# BIOLOGICAL ASSESSMENT

# OF PROPOSED PECOS RIVER 1999-2000 WINTER OPERATIONS

# ON PROPOSED, THREATENED AND ENDANGERED SPECIES

# OF THE PECOS RIVER BASIN

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## 1. INTRODUCTION

This biological assessment analyzes the potential effects of the U.S. Bureau of Reclamation's (Reclamation's) proposed 1999-2000 winter operations of Sumner Dam on twelve proposed, threatened and endangered species of the Pecos River Basin. The 1999-2000 winter operations of Sumner Dam began on November 1, 1999 and will end on February 29, 2000.

The species identified in this biological assessment are federally listed and are found within the greater area of the Pecos River basin. Most are native to the basin. Some of these species now have limited ranges throughout the basin in both New Mexico and Texas. Only one of these species, the Pecos bluntnose shiner, is restricted to the 225-mile mainstem section of the river between Sumner Reservoir and Brantley Reservoir in New Mexico and has the potential for being directly affected by the proposed action.

## 2. DESCRIPTION OF THE AREA

The Carlsbad Project Area (Project Area) is located within the Pecos River Basin of southeastern New Mexico. It includes the reach of the Pecos River from Santa Rosa Reservoir downstream to Brantley Dam. Within this area, the river has a drainage area of approximately 25,470 square miles (65,984 square kilometers) and traverses 200 miles (321 kilometers).

The Pecos River flows through alternating narrow canyons and slightly wider valleys in the reach from Santa Rosa Dam to Sumner Reservoir. From Sumner Dam downsteam for 106 miles (170 kilometers) to the Pecos River the near Acme gage site (Acme), the channel is generally wide, sandy and unstable. Throughout this reach, water from springs and irrigation returns maintain flows in the channel during times when no bypasses were occurring from Sumner Dam. Shifts occur in the bed structure as flows fluctuate through these habitats. The channel becomes spread out and braided (Tashjian, 1992-1995).

The Sumner-Acme stretch of river is also hydrologically characterized as a losing reach. Surface water is lost both through seepage and evaporation and transpiration. Depending on the time of year, the amount of water moving down the channel, and local weather conditions, water losses of 20 cfs to this portion of the river can be as much as 50% (Fig 1) by the time the water reaches Acme. From Acme downstream the river begins to gain water back to the surface and is a gaining reach. In addition, the stream from this point slowly begins to narrow and deepen. The reach from near Roswell to the headwaters of Brantley Reservoir is characterized by deep entrenchment and the river is confined to a single channel.

## 3. CONSULTATION TO DATE

In 1989, Reclamation released water to fill the newly-completed Brantley Reservoir. Downstream water deliveries for the year created an intermittent situation, drying the river channel for several weeks. Reclamation consulted with the U. S. Fish and Wildlife Service (Service) over the Carlsbad Irrigation Project's (Project) water operations impacts on the threatened Pecos bluntnose shiner. In

1991, Reclamation submitted a Biological Assessment to the Service. The Service issued a Biological Opinion on that assessment in the same year, stating that Reclamation's Pecos River operations were jeopardizing the continued existence of the shiner.

The outcome resulted in a Memorandum of Understanding (MOU) which provided the framework for a 5-year research program and established biannual meetings for MOU parties including the U.S. Bureau of Reclamation (BR), Carlsbad Irrigation District (CID), the Service, and the New Mexico Department of Game and Fish (NMDGF). These meetings provided the forum to discuss Pecos River biological and hydrological issues and to develop flow recommendations for irrigation and research needs.

Upon expiration of the original MOU (dated February 1997), a subsequent MOU extended the relationships another three years. The new agreement included the New Mexico Office of the State Engineer (OSE) as a signatory. The new MOU marked a crossover from the completion of the study phase to the beginning of the decision making process through the National Environmental Policy Act (NEPA) portion.

The NEPA process is ongoing and no long-range operational decisions have been made. As part of the NEPA process, Reclamation plans to consult with the Service over long-term operations. In the interim, Reclamation is consulting over the 1999-2000 Winter Operations. The purpose of this BA is to consult over interim operations of Reclamation's discretion that have the potential to affect these species during the remainder of the 1999-2000 winter operation season.

## 4. DESCRIPTION OF PROPOSED ACTION

### 4.1 Sumner Dam Winter Operations and Bypass Flows

The dams on the Pecos River were built for the purpose of flood control and the storage of water for the benefit of the Project. Reclamation has the right to store all of the winter inflows (beginning of November through the end of February) in Sumner Reservoir for the benefit of the Project. This winter, in order to improve conditions for the Pecos bluntnose shiner, Reclamation has elected to store only a portion of the inflow when the remainder is needed downstream to meet an objective flow at the Acme gage.

During the months of November and December 1999 and January and February 2000, Reclamation proposes to implement a Pecos River winter operations plan that will store only a portion of inflows to Sumner Reservoir so that the average habitat objective flow of 35 cfs at the USGS Pecos River Acme gage can be provided. If storing a portion of inflows hinders our ability to provide 35 cfs on average, then Reclamation will use its full discretionary authority and not store any inflows if they are needed at Acme. If and when the habitat objective of 35 cfs at Acme is being fulfilled entirely by baseflows, then Reclamation will not act to bypass any inflows. The portion of the inflow that is not stored by Sumner Dam are known as bypass inflows. Storage of these bypassed inflows, in whatever quantity is realized after transport losses, would occur at Brantley Reservoir.

In no case will the bypass inflows exceed the natural inflow to Sumner Reservoir as measured at the Pecos River near Puerto de Luna (PDL) gage that is operated by US Geological Survey (USGS). The PDL gage is used to determine what water is available for bypass inflows for winter operations, while the total inflow above Sumner Dam is used for irrigation season operations. Reclamation is using the PDL gage for winter operations for two reasons.

First, Reclamation was basing the total inflow above Sumner calculation on the State Engineer's determination for Fort Sumner Irrigation District diversion. This calculation is not done during the winter months. Since the data is not available it would have to be generated at an additional cost, and that expense was not anticipated.

Secondly, this calculation is not needed since Reclamation does not plan to bypass more than has historically been available at the PDL gage. For the period after construction of Santa Rosa Dam (1980 to 1998), the average flow from November 1 to February 15 at PDL was 85 cfs. The minimum flow for this period was 65 cfs. The minimum flow for the period of record (1938 to 1998) at PDL gage was 40 cfs, which occurred on February 1, 1951. Reclamation does not anticipate the need to bypass more than this minimum amount during the winter operations period.

The average objective flow at Acme for this plan of operations is 35 cfs, with an overall range fluctuating between 20 and 40 cfs. The travel time to Acme for this range of flows is approximately 10 to 12 days. Typically Reclamation will wait a minimum of 12 days between changes in bypass rates of flow at Sumner Dam to allow adequate time for the gage at Acme to stabilize after bypassed inflows were adjusted at Sumner Dam. If flows at Acme are below the objective after this 12 day period, then the bypass from Sumner Dam will be increased by 5 cfs. If flows at Acme are above the objective flows after this 12 day period, then the bypass from Sumner will be reduced by 5 cfs. We do not expect bypass flows through Sumner Dam to exceed 35 cfs.

When climatic conditions significantly change in the basin, Reclamation will evaluate the current conditions and store less if we determine that the natural runoff will be sufficient to provide flows needed to maintain or exceed the objective flow at Acme.

### 4.2 Operation and Coordination Protocol

On November 18, 1998, Reclamation resumed operation of Sumner Dam. Since then Reclamation has been directing changes in Sumner Dam operations. During the operation, flows at key river gages are monitored using the Corps of Engineers' near real time Pecos report, or the USGS web site providing near real time data for the Pecos gages. The key river gages are the PDL, Pecos River below Sumner Dam, Pecos River below Taiban Creek, and Acme gages. If there are questions about a gage reading, Reclamation may direct staff, or ask USGS personnel to take an additional direct flow measurement to provide a current discharge and shift reading.

Managing this winter's operations will continue to be a balance of Reclamation responsibilities. Reclamation intends to utilize its authority to conserve the Pecos bluntnose shiner and also to conserve water to the extent possible to maximize water supply for the Carlsbad Project beneficiary.

To increase or decrease storage arbitrarily and without considerable forethought has the potential to impact listed species or unduly waste water.

Data from the monitoring effort conducted during the 1998-1999 Winter Operations revealed a slight drying trend throughout this period. This trend was observed in the daily average flow data collected at Acme (Fig 2). The trend was a result of average diminishing return flows to the Pecos River following the irrigation season (Fig 3). Based on this data, Reclamation may be able to more closely assess the amount of inflows needed to bypass at Sumner Dam to maintain a more stable objective flow at Acme.

Still, there are difficulties in maintaining stable flows at Acme because of the great distance involved between the existing real time gages. Different flow rates and travel times vary over this distance under changing weather conditions. To assist in determining flow rates and travel times for real time operations, Reclamation is working with USGS to add an additional depth sensor at Acme gage to provide a more accurate and reliable measurement and add data collection platforms (DCPs) at the Pecos River near Dunlap and Pecos River above Acme gages which will provide near real time access to this data.

A DCP at the near Dunlap gage would not only provide instantaneous daily data, but this gage is located within critical habitat for the shiner. It would be a valuable tool for monitoring flows for the portion of the upper critical habitat reach. During the 1998-1999 Winter Operations, provisional data obtained from USGS shows that daily flows averaged about 47 cfs over the four month period for this gage. The following table is a list of monthly mean flows for the 1998-1999 winter operations period.

**Table 1.** Monthly mean flows at near Dunlap for the 1998-1999 Winter Operations period.

| Winter Period | November 1998 | December 1998 | January 1999 | February 1999 |
|---|---|---|---|---|
| Monthly Flows (cfs) | 79.8 | 40 | 37.8 | 30.5 |

As characterized in the "Description of the Area" section, this stretch of the Pecos River is a losing reach down to the Acme site. The Acme site has been identified by the Service as the location on the river that would go dry first during intermittent conditions. From the Acme site downstream the river begins to gain back flows through the portion of the lower critical habitat reach. This reach is less likely to have flow conditions lower than the objective flow as compared to the upper reach because of the channel geomorphology (Tashjian, 1995).

Depending on the rate of flow, the USGS gage data for the near Dunlap gage indicates a range of 10-15 cfs above that of the Acme gage over the winters of 1997-1998 and 1998-1999. If an objective flow of 35 cfs is achieved at Acme lower flows should not occur at the near Dunlap site.

### 4.3 Management of End of 1999 Irrigation Season Flow Recession at the Acme Gage

On November 9, 1999, Reclamation initiated a 10 cfs bypass at Sumner Dam to reduce the end of irrigation season flow recession at the Acme gage. Reclamation increased the bypass to 20 cfs on November 16, 1999. The Taiban gage started leveling out on or about November 10, 1999, and at this time the Acme gage is still declining, but at a constantly slower rate. The travel time to Acme from Sumner is about 10 to12 days with these flow rates. The additional 10 cfs bypassed from Sumner showed up at Acme around November 20 and the 20 cfs bypass flows arrived at Acme about November 27.

### 4.4 Short Term (2-3 months) Weather Forecast

Forecasters are predicting a strong La Niña condition for the 1999-2000 winter, which is driving much of the current weather patterns. We are experiencing record breaking high temperatures throughout much of the Pecos Basin in New Mexico. There has been no precipitation, either in the form of rainfall or snowfall, in the Pecos Basin since November 1. This La Niña forecast calls for this weather to continue throughout the winter months. Last year at this time some precipitation helped maintain the Acme gage flows. Reclamation did not start bypassing inflows at Sumner until November 18. The first combined forecast for the Pecos Basin is not due out until January 15, 2000.

### 4.5 Review of the 1998-1999 Winter Operations

This winter's operations will be similar to last winter's. During the winter operations from November 1, 1998, to February 28, 1999, Reclamation bypassed inflows at Sumner Dam which met or exceeded 30 cfs flow at the Acme gage for a total 108 days out of 120 days, or 90 percent of the time. Flows at Acme exceeded 35 cfs a total of 90 days or 75 percent for the same period of time (Fig 4). Figure 2 (based on provisional data) shows the average daily flows measured at the Acme gage and inflows bypassed from Sumner Dam. Periodic rain events show as spikes in the flows at the Acme gage over the winter.

As described in the 1998-1999 winter operations plan, Reclamation was prepared to meet target flows and initially bypassed 25 cfs inflows starting on November 18, 1999. The gates were adjusted to bypass 28 cfs the following day based on the steady fall of the gage at Acme. The Taiban gage was stable at 35 cfs. Reclamation uses the Taiban gage as a reference to propose possible bypass scenarios. When the gage climbs steadily above or drops below 40 cfs, and based on several other independent variables (climate, rate of climb or fall, etc.), adjustments are made in the bypass flows to reflect the needed flows at Acme. There is a high amount of variability in the flow rates given the distance to and time required to reach the Acme gage 106 miles downstream. As identified in the 1998-1999 winter operations plan, conditions at Acme would be allowed to stabilize within a 12 day period to prevent unnecessary adjustments at the gate when the gages show variable flows. This time would be used to determine whether the flows were simply oscillating about a mean or actually rising or falling.

Based on available data and a reported storm event that did not show on the gage at Taiban, Reclamation closed the gates at Sumner Dam on November 30, 1998 and reopened on December 4, 1998, bypassing 20 cfs, following the above criteria. On December 11, 1998, bypassed inflows

were reduced to 10 cfs as flows at Acme appeared to be high and somewhat stable. Taiban's gage also remained high and stable, indicating some stability in the system however, Acme's gage gradually dropped. On December 19, 1998, bypassed inflows were increased to 25 cfs. Flows at Acme fell sharply and then rose over a two hour period on December 22, 1998.

Over a period of three days following the initial drop, the flows were erratic, falling and rising as much as twice a day. The provisional data by the USGS shows a low was estimated at 17 cfs and the high near 150 cfs. There was some speculation that icing may have been the cause of some of this fluctuation. It remained unstable for a total of four days until a small weather front moved through, providing some moisture.

On January 9, 1999, ice forming on the surface water caused the gage to stick. The system appeared to be stable and Reclamation reduced the bypassed inflows to 20 cfs. As another weather system moved through the area on January 29, 1999, Reclamation bypassed inflows to 15 cfs and again changed back to 20 cfs on February 3, 1999 trying to stabilize a falling gage at Acme. Taiban's gage was showing flows below 40 cfs. At the end of February, as Acme's gage continued to fall, bypass inflows were again increased to over 30 cfs.

The mean flow for the complete winter period at Acme was about 69.5 cfs. The following table is a list of monthly mean flows for the 1998-1999 winter operations period.

**Table 2.** Monthly mean flows at Acme for the 1998-1999 Winter Operations period.

| Winter Period | November 1998 | December 1998 | January 1999 | February 1999 |
|---|---|---|---|---|
| Mean Flows (cfs) | 147 | 51.4 | 42.1 | 37.3 |

Based on the experience gained in the November 1, 1998 to February 28, 199 winter operations, with support from the Riverware model of the Pecos between Sumner and Acme, Reclamation learned that it took an approximate bypass of between 10 to 25 cfs at Sumner Dam to achieve the target flow at Acme. This bypass at Sumner, in addition to typical natural gains to the river in this reach during the winter months, provide an approximate flow of 40 cfs at Taiban, which has been needed to meet the target flows of 35 cfs at Acme.

## 5. SPECIES DESCRIPTION

The effects of the proposed action on twelve proposed, threatened and endangered species of the Pecos River Basin will be analyzed in this biological assessment. The twelve species include: Bald Eagle (*Haliaeetus leucocephalus*), Interior Least Tern (*Sterna antillarum*), Pecos bluntnose shiner (*Notropis simus pecosensis*), Pecos Gambusia (*Gambusia nobilis*), Pecos Pupfish (*Cyprinodon pecosensis*), Pecos Sunflower (*Helianthus paradoxus*), Mountain Plover (*Charadrius montanus*), Mexican Spotted Owl (*Strix occidentalis lucida*), Black-footed Ferret (*Mustela nigripes*), Gypsum wild-buckwheat (*Eriogonum gypsophilum*), Kuenzler hedgehog cactus (*Echinocereus fendlerivar.*

*kuenzleri*), and Lee's pincushion cactus (Coryphantha sneedii var. leei).

## 5.1 Bald Eagle

### 5.1.1 Distribution and Abundance

On a seasonal basis, the bald eagle is located throughout the conterminous United States. The bald eagle was listed under the Endangered Species Act (Public Law 93-205) on March 11, 1967.

In the Southwestern United States, wintering bald eagles from the northern United States and Canada arrive in October and November, depending on climatic conditions, and normally migrate north by March and April (Ohmart and Sell 1980). In New Mexico, bald eagles winter from the northern border of the state southward to the basins of the Gila, Rio Grande, Pecos and Canadian rivers.

From December 1989 through March 1990, the Corps undertook an aerial survey of the upper Pecos River system, in the vicinity of Santa Rosa Lake, to identify overwintering bald eagle habitat. Ground observations by Corps personnel at Santa Rosa Lake were also recorded in the aerial survey summary. Survey results indicate both adult and sub-adult bald eagles use Santa Rosa Lake between December and March. New Mexico Department of Game and Fish (NMDGF) aerial surveys (1982-1990), from the headwaters of the Pecos River to the vicinity of Fort Sumner, New Mexico, show a upward trend in overwintering populations over the past 8 years and comprise an average of 11.3% of the New Mexico bald eagle winter total. Appendix B summarizes bald eagle distribution in the upper Pecos River valley during the 1982-1990 NMDGF aerial survey.

### 5.1.2 Life Requisites

Wintering bald eagles in New Mexico are associated with unfrozen lacustrine, riverine, and riparian habitats. Distribution appears dependent on prey density, suitable perch and roost sites, weather conditions, and lack of human disturbance (Ohmart and Sell 1980).

Bald eagle numbers fluctuate considerably during sequential winters due to weather conditions and prey availability at the wintering site as well as weather conditions further north.

Bald eagles are opportunistic feeders, and their diet varies regionally in the southwest. Important food items include warmwater fish species, particularly common carp (Cyprinus carpio) and channel catfish (Ictalurus punctatus), waterfowl, carrion, and smaller mammals. The construction of mainstem dams has had a major influence on eagle distribution as the birds take advantage of newly created food sources at impoundments (Steenhof, 1978).

## 5.2 Interior Least Tern

### 5.2.1 Distribution and Abundance

The interior least tern was listed under the Endangered Species Act on May 28, 1985. New Mexico is located on the extreme southern and western periphery of the interior least tern's historic range.

The first recorded sightings of interior least tern in New Mexico occurred in 1949 on the Bitter Lake National Wildlife Refuge (BLNWR), located northeast of Roswell, New Mexico (Jungleman 1988). This refuge was established adjacent to the Pecos River in 1939. A small population of least terns has utilized this area for the past 51 years; the number of terns sighted at BLNWR during peak abundance fluctuates annually, with 60 sighted on September 5, 1961 and no birds sighted for several years. The average number of interior least terns sighted at the LBNWR on the peak use day and number of nests during the period of record indicates tern populations have remained low and production of young terns has been minimal. While most of the past research has centered in and around Roswell, New Mexico, other sightings have been documented near Las Crusces, New Mexico (1980), in the Rio Grande Basin, White Sands (1981), Holloman Lake near Alamogordo (1980/1982), Bottomless Lakes State Park, and Wade's Bog (prior to 1973). There are no additional sightings in the Pecos River Basin.

5.2.2 Life Requisites

Interior least terns may utilize areas within the Pecos River basin for both nesting and feeding. Throughout the interior least tern's range the nesting period starts in mid-June and may last through August.

Interior least terns typically nest in colonies. There are two factors required for successful interior least tern nesting. Nesting sites, the first factor, normally occur on broad, unvegetated sand bars. The nest is scraped in sand and/or gravel and is normally unlined. Two to four eggs (usually three) are laid in the nest, and incubation takes 20-22 days. The peak of hatching is generally during the first week of July. Chicks leave the nest after 1 to 2 days and are full-fledged at 2 to 3 weeks. There is a great deal of variability between the maximum nesting densities in tern colonies throughout its range. In recent years, least tern preferred nesting habitat in the Roswell area has been salt flats. This is probably due to the fact that salt flats are one of the few habitats with substrates that lack vegetation. The disadvantage of salt flats nesting habitat is the inability of precipitation to infiltrate the clay/silt soils, causing flooding of nest sites during rain events.

The second factor for successful interior least tern nesting is the adequacy of the food base. The primary food source of the interior least tern consists of non-spiny rayed fish less than 9.9 cm (3.9 in) in length and with a body depth diameter less than 1.5 cm (.0.6 in) (Atwood and Kelly, 1984). The food base for interior least tern chicks consists of fish less than 1.5 cm (0.6 in) in length. The type of fishery associated with providing an adequate food base for both adult and young-of-the-year appears to be common in the Pecos River.

## 5.3 Pecos Bluntnose Shiner

5.3.1 Distribution and Abundance

Brooks et al. (1991) reviewed historic and recent surveys of fish communities in the Pecos River. These surveys included collections from Sumner Dam downstream to the Brantley Reservoir inflow. Intensive surveys that Brooks et al. (1991) summarized form the basis for current knowledge of Pecos bluntnose shiner distribution and abundance.

The Pecos bluntnose shiner was listed as threatened by the U.S. Fish and Wildlife Service on February 20, 1987; critical habitat for this endemic subspecies was designated to include two sections of the Pecos River. The first section starts about 10 miles downstream of Ft. Sumner and extends approximately 64 miles further downstream. The second section starts near Hagerman, New Mexico and extends 37 miles downstream to the Highway 82 bridge, near Artesia, New Mexico. Though some of this habitat is not designated as critical habitat (Acme is located roughly 25 miles downstream of critical habitat), it nonetheless serves as important habitat for the shiner and supports high numbers of the species.

The Pecos bluntnose shiner was listed as threatened by the U.S. Fish and Wildlife Service on February 20, 1987; critical habitat for this endemic subspecies was designated to include two sections of the Pecos River. The first section begins approximately 10 miles South of Fort Sumner and extends 64 miles downstream. The second section begins near Hagerman and extends 37 miles downstream to near Artesia, (U.S. Fish and Wildlife 1987.).

The bluntnose shiner was first collected by Cope and Yarrow, at San Ildefonso, Santa Fe County, New Mexico in 1876 (Sublette, 1990). Confusion regarding taxonomic status of N. Simus was resolved when Chernoff et al. (1982) determined that two subspecies occurred, the Rio Grande and Pecos forms. The Rio Grande form is now extirpated (Bestgen and Platania, 1990). Historic distribution and abundance of the Pecos subspecies are known; the Final Rule determining the Pecos bluntnose shiner is threatened indicates historic occupation of the Pecos River between the towns of Santa Rosa and Carlsbad, New Mexico (U.S. Fish and Wildlife Service, 1987). Collections subsequent to initial discovery have been sporadic and inconclusive, but indicate a reduced range for the Pecos bluntnose shiner, from below Sumner Dam to the Brantley Reservoir inflow (Hatch et al., 1985; Sublette et al., 1990; Brooks et al., 1991). Collections of Pecos bluntnose shiner during 1990 indicate a current range of 8 km (5 mi) below the town of Fort Sumner to Artesia (Brooks et al., 1991).

Historic and recent riverine sampling to determine seasonal and annual status and distribution of the Pecos bluntnose shiner were analyzed by Brooks et al. (1991) using a species guild approach, as described by Bain and Boltz (1989). Because of the complex diversity of the Pecos River fish community, comprised of over 25 species, actual abundance measures for trend analysis are difficult to analyze. The species guild analysis approach, in this case the shiner guild, allows for a simplified analysis with focus on trends within a certain species guild.

The overall trend in Pecos bluntnose shiner abundance within the shiner guild indicates a decline in abundance of this species (Brooks et al., 1991). Collections by Hatch (1982), when compared to shiner guild values of historic collections, indicate a guild that was no longer dominated by Pecos bluntnose shiner. Collections between 1986 and 1990 indicate a further decline in abundance and a reduction in range, although the species still exists within the designated Critical Habitat reaches (Brooks et al., 1991). Non-native species, including the plains minnow (Hybognathus placitus) and the Arkansas River shiner (N. girardi), now comprise a large portion of the shiner guild, and may indicate interspecific competition as a factor in Pecos bluntnose shiner abundance and distribution reductions. These species apparently spawn during high flow events in the Pecos River, with eggs

and larvae being distributed downstream to colonize new areas (Bestgen et al. 1989).

5.3.2 Life Requisites

Since 1992, a great deal of data has been collected on the life history of the Pecos bluntnose shiner. Hatch (1982) collected the species most frequently in the main stream channel, but the species has been collected in all representative habitat types of the Pecos River (J.E. Brooks, personal communication). Physical habitat utilized by Pecos bluntnose shiner included sand substrate, low current velocity, and water depths of 17 to 41 cm (7 to 16 in), (Hatch, 1982). Temporal or seasonal shifts in physical habitat utilization are unknown.

Pecos bluntnose shiner are apparently prolonged spawners, beginning in early summer and ending by October (Sublette et al. 1990), although Bestgen and Platania (1987), analyzing historic collections of N. s. simus, from the Rio Grande, reported a much reduced period of spawning for the Rio Grande form; length frequency data of age 0 and age 1 fish indicate a four to six week spawning period from mid-June to early July. Examination of flow events during the early summer period indicated spawning occurring during the descending waters of spring runoff (Bestgen and Platania, 1987). Fecundity studies for the Pecos form have not been done, however, Bestgen and Platania, (1987), reported age 2 and age 3 female Rio Grande bluntnose shiner to produce 1,298-2,831 eggs and 2,331-3,090 eggs, respectively. Newly hatched Pecos bluntnose shiner larvae drift downstream in post spawning flows for at least 3-4 days. Dudley and Platania (1999) have concluded that the larvae "...do not have sufficient mobility to move out of the main channel flows..." during these first few days after hatching.

Rio Grande bluntnose shiner achieve a maximum length of approximately 70 mm (3 in) Standard Length and maximum of age 3 (Chernoff et al., 1982; Bestgen and Platania, 1987). Hatch (1982) found Pecos bluntnose shiners growing to a maximum length of 56.5 mm ( 2 in) Standard Length with a maximum longevity of age 2. Recent collections (S. P. Platania, personal communication) indicated the Pecos form achieves a similar maximum length and longevity as the Rio Grande form. Collections made during 1990 by Brooks et al. (1991) indicate that all age classes (age 0-3) were present within the upper Critical Habitat reach, while only age 0 and age 1 were collected in the lower Critical Habitat reach.

Little is known of Pecos bluntnose shiner food habitats. N. simus exhibit an S-shaped gut, indicating a carnivorous-omnivorous diet (Sublette et al. 1990). Bestgen and Platania (1987) examined digestive tracts of Rio Grande bluntnose shiner and found a mostly omnivorous diet, including food items of detritus, filamentous algae, terrestrial plant material, and aquatic and terrestrial insects. Pecos bluntnose shiner are also omnivorous (unpublished data, K.R. Bestgen and S.P. Platania, cited in Bestgen and Platania 1987). Temporal and/or seasonal shifts in food habitats are unknown.

## 5.4 Pecos Gambusia

5.4.1 Distribution and Abundance

The Pecos Gambusia was listed as endangered under the Endangered Species Conservation Act of 1969, on October 13, 1970. No critical habitat has been designated. The Pecos Gambusia is

endemic to the Pecos River basin. It once occurred in the Pecos River system from just below Ft. Sumner, New Mexico downstream to Fort Stockton, Texas, including small tributaries of the Pecos River and isolated springs with outflows.

At present, their habitat has been greatly diminished. Pecos Gambusia have been restricted to ponded habitats, heads and runs of springs, and gypsum sink holes associated with aquatic vegetation located on Bitter Lake National Wildlife Refuge (NWR). Most of these habitats are spring fed with constant temperatures. They can also be found in these type habitats at Blue Spring and Salt Creek Wilderness Area in New Mexico, as well as being introduced to artificial pools at the Living Desert State Park just West of Carlsbad, New Mexico. There are 12 known populations of Pecos Gambusia located within the vicinity of Roswell, New Mexico. Sublette, et. al. (1990), shows no mainstem populations of Pecos Gambusia presently existing in the Pecos River basin throughout New Mexico. In Texas, they can be found in several spring areas near Balmorhea and in the Leon Creek drainage near Fort Stockton.

They are frequently abundant where found in these locations. In 1975, the population at Blue Spring was estimated at just less than one million and the population at Bitter Lake NWR was estimated to be between 26,000 - 29,000.

Conditions that limit or reduce these populations are introduced non-native fish species that are predators or compete for space and food, as well as species that are congeneric competitors. The introduction of the western mosquitofish (*G. affinis*), used as a biological mosquito control, into Pecos Gambusia habitats, is such a competitor and has contributed to the failure of some of these populations. Pecos Gambusia exhibited lower fecundity rates than western mosquitofish. When these two species occurred sympatrically, Pecos Gambusia survival was reduced. Where habitats were large enough to accommodate both species, such as at Blue Spring, hybrids do exist, but the diversity of habitat offers a partial isolation preventing the complete mixing of both species.

5.4.2 Life Requisites

The Pecos Gambusia belongs to the family of live-bearers. Females give birth to their young alive and average about 38 embryos per reproductive period. Pecos Gambusia are small, not reaching more than 60 mm in length and having a lower protruding jaw which causes the mouth to be up-turned (described as superior). As a result the species feeds at the surface or in the upper portion of the water column. It is a carnivore and is also an opportunistic feeder. It will eat any small insect, aquatic or terrestrial. Its preferred prey are mosquito larvae and water boatman larvae.

The Pecos Gambusia live in conditions of shallow, alkaline waters with aquatic vegetation for cover. The species has a limited thermal range. Reported temperature tolerances for a Texas population ranged between 21-30 C. Its upper temperature limit can go as high as 39 C. Pecos Gambusia are intolerant to cold temperatures for long periods. This is a factor which limits the distribution of New Mexico populations. The species can tolerate high salinities but is also intolerant of total hardness above 5,000 milligrams/liter $CaCO_2$, conditions which sometimes exist in various sinkholes.

**5.5 Pecos Pupfish**

5.5.1 Distribution and Abundance

Originally, the Pecos pupfish commonly occurred in the mainstem of the Pecos River on the Bitter Lake National Wildlife Refuge (the Refuge), just North of Roswell, NM, downstream to Independence Creek in Texas. It was found in suitable habitats of small tributaries, saline springs, and gypsum sinkholes also within this range (Echelle and Echelle, 1978).

Now, no longer extant in the mainstem of the Pecos River, most populations of the species occur in gypsum sinkholes, isolated oxbow lakes and artificial impoundments on the Refuge and are very abundant at the Bottomless Lakes State Park in New Mexico. Collections of the Pecos pupfish are occasionally made in the Pecos River at the Refuge, but decline immediately downstream. Hoagstrom and Brooks (1999) show that Pecos Pupfish are found in "...ephemeral pools and seeps in the river bed," but reduced flows and geomorphic degradation in both in the Pecos River and tributaries are the main causes of habitat disappearance within stream beds. It no longer exists in the Pecos River in New Mexico from about Loving Crossing downstream and throughout Texas (Wilde and Echelle, 1992). It does occur in Salt Creek, Texas (Hoagstrom and Brooks, 1995), a tributary of the Pecos River.

5.5.2 Life Requisites

Very little is known about the life history of the Pecos pupfish. Most of the research appears to have been conducted in the late 1970's and early 1980's. It spawns during the summer months when temperatures are above 30 degrees Celsius. Reproductive strategies vary. Males defend small territories when populations are very dense. When populations are low, no territories are established. Where green sunfish are present, populations of Pecos pupfish are often affected, resulting in low densities. Pecos pupfish are omnivorous and feed mainly on diatoms and detritus.

The Pecos pupfish is found in a number of varying habitats. These habitats often have conditions which fluctuate greatly, conditions such as high salinity ranging from 3,000 to 50,000 milligrams/liter (mg/l) and low dissolved oxygen concentrations as low as 2/5 mg/l.

## 5.6 Pecos Sunflower

5.6.1 Distribution and Abundance

The Pecos sunflower is a an endangered species of sunflower listed in April of 1998. In New Mexico, it is found in several locations across the state: three sites in Chaves County, one site in Valencia County, one site in Guadalupe County, and one site in Cibola County, New Mexico. The sites within the Pecos River Basin which might be affected by the winter operations activities are at the Bitter Lake NWR northeast of Roswell and the Dexter National Fish Hatchery near Dexter, New Mexico. Both these populations of Pecos sunflowers are presently being managed by the U.S. Fish and Wildlife Service.

Most of these sites are limited to less than 2 hectares (5 acres) of wetland habitats. The refuge manages a large population of Pecos sunflowers over the perimeter of a 300 hectare area. The area is a series of six spring-fed impoundments. During the winter these impoundments are kept full and

drained in the spring to mimic a natural hydrograph. The sunflowers thrive in these conditions.

At the Dexter National Fish Hatchery a small site exists. This site has less than 100 plants. The plants appeared after saltcedar was removed in a wetland area.

5.6.2 Life Requisites

The Pecos sunflower is an annual member of the sunflower family. It grows in soils that are permanently saturated. They are most common is desert wetland areas such as cienegas which are associated with springs, but can also be found along stream margins and margins of impoundments. It grows in saline soils. For the seeds to germinate, however, they require soils where high water tables have reduced salinities near the soil's surface. Pecos sunflowers have narrower leaves than the common sunflower, fewer hairs on the stems and leaves, slightly smaller flower heads, and flower later in the year, from September to November.

## 5.7 Mountain Plover

The mountain plover is generally found in upland areas of the Eastern and Great Plains. It breeds in dry, open shortgrass prairie habitats and is mostly a migrant throughout New Mexico. It does not require open water habitats and is rarely found near water (Federal Register, 1999).

## 5.8 Mexican Spotted Owl

The Mexican spotted owl is a resident of the Guadalupe Mountains near the New Mexico border. They have been seen in Carlsbad National Park, but are not a part of the Pecos River Basin. These owls are very habitat-specific (Finch, 1992), preferring forested mountainous terrain.

## 5.9 Black-footed Ferret

Black-footed Ferrets were at one time identified as common in New Mexico, but are thought not to have survived. If they have survived, the most likely location is in the northwestern part of the state (Findley, et al., 1975). Reports of Black-footed Ferrets have come from all parts of the state except the most southern areas, from Mogollon Plateau east to the Pecos Valley.

They are mostly associated with prairie dog communities, which are rare in New Mexico. There are no recent records of Black-footed Ferrets in the Pecos River Basin.

## 5.10 Gypsum wild-buckwheat

The Gypsum wild-buckwheat has been recorded in one location within the winter operations area of the Pecos River Basin (Hildebrandt and Ohmart, 1982). It was found on some rocky hillsides near Seven Rivers, New Mexico, but not within in the riparian areas. The soil structure restricts it from growing in sandy or loamy conditions.

### 5.11 Kuenzler hedgehog cactus

The Kuenzler hedgehog cactus is known to be in both Chavez and Eddy Counties, but it is not likely to be seen growing within floodplain areas due to its xerophytic nature. It requires well-drained sandy or gravelly soils of plains or upland slopes, generally 6,000 to 8,000 feet in elevation. To date, there are no resource inventory reports that show this cactus growing within the operations area.

### 5.12 Lee's pincushion cactus

The Lee's pincushion cactus is another cactus similar in nature to the Kuenzler hedgehog cactus, but is found mostly in the Guadalupe Mountains to the south. In New Mexico it grows on rocky slopes or limestone ledges above the 4,000 foot elevation. There have been no findings of this cactus within the riparian areas of the Pecos River Basin.

## 6. ANALYSIS OF EFFECTS OF THE PROPOSED ACTION

In accordance with the ESA Section 7 Consultation regulations, the proposed action of the Pecos River 1999-2000 Winter Operations requiring preparation of this biological assessment is identical to the previous actions of the 1998-1999 Winter Operations. The proposed action involves similar impacts to the same species located in the same geographic areas and that no new species have been listed or proposed. This assessment does however, address the full range of proposed, threatened, and endangered species known to occur within the Pecos River basin area. Not all species listed will be identified as being affected by either the previous 1998-1999 Winter Operation or the proposed 1999-2000 Winter Operation. This assessment has been supplemented with relevant changes in information and the latest scientific data regarding the possible impacts of the operation to these species.

### 6.1 Bald Eagles

It is unclear whether the 1998-1999 winter operations had any direct affects on overwintering Bald Eagles in the area. Though fish are an important part of the eagle's diet, it will feed on a wide variety of other species, such as small mammals and waterfowl when fish are not readily available. Surveys done as far back as 1982 (Hildebrandt and Ohmart)have shown that Bald Eagles were present, but appeared to be uncommon in this area. Bald Eagles have been seen at Bitter Lake NWR on occasion and once at the Bosque Grande.

Habitats may also be a deciding factor for this bird. Eagles generally nest on high rocky ledges or in tall trees which offers protection for their young. They require high perch sites, preferably near water. Most of this area is identified as a wide open, grasslands plains region. Rocky ledges near Bitter Lake NWR and the Bottomless Lakes State Park offer marginal habitat at best. Few trees along the Middle Pecos River Basin, aside from the cottonwood communities, offer good eagle habitat. Only a few cottonwood groves are known in this area, one grove at the Bosque Grande, about 25 miles northeast of Roswell and the other at Bosque Redondo just south of Fort Sumner.

In this case, Reclamation's proposed actions may not have a direct effect on the bald eagle. It is possible that in the situation when flows were low, large fish, preferable to the eagle's diets, may have been concentrated in clear pools offering a better feeding opportunity for those eagles.

Indirectly, habitats for waterfowl affected by any type of low flows may not be in abundance, thereby reducing the numbers of prey birds in a given area. Bald Eagles can be displaced by such activity. However, in this region, drought conditions may also be a factor in determining numbers of prey birds. Cumulatively, the effects are discountable, being extremely unlikely that they would have been adversely affected.

### 6.2 Interior Least Tern

There are very few areas where the least tern is found in New Mexico. The primary area is the Bitter Lake NWR just northeast of Roswell. In New Mexico the least tern is a spring/summer resident. They do not reach their breeding sites till late April and are usually gone by the end of October. The interior least tern was not affected by the winter operations activities.

### 6.3 Pecos Bluntnose Shiner

During the 1998-1999 winter operation period, flows at Acme exceeded 30 cfs, 90 % of the time and 35 cfs, 75% of the time (Fig 4). This winter operation was marred by two periods where flows dropped temporarily below 30 cfs. The first period was unexpected. Reclamation had previously increased the bypass to 25 cfs on December 19, 1999 in anticipation of offsetting a gradual declining flow at Acme. The second drop was at the end of the season. Reclamation continued to increase bypasses till the hydrograph at Acme bottomed out around 25 cfs and started climbing back up.

It is possible that individuals of the species may have been directly affected by these lower flows, but does not know what the total impact was on the species. An intensive monitoring effort was undertaken to detect these types of effects, but there is no evidence available from monitoring efforts to show how much the Pecos bluntnose shiner was affected at either period of low flows at the time this assessment was prepared.

Existing data by the Service shows that if flows drop to 26 cfs or lower, shiner habitat is reduced to nearly one-third of the habitat present at 35 cfs and almost a quarter of the velocities (USFWS, 1998; Hoagstrom, 1999). Though this data was collected at the Gasline site, the Service utilized the data for "analysis of effect" at Acme in the "Biological Opinion on Proposed Winter Operations on the Pecos River, 1998-1999."

Though the Service's reference (Biological Opinion, 1999) to a "...worst case scenario," is unlikely, prolonged flows lower than the objective flow, could have a notable impact on the shiner. Loss of habitat forces fish into remaining and often overcrowded habitats where predators, such as predatory fish (Larson and Propst, 1999) and external predators, like birds and fur bearing animals, can cause considerable damage to potential spawning populations of the shiner.

The spatial closeness of these fish in limited habitats can create stress on the members of the species. Stress can cause fish to become more susceptible to disease (Piper et. al., 1983), especially if temperatures begin to rise. Many fish diseases are temperature dependent and will occur when temperatures begin to rise in the spring. Though winter temperatures are often more stable, the overwintering stress of limited space could cause morbidity or even mortality to occur in the spring when temperatures begin to rise.

Cumulatively, these types of effects can have a significant impact on overwintering populations of shiners. However, Reclamation expects that managing these bypassed inflows for the benefit of the shiner can greatly reduce any harmful affects that would be otherwise created by lower flows. Both weekly hydrological monitoring by Reclamation and regular, bi-weekly population monitoring by the Service will also serve to maintain consistent benefits to the bluntnose shiner.

### 6.4 Pecos Gambusia

The Pecos Gambusia have been collected in the mainstem of the Pecos River in backwaters, eddies, and pooled habitat within the Bitter Lake NWR, as well as Blue Spring and Salt Creek Wilderness Area. Gambusia was transplanted in both the Bitter Lake NWR and the Salt Creek Wilderness Areas. Since Gambusia require slow moving water and stable temperatures, the Pecos River offers extremely limited habitat.

During the winter when flows are considerably slower, Gambusia that find their way to the river can find some habitats there, but because of the extreme shallowness of the habitat, it is likely that they do not survive any freezing temperatures. If they do survive the winter, high flows in the spring would flush them downstream to less suitable habitats and awaiting predators. The presence of these fish in the river are an indication that they came from off-river sites, such as connected springs and pools and are incidental to the Pecos River because of the flow conditions and lack of suitable habitats and temperatures.

It is highly likely that individuals of the Pecos Gambusia entered the river proper last winter and may not have survived, but it is not likely to have affected the local populations from which they came nor destroyed or adversely modified their habitat. No evidence was available at the time of this assessment to show whether Pecos Gambusia was collected over the 1998-1999 winter period in the Pecos River.

### 6.5 Pecos Pupfish

The Pecos pupfish is another, primarily off river species of the Pecos River Basin; however, it can be found in the river, though this is very uncommon. Like the Pecos Gambusia, the pupfish inhabits slow moving waters within channels of tributaries of the Pecos River, marshes, backwaters, sinkholes, and spring areas. Though more tolerant of low temperatures and higher salinities, it has limits.

High flows would also be detrimental to any individual pupfish caught in the mainstream of the

Pecos River. Again, it is highly likely that individual Pecos Pupfish entered the mainstem of the Pecos River last winter and may not have survived, but the 1998-1999 Winter Operation is not likely to have affected the local populations from which they came nor destroyed or adversely modified their habitat. No evidence was available at the time of this assessment to show whether Pecos Pupfish were collected over the 1998-1999 winter period in the Pecos River.

### 6.6 Mountain Plover

The mountain plover and its habitat has not been affected by the winter operations activities. The species does not require open water habitats and is rarely found near water (Federal Register, 1999).

### 6.7 Mexican Spotted Owl

Mexican spotted owls are very habitat-specific (Finch, 1992), preferring forested mountainous terrain. The Mexican spotted owl and its habitat has not been affected by the proposed winter operations activities.

### 6.8 Black-footed Ferret

Black-footed Ferrets are mostly associated with prairie dog communities, which are rare in New Mexico. There are no recent records of Black-footed Ferrets in the Pecos River Basin. It is unlikely that the proposed winter operations activities had any affects on this species.

### 6.9 Pecos sunflower

It is likely that individuals plants or small groups of plants could exist within the river corridor as a result of dispersion from these main sites. The proposed winter operations activities may have affected individual plants, but did not effect the local managed populations.

### 6.10 Gypsum wild-buckwheat

The Gypsum wild-buckwheat has been found on some rocky hillsides near Seven Rivers, New Mexico, but not within in the riparian areas. It is Reclamation's assessment that Gypsum wild-buckwheat was not affected by the proposed winter operations activities.

### 6.11 Kuenzler hedgehog cactus

To date, no resource inventory reports on vegetation held by Reclamation show this cactus growing within the operations area. It is Reclamation's belief that the Kuenzler hedgehog cactus was not affected by the proposed winter operations activities.

### 6.12 Lee's pincushion cactus

There have been no findings of this cactus within the riparian areas of the Pecos River Basin. It is

Reclamation's belief that the Lee's pincushion cactus was not affected by the proposed winter operations activities.

## 7. EFFECT DETERMINATION

### 7.1 Bald Eagle

Though the Bald Eagle may not experience a direct effect, indirectly, the 1999-2000 Winter Operations **may indirectly affect, but are not likely to adversely affect** wintering populations.

### 7.2 Interior Least Tern

The Interior least tern is a spring/summer migrant to this basin. Therefore, the proposed 1999-2000 Winter Operations will have **no affect** on the least tern.

### 7.3 Pecos Bluntnose Shiner

Based on Reclamation's proposal to bypass inflows from Sumner Dam to achieve an objective flow of 35 cfs, the 1999-2000 Winter Operations **may affect, but are not likely to adversely affect the shiner**. In addition, as observed in the 1998-1999 Winter Operations, unforseen circumstances or acts of nature may lead to some unpredictable flow decreases. Adjustments in the rate of flow from Sumner Dam, based on real time data and following Sumner Dam Winter Operations and Bypass Flows section, should reduce the affects of these flow decreases.

Reclamation's proposed winter operations are expected to result in an objective flow around 35 cfs at the Acme site. Based on existing data for reaches designated as critical habitat for the shiner, flows through these areas are not anticipated to be less than the objective flow. Every effort will be made to achieve the objective flow in a timely manner as outlined in the Sumner Dam Winter Operations and Bypass Flows section. Also, efforts to obtain additional real time data gages for the near Dunlap and above Acme sites are on ongoing. These gages are important decision making tools. Therefore, Reclamation's proposed 1999-2000 Winter Operations **will not adversely modify or destroy critical habitat**.

### 7.4 Pecos Gambusia

The Pecos Gambusia lives in habitats that are directly linked to the mainstem of the Pecos River, but are not directly affected by the Pecos River flows. Some individuals may move into the Pecos River and may not survive. This would occur irrespective of the proposed action. Therefore the 1999-2000 Winter Operations **may affect, but are not likely to adversely affect** the Pecos gambusia.

### 7.5 Pecos Pupfish

The Pecos pupfish is another species which does not inhabit the mainstem of the Pecos River.

Though it is occasionally found there, the pupfish is primarily incidental to this river, often being flushed out of tributaries where it resides. Therefore, the 1999-2000 Winter Operations **may affect, but are not likely to adversely affect** the Pecos pupfish.

### 7.6 Mountain Plover

The mountain plover is a resident of a more dry, uplands, short-grass prairie habitat and requires no open water for its existence. Therefore, the 1999-2000 Winter Operations **will have no effect** on the mountain plover.

### 7.7 Mexican Spotted Owl

The Mexican spotted owl is primarily a resident of the Guadalupe Mountains further to the southwest. The 1999-2000 Winter Operations **will have no effect** on the Mexican spotted owl.

### 7.8 Black-footed Ferret

The black-footed ferret has very limited sighting in New Mexico in recent years and is thought not to have survived at all in the Pecos River basin and many other places in the state (Findley, 1975). Therefore, the 1999-2000 Winter Operation **will have no effect** on the species.

### 7.9 Pecos Sunflower

Since there are several wild communities of the Pecos sunflower in and around the communities of Santa Rosa and Roswell, and several large, managed populations existing on the Bitter Lake NWR and the Dexter National Fish Hatchery, which are adjacent to the Pecos River, river flows could influence the plant's establishment along the active river channel. Therefore, the 1999-2000 Winter Operations **may affect, but are not likely to adversely affect** the Pecos sunflower.

### 7.10 Gypsum Wild-Buckwheat

The Gypsum wild-buckwheat is a plant that grows on a rocky hillside near Seven Rivers. It has not been seen in the riparian area of the Pecos River. Therefore, the1999-2000 Winter Operation **will have no effect** on this species.

### 7.11 Kuenzler hedgehog cactus

The Kuenzler hedgehog cactus is not thought to be uncommon in this area, but prefers the sandy or gravelly, well drained soils of upslopes and ledges. It is not generally found in riparian areas. Therefore, the 1999-2000 Winter Operation **will have no effect** on the species.

### 7.12 Lee's Pincushion Cactus

This cactus inhabits rocky, upslope conditions, but more commonly found in the Guadalupe Mountains to the southwest. It is very seldom seen more northward of these mountains. Therefore, the 1999-2000 Winter Operations **will have no effect** on the species.

**Table 3.** Tabulated Summary of Effects Determination

| Listed/Proposed Species | Directed Effect Finding | Indirect Effect Findings | Cumulative Effect Finding | Critical Habitat Effect Findings |
|---|---|---|---|---|
| Bald Eagle | No Effect | May Affect, Not likely to adversely affect | May Affect, Not likely to adversely affect | No Effect |
| Interior least tern | No Effect | No Effect | No Effect | No Effect |
| Mountain plover | No Effect | No Effect | No Effect | No Effect |
| Mexican spotted owl | No Effect | No Effect | No Effect | No Effect |
| Pecos bluntnose shiner * | May Affect, Not likely to adversely affect | May Affect, Not likely to adversely affect | May Affect, Not likely to adversely affect | Will not destroy or adversely modify |
| Pecos gambusia | May Affect, Not likely to adversely affect | May Affect, Not likely to adversely affect | May Affect, Not likely to adversely affect | Will not destroy or adversely modify |
| Pecos Pupfish | May Affect, Not likely to adversely affect | May Affect, Not likely to adversely affect | May Affect, Not likely to adversely affect | Will not destroy or adversely modify |
| Black-footed ferret | No Effect | No Effect | No Effect | No Effect |
| Pecos sunflower | May Affect, Not likely to adversely affect | May Affect, Not likely to adversely affect | May Affect, Not likely to adversely affect | Will not destroy or adversely modify |
| Gypsum wild-buckwheat | No Effect | No Effect | No Effect | No Effect |
| Kuenzler hedgehog cactus | No Effect | No Effect | No Effect | No Effect |
| Lee's pincushion cactus | No Effect | No Effect | No Effect | No Effect |

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