INTERIM

PROGRAMMATIC BIOLOGICAL ASSESSMENT

OF EFFECTS OF

PROPOSED PECOS RIVER WINTER OPERATIONS

ON THE PECOS BLUNTNOSE SHINER

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INTERIM PROGRAMMATIC BIOLOGICAL ASSESSMENT OF EFFECTS OF PROPOSED PECOS RIVER WINTER OPERATIONS ON THE PECOS BLUNTNOSE SHINER

1. INTRODUCTION

This Interim Programmatic Biological Assessment (BA) analyzes the potential effects of the Bureau of Reclamation's (Reclamation) Interim Winter Operations Plan on the Pecos bluntnose shiner (*Notropis simus pecosensis*) (shiner) and its critical habitat within the Pecos River basin. Actions proposed are "interim" until the National Environmental Policy Act (NEPA) process is complete (estimated completion date is December 2003).

The shiner was listed by the state of New Mexico as threatened in 1976 and again by the US Fish and Wildlife Service (Service) as threatened under the Endangered Species Act (ESA), with critical habitat also designated in 1987. Historically, the species occurred throughout the Pecos River basin in both New Mexico and Texas, but its range has now diminished to a 223-mile section of the river between the Ft Sumner and Brantley Reservoirs in New Mexico.

The purpose of this interim BA is to consult with the Service over the effects of Reclamation's proposed discretionary actions related to winter operations that may affect the shiner in the Pecos River during the remainder of the NEPA process. Hence, the proposed actions would be implemented annually for the next three years. However, during this interim period, if any new information or findings point to a need for revised operations, then Reclamation would consider modifying this current assessment or preparing a new assessment to address any significant operational changes which may be proposed as a result. Proposals in this BA are subject to change and may not reflect conditions or proposed alternatives that may be identified by the Environmental Impact Statement (EIS) through the NEPA process.

2. BACKGROUND

The dams on the Pecos River were built for the purpose of flood control, water storage, sediment retention and other purposes. Congress authorized the Santa Rosa Dam through the Flood Control Act of 1954. The Dam is owned, operated, and maintained by the U.S. Army Corps of Engineers (Corps). Additional water is stored in this Dam by a contract with Reclamation for use by the Carlsbad Irrigation District (CID) through the Carlsbad Project and in accordance with a Memorandum of Understanding (MOU), the Corps agreed to operate and maintain the measuring devices as made necessary by the additional water. No minimum pool has been established in Santa Rosa Reservoir.

Sumner Dam, originally named Alamogordo Dam, was authorized by the President in 1935 and built in 1937 to store and release water, also for the benefit of CID. The dam is approximately

55 miles downstream from the Santa Rosa Dam. Reclamation owns and operates the Sumner Dam, but it is maintained by CID through contract with Reclamation.

Fort Sumner Land and Canal Company was formed in 1906. Originally, irrigation was initiated at old Fort Sumner in 1862. The project was abandoned in 1868 when the Indians suffered major hardships. Fort Sumner Irrigation District (FSID) purchased the irrigation system from Fort Sumner Land and Canal Company in 1919. FSID appealed to Reclamation for assistance in 1943 when the project fell into a state of disrepair and the District was not financially able to further support the irrigation structure. Public Law 192, 63 Stat. 483, authorized the reconstruction of the diversion and canal system. The diversion dam is owned by Reclamation, but operated and maintained by FSID through contractual agreement with Reclamation. The U.S. does not own water rights used within the Ft. Sumner Project.

Brantley Dam, 223 miles downstream of Sumner Dam, was authorized by Public Law 92-514, in 1972. This dam is also owned by Reclamation, but is operated and maintained by CID by contract with Reclamation. Construction of this dam was completed in 1989 (U.S. Army Corps of Engineers, 1991 and 1995).

3. HISTORY

In 1989, due to an effort to fill the newly-completed Brantley Reservoir, downstream water deliveries were made which exacerbated intermittency and long-term drying of the river channel. As a result, Reclamation was directed by the US Fish and Wildlife Service (Service) to consult over the project's water operations impacts on the threatened Pecos bluntnose shiner. In 1991, the Service issued a biological opinion stating that Reclamation's Pecos River operations were jeopardizing the continued existence of the shiner.

The outcome of this consultation (Biological Opinion, USFWS, 1991) was a suite of Reasonable and Prudent Alternatives (RPAs) including:

1) The Bureau, District, Department and Service develop an MOU formulating annual plans of operation for the Bureau Pecos River facilities.

2) For the 1991 season, releases from Santa Rosa Reservoir and Sumner Reservoir scheduled to provide gradual increases of flow (ramping) at the beginning of the release periods and similarly gradual ramping of releases at the end.

3) The Bureau funds 5 years of research activities designed to determine biologic and hydrologic needs of the Pecos bluntnose shiner and operational guidelines for the Bureau Pecos River projects which will protect, maintain, an assist in recovery of the species.

4) The Bureau provides colored infrared aerial photographs and video imagery of the

Pecos River from Santa Rosa Dam downstream to the Brantley Reservoir inflow during winter low flows.

5) The Bureau Albuquerque Projects Office staff will conduct those hydrological studies necessary to develop a flow model which will investigate the downstream effect of various releases upon water delivery and habitat conditions for the listed species.

The MOU would be comprised of four entities: Reclamation (the Bureau), CID, the New Mexico Department of Game and Fish (Department), and the Service (Service), as identified in paragraph 1 of the RPAs. This MOU group met twice yearly from 1992 to 1997 with concurrent updates from the researchers.

Upon expiration of the original MOU, another MOU was signed in February 1997 which included the New Mexico Office of the State Engineer (OSE) as signatory and extended the MOU relationships another 3 years. This marked the completion of the study phase of the program and the beginning of the decision making process through the NEPA portion.

The NEPA process is ongoing, and Reclamation is consulting with the Service over long-term operations under the ESA as part of the actions contemplated in the EIS. In the interim, Reclamation is consulting over bypassing winter inflows for which Reclamation had some discretion to store or bypass in Sumner Lake.

4. 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 223 miles (360 kilometers), (Figure 1).

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 near Acme gage site (Acme), the channel is generally wide, sandy and unstable. 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. Depending on the time of year, the amount of water moving down the channel, and local weather conditions, water losses in this portion of the river can be as much as 60-70% by the time the water reaches Acme. Throughout this reach, water from springs and irrigation returns helped to enhance flows in the channel, especially in the upper critical habitat reach, but sometimes were not enough to maintain a flow at Acme during times when no bypasses were occurring from Sumner Dam.

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.

5. CONSULTATION TO DATE

Since 1990, Reclamation has consulted with the Service over the effects of Reclamation's Carlsbad Project water operations on the threatened Pecos bluntnose shiner. The lack of basic species' life history information precluded the Service from making "quantitative decisions" regarding effects that the operations of the federal facilities may have had on the shiner and its critical habitat. In 1991, the Service issued a Biological Opinion (Jeopardy), together with RPAs (as quoted above).

Following the RPAs, interested parties entered into an MOU, (U.S. Bureau of Reclamation, 1992) which provided the framework for a 5-year research program and established biannual meetings for MOU parties. These meetings provided the forum to discuss Pecos River biological and hydrological issues and to develop flow recommendations for irrigation and research needs. Under the RPAs, consultation was deferred until the completion of the 5-year study.

Upon expiration of the original MOU (dated February 1997), (U.S. Bureau of Reclamation, 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.

At the end of the research study period, the data was assimilated and reported to Reclamation. Reclamation resumed consultation with the Service in November 1998 over proposed 1998-1999 Winter Operations. Reclamation determined that the proposed winter operations "may affect," but "not likely to adversely affect," the shiner and its critical habitat. Data from those reports were used to establish Reasonable and Prudent Measures (RPMs) by the Service in its 1998-1999 Biological Opinion.

Reclamation again consulted with the Service on the 1999-2000 Winter Operations. Using the previous year's winter operations as a guideline, Reclamation resubmitted the same operational plan, but with a "no effect" determination. The Service concurred, but required continued monitoring with an increased effort on Reclamation's behalf to maintain the objective flows.

In February 2000, Reclamation decided to combine the winter and irrigation summer operations plans during the interim period prior to the completion of the EIS. This interim, programmatic document would address all the issues for both summer and winter operations. A draft BA was presented to the Service in May 2000; however, the Service identified concerns about issues that were not addressed in the BA and declined to initiate formal consultation until Reclamation

could reassess those issues. Informal consultation continued until court-ordered mediation occurred on September 25, 2000.

The NEPA process is ongoing and no long-range operational decisions have yet been made. As part of the NEPA process, Reclamation will consult with the Service over the effects of proposed long-term operations actions on the shiner. In the interim, through this BA, Reclamation is consulting over a short-term Interim Programmatic Winter Operations Plans which will be implemented until a long-term plan is desired. Reclamation anticipates this will be three years.

6. DESCRIPTION OF THE PROPOSED ACTION

The proposed Interim Operations will address the winter plans for operating Sumner Dam until the EIS is completed. A Record of Decision is expected in December of 2003. These plans are similar to previous plans submitted for the 1998-1999 and 1999-2000 Winter Operation seasons.

Winter Operations Plan

During the months of November through February, Reclamation proposes to implement a Pecos River interim programmatic winter operations plan that will store portions of the available inflows to Sumner Reservoir and target an objective average flow of 35 cfs at the Acme gage. If storing a portion of the available inflow would hinder Reclamation's ability to provide a target of 35 cfs at Acme, then Reclamation will not exercise its discretionary authority to store inflows. When the flow objective of 35 cfs at Acme is being fulfilled entirely by baseflows, Reclamation will not act to bypass any inflows. The portion of the inflow that is not stored at Sumner Dam are known as "bypass flows." Storage of these bypassed flows, if any, in whatever quantity is realized following transport losses, would occur downstream at Brantley Reservoir at the Southern end of critical habitat.

In no case will the bypass flows 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 flows for winter operations.

Historically at Santa Rosa Dam, (1980 to 2000), the average flow from November 1 to February 28 at PDL was 98 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. We do not anticipate a need to bypass more than this amount during the winter operations period to target the objective 35 cfs average at the Acme gage.

The objective flow at Acme for this plan of operations is 35 cfs. Approximate travel time to Acme, with flows in this range, 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, in order to allow adequate time for the gage at Acme to stabilize after bypassed inflows are adjusted at

Sumner Dam. If flows at Acme are below the objective after this 12 day period, then an additional 5 cfs will be bypassed at Sumner Dam, if available. If flows at Acme are above the target 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 throughout the winter operations.

Recently, the USGS updated the near Dunlap site (Dunlap) with a real time data gauge recorded by a Data Collection Platform[1] (DCP). The Dunlap site is 30 miles downstream from Taiban and 52 miles upstream from Acme. Dunlap is located directly in the middle of the upper critical habitat reach.

USGS also installed an FM transmitter to a non-DCP recorder at the Acme site during the summer of 2000. This transmitter is located on the opposite side of the river from the DCP recorder and relays data from non-DCP system to the DCP recorder. These additional "eyes" on the river will increase the opportunity for accuracy when determining how much to bypass and when those bypasses should be started. Flows are rigorously monitored using the DCP systems to achieve the objective flow at Acme.

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

7. SPECIES DESCRIPTION

Originally, there were eleven species identified in the Project area: the Bald Eagle (*Haliaeetus leucocephalus*), the Interior Least Tern (*Sterna antillarum*), the shiner, the Pecos Gambusia (*Gambusia nobilis*), the Pecos Sunflower (*Helianthus paradoxus*), the Mountain Plover (*Charadrius montanus*), the Mexican Spotted Owl (*Strix occidentalis lucida*), the Black-footed Ferret (*Mustela nigripes*), the Gypsum wild-buckwheat (*Eriogonum gypsophilum*), the Kuenzler hedgehog cactus (*Echinocereus fendlerivar. kuenzleri*), and the Lee's pincushion cactus (*Coryphantha sneedii var. leei*). The Service concluded that all but one of the above species, the shiner, were determined to not be affected by the winter operations; therefore, only the affects of the winter operations on the shiner will be analyzed in this BA.

7.1 PECOS BLUNTNOSE SHINER

[1] Flow data is recorded on 15 minute intervals and broadcast to a web-site every four hours through satellite connections. The data is accurate to within ±10 % of the actual flow occurring. Physical measurements of flows are regularly taken at the site location and over time a rating table can be developed. These ratings are correction factors or shifts that can be applied to observed flows from the web-site to obtain a more accurate flow reading.

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. Historically the species occurred throughout the Pecos River in both New Mexico and Texas, but its range is now restricted to a 223-mile section of the river, between Sumner Reservoir and Brantley Reservoir, New Mexico (Figure 1). Intensive surveys that Brooks et al. (1991) summarized form the basis for current knowledge of Pecos bluntnose shiner distribution and abundance.

The shiner was listed as a New Mexico State threatened species on May 11, 1984 and a federally threatened by the U.S. Fish and Wildlife Service on February 20, 1987. The shiner was first collected by Cope and Yarrow, at San Ildefonso, Santa Fe County, New Mexico in 1876 (Sublette et. al., 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) in the Pecos River Basin.

Historic distribution and abundance of the Pecos subspecies are known; the Final Rule determining the Pecos bluntnose shiner as 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 shiner, from below Sumner Dam to the Brantley Reservoir inflow (Hatch et al., 1985; Sublette et al., 1990; Brooks et al., 1991). Collections of 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 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 native and non-native fish 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 a 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 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) (Sublette et. al., 1990), now comprise a large portion of the shiner guild, and may indicate interspecific competition as a factor in shiner abundance and distribution reductions. These species spawn during high flow events in the Pecos River, with eggs and larvae being distributed downstream to colonize new areas (Bestgen et al. 1989).

Life Requisites

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 shiner included sand substrate, low current velocity, and water depths of 17 to 41 cm (7 to 16 in), (Hatch, 1982).

Pecos bluntnose shiner are prolonged spawners, beginning in early summer and ending by October (Sublette et al. 1990). Examination of flow events during the early summer period indicated spawning occurring during the descending waters of spring runoff (Bestgen and Platania, 1987). Viable eggs remain suspended in the water column and hatch within 1-2 days after spawning. 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. Newly hatched shiner larvae drift downstream in post spawning flows for at least 3-4 days. After the swim bladder is fully developed the protolarvae can begin to move horizontally, actively seeking low-velocity habitats (Hoagstrom, 1995; Platania and Altenbach, 1998).

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. Rio Grande bluntnose shiner achieved a maximum length of approximately 70 mm (3 in) Standard Length and maximum of age 3 (Chernoff et al., 1982; Bestgen and Platania, 1987).

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 (Bestgen and Platania 1987).

Critical Habitat

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 (U.S. Fish and Wildlife, 1987). Acme is located in a noncritical habitat stretch of the river roughly 25 miles downstream of the upper critical habitat reach, but serves as important habitat and supports high numbers of shiners.

From Old Fort Park to just below Highway 380, 102 miles downstream, the channel is generally wide, sandy and unstable. Shifts occur in the bed structure as flows fluctuate through these habitats. The channel becomes spread out and braided, creating suitable habitat for the shiner.

This stretch of river is also hydrologically characterized as a losing reach. Surface water is lost both through seepage and evaporation. Depending on the time of year, the amount of water

moving down the channel, and local weather conditions, water losses to this portion of the river can be as much as 60-70% by the time the water reaches Acme. From Acme downstream, the river begins to gain water back to the surface and is called a gaining reach, however, the stream from this point slowly begins to narrow and deepen, losing the important features necessary for good shiner habitat. It is known that the lower reach of critical habitat is poor shiner habitat.

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. Hoagstrom (1995) later confirmed that reach five (the lowest study reach below the lower critical habitat area) did contain the highest relative abundance of age class zero individuals of shiners. Block reservoir releases were cited as the cause for fish larvae displacement downstream..

8. REVIEW OF PREVIOUS WINTER'S OPERATIONS

The proposed winter operations have been carried out for the last two winter seasons beginning November 1, 1998 through February 28, 1999 and November 1, 1999 through February 29, 2000. Figure 1 below illustrates the percent flow exceedence at the near Acme gage and of the Sumner bypasses for the last two winter seasons combined. Daily instantaneous flows at Acme were at or above 26, 30, and 35 cfs 98-, 90-, and 51-percent of the time, respectively. The river at the near Acme gage has not gone dry since initiation of these operations.

If the near Acme flows were holding steady between 30 and 35 cfs, no bypass adjustments were made. This is due to the accuracy of stream gaging (flows within the 30-35 cfs range are within the accuracy of a 35 cfs the gage readings), the variation in channel losses between Sumner Dam and the near Acme gage, the travel time for bypass changes to reach the near Acme gage and the gate configuration at Sumner Dam. These operations explain the large difference in percent exceedence between the "at or above 30 cfs" and "at or above 35 cfs flows."

Recorded daily instantaneous bypass flows at Sumner ranged between 5 and 40 cfs. Fifty-percent of the time the bypass was at or above 22 cfs. Approximately eighteen-percent of the time, inflows were not bypassed.

Figure 1 shows that winter operational flows can be managed to a reasonable degree of accuracy. Still there is a margin of error, represented by the 10% of flows that fall below the desired objective flow. These temporary drops in flow were generally transition zones where bypasses were adjusted to catch rising or falling flows at the Acme gauge. The flows were observed via

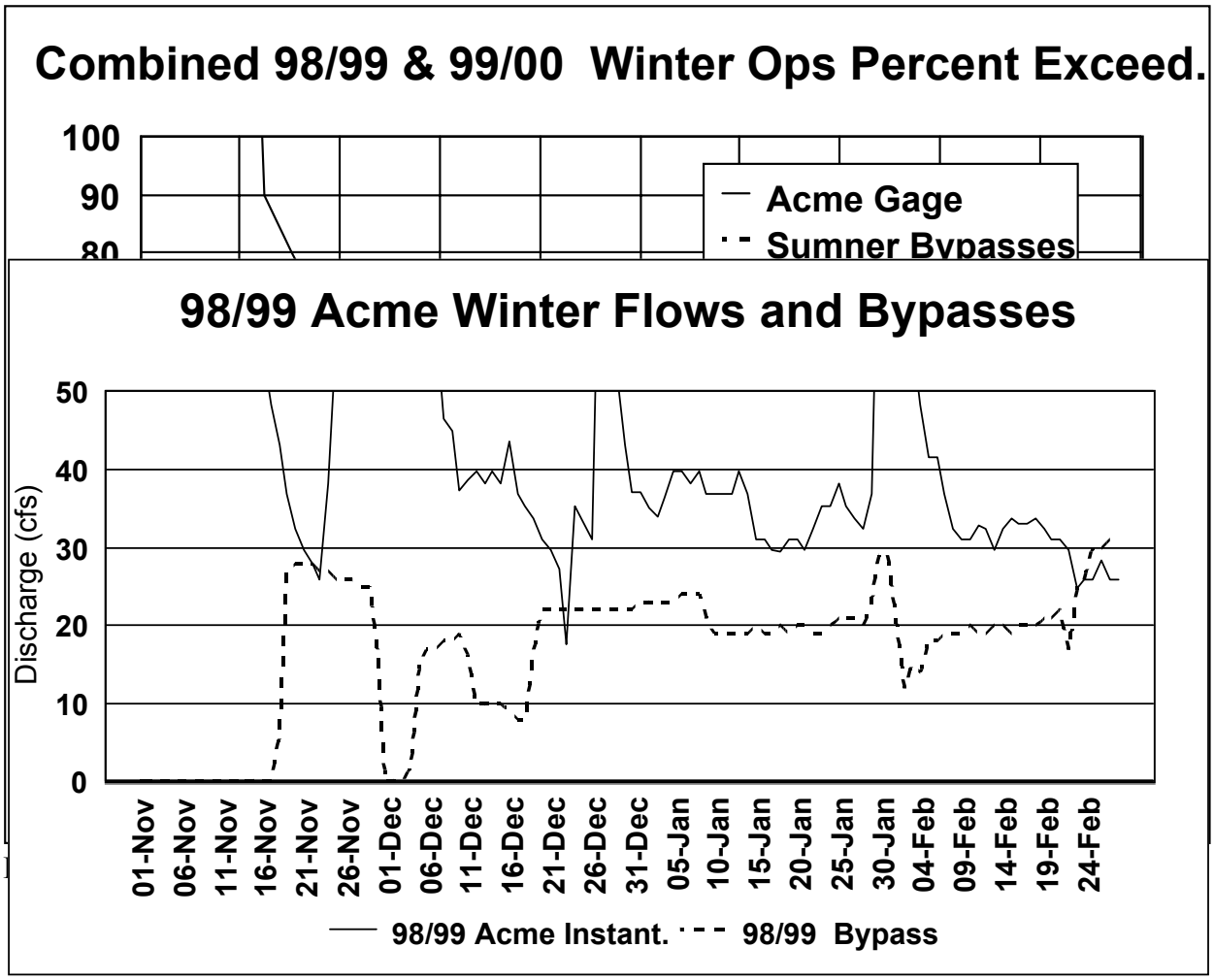

Figure 2 1998-1999 Acme Winter Flows and Bypasses Graph

(DCP) stations located at the site and transmitted to Internet websites. Though the flow reported by the DCP may not reflect current shifts, the rate at which the flow rises or falls is representative and is used to determine when bypasses should be started and how much should be bypassed or added to target the objective flows.

The difficulty is in estimating when a bypass needs to occur. For the past two years, the determinations were made by evaluating the Taiban gauge (Taiban) directly below FSID irrigation return. Acme is 82 miles downstream from Taiban. With no knowledge of stream conditions between these two gauges, estimates of what was needed to target the objective flow were made based on weather conditions and amounts and rates of flow.

During the 1998-1999 winter operation period, flows at Acme exceeded 26 cfs 98 % of the time; 30 cfs, 90 % of the time; and 35 cfs, 66 % of the time. The 1998-1999 winter operation was marred by two periods where flows dropped temporarily below 30 cfs. The first period was unexpected. Reclamation had increased flows too late to catch the quickly falling limb of the

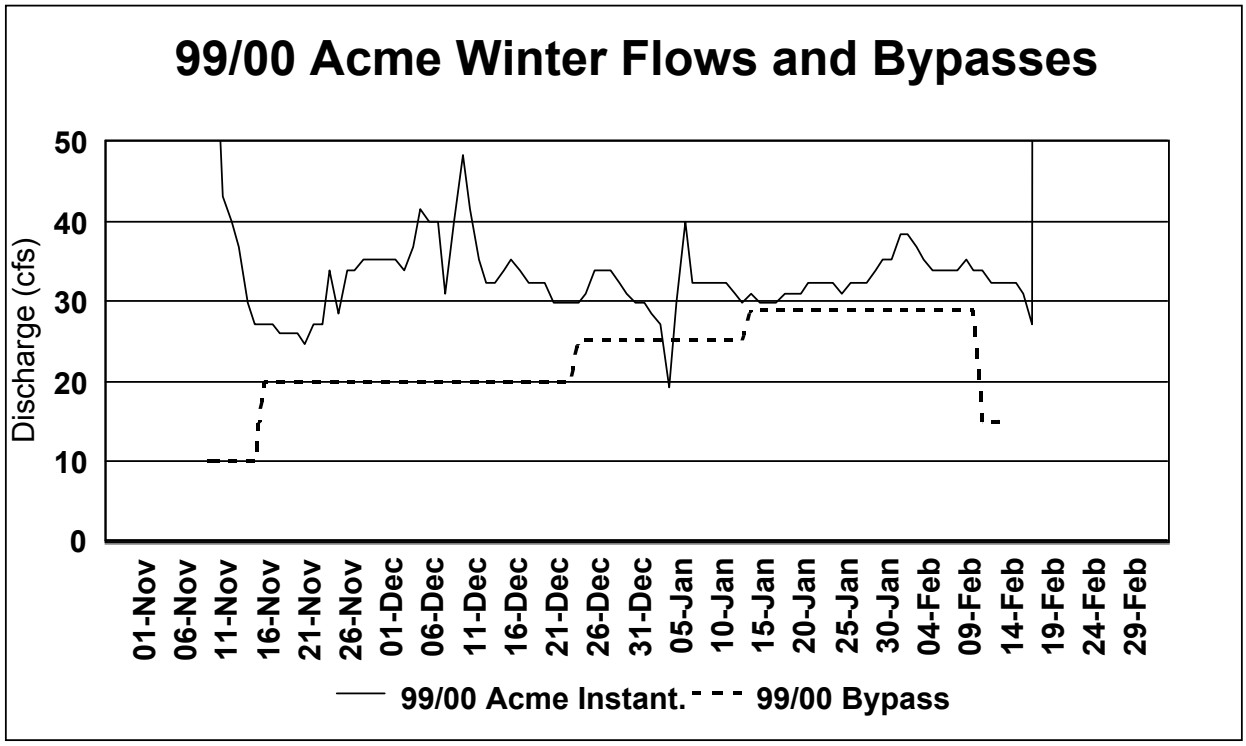

Figure 3 1999-2000 Acme Winter Flows and Bypasses Graph

hydrograph. The second drop was at the end of the season. Reclamation had previously increased the bypass to 25 cfs on December 19, 1998, (Figure 2) in anticipation of offsetting a gradual declining flow at Acme. Reclamation continued to increase bypasses until the hydrograph at Acme bottomed out around 25 cfs and started climbing back up.

In the 1999-2000 winter operations season, the number of days that flows exceeded 35 cfs at Acme were fewer than in the 1998-1999 winter period. These flows occurred 40 % of the time. There was a small change in the number of days that flows exceeded 30 cfs, occurring 88 % of the time, but there was no change in the number of days that flows exceeded 26 cfs, which was 98 % of the time.

The major difference between the two winter operations was that during the winter of 1998-1999, there were three rain events which kept the flows at Acme from falling too quickly and kept bypassed inflows considerably lower. In the winter of 1999-2000, there was only one minor rain
event around the middle of December 1999. This was a half-inch rainfall in the area of Ft. Sumner, which provided a momentary rise in the flows at Acme, but no significant relief from drying conditions (Figure 3). The drop at the beginning of January 2000 was the result of an adjustment in the gaging equipment.

Figure 3 also shows that Reclamation continued to increase bypassed inflows at Sumner Dam throughout the 1999-2000 winter period to almost 30 cfs to maintain the 35 cfs objective flow. The instantaneous flows at Acme appear to be variable in the last half of November 1999 when the final release of the irrigation season passed. Flows at Acme began to stabilize toward the middle part of December 1999, but required higher bypasses to maintain that stability. The average for both years combined was 53 % for flows exceeding 35 cfs; 89 % for flows exceeding 30 cfs; and 98% for flows exceeding 26 cfs. The dip in flows at the beginning of January 2000 were assessed to be a gauge malfunction rather than a loss of flows.

9. ANALYSIS OF THE EFFECTS OF THE PROPOSED ACTION

Implementation of the proposed action is expected to result in an objective flow at the Acme Gauge of 35 cfs at least 50% of the time. Flows in the local area around Acme (approximately 5 river miles) could drop below 26 cfs on rare occasions. In the past two winter operations seasons flows less than 26 cfs occurred only 2% of the time.

As described earlier, the 106 mile reach from Sumner Dam to the near Acme gage site (Acme) is hydrologically characterized as a losing reach. The cumulative loss is greatest at Acme; therefore, upstream flows are higher. The river begins to gain water downstream from Acme. Due to these hydrologic characteristics, the flows in the remainder of the river (not including the 5-mile section around Acme), which includes the reaches designated as critical habitat, are expected to remain above 35 cfs. These higher flows will provide sufficient habitat so that potential overcrowding and stress are not a consideration.

The Service stated in the 1998-1999 BO that if flows drop to 26 cfs or lower, shiner habitat would be reduced to nearly one-third of the habitat present at 35 cfs and almost a quarter of the velocities. 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," (U.S. Fish and Wildlife Service, 1998a).

Channel geometry and flow relationships developed in the draft hydrologic study report of the Pecos River (Tetra Tech, Inc., 2000) indicate otherwise. At the Acme gage (located approximately 6 miles downstream of the Gasline site), a reduction in flows from 35 cfs to 26 cfs results in only a 16% reduction in flow area. At the above Acme gage (located approximately 7 miles upstream of the Gaseline site), an equal reduction in flows results in only a 14% reduction in flow area. These reductions in flow area are approximately 50% of what the Service stated. A reduction of about one-third of the habitat would actually not occur unless flows fall below approximately 18 cfs at the above Acme gauge and 16 cfs at the near Acme gauge (Tetra Tech, Inc., 2000).

As a result of previous consultations regarding winter operations, the Service (Fisheries Resource Office) was contracted to conduct intensive monitoring of low flow periods. Though it

is possible that individuals of the species could have been affected by these temporary decreases in available habitat, the Service, through its monitoring efforts, has reported no evidence of adverse effects to the shiner.

Some conditions of reduced habitat include forcing fish into remaining and often overcrowded habitats where predators, such as predatory fish (Larson and Propst, 1999) or perhaps where external predators too, like birds and fur bearing animals, could impact potential spawning populations at significantly reduced flows over time.

The spatial closeness of these fish in limited habitats can also 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. These conditions are possible, but have not been recorded to-date.

As suggested by the Service in a "worst case scenario," analysis, a loss of 30% habitat for a majority of the 4-month winter operations could result in a permanent loss of individuals, but that loss would not be considered great enough to the "overall population viability of the shiner...that it could not be made up during successful spawning periods next year." Figures 2 and 3 show only momentary drops in flows at Acme in response to adjustments in bypasses and only for short durations of time.

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 effects that would be otherwise created by lower flows. Improvements over each previous season's operations continue to be made. Both monthly hydrological monitoring by Reclamation and regular, monthly population monitoring by the Service will also serve to maintain consistent benefits to the bluntnose shiner.

10. EFFECTS DETERMINATION

Based on Reclamation's proposal to bypass inflows from Sumner Dam to achieve an objective flow of 35 cfs, the Interim Winter Operations **may affect, but are not likely to adversely affect the shiner**. In addition, as observed in the 1998-1999 and 1999-2000 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 the Winter Operations Plan section, should reduce the effects of these flow decreases.

Reclamation's proposed winter operations are expected to result in an objective flow of 35 cfs at the Acme site. Based on existing data for reaches designated as critical habitat for the shiner, flows through these areas are anticipated to be greater than 35 cfs, and therefore Reclamation's

proposed Interim Operations will **not adversely modify or destroy critical habitat**. Every effort will be made to achieve the objective flow in a timely manner as outlined in the Description of the Proposed Action section. Also, efforts to obtain additional real time data gages for the Gasline site or another closely related site are on ongoing. These gauges are important decision making tools.

11. LITERATURE CITED

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