” The IUCN classifies this species as vulnerable, reports that only one locality remains, and list threats of development, dam construction, and water pollution (Bryophyte Specialist Group 2000). This species comprises a monotypic genus: if it goes extinct, an entire genus would vanish. Given its restriction to one site, it is vulnerable to total extirpation.

FWS should consider whether drought or altered hydrology as a result of climate change is a threat to this species (Listing Factor E). See Karl et al. (2008, 2009) for descriptions of climate change effects in the southwestern U.S.

We appreciate that FWS has decided to conduct a status review for this species, and we believe it should be promptly listed under the ESA.

Narrow Range
(Listing Factor E)

For several of the above species, FWS wrote in its 90-day finding,

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In the absence of information identifying other threats to the species and linking those threats to the restricted distribution of the species, we do not consider restricted distribution to be a threat.

This position is contradicted by the position FWS has taken for many ESA candidate species, where the agency has recognized restricted range, narrow distribution, and/or small population size as a threat under Listing Factor E. The U.S. Fish and Wildlife Service (FWS) has routinely recognized that small population size increases the likelihood of extinction.³ For the Langford's tree snail (*Partula langfordi*), FWS states:

Even if the threats responsible for the decline of this species were controlled, the persistence of existing populations is hampered by the limited number of known individuals of this species. This circumstance makes the species more vulnerable to extinction due to a variety of natural processes. Small populations are particularly vulnerable to reduced reproductive vigor caused by inbreeding depression, and they may suffer a loss of genetic variability over time due to random genetic drift, resulting in decreased evolutionary potential and ability to cope with environmental change (Lande 1988; Pimm et al. 1988; Center for Conservation Update 1994; Mangel and Tier 1994).⁴

Here FWS relies on citations not specific to *Partula langfordi* that indicate the threat to survival presented by limited population numbers even without other known threats. The agency similarly notes for a snail called Sisi (*Ostodes strigatus*), "Even if the threats responsible for the decline of this species were controlled, the persistence of existing populations is hampered by the small number of extant populations and the small geographic range of the known populations."⁵

Conclusion

We thank FWS for conducting these ESA status reviews. We believe listing these species will greatly benefit the ecosystems and biodiversity of the southwestern U.S. and adjacent areas. We further believe that listing of these species can be accomplished efficiently, through multiple-species listing rules.

Sincerely,

/s/Nicole J. Rosmarino

Nicole J. Rosmarino, Ph.D., Wildlife Program Director

³See, e.g., FWS candidate assessment forms for *Doryopteris takeuchii*, *Huperzia stemmermanniae*, *Megalagrion nesiotae*, *Melicope degeneri*, *Melicope hiiakae*, *Myrsine mezii*, *Ostodes strigatus*, *Partula langfordi*, *Peperomia subpetiolata*, *Phyllostegia bracteata*, and *Tryonia circumstriata*. Accessible via FWS website at <http://www.fws.gov/endangered/wildlife.html> [Accessed November 2009].

⁴See 2009 Listing Form for *Partula langfordi* at: http://ecos.fws.gov/docs/candforms_pdf/r1/G0A1_I01.pdf [Accessed November 2009] at p. 5.

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67 Species Comments Reference List

Note: Even if a source was used in multiple species accounts, it appears in the bibliography only once, under the first entry where it appears in our comments.

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