

# Endangered Species Information Needs

USGS Central Region  
FY 2001



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## **Background:**

The U.S. Fish and Wildlife Service (FWS), in the Department of the Interior, and the National Marine Fisheries Service (NMFS), in the Department of Commerce (DOC), share responsibility for administration of the Endangered Species Act (ESA). Generally, the NMFS deals with those species occurring in marine environments and anadromous fish, while the FWS is responsible for terrestrial and freshwater species and migratory birds. Biological research within FWS historically addressed issues of species biology including investigations of: (1) disease outbreaks, (2) contaminants issues relative to species survival and ecological health of habitats, (3) basic and applied investigations of habitat conservation and management, (4) population metrics relative to harvest, and (5) population viability of species threatened with extinction.

The ESA has been the source of controversy since its initial passage in 1966. Interpretation of the Act has resulted in more than twenty years of litigation and legislation. In response to political confrontations stemming from enforcement of the ESA in the early 1990s, the Secretary of the Interior separated FWS research science and regulatory activities by creating the National Biological Survey (NBS). The Director of NBS, Ron Pulliam, was asked to focus research to ensure ecosystem health and sustainability, and to avoid environmental "train wrecks" from ecosystem degradation or biological/economic losses resulting from listing of species under the ESA. While continuing current research efforts on selected endangered species, NBS refocused research efforts on species "at-risk"(SAR), defined as those that are thought to be declining to the point that they may soon need enhanced protection under provisions of the ESA.

**The Problem:** Under ideal circumstance, in which unlimited funding is provided for research on imperiled or declining species, focusing research on SAR would have enabled NBS (now U.S. Geological Service, Biological Resources Division [BRD]) to provide timely scientific information to support protection of species. Unfortunately, the current approach is reactive and economically costly and often politically confrontational, resulting in crisis-oriented research. If adequate information were made available upon which to base pro-active management plans, no new species would be listed under the ESA. Funding for research, monitoring, and information transfer, however, has been limited and static during the past decade. Typical decisions on allocation of the limited funding available for SAR have operated under the paradigm of using the

available dollars on short-term efforts to address as many issues as possible, especially those that are politically sensitive. Thus, numerous, less expensive projects are typically funded at the expense of fewer, more costly efforts that could provide robust, scientifically valid information for effective recovery and management. In the case of species like the Mountain Plover, therefore, adequate funding has not been available to address conservation information needs within the SAR program. Now that the species is being recommended for listing under ESA, proposals of research efforts addressing management needs of this species are left in the administrative “never-land” of neither being eligible for funding consideration as a species already listed prior to the NBS/BRD split from FWS, nor eligible to compete for SAR dollars. There currently is no program within BRD identified to address critical research issues that have arisen since 1992 relative to species listed under ESA. When this scenario was pointed out during an interagency meeting in late 1999, one FWS Regional Director commented “But that’s what we do. That’s where our information needs are.” It seemed prudent for BRD to address this issue of how to fund research on species currently being listed under the auspices of ESA.

**Objective:** Given the frustration of FWS with a deficiency of critical information to address recovery of threatened and endangered species, the Central Regional Biologist of BRD requested that I host a workshop with partners to identify topical issues for consideration in research re-programming within the region. Early discussions indicated that most information needs within the Bureau of Land Management, Bureau of Reclamation, and the National Park Service would be the conduct of presence/absence inventories or clearances for development activities. The surveys and clearances are generally met through contracts of project funds within those agencies. In contrast, basic biological information needs to define causal mechanisms of continental declines or recovery of populations are primarily (if not exclusively) within the FWS. Thus, I solicited critical information needs on species that have assumed an official status (petition to list, publication of a proposed rule, listing) under the auspices of the ESA since 1992, plus species that (although listed before 1992) have never had research funding. **It should be emphasized that the objective was not to identify all biological information needs for all listed “threatened and endangered” species, but just those information needs for species deemed most critical by the FWS regions at the time of the survey.**

**Approach:** I visited with the Chiefs of Endangered Species and their staffs in FWS Regions 2, 3, and 6 between the middle of December 1999 and early January 2000. Individuals contacted included Steve Chambers (R2), T.J. Miller (R3), and Jill Parker (R6). I also contacted Cindy Dohner (R4) for inputs relative to the inclusion of Arkansas and Louisiana from her region in BRD’s Central Region. Generally, their regional budgets are entirely expended by the personnel costs of preparing new listing packages and responding to legal petitions. I explained that we were looking to identify new information needs for guidance in allocating BRD funds as the opportunity presented itself. The Endangered Species Chiefs were receptive and each wanted to solicit input from field personnel. They requested the opportunity to provide statements of needs and FWS contacts for species that had been listed prior to 1992 but had never been the subject of research inquiry. I requested a short description for each species to include its status, the problem, the critical information need, and the FWS contact. Those statements were all received

in March, 2000, and updated in January, 2001, and are attached. We discussed the pros and cons of prioritizing these species both within and across FWS regions and generally decided that each information need was critical and all are priority. A few contributions were edited slightly to ensure that each information need was presented on a single page.

### Results:

Region 2 submitted information needs for twenty-six species, region 3 submitted nine, region 4 submitted one, and region 6 submitted twenty-nine. Table 1 summarizes the actual number of species discussed in the forty-two Regional Information Needs sheets by taxa.

**Table 1:** Taxonomic distribution of species submitted by FWS Region

Region	Plants	Invertebrates	Amphibians	Fish	Birds	Mammals	Total
2	12	5	2	6	1		26
3		6		2		1	9
4				1			1
6	16	2	1	5	2	3	29
Total	28	13	3	12*	3	4	63*

\* corrected for double listing of 2 species of fish by Regions 3 and 6.

Over half of the 63 species identified by FWS regions have been listed as endangered (table 2). The table includes a breakdown of species among candidate, threatened, and endangered species.

**Table 2:** Current legal status of species by taxonomic group

Status	Plants	Invertebrates	Amphibians	Fish	Birds	Mammals	Total
Candidate	7	6	1	2	1		17
Threatened	7	1		3	1	2	14
Endangered	14	6	2	7	1	2	32
Total	12	7	3	13*	3	4	63

These 63 species represents almost 12% of the total number of species listed by taxa within these regions (table 3). If Region 4 is not included, however, the number of listed species included in the research priority list, is 30% of the total listed in the subject regions.

**Table 3:** Total number of species currently listed as threatened or endangered by FWS regions

Region	Plants	Invertebrates	Amphibians	Reptiles	Fish	Birds	Mammals	Total
2	54	14	2	6	24	10	11	120
3	16	10	-	2	2	4	3	37
4	150	84	5	21	29	19	17	324
6	29	3	1	-	12	-	6	50
Total	249	111	11	26	67	33	37	531

The following statements contain the species information needs submitted from the four FWS regions, with minor editorial changes for consistency of the presentation.

Some statements included several species (forty-two sheets include sixty-three priority species).

Two of the submissions (gammarid amphipods and pearl darter) did not meet the requested legal criteria, but are appended herein as topical issues for SAR consideration.

**Region 2/ Comal Springs Riffle Beetles (*Heterelmis Comalensis*)**

**Status:** The endangered Comal Springs riffle beetle *Heterelmis comalensis* occurs principally in the spring-runs of the Comal River, Comal County, Texas (a single beetle was collected in the San Marcos River, Hays County, Texas, in 1993). Little is known about its life history, habitat requirements, or population dynamics.

**Problem:** The beetle apparently depends upon adequate flows from the Edwards Aquifer to maintain suitable habitat. Increasing water demands on the aquifer and pollution of recharge water increase the risk of eliminating the beetle's habitat. The possible dependence upon a refugium for the continued existence of *H. comalensis* was recognized in the 1996 San Marcos/Comal/Edwards Aquifer Rare, Threatened, and Endangered Species Contingency Plan (the beetle was listed as endangered in December 1997).

**Critical Information Needs:** Preliminary cooperative work on habitat characterization and phenology has been completed by the Texas Parks and Wildlife Department and the Fish and Wildlife Service. Culture techniques, population estimates, dynamics, and habitat requirements remain to be detailed. Additionally, a functional refugium needs to be operational in the event of drought.

**FWS Contact:** Joe N. Fries, San Marcos National Fish Hatchery and Technology Center, 500 East McCarty Lane, San Marcos, Texas, 78666; (512) 353-0011; e-mail: joe\_fries@fws.gov

**Region 2/ Houston Toad (*Bufo Houstonensis*)**

**Status:** Listed as endangered in 1970; critical habitat designated in 1978.

**Problem:** Habitat for the Houston toad is disappearing at an unprecedented rate from urban expansion and certain agricultural practices. The toad has been extirpated from 3 counties. The remaining small, isolated populations are scattered across 9 counties.

**Critical information Needs:** The Houston Toad Recovery Team has identified the following research needs and has drafted a scope of work for each (available upon request):

1. *Biology, Demography, Demographic Sampling Biases, and Toad Movements.*

Additional information is needed to better model and predict population viability, including (1) number of eggs produced as a function of body size and/or age (stage), (2) sex ratios, (3) age-/stage-dependent survivorship of females, (4) movements of adult toads, (5) dispersal distances of juvenile toads. These data will be used in designing and configuring preserve systems to promote population viability.

2. *Genetic Population Structure of the Houston Toad.* Understanding the genetic population structure of the Houston toad is critically important to effective conservation planning to determine the extent to which different subpopulations may be connected; understand source-sink population dynamics; calculate effective population size and effective number of breeding adults; and detect recent population bottlenecks or expansion.

3. *Inventory and Multi-Scaled Habitat Characterization for Houston Toad Populations within the Geographic Range of the Species.* Understanding the past and current distribution of the Houston toad is essential to implementing conservation programs. Once the known distribution is better understood, a GIS assessment is needed to determine which habitat conditions are either most conducive to healthy populations of Houston toads or increase risk of to extirpation. The U.S. Fish and Wildlife Service is currently acquiring GIS information needed to conduct these analyses.

4. *Experimental Habitat Manipulation.* Information is needed to identify management practices that promote the toad's survival and recovery. Experiments should assess how different land use and management practices affect the toad and its habitat. Land uses include prescribed burning, forestry practices, and certain agricultural practices, while smaller scale management includes the creation and maintenance of artificial breeding ponds and brush control.

**FWS Contact:** Lisa O'Donnell, Austin Fish and Wildlife Service Office, (512) 490-0057, e-mail: Lisa\_O'Donnell@fws.gov.

**Region 2/ Razorback Suckers (*Xyrauchen Texanus*)**

**Status:** The razorback sucker is endemic to the Colorado River basin. The Colorado River supports an endemic mainstream fish community that is classified as the "Big River" fishes. The razorback sucker was listed as endangered in 1991 and its critical habitat in 1994. Razorback sucker populations have declined precipitously in the last 50 years. Most razorback populations are old fish nearing their maximum life expectancy.

**Problem:** The razorback sucker is experiencing extremely low (and often no) recruitment.

**Critical Habitat Needs:** Lack of recruitment of this species has been documented to be caused by several reasons, to include predation, poor spawning success in colder water, and other interactions with non-indigenous species. This is particularly true in the lower basin where the largest population persists in Lake Mojave Arizona-Nevada with most riverine populations being either absent or present in low numbers. In the mid-1970s, 750 adult flannelmouth suckers were introduced below Davis dam, at the headwaters of Lake Havasu. At this time that population is established as shown by the presence of flannelmouths of various size, while the razorback suckers in the area are represented by old, senescent individuals. Recruitment has occurred in the flannelmouth population and not with the razorbacks. The research question is why? Why has the flannelmouth established and the razorback continues to fail. Answering this question could have ramifications for razorback populations in the Colorado River basin and also provide information on the flannelmouth to assist in its future protection.

**FWS Contact:** Dr. C.O. Minckley, AZFRO-Parker River, (520) 667-4785, e-mail: chuck\_minckley@fws.gov.

**Region 2/ Navasota Ladies'-tresses (*Spiranthes Parksii*)**

**Status:** The Navasota ladies'-tresses was listed as an endangered species in 1982. The seepage-bogs, upland sand terraces, riparian corridors, and longleaf-pine savannahs of the Catahoula Barrens of east Texas also supports the only population of the ladies'-tresses found on Federal land, in the Angelina National Forest. All other sites are on private land and currently unprotected.

**Problem:** Areas supporting these species are experiencing severe habitat loss and encroachment due to fire suppression, timber activities, and increased recreational use.

**Critical Information Needs:** Surveys for additional populations and the identification of management needs is of high need. The affects of fire on restoration efforts is critical. An area which historically supported the ladies'-tresses, but currently no longer supports the plants, is scheduled for a prescribed burn in an attempt to restore former habitat. The results of this burn need to be monitored and analyzed to determine effectiveness of the restoration effort. If the effort is successful, many additional adjacent sites could be treated to restore habitat and locate other potential populations. The result could be the re-establishment and protection of significant populations of these plants and their habitat. Potential partners include the U.S. Forest Service, several State agencies, and several timber industry representatives. This project could support the establishment and implementation of management agreements with the U.S. Forest Service dealing with recovery of the ladies'-tresses.

**FWS Contact:** Carlos Mendoza, Project Leader, Clear Lake Ecological Services Office, (281) 286-8282, e-mail: Carlos\_Mendoza@fws.gov.

## Region 2/ Chiricahua Leopard Frog (*Rana Chiricahuensis*)

**Status:** Chiricahua leopard frog is a candidate; a proposed rule is expected to be published soon. The species occurs in central and southeastern Arizona, west-central to southwestern New Mexico, and portions of northwestern Sonora, Chihuahua, and perhaps Durango.

**Problem:** The distribution in Mexico needs to be clarified. The distribution of the species in Mexico is known from only 12 specimens. We suspect the species occurs or occurred at many more locales. For instance, only one locality is known for Sonora; however, the species is known from many locales in Arizona just north of the Sonora border. Some authors believe specimens reported from southern Chihuahua and Durango may not be *chiricahuensis*. In addition, the role of chytridiomycosis in population dynamics needs to be investigated. Chytrid fungus has been found in Chiricahua leopard frogs as well as other leopard frog species in Arizona. Die-offs of anurans in Panama and Australia have recently been attributed to chytrids; however their role in the population dynamics of North American anurans is as yet unclear. Rapid death of recently metamorphosed frogs (post-metamorphic death syndrome), noted at stock tank populations in New Mexico by Norm Scott and others, is characteristic of chytrid infections, but specimens collected during the New Mexico mortality events have not been examined for chytridiomycosis. Winter die-offs of Chiricahua leopard frogs are also not uncommon, and could be caused by chytrid fungal infections. Both information needs can be addressed by examining museum specimens.

**Critical Information Needs:** The following are the research needs for the Chiricahua leopard frog:

1. *Examine Museum Records.* Examine museum locality records and contact herpetologists to compile additional records for Mexico. BRD should contact individuals that have worked in Sonora, Chihuahua, and Durango for information about specimens and sight records for Chiricahua leopard frogs in Mexico. An extensive search of museums should be made for specimens. Visits may be needed to certain museums to confirm the identity of specimens. In some cases (i.e. specimens from southern Chihuahua and Durango) identity to species may not be possible; however, deviation from *chiricahuensis* morphology should be described.
2. *Examine specimens for chytridiomycosis.* Specimens, particularly those collected during mortality events, should be inspected histologically for chytridiomycosis. A wide geographic and temporal range of specimens should be examined to frame the extent (if any) of the problem.

**FWS Contact:** Jim Rorabaugh, Arizona Ecological Services Field Office, 2321 West Royal Palm Road, Suite 103, Phoenix, AZ, Phone: 602/640-2720 x238, Fax: 602/640-2730, e-mail: Jim\_Rorabaugh@fws.gov

**Region 2/ Devils River Minnow (*Dionda Diaboli*)**

**Status:** Devil's River minnow was listed as a threatened species in October 1999. This fish is currently known only from two locations in Texas (San Felipe Creek in Del Rio and two small tributaries in the Devil's River) and one location in Chihuahua, Mexico.

**Problem:** The Devil's River Minnow Conservation Agreement was signed in 1998 by the Service, Texas Parks and Wildlife Department, and the City of Del Rio. The agreement focused on specific conservation actions to improve the status of the species. However, a paucity of information exists on this fish species and thus, recovery actions will be extremely limited.

**Critical Information Needs:** The following have been identified as research needs for the Devil's River minnow:

1. Describe reproductive strategies and early life history characteristics and development;
2. describe fundamental ecological requirements such as microhabitat utilization and feeding habitats;
3. Quantify the potential affects of introduced fishes, such as predation of smallmouth bass, on natural populations;
4. Conduct genetic analysis of geographically distinct populations in the U.S. and Mexico to identify the importance of specific populations in species conservation; and
5. assess the impacts on individuals and populations from water quality deterioration due to pollution from an urban environment, such as in San Felipe Creek, Del Rio, Texas.

**FWS Contact:** Nathan Allan, Austin Ecological Services Field Office, (512) 490-0057, e-mail: Nathan\_Allan@fws.gov

**Region 2/ Pecos Gambusia (*Gambusia Nobilis*), Pecos Pupfish (*Cyprinodon Pecosensis*), Roswell Springsnail (*Pyrgulopsis Roswellensis*), Koster's Springsnail (*Tryonia Kosteri*), and Pecos Assiminea Snail (*Assiminea Pecos*).**

**Status:** Pecos gambusia (*Gambusia nobilis*) (Endangered), Pecos pupfish (*Cyprinodon pecosensis*) (Proposed Endangered), Roswell springsnail (*Pyrgulopsis roswellensis*) (Candidate), Koster's springsnail (*Tryonia kosteri*) (Candidate), and Pecos assiminea snail (*Assiminea pecos*) (Candidate).

**Problem:** On Bitter Lake NWR, Pecos gambusia, Pecos pupfish, Roswell springsnail, Koster's springsnail, Pecos assiminea snail, and Noel's amphipod inhabit isolated freshwater springs surrounded by sacaton grasslands with scattered saltcedar (*Tamarix* sp.). The one-mile long Bitter Creek and 100 yards-long Sago Spring are critical habitat for Pecos gambusia, all of the snails and the amphipod on the refuge. Noel's amphipod may occur at one other site on the refuge (in the freshwater ditch west of Unit 6), and in the entire world. The Roswell springsnail and Koster's tryonia occur at one site adjacent to the refuge on private land. Brian Lang, New Mexico Department of Game and Fish biologist, conducted baseline research on the snails from 1995-98. Pecos gambusia occur at only a few other small, isolated sites in New Mexico and Texas. Refuge sites occupied by these species are critically important to their continued survival.

Virtually all habitats of these species on the refuge historically experienced some degree of natural fire. Currently all habitats are excluded from prescribed fire as per the Pecos Complex Fire Management Plan, and accompanying Biological Assessment. The risk of burning in these habitats was considered unacceptable given the lack of information on possible fire affects to the species assemblage. Noel's amphipod is especially sensitive to contaminants and may be negatively affected by siltation, ash deposition, and salinities that occur when precipitation follows a fire. Pecos assiminea is the only snail of the three that is a lung-breather, inhabiting the moist litter just above the water. Besides a fire seriously altering its habitat, it could suffer direct fire mortality. However, as we have discovered in other habitats and other ecosystems, if fire is a natural process, then it probably contributes to the long-term integrity of the vegetative and animal community where it occurs. Excluding prescribed fire may increase the risk of a more damaging wildfire; and/or it may hasten the ultimate demise of these species that may be dependent upon fires in ways that we do not know.

**Critical Information Needs:** A study of the effect of prescribed fire on the Bitter Creek/Sago Springs assemblage at Bitter Lake National Wildlife Refuge is required. What are the short- and long-term effects of controlled fire in surrounding uplands and sites immediately adjacent to habitats of these species? Can we anticipate increased siltation, salinities, ash deposition, or changes in water chemistry? How will it affect these species in the short term? How may periodic fires contribute to the long-term integrity of this system?

**FWS Contact:** Gordon Warrick Bitter Lake NWR, Roswell, NM (505-622-6755). E-mail: Gordon\_Warrick@fws.gov. Also: Brian Lang, New Mexico Department of Game and Fish (505-

827-3181),

**Region 2/**      **Bunched Cory Cactus (*Coryphantha Ramillosa*), Davis Green Pitaya Cactus (*Echinocereus Viridiflorus Davisii*), Lloyd's Mariposa Cactus (*Echinomastus Mariposensis*), Nellie Cory Cactus (*Coryphantha Minima*), Pecos (= Puzzle) Sunflower (*Helianthus Paradoxus*), Shinner's Tickle Tongue (*Zanthoxylum Parvum*), Tall Paintbrush (*Castilleja Elongata*), and Terlingua Creek Cat's Eye (*Cryptantha Crassipes*)**

**Status:** All are Federal and State listed as endangered.

**Problem:** Identification of effective pollinator(s) is needed to support recovery planning and section 7 consultations on project impacts and pesticides. Most of these species are cacti which are usually out-crossing species and knowledge of pollinators is essential to conservation. The breeding system is relatively unknown for other species.

**Critical Information Needs:** Information is needed to define the pollination system, identify effective pollinators, estimate pollinator foraging distances, possibly estimate the influence of population size on pollination success, and note observations of any populations that appear pollinator limited. Sites have been identified by the Austin Ecological Services Field Office.

**FWS Contact:** Kathryn Kennedy, endangered species botanist (512) 490-0057,  
Kathryn\_Kennedy@fws.gov

**Region 2/ White Bladderpod (*Lesquerella Pallida*) and Texas Golden Gladecress (*Leavenworthia Texana*)**

**Status:** The endangered white bladderpod and Texas golden gladecress, a candidate species, are restricted to a unique, but important, wetland type found within a small section of eastern Texas. White bladderpod has been found on nine sites, all on private land. The gladecress (historically reported from eight locations), is now restricted to only four known sites with declining populations. Immediate action may be necessary to avoid extinction of this species.

**Problem:** These species have been impacted by urban and highway construction, conversion to pasture and cropland, widespread use of herbicides, and glauconite mining activity. All sites are on private land and remain vulnerable to mining, conversion to pasture, and mowing and herbicide use during the bladderpod's growing season. Concentrated chicken production operations are also a concern. However, the greatest threat is currently the invasion of Weches communities by non-native shrubs and vines, converting these wet, herbaceous glades to dense shrub-thickets. Three of the existing gladecress sites have suffered shrub encroachment and require management treatment.

**Critical Information Needs:** A study of habitat manipulations of the white bladderpod (*Lesquerella pallida*) and Texas golden gladecress (*Leavenworthia texana*) is needed. Control measures (brush-clearing) carried out in 1995 resulted in dramatic population increases of the bladderpod, from 22 to 600 at one site, and over 2000 at a second. The gladecress reappeared at one site after a 10-year absence, and was discovered for the first time at another. However, non-natives have again become dominant in these areas. Recovery work must focus on long-term control of these invasive species. Development of a long-term protocol for controlling non-natives, possibly involving a combination of prescribed burning, selective pesticide use, and grazing modification is needed. If a safe and effective protocol for eliminating these invaders can be developed, private landowners would be more willing to enter into recovery agreements for the bladderpod and gladecress. Besides work on private land, a number of sites administered by county or city agencies could serve as demonstration areas for restoration and reintroduction efforts. The excavation of a 16th-century Spanish mission in the area may provide another opportunity; plans for the complex include wildflower gardens. Moreover, the Texas Department of Transportation and the Deep East Texas Electric Cooperative are interested in establishing bladderpod and gladecress within their rights-of-way. In expectation of reintroduction efforts, the Mercer Arboretum and Botanical Gardens in Houston have developed a captive population of the bladderpod, and seeds have been collected in recent years to produce a diverse genetic mix.

**FWS Contact:** Carlos Mendoza, Project Leader, U.S. Fish and Wildlife Service, (281) 286-8282, e-mail: Carlos.Mendoza@fws.gov

**Region 2/ Navasota Ladies'-tresses (*Spiranthes Parksii*)**

**Status:** The Navasota ladies'-tresses (*Spiranthes parksii*) is Federally and State listed as endangered.

**Problem:** Inadequate outcrossing/gene flow information to support preserve design and section 7 consultation needs.

**Critical Information Needs:** A study of pollination systems of the navasota ladies'-tresses is needed. While most orchids of this group have been considered selfing, this species has been observed to have a fragrance and is thus visited by bumble bees. Further, it is frequently found to hybridize with a sympatric species (*Spiranthes cernua*). Information is needed concerning the pollination system, level of outcrossing, and relative flight distance of pollen vectors (if any). The Service is about to undertake a preserve design exercise for Brazos County and thus, these data are critical to support decision making about size, configuration and distance between preserve sites within a proposed greenbelt system.

In addition, information will be needed on habitat management needs for preserves to conserve the species. The species appears to be a patchy species within thin areas of post oak woodlands, that may require management to keep canopy conditions favorable.

Partners are available that are interested in participating in the study if any contract funding is available.

**FWS Contact:** Kathryn Kennedy, endangered species botanist (512) 490-0057,  
Kathryn\_Kennedy@fws.gov

**Region 2/ Bonytail Chub (*Gila Elegans*)**

**Status:** The bonytail chub is Federally listed as endangered.

**Problem:** Wild populations are almost extinct. No research is currently conducted on repatriated fish.

**Critical Information Needs:** The bonytail chub is the most endangered cyprinid in the American Southwest. A study of the habitat needs of the bonytail chub is needed. Once abundant in the Colorado River basin wild populations are now nearing extinction throughout the basin. The largest population in the lower basin currently persists in Lake Mojave AZ-NV where it is estimated 20% of the larger fish in the lake still represent the wild genome. Unfortunately, there are so few fish that a population estimate cannot be made. The Service has been supplementing this population for several years and to date has repatriated ~230,000 fish. However, many of these were fingerlings or smaller and are presumed to have been eaten. More recently, larger fish (>10 inches) have been stocked but no large scale research program is addressing that effort. A similar effort is also underway on Lake Havasu downstream of Lake Mojave.

In order to preserve this species it is crucial that more is learned about this fish. Telemetry studies have been done but were preliminary and did not provide detailed enough information to address the biology of this fish. Spawning areas and requirements, habitat preferences of all life stages, food habits, predators of large and small individuals need to be determined. Additionally, the current broodstock was established using three individuals. It is imperative to get more wild fish into the broodstock before the wild fish disappear. In summary information needs include:

1. More in depth telemetry studies on Lake Mojave and Lake Havasu;
2. location and description of spawning areas;
3. collect basic life history information as to spawning success, recruitment or lack there of;
4. collect more wild individuals to enhance the genetic diversity of the broodstock; and
5. study interactions of the various life history stages of bonytail and nonindigenous fish species.

**FWS Contact:** Dr. C.O. Minckley, AZFRO-Parker River, (520) 667-4785,  
Chuck\_Minckley@fws.gov

**Region 2/ Northern Aplomado Falcons (*Falco Femoralis Septentrionalis*)**

**Status:** The Northern Aplomado Falcon (*Falco femoralis septentrionalis*) was listed as endangered in 1986. The species decline was mostly attributed to adverse habitat modifications, and evidence of pesticide contamination may have prevented re-establishment. The Aplomado Falcon formerly nested in South Texas, West Texas, southern New Mexico, and southeastern Arizona. A successful reintroduction effort is currently underway only in South Texas. However, within the remaining U.S. range (desert grasslands), comparatively little is known of the species' dynamics. Two remnant populations of the falcons were "discovered" in the desert grasslands in proximity to the U.S. border in New Mexico, Texas, and Chihuahua, Mexico.

**Problem:** Reproductive success of 61 nests monitored from 1996-1999 showed very low to declining reproduction trends. This poses serious implications for successful natural recolonization and recovery efforts. Virtually all reproductive losses are occurring before the hatching stage. It is unclear what specific factors and to what extent they are responsible for the observed low reproduction. Funding is needed to continue monitoring at a level necessary to identify these apparent limiting factors. Continued banding young-of-year to track dispersing individuals is recommended.

**Critical Information Needs:** A study of nesting success and movements of northern aplomado falcons in desert grasslands is required, including identifying factors associated with low reproductive success of the only known remaining populations of the species in the desert grasslands near their former range. Band young-of-year to establish dispersal patterns.

**FWS Contact:** Chris Perez, New Mexico Ecological Services Field Office, (505) 346-2525, ext.119, e-mail: Chris\_Perez@fws.gov

**Region 2/ Rio Grande Silvery Minnow (*Hybognathus Amarus*)**

**Status:** The Rio Grande silvery minnow (silvery minnow), an endangered species, is limited to five percent of its historic range with a continued downward trend in population size and distribution.

**Problem:** Many activities occurring in the Middle Rio Grande in New Mexico could be impacting this species. Suspended sediments, cadmium, diazinon, and wastewater effluent in the Rio Grande at Albuquerque, New Mexico, caused by human activities may be contributing to mortality. Also, changes in water temperature may be limiting the distribution of this species.

**Critical Information Needs:** A study of acute toxicity of pulsed and sustained sediment, cadmium, diazinon and wastewater and thermal tolerance of Rio Grande silvery minnow is needed. The relative tolerance of different life stages of the silvery minnow to constant high suspended sediment is unknown, as are the toxicities of cadmium, diazinon and urban wastewater. The physiological response of the silvery minnow to different temperature regimes needs to be determined. The following are critical information needs for this fish species:

1. Design and build an exposure system to prepare and maintain constant suspended sediment concentrations in exposure vessels during the desired test periods.
2. Conduct acute toxicity tests with different life stages of the silvery minnow exposed to constant high suspended sediment concentrations.
3. Conduct acute toxicity tests with different life stages of the silvery minnow exposed to pulses of high suspended sediment concentration.
4. Expose larvae fish to various concentrations of heavy metals and record the impacts.
5. Determine growth, reproduction and survival of various life stages at various temperatures, determine minimum and maximum temperature tolerances.

**FWS Contact:** Joel Lusk, New Mexico Ecological Services Field Office, (505)-346-2525, e-mail: Joel\_Lusk@fws.gov

**Region 2/ Texas Wild-rice (*Zizania Texana*)**

**Status:** Texas wild-rice (*Zizania texana*) is federally and State Listed as endangered.

**Problems:** Failure of the plant to reproduce sexually in the wild in recent years, although known to have done so in the past. Incomplete understanding of the relative degree of genetic variability in the species, which reproduces both clonally and sexually.

**Critical Information Needs:** There is a lack of complete genetic information on the heterogeneity within and between stands to support permit evaluations, section 7 consultations, and recovery objectives. A need exists for evaluation of the occurrence of inbreeding depression in some stands in the population and possible role of genetic issues in failure of the species to reproduce sexually in the wild. In addition, information on seed phenology and viability is needed. Further, an evaluation of impacts of wetting/inundation from recreation in the river on reproductive success is needed.

This is a project appropriate for contract funding as academic investigators have initiated, but not completed work on these issues. Colorado State University and the USDA National Seed Storage Lab in Fort Collins, Colorado, have been working for a year to evaluate genetic variability within and between stands and has a post-doc working on the problem. However, funding is inadequate to complete their current work. They are interested and able to do the work investigating possible inbreeding depression and seed issues as well, but lack funding to initiate these studies. They can provide in-kind match, and possible cost-share in part.

**FWS Contact:** Kathryn Kennedy, Austin Field Office (512) 490-0057, e-mail: Kathryn\_Kennedy@fws.gov

**Region 3/ Hine's Emerald Dragonfly**

**Status:** Endangered (1/26/95).

**Problem:** Lack of surveys throughout southern portion of species' historical range.

**Critical Information Needs:** Extensive survey work is needed to investigate the hundreds of fens in Missouri. The species was discovered in MO the summer of 1999. Due to the large number of fens in the state, it is highly likely that the species will be discovered at additional locations. Because this can be a hard-to-identify species, only species experts should conduct the surveys (e.g., Tim Cashett & Tim Vogt in IL, Wayne Steppens in MI, and Bill Smith in WI. Linden Trial with MDC is the local expert entomologist who is on the recovery team.

**FWS Contact:** Paul McKenzie, Columbia, MO, (573-876-1911 x107), e-mail: Paul\_McKenzie@fws.gov; or Karla Kramer, Barrington, IL (847-381-2253 x230)

**Regions 3 and 6/ Topeka Shiner**

**Status:** The Topeka shiner was listed as endangered in December 1998. Currently it is found in all six states within its historical distribution; however, in much reduced numbers and locations. Since the time of listing, the species has declined further in MO, although several additional localities have been found in SD. The species has also been found to use off-channel habitat in both Minnesota and Iowa, which had previously not been documented. It is questionable whether viable populations exist in Nebraska.

**Problem:** Limited information on the species ecology and life history is available in order to help guide and support conservation and recovery of the species.

**Critical Information Needs:** Information is needed on the basic ecology and life history requirements of the species. Although Topeka shiner habitat is generally recognizable in the field, little research has been done to quantify habitat requirements. Of particular interest is information on spawning requirements and habits, recruitment, and dispersal. Some research is currently being conducted on food habits and genetics, but there may be additional information needed beyond that being currently collected. In addition, research is needed on the impacts of predators, especially largemouth bass in the southern portion of the range; and on developing methods to restore off-channel habitats for this species.

Additional information needs include studies of the impacts of changes in hydrology on the species; reproductive strategies/success, especially in streams that are heavily silted; review of possible importance of off-channel habitats to the species historically, especially in the southern portion of the fish's range where such habitat no longer exists; impacts of point and non-point source pollution; impacts of pond development on TS populations; additional information on movements and microhabitat needs; causative agent for incident of scoliosis in TS in MO Bon Femme Creek watershed; impacts of gravel mining; additional survey work in off-channel and mainstem/tributary habitats.

**FWS Contacts:**

Region 3: Paul McKenzie, Columbia, MO, (573-876-1911 x107)

e-mail: Paul\_McKenzie@fws.gov

Region 6: Vernon Tabor, Kansas Ecological Services Field Office, 785-539-3474, ext. 110,

e-mail: Vernon\_Tabor@fws.gov

**Region 3/ All FWS Region 3 species of freshwater mussels**

**Status:** All listed as endangered (prior to 1992) except **Scaleshell** (proposed 8/13/99).

**Problem:** Need to perfect propagation methods for the development of juvenile mussels and holding environments for adults. Threatened by spreading zebra mussel populations.

**Critical Information Needs:** (1) Recent research investigations have resulted in the discovery of the host fish for most critically imperiled species; however, we have yet to discover the type of culture mediums that will ensure growth for certain species of developing juvenile mussels to the point that they can be successfully reintroduced to the wild. Also need data on the best environments to hold adult freshwater mussels in captivity after being removed from the wild due to the continued spread of zebra mussels. Coordinate work with numerous researchers who have already made significant advances, such as Mark Hove, Chris Barnhart, Diane Waller, Dick Neves, etc. (2) Methods to control zebra mussel spread and/or density in areas already inhabited by endangered mussels. Coordinate work with FWS and Corps of Engineers who soon expect to participate in an emergency effort to relocate or reestablish native mussel populations in waters uninfested with zebra mussels.

**FWS Contacts:**

Paul McKenzie, Columbia, MO (573-876-1911 x107), e-mail: Paul\_McKenzie@fws.gov  
Russ Peterson, Bloomington, MN. (612-725-3548 x201), e-mail: Russ\_Peterson@fws.gov

## **Regions 3 and 6/ Pallid Sturgeon**

**Status:** Endangered (10/09/90)

**Problem:** Many aspects of life history requirements and habits of pallid sturgeon are unknown, particularly for young of the year and juvenile fish. This lack of information greatly hinders conservation and recovery efforts.

**Critical Information Needs:** Numerous research needs have already been submitted to BRD during other related exercises (e.g., Species at Risk, Quick Response Funds). Itemized information needs include investigations of (1) age distribution, growth and growth rates; (2) food habits and feeding behavior, movements and behavior; (3) macrohabitat needs; (4) microhabitat needs for spawning, feeding, staging and rearing areas; (5) population viability to determine appropriate recovery numbers; and (6) methods to improve spawning, culturing and rearing of pallid sturgeons. Additionally, we need information to understand the impacts of the current operation and maintenance of the Missouri and Mississippi Rivers on pallid sturgeon reproduction (including hybridization with shovel-nosed sturgeon) and movements. To date all reported impacts have been mostly speculative; solid data are needed. The recent discovery of pallid sturgeon reproduction in the lower Missouri River by the Columbia, MO, Fisheries Resources Office, further elucidates the importance of this river to pallid sturgeon, and the urgent need for additional studies there while reproduction is occurring.

### **FWS Contacts:**

Region 3: Paul McKenzie, Columbia, MO, (573-876-1911 x107), e-mail:

Paul\_McKenzie@fws.gov

Region 6: Steve Krentz, Missouri River Fish and Wildlife Management Assistance Office, (701) 250-4419, e-mail: Steve\_Krentz@fws.gov

**Region 3/ Indiana Bat**

**Status:** Endangered and continuing to decline at an alarming rate.

**Problem:** Lack of research that investigates the potential impact of various timber management activities on the species; additional research needs related to changes in the species' cave microclimate during hibernation.

**Critical Information Needs:** Because the species uses dead or dying trees for roosting during the summer and migration, and also uses various types of forests for foraging, many believe that the main reason for the species' decline is timber management that removes any trees that could be used by the species (regardless of how much habitat is still available to the species adjacent to areas manipulated or harvested). However, we have little data from rigorous studies that: 1) conducted pre-treatment surveys for the species in areas scheduled for harvest or management, 2) subjected the forest to different types of even-aged and uneven-aged management, and 3) conducted post-treatment surveys to evaluate how changes in forest canopy and structure impacts habitat use, movement, and reproduction by the species. Such studies are needed at several locations across the species' range.

**FWS Contact:** Paul McKenzie, Columbia, MO, (573-876-1911 x107), e-amil: Paul\_McKenzie@fws.gov; or Scott Pruitt, Bloomington, IN (812-334-4261 x217), Scott\_Pruitt@fws.gov

**Region 3/ Winged Mapleleaf Mussel**

**Status:** Endangered (7/22/91); single remaining population exists in St. Croix River, between Minnesota and Wisconsin.

**Problem:** Much basic life history information is lacking. Exotic Zebra mussels have significantly expanded toward the only remaining population.

**Critical Information Needs:** Identification and distribution of host fish species (coordinate with Mark Hove); factors influencing reproductive success; distribution of the species in and above Pool 3 of the Mississippi River (also surveying for Higgins' eye pearly mussel in same area, coordinated with FWS, DNRs and Corp of Engineers); assessment of threats from zebra mussel, including identifying occurrence and expansion of zebra mussel populations. Identify streams within the species' historic range that may now be suitable for reintroduction.

**FWS Contact:** Phil Delphey, Bloomington, MN (612-725-3548 x206), [Phil\\_Delphey@fws.gov](mailto:Phil_Delphey@fws.gov)

**Region 6/ June Sucker**

**Status:** Endangered, listed in March 1986. The June sucker is endemic to Utah Lake and currently is known to spawn only in the Provo River. At the time of listing, the June sucker population was  $\approx$  1,000 individuals, and has continued to decline. The current population in Utah Lake is estimated to be approximately 400 aging, senescent adults.

**Problem:** Threats to the continued existence of the species, as well as threats responsible for its decline within Utah Lake and the Provo River include habitat alteration from channelization, water diversion and development, commercial and residential development, altered natural flow regime, reduced annual lake level stability, blocked migration corridors, changes in water quality, and competition and predation from non-native species. Lack of successful spawning and recruitment is also contributing to the species decline.

Only minimal recruitment of June suckers has been documented in the last decade. Every year the number of adults coming into the Provo River to spawn is decreasing, consistent with a senescent population composed of old, mature individuals with very little recruitment. Hatchery fish are being released into Utah Lake and the Provo River. However, because young are hatched and reared in captivity, stocked June sucker may not develop the biological affinity for appropriate stream or stream reaches.

**Critical Information Needs:**

- 1) Current June sucker culturing methods have not been successful. Research is urgently needed regarding the development of culture methods, particularly requirements for feed type, density, temperature, ammonia, and water re-circulation information.
- 2) Negative interactions with non-native fish species is a primary threat to June sucker in the Provo River and Utah Lake. Investigation of measures and alternatives necessary to protect June suckers from non-natives (including the feasibility of the removal and/or control of non-native fish predators) are urgently needed.
- 3) The Provo River is the primary spawning habitat for June sucker. Studies are needed to examine past and present habitats of the Provo River, including its delta, particularly as it relates to spawning and successful recruitment. Investigation of potential impacts of fluctuating water levels on aquatic vegetation and relationships between water level, riverine flows, aquatic vegetation, and habitat use of the June sucker both in the lower Provo River and delta area in Utah Lake are needed. Alternatives for increasing habitat complexity and structural refugia in the Provo River and delta area of Utah Lake are also needed.
- 4) Currently there is very poor recruitment of June sucker from larval into adult life stages. Investigations of habitat use and requirements for early life stages of June sucker in the Provo River and Utah Lake is a high priority.

**FWS Contact:** Jessica Gourley, Utah Ecological Services Field Office, 801-524-5001, ext. 133, e-mail: Jess\_Gourley@fws.gov

**Region 6/ Neosho Madtom**

**Status:** The Neosho madtom was listed as threatened in May 1990. Recent population data indicates the species is currently stable.

**Problem:** Limited information on the species ecology and life history is available in order to help guide and support conservation and recovery of the species.

**Critical Information Needs:** Information is needed on the basic ecology and life history requirements of the species. Of particular interest is information on spawning requirements and habits, recruitment, dispersal, and impacts to the species resulting from altered flow regimes (dam releases). Some research is currently being conducted on food habits, genetics, and effects of small dam removals, but there may be additional information needed beyond that being currently collected.

**FWS Contact:** Vernon Tabor, Kansas Ecological Services Field Office, 785-539-3474, ext. 110, e-mail: [Vernon\\_Tabor@fws.gov](mailto:Vernon_Tabor@fws.gov)

**Region 6/ American Burying Beetle**

**Status:** This beetle was listed as endangered in July 1989. The American burying beetle was historically found in 32 states and two Canadian provinces. Currently, populations can be found in South Dakota, Nebraska, Kansas, Oklahoma, Arkansas, and two islands off the east coast.

**Problem:** In Nebraska, there are two main populations, one in the north-central region and the other in the central region, with a few scattered reports in between. We do not know the importance of these populations to each other and therefore do not know if an interchange between these population is important for recovery.

**Critical Information Needs:** Develop and initiate a monitoring program for extant populations in Nebraska and determine if the populations are isolated or if an interchange of individuals may occur between populations.

**FWS Contact:** Wally Jobman, Nebraska Ecological Service Field Office, 308-382-6468, ext. 16 , e-mail: [Wally\\_Jobman@fws.gov](mailto:Wally_Jobman@fws.gov)

**Region 6/ Shivwits Milk-vetch, Holmgrens Milk-vetch, Dwarf Bear-poppy (E), Clay Phacelia (E), Siler Pincushion Cactus (T), Autumn Buttercup (E)**

**Status:** Holmgrens milk-vetch and Shivwits milk-vetch will be proposed for listing in the near future. Dwarf bear-poppy was listed as endangered in November 1979; Clay phacelia was listed as endangered in September 1978, Autumn buttercup was listed as endangered in July 1989, and Siler pincushion cactus was listed as threatened in December 1993. The milk-vetches, bear-poppy, and cactus all occur in the same general habitat and location. The clay phacelia and autumn buttercup occur in different locations within the state but have similar research needs.

**Problem:** The majority of the Service's limited funds for recovery of listed species are used to support recovery of animals, only minimal amounts are available on an infrequent basis for recovery of plants. Limited information on the species ecology and life history has been obtained. Therefore, threats that may modify physical or biological components of their habitat that may preclude or limit recovery options are unknown.

**Critical Information Needs:** All of these plant species need basic ecology and life history research in order to guide and support recovery and to identify threats and conservation measures. Of particular interest are the effects of off-road vehicle use, loss of pollinators, introduced invasive species, and species/pollinator interactions, in addition to the need for background information on the species life history/ecology.

**FWS Contact:** Larry England, Utah Ecological Services Field Office, 801-524-5001, ext 138, e-mail: [Larry\\_England@fws.gov](mailto:Larry_England@fws.gov)

**Region 6/ Barneby Reed-mustard, Clay Reed-mustard, Shrubby Reed-mustard**

**Status:** All three species are found in the same general habitat and location. The Shrubby reed-mustard was listed as endangered prior to 1992; the Barneby reed-mustard and clay reed-mustard were listed in January 1992 as endangered and threatened, respectively. The shrubby reed-mustard is believed to be declining, while the other two species appear to be stable.

**Problem:** The majority of the Service's limited funds for recovery of listed species are used to support recovery of animals, only minimal amounts are available on an infrequent basis for recovery of plants. Limited information on the species ecology and life history has been obtained. Therefore, threats that may modify physical or biological components of their habitat that may preclude or limit recovery options are unknown.

**Critical Information Needs:** All of these plants need basic ecology and life history research in order to guide and support recovery and identify continuing threats and needed conservation measures. Of particular interest are introduced invasive species.

**FWS Contact:** Larry England, Botanist, Utah Ecological Services Field Office, (801) 524- 5001, ext. 144, e-mail: [Larry\\_England@fws.gov](mailto:Larry_England@fws.gov)

**Region 6/ Winkler Cactus (T), San Rafael Cactus (E), Last Chance Townsendia (T),  
Wright Fishhook Cactus (E)**

**Status:** All four species are found in the same general habitat and location. Except for the winkler cactus, all species were listed prior to 1992.

**Problem:** The majority of the Service's limited funds for recovery of listed species are used to support recovery of animals, only minimal amounts are available on an infrequent basis for recovery of plants. Limited information on the species ecology and life history has been obtained. Therefore, threats that may modify physical or biological components of their habitat that may preclude or limit recovery options are unknown.

**Critical Information Needs:** All of these plants need basic ecology and life history research in order to guide and support recovery and identify continuing threats and needed conservation measures. Of particular interest are off-road vehicle damage and introduced invasive species.

**FWS Contact:** Larry England, Botanist, Utah Ecological Services Field, (801) 524- 5001, ext. 144, e-mail: Larry\_England@fws.gov

**Region 6/ Blowout Penstemon**

**Status:** The blowout penstemon was listed as endangered in September 1987. This plant is found only in Nebraska and Wyoming. Since the listing of this species, its status has remained relatively stable (possibly increasing in Nebraska) because of several reintroduction efforts. Recently a new population was discovered in Wyoming.

**Problem:** Not enough information is known about the habitat requirements of the species or management of newly established or naturally occurring populations.

**Critical Information Needs:** Research is needed on population parameters, habitat requirements, and management criteria for naturally occurring and newly established populations of the species. This information could then be used to develop management plans.

**FWS Contact:** Wally Jobman, Nebraska Ecological Service Field Office, 308-382-6468, ext. 16, e-mail: Wally\_Jobman@fws.gov

**Region 6/ Bull Trout (St. Mary-Belly River Population)**

**Status:** Threatened

**Problem:** The major adverse action limiting recovery of the St. Mary's River DPS is a Bureau of Reclamation irrigation project. The Service is working with the Bureau to resolve this issue but needs additional information

**Critical Information Needs:** FSW needs to define (1) specific fish passage screening criteria for irrigation diversions and fish passage design criteria for culverts for all life history stages of bull trout; (2) habitat needs, food habits, distribution and movements of juvenile and subadult bull trout in tributary streams, large rivers and lakes and the effects of land management activities on these aspects of bull trout life history; (3) minimum flow requirements for resident and adfluvial bull trout in regulated streams and rivers; and (4) lake trout and bull trout interactions and the role of brook trout hybridization with bull trout.

**FWS Contact:** Tim Bodurtha, Montana Ecological Services Field Office: (406) 758-6882, e-mail: [Tim\\_Bodurtha@fws.gov](mailto:Tim_Bodurtha@fws.gov)

**Region 6/ Canada Lynx**

**Status:** Proposed Threatened, Final determination due January 8, 2000

**Problem:** Because the Canada lynx is such a wide-ranging and secretive animal, we are lacking information on basic presence and absence of the species and habitat availability and suitability in the southern margins of its range. Furthermore, we lack information on reactions of lynx individuals and populations to ongoing and proposed activities and potential threats and impacts these activities pose to lynx.

**Critical Information Needs:** (1) Presence/absence surveys in Utah; (2) habitat availability/suitability evaluations (including prey base), particularly in areas such as Utah which are considered the margins of lynx range; (3) potential impacts to lynx, their habitats, prey and competitors from ongoing and proposed activities, such as winter recreational activities and related structures and development, snow compactions and alteration of snow conditions by packing trails, plowing roads; and (4) evaluation and validation of hair snagging sampling methodology and its application to lower density populations and more fragmented habitats.

**FWS Contact:** Lori Nordstrom, Montana Ecological Services Field Office: (406) 449-5225, ext. 208, e-mail: [Lori\\_Nordstrom@fws.gov](mailto:Lori_Nordstrom@fws.gov)

**Region 6/ Desert Yellowhead**

**Status:** Proposed Threatened, final determination due December 22, 1999

**Problem:** Very little is known about this species. It was discovered in 1990 and represents a new plant genus. Only one small population is known to exist on BLM lands.

**Critical Information Needs:** Because only one population of this species is known to exist, the species faces numerous threats to its continued existence. However, we lack critical information on the plant's reactions to disturbance, such as cattle grazing. Furthermore, basic information is needed on this plant's life history and identification and status of pollinators. Developing propagation and transplant techniques will be critical to protecting and conserving this species.

**FWS Contact:** Mary Jennings, Wyoming Ecological Services Field Office: (307) 772-2374 ext. 32, e-mail: [Mary\\_Jennings@fws.gov](mailto:Mary_Jennings@fws.gov)

**Region 6/ Preble's Meadow Jumping Mouse**

**Status:** Threatened

**Problem:** The range of the Preble's Meadow Jumping Mouse includes portions of Colorado and Wyoming. However, in Wyoming, this range overlaps with that of *Zapus princeps*, a non-listed species. Current science does not allow for visual or habitat differentiation between the two species which has resulted in numerous conflicts in determining both the range and presence of the listed entity. This makes section 7 consultations extremely difficult and contentious. Along these same lines, hydrological studies of the impacts of water diversions and ditches on known and potential preble's habitat are sorely needed to determine both impacts for section 7 purposes and their importance to the conservation and recovery of the species.

**Critical Information Needs:** (1) Study the interactions between *Zapus princeps* and the Preble's Meadow jumping mouse in areas of range overlap to determine habitat partitioning and hybridization between the two species; (2) clarify morphological/genetic differentiation between *Zapus princeps*, the Preble's Meadow jumping mouse, and other subspecies; (3) conduct hydrological studies of water diversions and impacts on known and potential preble's habitat; and (4) develop a population viability analysis for the species.

**FWS Contact:** Mary Jennings, WY Ecological Services Field Office: (307) 772-2374 ext. 32, e-mail: Mary\_Jennings@fws.gov

**Region 6/ Piping Plover (Northern Great Plains Population)**

**Status:** Threatened

**Problem:** The large range, both breeding and wintering, of the piping plover and the distinctness of the three populations (Atlantic coast, Great Lakes and Northern Great Plains), make it extremely difficult to determine what the limiting factors are in plover survival and conservation.

**Critical Information Needs:** FWS needs research to (1) determine limiting factors affecting piping plovers on their breeding grounds and overwinter survival; (2) understand adult annual survival rates, particularly outside of the North Dakota coteou region; (3) define the geographical, temporal, and successional variability in quality of foraging habitat on the Missouri River and North Dakota coteou wetlands.

**FWS Contact:** Nell McPhillips, Pierre, MT Ecological Services Field Office; (605) 224-9974, e-mail: [Nell\\_McPhillips@fws.gov](mailto:Nell_McPhillips@fws.gov)

**Region 6/ Black-footed Ferret**

**Status:** The black-footed ferret is one of the most endangered mammals in North America. Substantial progress towards recovery of this species has occurred through captive propagation over the past decade. However, there are still significant threats to the species survival and persistence at reintroduction sites due to the presence of an introduced disease (plague).

No animals are known to occur in the wild, other than at the 6 reintroduction sites where captive bred ferrets have been released.

**Problem:** The species is very highly susceptible to plague. Neither ferrets nor prairie dogs (their prey) are immune, and mortality from the disease is locally 100%. It is essential for this species recovery and long-term survival in the wild to have some method of controlling plague.

**Critical Information Needs:** Need to identify ways to control plague at ferret reintroduction sites. Some evidence to indicate that plague management by dusting for fleas is a primary need for sustaining ferret populations at reintroduction sites. But additional research is needed to verify this opportunity and to identify control methodologies.

Also needed are long term studies of plague dynamics to identify methods for interrupting or controlling plague cycles to provide additional methods of longer-term control of the disease.

Additional research on telemetry is also needed at ferret reintroduction sites. Telemetry is a primary tool for relocating ferrets and measuring success of reintroductions. Research into improved attachment techniques, design of transmitter packages, longevity of transmitters, and enhanced reception is needed.

**FWS Contact:** Mike Lockhart, Black-footed Ferret Coordinator, Laramie, WY (307) 721-8805, e-mail: Mike\_Lockhart@fws.gov

**Region 6/ Mountain Plover**

**Status:** Proposed as Threatened, 2/99; Final Rule signed by Director Clark 01/18/01; listing decision pending

**Problem:** A wide-ranging, low population species subject to multiple threats as changes in predator populations, grazing practices, oil and gas exploration and production, and changing agricultural practices.

**Critical Information Needs:** Assess changes in predator or predation levels from changes in ecosystems (loss of free-ranging bison, increased cottonwoods in riparian areas, increased human populations), and the impact of such changes on plover production and habitat use. Determine impacts of oil and gas development on plover production, types of agriculture that are compatible and not compatible with successful reproduction, and grazing systems that favor plover nesting. Develop techniques to accurately estimate breeding populations.

**FWS Contact:** Bob Leachman, Colorado Ecological Services Office (970) 243-2778, e-mail: Bob\_Leachman@fws.gov

**Region 6/ Pawnee Montane Skipper (*Hesperia Leonardus Montana*)**

**Status:** Unknown. The subspecies of butterfly was listed as threatened in 1987 and no information regarding status and trends of the species has been gathered since then.

**Problem:** A distribution survey was conducted in 1985 due to the threat of a dam proposed by the Denver Water Board. Population surveys were conducted in 1985, 1986 and 1987. No research has been conducted on this species since then. Most populations occur on public lands (State or federal) in the South Platte River drainage system in four counties in Colorado, however no guidance has been developed on how to manage habitat for the species and no evaluation has been done of how lands are currently being managed. Existing land management varies between agencies. It is unknown whether (or to what degree) management regimes may benefit or impact the species.

**Critical Information Needs:** Research is needed to guide land management of the public land on which the species occurs, specifically research into fire management, population trends, introduced invasive species, and grazing regime (or lack of grazing) to determine how best to maintain optimum habitat for the species.

**FWS Contact:** Bettina Proctor, U.S. Fish and Wildlife Service, Denver Federal Center, P.O. Box 25486, Denver, CO 80225; (303) 236-8145 x606; e-mail: [bettina\\_proctor@fws.gov](mailto:bettina_proctor@fws.gov).

**Region 6/ Western Prairie Fringed Orchid**

**Status:** Threatened

**Problem:** Frequent natural fires and migratory grazing herds historically impact prairie habitats in variable patterns. Most of the species' habitat has been converted to agriculture and all remaining native prairies exist in small, isolated remnants. These small patches are subject to fire suppression and regular patterns of grazing that have significantly altered the natural disturbance patterns. Land managers are attempting to use fire and grazing to simulate natural disturbance in order to manage and maintain prairie habitat.

**Critical Information Needs:** Research on prairie management/maintenance activities to simulate natural fire/grazing patterns. Prairie species respond differently to both fire and grazing pressure, some being favored and others being inhibited and responses also vary with timing, season, and drought cycles. Research on the effects of various fire and grazing regimes on the western prairie fringed orchid is critical to understanding how best to use these tools to sustain/ enhance existing populations and to achieve recovery and long-term persistence of the species.

**FWS Contact:** Karen Kreil, Bismarck, ND Ecological Services Field Office, e-mail: [Karen\\_Kreil@fws.gov](mailto:Karen_Kreil@fws.gov)

**Region 6/ Wyoming Toad**

**Status:** Endangered

**Problem:** While this species has declined drastically, we have very little information as to what has caused these declines and what are the current factors limiting survival and conservation of the species.

**Critical Information Needs:** Determination of (1) how significant a role disease has and may continue to play in the decline of the species; (2) whether hibernation is a limiting factor in recruitment and annual survival of toads; (3) the microhabitat needs of toads is essential to reintroduction efforts; and (4) why toads are not surviving to reproductive age.

**FWS Contact:** Mary Jennings, Wyoming Ecological Services Field Office: (307) 772-2374 ext. 32, e-mail: Mary.Jennings@fws.gov

## Appendix I

### **Region 2/      Genetics of the Gammarid Amphipods of the *Gammarus Pecos*-Complex in New Mexico and Texas**

**Status:** Three aquatic snail species (*Assiminea pecos*, *Pyrgulopsis roswellensis*, and *Tryonia kosteri*) are considered candidate species and currently possess a federal Listing Priority Number of 2, based on imminent threats posed by contamination of refuge ground and surface water quality from off-refuge land use practices. These demes are characterized by narrowly restricted endemic species of what Cole (1985) termed the “*Gammarus-Pecos* complex.” Although listed by the State of New Mexico as endangered, Noel’s amphipod (*Gammarus desperatus* Cole, 1981) has no Federal protection and is considered a species of concern.

**Problem:** Based on similarity of structural features, gammarid amphipods from the Bitter Lake National Wildlife Refuge (BLNWR), Chaves County, New Mexico, are considered conspecific with known populations of *G. desperatus* that have been extirpated in New Mexico (NMDGF 1988, 1998, 1999). Members of the *Gammarus-Pecos* Complex in western Texas occupying isolated spring systems are threatened by ongoing drought conditions that are exacerbated by regional/local groundwater mining practices.

**Needs:** Considering the number of unique populations within this geographically disparate species complex that remain undescribed, or in question, it would behoove conservation agencies to support a genetic and morphological analysis of the *Gammarus-pecos* complex. Recent genetic studies of peracarida crustaceans, namely hyalellid amphipods (Guttman 1994, Duan et al. 1997, Thomas et al. 1997, Hogg 1998, McPeck and Wellborn 1998), indicates that lack of phylogenetic studies has impeded studies of *Hyaella* comparative biology, biogeography, and evolution (Duan et al. 2000).

Allozymic analysis of known species of the *Gammarus-Pecos* complex is recommended for comparison with undescribed, and putative taxa of questionable taxonomic validity. Morphological analysis of specimens from extant populations and collections of type specimens housed at the National Museum of Natural History-Washington, DC will compliment proposed genetic studies. Ecological and habitat data recorded at collection localities and published in the literature will supplement our assessment of the genetic affinities of gammarid amphipods of the *Gammarus-Pecos* complex of New Mexico and Texas. Estimated funding needed is \$18,000. Literature citations available upon request.

**USFWS Contact:** Gordon Warrick BLNWR, Roswell, NM (505-622-6755), e-mail: Gordon\_Warrick@fws.gov. Additional contacts include: (1) Brian Lang,

New Mexico Department of Game and Fish (505-827-4628); and (2) Dr. Sheldon Guttman, Crustacean Geneticist, Miami University, Ohio (513-529-3181).

## Appendix II

### Region 4/ Pearl Darter, *Percina aurora*

**Status:** Candidate Species

**Problem:** The Pearl darter (Suttkus and Thompson, 1994) is vulnerable to non-point source pollution, changes in river and stream geomorphology and other human-induced threats to its environment, because of its restriction to the Pascagoula River drainage and localization to site-specific habitats.

Collection data suggests that the Pearl darter is very rare in the Pascagoula River system. The rarity of the Pearl darter within the Pascagoula drainage was estimated from 379 collections (81,514 fish specimens) since 1973 and found only one Pearl darter collected for every 4,795 specimens. Site records from museum fish collections suggests that the Pearl darter inhabited the main channels of large Pascagoula drainage tributaries from Jackson to Lauderdale Counties, Mississippi, and had a historical noninclusive range of about 30 river miles of the Pascagoula River, 24 river miles of Black Creek, 48 river miles of the Leaf River, 24 river miles of Okatoma Creek, 102 river miles of the Chickasawhay River, 24 river miles of the Bouie River and 8 river miles of Chunky Creek. Since 1983, Pearl darters have only been found in scattered sites within approximately 88 miles of the Pascagoula drainage, including the Pascagoula, Chickasawhay, Chunky, Leaf and Bouie Rivers and Okatoma and Black Creeks resulting in a decrease of range of approximately 66 percent.

Ancillary collections in 1996 and 1997 from the Pascagoula drainage accounted for only 10 Pearl darters at four sites (the Leaf River at Estabutchie; lower Leaf River at Merrill; Bouie River downstream of I-59 crossing; and Okatoma Creek at Collins). Three specimens were collected in the Leaf River at Estabutchie in the spring of 1998 while in December 1998, no Pearl darters were found in the upper reaches of the Leaf River between Estabutchie and north Hattiesburg. No Pearl darters were found in selected sites of the Chunky River in 1995 and 1997.

**Critical Information Needs:** Some additional survey work is needed within Okatoma Creek, and the Bouie, Leaf, and Chunky rivers.

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