Dear Mr. Martinez:

Thank you for the August 31, 2016, provision of a Biological Report (Parmenter 2016a), Wetlands Report (Parmenter 2016b), and cover letter describing the proposed construction of a new bridge on United States Highway 550 (US 550) over the Rio Grande in the Town of Bernalillo, Sandoval County, New Mexico (Figures 1-3). The U.S. Department of Transportation Federal Highway Administration (FHWA) is working with the New Mexico Department of Transportation (NMDOT) to improve 7.9 miles of the four-lane roadway and east-west transportation corridor of US Highway 550 between New Mexico (NM) State Road 313 and NM 528 (Lee Engineering et al. 2014) (Proposed Action). The new bridge construction will be conducted (approximately) from July 2017 through March 2019 with various restrictions of activity due to species protections or safety. Dredging, fill, and construction activity is also proposed to occur in and near the Rio Grande (river) under a nationwide permit authorized by the U.S. Army Corps of Engineers (USACE). The focus of this consultation is the new bridge and associated construction activities to the north of the existing George Renaldi Bridge crossing the river. The FHWA as lead federal agency, along with the NMDOT and the USACE, have requested formal consultation with the U.S. Fish and Wildlife Service (Service) on the Proposed Action with a Biological Opinion that addresses the effects to federally-listed species by all proposed road and bridge construction-activities or associated agency actions.

You determined that the Proposed Action is not likely to adversely affect the Southwestern Willow Flycatcher (*Empidonax traillii extimus*; flycatcher), the Yellow-billed Cuckoo (*Coccyzus americanus*; cuckoo) or proposed or designated critical habitat for each of these species. You determined that the Proposed Action will have no effect on the New Mexico Meadow Jumping Mouse (*Zapus hudsonius luteus*), its designated critical habitat, Jemez Mountain salamander (*Plethodon neomexicanus*), its designated critical habitat, or the Mexican spotted owl (*Strix occidentalis lucida*), and its designated critical habitat. You determined the Proposed Action may
affect and is likely to adversely affect the Rio Grande Silvery Minnow (*Hybognathus amarus*; silvery minnow) and silvery minnow designated critical habitat.

**Effects to Flycatcher**
The Service concurs with the determination of may affect, but is not likely to adversely affect the flycatcher and its critical habitat based on the following proposed actions. Protocol surveys have not detected flycatchers in the action area during spring and summer 2015 (Parmenter 2016a). The proposed construction activities, including vegetation clearing, are proposed to begin and end during the fall and winter months (October through February).

However, you requested additional construction activities be considered to occur in or near the river floodplain from July 1 through August 15, based on the following conditions. A biologist with an active flycatcher certification (ESA section 10(A)(1)(a) permit) will conduct formal protocol surveys starting May 15th to aurally and visually survey the floodplain and action area for flycatchers when construction must take place at any time during the flycatcher breeding season. If a flycatcher is detected by the biologist, then they will inform the Project Manager, who has the authority and will cease construction or other activities until the flycatcher leaves of its own volition or the Service’s New Mexico Ecological Service Field Office (NMESFO) is contacted for further instruction and determination of nesting activity. Therefore, construction activities may occur during the nesting season provided no nesting activities occur and are verified. The area affected by construction activities will be reseeded with native vegetation and additional mitigation for the silvery minnow will also help offset any losses of flycatcher habitat.

**Effects to Cuckoo**
The Service concurs with the determination of may affect, but is not likely to adversely affect the cuckoo and its proposed critical habitat based on the following proposed actions. No cuckoos have been detected in the area during 2015 (Parmenter 2016a). The Proposed Action occurs within cuckoo proposed critical habitat Unit 52: New Mexico 8, Middle Rio Grande 1 (Service 2014). The primary constituent elements of proposed critical habitat for this species are riparian woodlands [contiguous or nearly contiguous patches that are greater than 100 meters (325 feet) in width and 81 hectares (200 acres) or more in extent], adequate prey base, and dynamic riverine processes. The forest vegetation in the floodplain of the project area does not support sufficient riparian woodlands of a quality, patch size, or quantity to support nesting, although it does provide marginal habitat for migration. No yellow-billed cuckoos were detected during 2015 protocol surveys (Parmenter 2016a). The proposed construction activities, including vegetation clearing, are expected to begin and end during the fall and winter months (October through February), with the exceptions as noted, below.

Additional construction activities are allowed to occur from July 1 through September 1, based on the following conditions. A biologist with an active cuckoo certification (ESA section 10(A)(1)(a) permit) will conduct formal cuckoo surveys starting June 15th to aurally and visually survey the floodplain area for the cuckoo when construction activities must occur within the cuckoo breeding season. If a cuckoo is detected by the biologist, then they will inform the Project Manager, who has the authority and will cease construction or other activities until the cuckoo leaves of its own volition or the Service’s NMESFO is contacted for further instruction and determination of any nesting activity. Therefore, construction activities may occur during
the nesting season provided no cuckoo nesting activities occur and are verified. Furthermore, the area of construction impact will be reseeded with native vegetation and additional stormwater swales and habitat mitigation for the silvery minnow may help offset any losses of cuckoo habitat and of any proposed critical habitat.

**Effects to Migratory Birds**

The Migratory Bird Treaty Act (MBTA) protects native and non-game migratory birds, occupied nests, eggs, and parts from take without a permit (16 U.S.C. 703-712). Service guidelines prohibit the removal or destruction of occupied migratory bird nests without a federal permit. Additional information about obtaining permits from the Service is available on the website at this link: https://www.fws.gov/permits/. Potential impacts to occupied nests should be avoided by scheduling vegetation clearing activities outside of the area nesting season (March 15 – September 15). Once an egg is laid in a nest, then the nest is considered active by the Service and is protected under the MBTA. Activities that may affect the nest must cease immediately and the Project Manager (or designee) must coordinate with the Service’s Migratory Bird Office for species-specific protocols and permits.

**Effects to Silvery Minnow**

The Service has prepared this Biological Opinion (BiOp) on the effects of the Proposed Action on the endangered silvery minnow and its critical habitat in accordance with section 7(a)(2) of the Endangered Species Act, as amended (ESA; 16 U.S.C. 1531, et seq.). This BiOp is based on information submitted in the US 550 corridor plans (Lee Engineering et al. 2014; Bohannon Huston 2016), the Biological and Wetland reports (Parmenter 2016a,b), the Bridge Scour Memo (Armstrong 2015); the geomorphic profiles of the river upstream and downstream (Varyu 2013), conversations and communications between NMDOT, USACE, and the Service; and other sources of information available to the Service. The proposed action and its construction activity effects to silvery minnow are similar to other project actions conducted by others (Reclamation 2014, 2015; Pueblo of Sandia 2008; SWCA 2008a,b; 2010a,b; McMillan et al. 2016; Golder Associates 2012; USACE 2007, 2012a,b,c)) and related BiOps issued by the Service (2003a; 2009a,b,c; 2010a,b; 2011a,b; 2012; 2013a,b,c; 2014a; 2015; 2016). This BiOp incorporates all the information cited above by reference. Therefore, the Service has abbreviated the narrative extent of this BiOp describing the proposed action, the status of the species, the environmental baseline, the cumulative effects, and their associated analyses by depending upon cited information incorporated herein. The result is that this BiOp focuses on the effects of the Proposed Action and its effects to silvery minnow and on reasonable and prudent measures to minimize those effects. A complete administrative record of this Consultation Number 02ENNM00-2016-F-0626 is on file at the Service’s NMESFO office at the letterhead address.

During construction activities, the proposed action will cause some silvery minnows to flee the physical disturbance, noise, vibration, and alterations in water quality during any earth moving activities conducted on or along the river and the shoreline. Therefore, the proposed construction activities will harass silvery minnows and may temporarily impair their natural feeding or sheltering activities or their ability to engage in such behaviors (50 CFR 17.3). Silvery minnow critical habitat will be adversely affected by the addition of the piers, the installation of fill materials. During peak flows, we expect that a localized increase in current velocities (some velocities will likely be above the silvery minnow swimming capability – Bestgen et al. (2010))
will occur alongside the piers and will also result in scoured holes that may foster predatory fish. After bridge construction, there is a potential for risk of harassment or harm that may occur silvery minnows as a result of the stormwater drainage, increased traffic noise and pollution, or the potential stranding or entrapment in construction areas or in restored features. Therefore, the Service concurs that the proposed action "may affect, is likely to adversely affect" silvery minnow and its critical habitat.

The NMDOT (2017) has proposed to offset these impacts by the creation or modification of floodplain habitat within the footprint of activities near the bridge. During formal consultation and in this BiOp, the Service has provided additional measures that NMDOT may take to minimize adverse effects to silvery minnows. The NMDOT has also proposed measures that will reduce the likelihood of adverse effects to silvery minnows. For example, the proposed 0.1 acres (ac) of habitat enhancements (NMDOT 2017) will increase the availability of lower velocity habitat near the bridge. The proposed habitat enhancements will also help enhance or create more silvery minnow nursery habitat that is capable of increasing egg and larval survival and thereby would potentially offset some of the potential losses by predatory fish or other factors. The US550 Bridge plans (Bohannan Huston 2016) also incorporate stormwater treatment, noise abatement, and other features that minimize the impacts on silvery minnows.

With the conservation and mitigation measures proposed, the Service finds that the Proposed Action is not likely to jeopardize the continued existence of the silvery minnow, because the number of silvery minnows expected to be adversely affected at any one time is small. The Service also finds that silvery minnow critical habitat that will not be adversely modified because of the amount of habitat enhancements proposed (0.1 ac) will more than offset the area of the habitat impacts (0.01 ac).

Thank you for working with the Service to address our project concerns and seeking to enhance and create habitat features associated with the Proposed Action. If you have any questions regarding this BiOp, please contact Joel Lusk, at the letterhead address, by email, at joel_lusk@fws.gov, or by telephone at (505) 761-4709. For issues involving the detection of flycatcher or cuckoo during the construction activities, please contact Vicky Ryan, by email, at vicky_ryan@fws.gov, or by telephone at (505) 761-4738.

Sincerely,

Susan Millsap
Field Office Supervisor

cc: (electronic copies)
cc: (electronic copies)

Natural Resources Section Supervisor, New Mexico Department of Transportation, Santa Fe, NM (Attn: T. Botkin)
Director, Department of Natural Resources, Pueblo of Santa Ana, NM (Attn: A. Hatch)
Director, Environment Department, Pueblo of Sandia, NM (Attn: F. Chaves)
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
Director, New Mexico Energy, Minerals, and Natural Resources Department, Forestry Division, Santa Fe, New Mexico
Natural Resources Program Manager, Marron and Associates, Albuquerque, NM (Attn. H. Parmenter)
Administrative Record Consultation Number 02ENNM00-2016-F-0626 (joel_lusk@fws.gov)
BIOLOGICAL OPINION

1. DESCRIPTION OF THE PROPOSED ACTION

US 550 Corridor Project
The US 550 is a four-lane roadway that provides the principal east-west travel route through the Town of Bernalillo and is the furthest north river crossing over the Rio Grande in the Albuquerque metropolitan area (Figures 1 and 2). The US 550 is heavily used because it is one of the nine river crossings in the metropolitan area. The nearest river crossing south of US 550 is Alameda Boulevard, located approximately 15.3 kilometers (km) (9.5 mi) south of US 550 (Lee Engineering et al. 2014). The nearest regional roadway with a river crossing north of US 550 is NM 502, which is located approximately 100 km (62 mi) north of US 550. The US 550 provides access to large tracts of undeveloped land on the west side of the Rio Grande and access to the commercial center of Bernalillo on the east side of the Rio Grande. The lack of an alternative route results in high traffic volumes on US 550 with a higher percentage of trucks.

Foreseeable US 550 Activities
The second phase of the US 550 project would be to acquire right-of-ways along the corridor that would be needed to construct the remainder of the improvements. In subsequent construction phases, US 550 would be reconstructed from NM 313 and NM 528. On the east side of the Rio Grande, a 6-lane roadway with a raised median to control access would be constructed. On the west side of the Rio Grande, a super street could be constructed consisting of six driving lanes, a median, bike lanes, sidewalks, and shoulders. There were no final plans available to review and therefore no evaluations were conducted in this BiOp on these foreseeable US 550 activities.

US 550 New Bridge Construction Activities
Phase I of the Proposed Action would add a northbound lane from the Rio Grande (George Renaldi) Bridge crossing the river to Jemez Dam Road (Figure 3). A new bridge would be constructed north of the existing Rio Grande (George Renaldi) Bridge to carry the westbound lanes, 1.8 m (6 foot (ft) shoulders for emergency vehicle access, 1.8 m (6 ft) bike line, and 1.5 m (5-ft) sidewalk on the north side of the roadway across the river bridge (Figures 3 and 4). Under current design, the project would construct a new bridge immediately north of the existing bridge. The overall width of the roadway cross-section of this alternative including curb and gutters, bicycle lanes, railings, and sidewalks is 112 ft (34 m). The existing bridge would remain in place to accommodate the eastbound lanes, a bike lane, and sidewalk. Bridge art would be placed on the bridge. Lighting would be installed on the new bridge. Some utilities in the corridor would be relocated within the project area (Figure 4).

Bridge construction activities would occur on the north side of the existing bridge, and access roads would be constructed on the east and west side of the river, north of the existing bridge (Figure 3). The new Rio Grande Bridge would be constructed of steel girders with two abutments and four piers. The steel girders would allow for the bridge to span the active river channel and would require three fewer piers than the existing bridge. The bridge foundation would consist of drilled shafts (Figure 4). Construction activities will need to occur in flowing water. A pier wall would be constructed on a pile cap. The excavation area for the bridge
foundations would be approximately 1.5 m (5 ft) wide by 19.8 m (65 ft) long by 3 m (10 ft) deep. For Piers 2 and 4, a raised drilling platform would be constructed with sand and impermeable barriers (concrete with plastic covering). Dewatering would be needed at Piers 2 and 4. The pier abutments would be 18.3 m (60 ft) by 1.5 m (5 ft) with 1.8 m (6 ft) deep excavations. The new abutments and piers would be aligned with the existing bridge to allow for effective river flow and minimal scouring (Figures 3 and 4). The piers would displace approximately $(60 \times 5 = 300 \text{ ft}^2)$ 0.007 acres of substrate per pier, with two piers (0.01 ac) in silvery minnow critical habitat.

**Construction Activity Runoff and Stormwater Drainage**

A ditch would be constructed on the north side of US 550 from Station 117+00 to Station 132+00 on the northwest side of the new bridge (Figure 4). The ditch would have a maximum top width of 18 ft (5.5 m) and a maximum depth of 4 ft (1.2 m). The ditch would be rip-rapped lined and empty west of the Rio Grande, north of the bridge. The ditch would comply with the stormwater permit standards, including the use of riprap and concrete apron at the outflow. The Service asked NMDOT to consider a constructed swale to treat stormwater discharges before it enters the river. The NMDOT has agreed to consider stormwater management, perhaps in conjunction with development of the proposed habitat enhancement activities below the bridge near the west subchannel and downstream of the stormwater discharges.

Where necessary, temporary walls, foundation forms, silt fences, hay bales, or other materials will be installed in the river to minimize temporary water quality degradation in the area of pier drilling activities, construction, and the spoils that are placed or that may enter the river channel.

**Wetlands Affected by the Proposed Action**

The biological reports provided for this US 550 project (Mattson et al. 2016; Parmenter 2016a, b) often quantified and referred to acres of wetlands impacted by the Proposed Action. There were no independent assessments of the acres of silvery minnow habitat or critical habitat adversely affected. Therefore, the Service used the available information on acres of wetlands impacted, along with other estimates about the sizes of areas of adverse effects as a surrogate measure of the adverse effects to silvery minnows and designated critical habitat. The following summary of wetlands impact areas were provided by Parmenter (2016a, b) and Mattson et al. (2016).

There were no indications of seeps, springs, or perched water tables that were not ultimately connected to the surface flows of the river. Two other areas with potential wetland habitat were identified and examined within the general area; these are the Bernalillo Riverside Drain and the Albuquerque Main Canal (which lies east of the Bernalillo Riverside Drain). The wetlands within the project area are primarily scrub/shrub particularly along the east channel of the river (Parmenter 2016b; Figure 5). A small amount of emergent wetland occurs along the edges of the west subchannel of the river. When water is present, some wetlands (particularly along the west subchannel) may provide habitat for the Rio Grande silvery minnow. The wetlands also provide temporary or permanent habitat for silvery minnows, birds, mammals, amphibians, terrestrial and aquatic invertebrates, and even aquatic vertebrate species. Finally, the scrub/shrub wetlands also may provide a function of sediment removal and may have the potential to remove pollutants from the water passing through or over it resulting in an improved water quality downstream.
Approximately 5,221 ft² (0.12 ac) of wetlands occur north of the existing US 550 bridge within the project area (Figure 5). The proposed project activities will have both permanent and temporary impacts upon these wetlands, but not all 0.12 acres will be affected by the bridge construction (Figures 3 and 5). The only permanent structures that will be placed within the river channel will be two piers of the new bridge (0.01 ac). The pier located along the east bank of the Rio Grande will be primarily within open water; only the southeastern edge of this pier will cover existing scrub/shrub wetland along the edge of the bank. In total, approximately 38 ft² (0.0009 acres) of this pier will permanently affect wetland function and channel habitat (Figure 6). The pier within the west subchannel of the river will be placed within the open channel bottom. The NMDOT (2017) has also proposed 0.1 acres habitat enhancements in this area.

A number of activities associated with the construction of the bridge may result in temporary impacts to wetlands (Figures 3, 5, and 6). These include:

1) Construction of a pad along the edge of the east bank of the river to build the bridge pier;
2) Construction of a temporary access route across the east channel of the river to the island; and,
3) Construction of the pier in the west subchannel.

Based on the current design, it is estimated that approximately 4,586 ft² or 0.11 acres of wetland will be temporarily impacted (Figure 6). This will include approximately 0.02 acres along the east bank wetland along the east side of the river, approximately 0.0014 acres along the east side of the island within the center of the river, and approximately 0.0872 acres along the west subchannel portion of the wetland. Upon completion of the project, the temporarily impacted wetland areas will be returned to preconstruction conditions. The permanent loss of wetlands from the project would be very small, approximately 38 square feet at ground level or less than a one-thousandth of an acre.

The Service anticipates that wetlands (Parmenter 2016b; page 21; Figure 5) under the bridge may also be permanently modified by the shading of the bridge (with an associated loss of wetland plant indicators). The bridge will reduce the sunshine below it for the duration of the project resulting in less plant and aquatic plant productivity below the bridge. For example, revegetation that may occur will likely be sparse-to-bare under the bridge (see Mattson et al. 2016, page 44). The NMDOT has proposed 0.1 acres of offsetting mitigation silvery minnow critical habitat impacted within the action area but dense riparian vegetation is not a critical component of that habitat. The NMDOT habitat enhancement will reduce the elevation of the west side island down so that flows greater than 3,000 cfs (as measured at the Rio Grande at Albuquerque Gage) will inundate that area near/under the bridge.

Vegetation Affected by the Proposed Action
The riparian vegetation within the US 550 Bridge Rio Grande action area is dominated by hydrophytic shrubs such as coyote willow (Salix exigua) and to a lesser degree salt cedar (Tamarix spp.; Parmenter 2016a, b). Trees such as Russian olive (Elaeagnus angustifolia) and Rio Grande cottonwood (Populus wislizeni) are also important components of the general wetland vegetation in the area. This woody vegetation generally occurred along the upper banks of the river channels or in the surrounding uplands. The lower banks of the channels usually
support herbaceous wetland vegetation such as rushes, grasses, cockleburs, and wild ryes. After earthwork is completed, access roads and the staging area will be reseeded or revegetated.

*Ordinary High Water Mark*

The ordinary high water mark locations within the project area were taken at bankfull. At about 1,400 cubic feet per second, the river flows down the west subchannel, and surface water flows reach the top of the west bank between 3,500 and 4,000 cubic feet per second. Bankfull stage within the river appears to occur approximately between 3,500 and 4,000 cubic feet per second.

*NMDOT Proposed Silvery Minnow Habitat Enhancements*

The Proposed Action will also include 0.1 acres of silvery minnow habitat enhancements (also sometimes referred to as habitat mitigation) (NMDOT 2017). NMDOT will contract earthmoving activities to grub (reduce the elevation by excavation, redistribution, or removal of sediment) near and from the west island, within the NMDOT right-of-way, only. Soil and vegetation will likely be removed from each of the sites using heavy equipment (such as dozers, belly scrapers, excavators, backhoes, or trucks). Spoils will be deposited outside the floodplain.

The areas of lowered elevation on or near the west island, associated with the west subchannel, will increase the areas subject to periodic flooding (Figure 6). Shallow, flooded shelves, subchannels, and lowered islands can result in slow velocity areas that retain silvery minnow eggs (Porter and Massong 2006) and create warm, productive areas with cover, which foster silvery minnow larvae growth, development, and survival (Magana 2012). The permanence of the habitat enhancements at this site in providing the physical features of silvery minnow egg and larval habitat over time is uncertain due to the dynamic features of a sand-bed river system. However, should the reduction of the elevation of the west island (of 0.1 acres) last for approximately 10 years, then the habitat enhancement will be (0.1 acres x 10 years) 1 acre-year. Compare the habitat enhancement benefits with the permanent loss of 0.01 acres critical habitat for up to 75 years (the duration of the bridge) (0.01 x 75 years) of 0.75 acre-years and it is clear that the mitigation offsets the impacts over time. Any increase in the amount of inundation by spring runoff, any native revegetation, or the presence of nearby native vegetation may encourage growth of native vegetation that could be subsequently be used by the listed birds.

The NMDOT has limited authority to reshape the areas of habitat enhancement after the project is complete. As reasonable and prudent measure, the Service will direct that the habitat enhancements designs include a drain or area that directly slopes into the river by way of the west subchannel or a channel feature to the east to facilitate silvery minnow movement onto and out of the habitat enhancement site to reduce the likelihood of entrapment (stranding) during declining river stage. Additionally, the Service will authorize the NMDOT to use of an entrapment protocol for up to five years for the rescue of any fish that may become stranded in the action area.

*Action Area*

The proposed project area is located along US 550 in the town of Bernalillo, Sandoval County, New Mexico. This area is located in Section 30 of Township (T) 13 North (N), Range (R) 4 East (E) and Sections 23, 24, and 25 of T13N, R3E. The project area is located within the Middle Rio
Grande Valley floodplain within the Angostura Reach. The “Angostura Reach” includes the channel and floodplain (between the levees or high ground) of the Rio Grande between the Angostura Diversion Dam and Isleta Diversion Dam. The proposed action would take place within the Angostura Reach of the Rio Grande.

The Action Area includes all areas that will be affected directly or indirectly by the proposed action (50 CFR 402.02). The Service finds that the Action Area includes those areas of disturbance associated with the proposed action at below and near the US550 bridge, and any areas downstream in which mixing may occur due to water quality alterations (Figure 7). The Action Area includes areas of earthwork, the staging area, access roads and haul routes, areas where vegetation would be mowed or removed, fill material or sediment disposal areas, as well as areas where noise, disturbance, or water quality changes would occur (adjacent to the construction sites or downstream into a zone of mixing (dilution), as identified by the wetted impact acreage), all areas of activity associated with habitat enhancement activities, or any areas associated with the contracted work, installation of the silt fences, temporary fills, and piers.

II. STATUS OF THE SPECIES


An updated status of silvery minnow in the Angostura Reach, which is broader than, but encompasses the Action Area, is provided in the Environmental Baseline section, below. This updated status of the species informs our effects analysis because it provides data on the abundance of the silvery minnows during the period in which the proposed activities may occur in or near the river channel and floodplain (October through mid-April, 2017, and July through mid-April, 2018). The Service assumes that the abundance of silvery minnows affected by the Proposed Action will be similar to the abundance of the silvery minnows found by silvery minnow population monitoring surveys conducted in the Angostura Reach over the last seven years (Table 1; Dudley et al. 2016).

III. ENVIRONMENTAL BASELINE

Under section 7(a)(2) of the ESA, when considering the effects of the proposed action on federally listed species, the Service is required to take into consideration the environmental baseline. Regulations implementing the ESA (50 FR 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the Action Area; the anticipated impacts of all proposed Federal actions in the Action Area that have already undergone formal or early section 7 consultation; and the impact of State and private actions that are contemporaneous with the consultation in process.
The environmental baseline defines the effects of these activities in the Action Area on the current status of silvery minnow and its habitat to provide a platform to assess the effects of the action now under consultation. The Service (2003a,b, 2010a,b; 2011a,b; 2012; 2013a,b,c; 2014a; 2015; 2016), the U.S. Army Corps of Engineers (USACE 2007, 2012a,b,c)), others (Crawford et al. 1993; Dudley et al. 2016; Geosystems Analysis 2015; Gunning 2010; Parametrix 2008; Posner 2011; Shah-Fairbank et al. 2011; Tetra Tech 2014), and Reclamation (USBR 2003; Massong 2005; Varyu 2013; Makar 2015; Reclamation 2015; McMillan et al. 2016) have described the environmental baseline, which encompasses the Action Area, and these are incorporated here by reference, as they inform the environmental baseline, the effects analyses, and the jeopardy analysis in this BiOp.

Generally, as a result of river management activities over the past 50 years, the Rio Grande in the Angostura Reach, particularly near the Action Area, has continued to degrade (that is, the channel bed elevation has incised downward), separating the river channel from its associated floodplain, which has reduced the areas of inundation even at modest flows (Parametrix 2008; Isaacson 2009; Gunning 2010; USACE 2007, 2013; Shah-Fairbank et al. 2011; USFWS 2013a).

**Hydrology in the Action Area**

The river channel within the project area is highly dynamic, changing dramatically over short periods. Currently the surface water flows are concentrated in a primary channel along the east side of river where perennial flows occurs year round (Parmenter 2016b). A subchannel occurs along the west side of the river (Figure 8). In December 2015, when flows in the river were over 2,000 cfs, there was water flowing in the west subchannel (Figure 8) (Parmenter 2016b). When flows in the river declined to 1,300 cfs, there was no water flowing in the west subchannel (Parmenter 2016b). However, even when the spring peak flows subside and the water level in the channel recedes, the saturated banks can retain water in bank storage for extended periods. Although the west subchannel may become completely dry for more than a week, the soil within the bank was still saturated 10 inches below the surface. It appears that the water storage in the bank along the river is sufficient to sustain wetland hydrological conditions in the banks for at least a week and possibly several weeks after higher flow events (Parmenter 2016b).

Observations from spring 2015 extending into early spring 2016 suggest that the east channel may be downcutting and deepening. As a result of this process, a portion of the east bank of the island was swept away in December 2015. If channel incision is occurring in the east channel, the western subchannel (which in 2015 conveyed water during flows in excess of 1,400 cubic feet per second) may eventually be left dry except during very high flow events (Parmenter 2016b). Therefore, the Service identified the need for habitat enhancement along the west side.

During flows of at least 3,000 cubic feet per second, the water level in the west subchannel occurs along the top of the vertical east bank of the channel and spills onto the more gently sloping west bank inundating the vegetation. During these storm surge flows, the water level appears to overtop west subchannel extending eastward across the western edge of the island. Concurrently, water rises onto the east side of the island and extends down the east edge.
STATUS OF SILVERY MINNOW IN ANGOSTURA REACH AND ACTION AREA

Life stages of silvery minnow currently inhabit the Angostura Reach on various days, seasonally. Standard surveys of silvery minnows are routinely conducted at five discrete locations within the Angostura Reach during long term monitoring (Dudley and Platania 2015; Dudley et al. 2016). Long-term, standardized monitoring of silvery minnows in the MRG began in 1993 and has continued annually, except for portions of 1998, 2009, and 2013 (Dudley et al. 2016). Long-term monitoring of silvery minnows has recorded substantial fluctuations within one year (orders of magnitude increases and decreases) in the overall (MRG) population densities (an index of abundance for the silvery minnow population; Figure 9). Silvery minnow abundance is correlated with hydrologic conditions, particularly the magnitude, duration, and timing of spring runoff (Dudley et al. 2016). During spring runoff, inundated habitat in the floodplain is increased and, when sustained, provides additional areas for spawning adults, eggs, and larvae to nurse (grow, feed, shelter), such that annual silvery minnow abundance is observed to subsequently increase in fall surveys. There is also a negative relationship between low flow volumes and the distribution of silvery minnows (probability of occurrence of silvery minnow during sampling; that is, less water results in fewer occurrences of fish found during surveys). Thus, prolonged high flows during spring are most predictive of increased silvery minnow abundance and prolonged low flows during summer are most predictive of decreased silvery minnow occurrence at sites sampled over the 23-year study period (Dudley et al. 2016).

Dudley et al. (2011, 2016) suggest that silvery minnows may shoal and swim into deeper pools, shallow backwaters, and along the edges of the river, most likely reflecting preferences for different micro- and macro-habitat conditions (e.g., such as temperature, slow-velocities, and food availability) throughout the river reach. Additionally, as silvery minnows move within and between locations in the Angostura Reach, there is the potential for fish to move into or near one of these sites of activity while work is conducted. Although habitat conditions at or near the US 550 bridge reconstruction may differ from habitat conditions at the standardized survey sites, the Service assumes that silvery minnows occupy these sites at densities similar to those at the long-term survey sites. Therefore, for the period between September 2009 and October 2016, the Service summarized in Table 1 the available data on silvery minnow densities in the Angostura Reach collected during long term population monitoring (Dudley et al. 2016) by month (for months occurring during Proposed Action activities may occur from July 1 through April 15).

The Service used the average of the average monthly 85th percentile silvery minnow densities from the last nine years of monitoring efforts in the Angostura Reach (which is a density of 5.7 RGSM/100m²) as representative of silvery minnow abundance within the Action Area (Table 1). This estimated density is being used to conservatively represent the status of the species for the duration of the proposed action across nearly two years. The Service used this density of silvery minnows, multiplied by the area of impact, to determine the number of silvery minnows that are likely to be adversely affected by proposed action, and in the Incidental Take Statement below.

Status of Silvery Minnow Critical Habitat in the Angostura Reach
With the exception of the lands of the Pueblos of Santo Domingo, Santa Ana, Sandia, and Isleta (USFWS 2003b), the floodplain and river channel between the Angostura Diversion Dam to the Isleta Diversion Dam is designated silvery minnow critical habitat. The critical habitat
designation defines the lateral extent (width) as those areas bounded by existing levees or, in areas without levees, 91.4 m (300 ft) of riparian zone adjacent to each side of the bank full stage of the MRG. The Service (Service 2003b) found that the riparian zone adjacent to the river channel provided an important function for the protection and maintenance of the primary constituent elements and was essential to the conservation of the species.

The primary constituent elements (PCEs) of the silvery minnow critical habitat are those elements of the physical or biological features in an area that provide for life-history processes and are essential to the conservation of the silvery minnow. The PCEs listed in the critical habitat designation for the silvery minnow are:

1. A hydrologic regime that provides sufficient flowing water with low to moderate currents capable of forming and maintaining a diversity of aquatic habitats, such as, but not limited to, the following: backwaters (a body of water connected to the main channel, but with no appreciable flow), shallow side channels, pools (that portion of the river that is deep with relatively little velocity compared to the rest of the channel), and runs (flowing water in the river channel without obstructions) of varying depth and velocity – all of which are necessary for each of the particular silvery minnow life history stages in appropriate seasons (e.g., the silvery minnow requires habitat with sufficient flows from early spring (March) to early summer (June) to trigger spawning, flows in the summer (June) and fall (October) that do not increase prolonged periods of low-or no-flow, and relatively constant winter flow (November through February);

2. The presence of eddies created by debris piles, pools, or backwaters, or other refuge habitat within unimpounded stretches of flowing water of sufficient length (i.e., river miles) that provide a variation of habitats with a wide range of depth and velocities;

3. Substrates of predominantly sand or silt; and

4. Water of sufficient quality to maintain natural, daily, and seasonally variable water temperatures in the approximate range of greater than 1 degree Celsius (°C) [35 degrees Fahrenheit (°F)] and less than 30 °C (85 °F) and reduce degraded conditions (e.g., decreased dissolved oxygen, increased pH).
Table 1. Estimated monthly densities of silvery minnows (RGSM per 100 m²) during standard surveys in the Angostura Reach, with average and 85th percentile RGSM densities, across all 9 survey sites, for the period between April 2009 and October 2016 (excluding non-construction months of April through July) ["na" – data unavailable; “ASIR” – American Southwest Ichthyological Researchers (Dudley et al. 2016); “NMFWCO” – New Mexico Fish and Wildlife Conservation Office].

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<th>RGSM per 100 m² in July</th>
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<th>RGSM per 100 m² in January</th>
<th>RGSM per 100 m² in February</th>
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Summary of the Environmental Baseline of Aquatic Habitat in the Action Area

The remaining wild population of silvery minnow is restricted to approximately seven percent of its historical range in the Rio Grande (Service 2010a). Several conditions in the environmental baseline have contributed to the current status of the silvery minnow and its habitat in the Action Area, and are believed to affect the survival and recovery of silvery minnows in the wild (Service 2016). Many of these activities are broader than the Action Area but have effects that extend into the Action Area. These include past and present projects that affect Rio Grande streamflow and riparian habitat such as water management, flood regulation, channelization, diversions for agriculture and drinking water, evaporation, climate change, land use changes, pollution, nonnative species invasion, ground water drainage, drought, salinization, and trans-basin diversions of water (Service 2016). The reduction in the magnitude, frequency, duration, and timing of flooding (particularly overbank inundation of the floodplain during high spring flows) has disrupted the functional integrity of aquatic and riparian habitats in the Rio Grande and reduced the abundance of silvery minnow (Service 2016). Additionally, river drying events have negatively affected silvery minnow distribution, including documented mortality. Silvery minnows in the MRG are unable to expand their distribution because poor habitat quality, diversion dams, and reservoirs restrict significant movement (Service 2010a, 2016).

Augmentation of silvery minnows with captive-reared fish has been ongoing, and monitoring and evaluation of these fish provide information regarding the survival and movement of individuals, including those affected by river desiccation (Archdeacon 2014; Archdeacon et al. 2015). Habitat conservation and restoration, captive propagation and augmentation, genetics management, salvage and relocation, and research activities have been ongoing to reduce the risk of extirpation of silvery minnow in the wild.

IV. EFFECTS OF THE ACTION

Regulations implementing the ESA (50 FR 402.02) define the effects of the action as the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, which will be added to the environmental baseline. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification; interdependent actions are those that have no independent utility apart from the action under consideration. The species that is likely to be adversely affected by the Proposed Action is the silvery minnow.

The Service expects an area of approximately 2,640 ft long by 135 ft wide or 346,400 ft² (8 acres or 32,100 m²) containing silvery minnows will be directly harassed by human activities, heavy equipment operations, noise, water quality mixing events, and any ancillary activities described by Parmenter (2016a,b). Using an average (85th percentile) monthly, density of 5.7 silvery minnows per 100 m², then the number of silvery minnows potentially harassed or harmed within any month of activities is approximately (5.7 fish/100 m² x 32.1/100 m²) 183 per month or about 7 silvery minnow per day. Should activities be sustained every day for ten months then (10 months x 183 silvery minnows = 54,891) up to 54,891 silvery minnows with some affected. However, activities are not proposed to occur in the river channel, or near the river's edge on a daily basis. Therefore, the Service will restrict the total potential incidental takes of silvery
minnow to the monthly average of 183 silvery minnows. Should any event incidentally kill over 183 silvery minnows, then reinitiation of formal consultation with the Service may be warranted.

**Mechanical Activities, Vegetation Clearing, Water Quality Impacts, and Construction Noise**

Increased human and heavy equipment activity and noise may cause wildlife to avoid accessing the area for water, cover, and food. Solid waste disposal (plastics, debris) practices may also pose risks to other fish and wildlife. Silvery minnows could be impacted if occupying the river within or immediately downstream of the construction activities.

Construction activities will remove of 0.6 acres of riparian vegetation for bridge and approach construction. Removal of riparian vegetation and dewatering will result in the loss of approximately 0.001 acre of wetlands and temporary impact to approximately 0.10 acre of wetlands. Removal of upland and wetland vegetation will expose soils and increase erosion and sedimentation until vegetation is established in cleared areas. As a result, impacts to downstream water quality could adversely affect silvery minnows in the action area.

If equipment were to make direct contact with occupied river substrates, an unexpected release or petrochemicals, large volumes of slurry, or sediment were to occur during the activity, and then individual silvery minnows present in downstream waters could be impacted. If an unexpected release of petrochemicals or sediment were to occur during the activity, individual silvery minnows present at the site and in downstream waters could be exposed to and succumb to materials released. The extent of these impacts would be relative to the material and volume released. Because the activity is being conducted during the expected low-flow stream condition and construction measures will be implemented to reduce likelihood of water quality effects, the potential for effects is reduced. However, the potential for effects to occur is not discountable, since water would be diverted and fill would be installed; and unexpected flow surges or failure of Best Management Practices (BMPs) would directly and immediately impact the river and aquatic life. In the event that a release of substances from the activities proposed were to occur and incidentally kill over 183 silvery minnows in a day, then reinitiation of formal consultation with the Service may be warranted.

Those silvery minnows that are startled and flee the construction noise, vibrations, and water quality alterations associated with the Proposed Action would be adversely affected. The Service assumed that the impact area was the width of the river times the length of 0.5 miles. And we assumed that the average density of silvery minnows in that area that could be harassed or harmed by mechanical disturbance, noise, and water quality alterations when such activities happen would occur to silvery minnows along or near the shoreline. The maximum total number of silvery minnows that could be adversely affected by mechanical activities, noise and water quality alterations numbered 183 per day, using the assumptions stated above.

**Bridge and Pier Construction**

A minor but permanent impact to occupied critical habitat (~0.01 acres) would result from the installation of the new bridge piers and abutments resulting in a change of substrate size and distribution from small, fine sediment, and gravel to cobble, rip rap, and cement piers.
New bridge piers would be installed in line with existing bridge piers to support the structure. Two of the piers would be constructed within the confines of the bankfull channel. The pier installation temporary access fill activity would occur within occupied designated critical habitat. Individual silvery minnows could be harassed (flee from and avoidance of the area) and be harmed during temporary access construction (placement of jersey barriers and soils within the low-flow channel) and removal; exposed to local increases in sediment (physiological stress, alteration of normal respiration); and via the operation of equipment in the channel (noise, vibration).

Diversion of flows from the construction sites could alter silvery minnow access to shelter and food sources and may entrap individuals. Diversion of flows, dewatering, pier construction, and need for equipment access would result in portions of the river being unsuitable to support established aquatic life for a five to ten month time period. Diversion of flows temporarily affects silvery minnow habitat by reducing the distribution and diversity of aquatic habitats.

**Bridge Scour**

The new bridge piers will cause localized scour in the river channel and in floodplain (when inundated) (Armstrong 2015). We assumed that river bed scouring could occur near the piers approximately 65 ft long, 6 ft wide, and 2 to 10 ft deep (390 ft²; 0.01 acres; 40 m²). Assuming an average density of 5.7 silvery minnows per 100 m², then as many as 3 silvery minnows per day will have lost slow velocity habitat within the Action Area. That project removes habitat for as many as 833 silvery minnows a year. For the duration of the project, 75 years, the potential habitat losses would have resulted in as many as 62,460 silvery minnows. We assumed those deep, scoured habitats would no longer provide the slow velocities necessary for silvery minnow habitat as well as potentially foster predatory fish capable of inhabiting these depressions. The habitat enhancements that create conditions favorable to recruitment could help offset this loss.

**Construction and augmentation of the US 550 Storm Drainage System**

Existing drainage structures in the Action Area identified include ponds, culverts, inlets, and ditches. US 550 roadway drainage in the area from NM 313 to the river is captured by inlets and a storm drain system that outfalls to a pump station just east of the river and south of US 550. The pump station discharges to the Rio Grande. Adjacent businesses to US 550 in this area convey their runoff away from the roadway into individual retention ponds.

The current new bridge design consists of a continuous storm drain system with capacity to accommodate flow generated through increased impervious area. Over 40 acres of impervious area with four through-lanes in each direction, which generates over 150 cfs for 50-year peak flow. This flow is captured and conveyed through 4,550 feet of 36-inch culvert pipe, 9,100 feet of 48-inch culvert pipe, as well as inlets, manholes, and laterals to carry the flow through the storm drain system. The storm drain system is sized to carry 50-year flow generated along the impervious roadway in the project area, and discharged to the Rio Grande.

West of the Rio Grande, the general drainage pattern is east, toward the river. In general, ditches along both sides of US 550 convey the roadway runoff and some minor adjacent area offsite runoff toward the river, with culverts at each roadway turn out. The Service has encouraged
NMDOT to create best management practices including swales and other features to reduce the potential impacts of stormwater pollution on silvery minnows and their habitats.

Water quality factors that are known to contribute to degraded fish habitat include temperature changes, sedimentation, runoff, erosion, organic loading, reduced oxygen content, pesticides, and an array of other toxic or hazardous substances. Both point source pollution (pollution discharges from a pipe or other discreet conveyances) and nonpoint source pollution (from diffuse sources such as urban stormwater runoff) affect the MRG (Ellis et al. 1993; NMED 2007, 2009, 2010).

There are concerns about the potential petroleum spills (and other chemicals) from pipelines or during transportation in vehicles on bridges or by rail along and across the Rio Grande. Fuels, such as diesel, that are carried by pipelines have documented toxicity to aquatic life due in part to semi-volatile compounds. For example, polycyclic aromatic hydrocarbons are known to occur during petroleum spills and may persist in contaminated sediments. Silvery minnows from the Action Area were found to contain up to five percent of hydrocarbons of petrogenic origin in their tissues (Lusk et al. 2012). These may be transported to fish tissues through foraging on contaminated sediments or prey where they can be toxic to fish (Eisler 1987; Schein et al. 2009). However, no incidental takes associated with these conditions were able to be quantified.

*Unexpected Spills, Crashes, Air Quality, and Traffic Noise*

The crash analyses (Bohannan Huston 2016a, b) suggested that as many as 1.5 crashes may occur on the new bridge. Vehicles in collision as well as associated emergency response actions have the potential to release hydrocarbons, fuels, and other materials into the storm drainage system and to the Rio Grande (see also the effects of water quality and stormwater analyses above).

Traffic is steady and is the main noise source in the Action Area. Vehicles travel at speeds of 30 to 45 miles per hour, which result in traffic noise levels typically found in urban areas. As wildlife habitat, the Rio Grande is a sensitive receptor to noise impacts on fish and wildlife located adjacent to US 550. The Service encourages some level of noise abatement mitigation such as sound barriers would be appropriate to protect critical habitats within the floodplain.

*Conservation Measures for Avoidance, Minimization, and Mitigation of Impacts*

The following Conservation Measures were proposed by NMDOT to avoid, minimize, and mitigate potential impacts:

- Limit in-channel construction to those months during low-flow conditions; which on average, occur from mid-July through March (to mid-April) for this reach to reduce the likelihood of surface water contact with equipment as well as surface water quality and sedimentation impacts;
- Vegetation clearing will occur outside of the migratory bird nesting season (March 15 – September 15) to reduce potential for impacts to nesting birds (as well as silvery minnow). Vegetation clearing may also commence up until April 15 and begin again July 16th, in association with bird surveys;
• The river channel and associated wetlands will be protected from direct contact with machinery, erosion, and sedimentation with durable rubber mats, filter fence, and hay bales as appropriate;

• The distance for equipment storage from flowing water will be maximized. Refueling and maintenance will occur in designated areas outside of the Rio Grande floodplain and all heavy equipment will be inspected daily for leaks. Leaking equipment will not be used in or near any watercourse;

• The Rio Grande channel, aggrading areas, and banks will be re-contoured to pre-construction condition, elevation will be lowered, sloped to the river or towards the west subchannel, or stormwater treatment swales will be designed and implemented onsite;

• Machinery will be washed prior to use at the project area to prevent spreading weeds or disease from other locations;

• The contractor will comply with Clean Water Act Section 404 permit conditions and Section 401 Water Quality Certification with Conditions;

• Where temporary access berms are needed, the contractor will place temporary fill onto rubber mats or a durable geotextile and contain it. Fill materials should be non-erodible, free of noxious weed seeds, and free of toxic material, or of local floodplain origin.

• The contractor will completely remove access structures from the river channel immediately upon completion of construction and/or prior to the next expected high flow event (e.g. spring runoff and/or summer monsoon season).

• The contractor will provide a spill prevention and containment plan; implement the plan, employ workers trained in spill containment, and to notify the designated NMDOT contact immediately if a spill occurs. The NMDOT will notify USFWS, USACE, NMED, and NMDGF.

• The NMDOT will notify the Service if isolated pools form from surface flows during installation of in-channel construction features so that entrapped (stranded) fish can be salvaged and moved to areas away from construction activities;

• If an excavator is required to remove soil from below the water line, the contractor will be required to tilt the bucket (after being raised above water levels) to drain water prior to placing earth onto land;

• The contractor will be required to provide a level of protection appropriate for temporary fill structures to prevent them failing and washing downstream during a high flow event;

• Temporary dredge soils will be stored in a protected location outside of the immediate floodplain to prevent oxygen demanding compounds or other pollutants from entering them before they are returned, as well as accidental release of large sediment load in the event of a seasonal high flow; and,

• The limit of disturbance will be defined within which the contractor will be required to operate.

**Silvery Minnow Habitat Enhancements proposed by NMDOT**

The proposed action is anticipated to have beneficial effects on silvery minnows in the long-term by lowering the elevation of the west island thereby increasing the amount and frequency of floodplain inundation. The amount of floodplain inundation at this site without the Proposed Action doing additional habitat restoration is limited. When flows inundate the floodplain, low velocity conditions also promote silvery minnow egg retention in the floodplain and foster conditions that can produce larval silvery minnow food and cover and promote higher survival.
(Magana 2012). At the Alameda Gage (Gage 08329928), during the runoff season (May-June), the percent exceedance (from 2003 to 2013; Bui 2014) for flows approximately 750 cfs was 53 percent; for flows approximately 1,250 cfs was 45 percent; for flows approximately 1,750 cfs was 42 percent; for flows approximately 2,250 cfs was 37 percent; and for flows approximately 2,750 cfs was 30 percent. There was a negligible chance of flow at or above approximately 7,250 cfs from this historical record. This analysis suggests that any habitat restoration on the west island should be inundated between 40 to 60 percent of the time when high flows (historically) occur during spring runoff or elevation reduced from 1 to 3 feet in depth.

SUMMARY OF EFFECTS TO SILVERY MINNOWS AND CRITICAL HABITAT

The Service has defined take by harassment as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering (see 50 CFR 17.3). The Service estimated no more than 183 silvery minnows per day (including larvae, juveniles, or adults) would be harassed or potentially harmed by the Proposed Action in any one day. The avoidance of proposed activities occurring during the major spawning season (from mid-April to end of June) should reduce takes of silvery minnow eggs.

During the implementation of the entirety of proposed activities to occur during July 2017 through April 2019, no more than 54,891 silvery minnows would be taken (harmed, harassed, and with some proportion killed). This is the highest number of silvery minnows that may be adversely affected by the proposed action and it assumed that activities would occur near the river channel every day for 10 months. That is not the case. Activities proposed will occur variously during different portions of the construction cycle and include activities occurring farther away from the river channel. Activities proposed will be staged in time according to the final project design. However, this identifies the maximum potential incidental takes that may occur due to the proposed action and includes any subsequent incidental takes associated with high velocities near the bridge piers. Should any event (e.g., spill, stormwater discharge, ground water pumping, accident, etc.) that is associated with the proposed action incidentally kill over 183 silvery minnows in a day, then reinitiation of formal consultation with the Service may be warranted. The potential mortality of over 183 silvery minnows in a day due to the proposed activity suggests that our estimates of incidental take may be in error and should be reviewed.

The Service also expects the proposed action to improve habitat for silvery minnows in the area of the west subchannel and west island (NMDOT 2017). The habitat enhancements proposed will likely benefit silvery minnow recruitment by creating low-velocity areas for silvery minnow feeding, spawning, growth, and survival. We were unable to estimate an exact number of silvery minnows that would benefit from this 0.1 acre habitat enhancement project. However, the creation of areas of slow water velocity in the Angostura Reach has been identified as a concern (Porter and Massong 2004; USACE 2013) and therefore, even small habitat restoration is beneficial. We anticipate that an unknowable number of silvery minnow eggs will be retained and an unknown number silvery minnow larva will grow and survive in the 0.1 acre habitat enhancement areas leading to an unmeasurable increase in recruitment in the fall census.
V. CUMULATIVE EFFECTS

Cumulative effects are those effects of future State or private activities, not involving Federal activities, which are reasonably certain to occur within the Action Area of the Federal action subject to consultation (50 FR 402.02). Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur within the Action Area considered in this BO. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. The Service (USFWS 2003a, 2010, 2011, 2013a, 2014, 2016) and Reclamation (USBR 2015) have described cumulative effects, which are incorporated here by reference, along with the cumulative effects below, which inform the jeopardy analysis for the Proposed Action.

Based on Ellis (2015), the Service expects that cumulative human activities will continue to affect silvery minnow habitat, the quality, availability, and timing of its prey, its predator and competitor relationships, the incidence of disease, the conditions that exceed its physiological tolerances, or that alter its rates of metabolic and biochemical processes, to continue to occur either individually or in combination, in the Action Area and to affect the status of the species in the Angostura Reach. The Service considered these cumulative impacts as well as the effects of climate change and determined that cumulative effects would not be measurable at the scale of the Proposed Action (about ten months). Cumulative effects will continue to reduce the quality and quantity of the silvery minnow’s habitat and continue to threaten its survival and recovery.

VI. CONCLUSION

After reviewing the status of the silvery minnow, the analysis of effects of the proposed action, along with the environmental baseline, it is the Service’s opinion that the proposed US 550 Bridge Proposed Action does not jeopardize the continued existence of the silvery minnow. The majority of silvery minnows adversely affected (up to 183 per day) will mostly occur due to harassment, with few silvery minnow mortalities expected due to the proposed action. During the proposed action, we do not anticipate that overall silvery minnow abundance index measured in the fall will drop below 0.3 fish/100 m². With the offsetting measures for habitat enhancement on the west island, the Service expects the amount and type of incidental take of silvery minnows by the proposed action is unlikely to appreciably diminish its abundance in the Angostura Reach, nor for the species as a whole in the MRG.

The Service estimates that 0.01 acres of piers and bridge scour will adversely affect silvery minnow critical habitat. The Service estimates that the proposed 0.1 acres of habitat enhancement will offset the losses of fine substrate and high velocities by the project impacts. With the offsetting measures of habitat enhancement onsite, the extent of habitat loss of designated critical habitat will not affect the survival and recovery of silvery minnow. We consider that the gain of 0.1 acres of slow velocity water with fine substrate will improve the function of silvery minnow critical habitat as compared to the loss of 0.01 acres of fine substrate and high velocities associated with the piers.
INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by FHWA and its partners so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The FHWA has a continuing duty to regulate the activity covered by this Incidental Take Statement. If the FHWA fails to assume and implement the terms and conditions or fails to require adherence to the terms and conditions of this Incidental Take Statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, FHWA must report the progress of the proposed action and its impacts on to the Service (annually) as specified in this Incidental Take Statement (50 CFR §402.14(i)(3)).

Amount or Extent of Take Anticipated

The Service has developed this Incidental Take Statement based on the premise that the Proposed Action will be implemented as described along with the final design of the proposed habitat enhancement actions. Take of silvery minnows is expected in the form of harassment, harm, and mortality due to the Proposed Action, and is restricted to the action area. If actual incidental take meets or exceeds the predicted level, the FHWA must reinitiate consultation.

The Service estimated that as many as 183 silvery minnows per day would be harassed, daily with up to 54,891 silvery minnows adversely affected by the proposed action for its duration. As many as 183 silvery minnows may subsequently die in any one day due to the proposed action. If scientific evidence is provided to the Service that indicates that actual incidental take of silvery minnows (juveniles or adults) that die exceeds 183 individuals in any single day due to the proposed action, then the FHWA must contact the Service and reinitiate formal consultation.

The Service bases the estimates of silvery minnows harassed on the best available information on a high (85th percentile) density expected to be encountered during any year during the implementation of the proposed action in the Action Area. The Service notes that this represents a best estimate of the extent of take of silvery minnows that is likely during the Proposed Action. Project specific monitoring of silvery minnows near the areas of impact associated with
construction activities along or near the shoreline was not proposed. However, Reclamation has
an active silvery minnow population monitoring program for the MRG and Angostura Reach,
including survey sites near the Action Area (Dudley et al. 2016). Based on the summary of
and see Table 1), the likelihood of higher densities of silvery minnows in the action area in the
months of the proposed action, should be quite rare. Therefore, population monitoring program
results will be monitored by the Service frequently, and if the Angostura Reach silvery minnow
density is greater than 15.7 fish/100m² (Table 1), then incidental takes could become exceeded
and FWHA should consult with the Service and if necessary, reinitiate formal consultation.

As a conservation measure, the Service will authorize incidental takes by biologists with a
Section 10(A)(1)(a) permit contracted by the NMDOT to conduct entrapment monitoring and
silvery minnow rescue (from within the silt fences, or associated with any feature of the project
site) for up to five years from the issuance of this BiOp. Any adverse effects to silvery minnow
associated with the entrapment monitoring protocol (Appendix A), including those from seining
and relocating silvery minnow to the main river channel are for the intended purpose of rescue
activities, and those takes will be attributed to this BiOp. Rescue of up to 54,891 silvery
minnows per year that could potentially become stranded at any feature of the proposed action is
authorized for up to five years from the issuance of this BiOp.

Effect of Take

The Service has determined that this level of anticipated take is not likely to result in jeopardy to
the silvery minnow. The US 550 Proposed Action may affect, is likely to adversely affect,
silvery minnow by harassment, harm, and mortality. Incidental take will mainly result from
harassment of minnows during construction activities, in high velocities associated with the
piers, and mortality of any individuals that may become stranded in restoration features (e.g.,
ephemeral channels) after peak flows recede, by water quality degradation, or cumulative stress.

Reasonable and Prudent Measures

The following reasonable and prudent measures are necessary and appropriate to minimize
incidental takes of silvery minnows from the proposed action:

1. Minimize takes of silvery minnows and reduce project impacts to their habitat.

2. Reduce the elevation of the West Island during construction and shape the landscape to
naturally drain to the river or the main channel of the river to avoid entrapment.

Minimizing the extent and duration during construction or other activities near or along the
shoreline may reduce the adverse effects to silvery minnows from disturbance, noise, vibration,
and water quality alterations. Constructing features to drain back into the river as waters recede
can reduce the number of silvery minnows harmed as a result of stranding.
Terms and Conditions

Compliance with the following terms and conditions must be achieved in order to be exempt from the prohibitions of section 9 of the ESA. These terms and conditions implement the Reasonable and Prudent Measures described above. These terms and conditions are non-discretionary.

To implement RPM 1 the FHWA shall:

a. To the extent practicable, minimize the area and duration of construction and other project related activities near (on the bottom of floodplain), in, or along the shoreline of the channel in the Action Area from mid-April through June, each year.

b. Ensure that conservation measures described in this BiOp are implemented, including those pertaining to equipment and operations, staging and access, water quality, noise abatement, and others BMPs.

c. Report to the Service findings of injured or dead silvery minnows, including eggs.

d. Implement the entrapment monitoring (Attachment A) and removal of stranded fish within the construction site and the West Island and subchannel, as appropriate.

e. Report the results of activities conducted within the channel and floodplain annually to the Service for as long as construction occurs in the floodplain.

To implement RPM 2 the FHWA shall:

f. During construction activities onsite, reduce the elevation of the West Island.

g. Shape the landscape features to drain back into the river or the west subchannel as waters recede to reduce the number of silvery minnows harmed as a result of stranding.

For all RPMs, FHWA (or NMDOT) shall monitor the implementation of the RPMs and their associated terms and conditions, and provide a report of their status of implementation and a summary of project activities to the Service’s New Mexico Ecological Services Field Office annually, no later than January 30th, for any proposed action activities conducted during the previous calendar year, until the proposed project activities are complete. Report to the Service’s New Mexico Ecological Services Field Office the discovery of any silvery minnow mortalities associated with the proposed action. Ensure that the Service receives electronic copies of all reports and plans related to implementation of these RPMs and terms and conditions, including but not limited to, any habitat enhancement designs and observations of success. Annual summaries of activities may be abbreviated and may be provided via email or in writing. These annual reports should reference Consultation # 02ENNM00-2016-F-0626 and be sent to the email address nmesfo@fws.gov or by mail to the New Mexico Ecological Services Field Office, 2105 Osuna Road NE, Albuquerque, New Mexico 87113.
CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service (USFWS 2011, 2012, 2014) provided conservation recommendations in previous BOs incorporated here by reference. In addition, the following conservation measure is provided:

- Reduce the direction, amount, and effects of traffic noise into the Rio Grande in the area.
- Direct all lighting away from the river channel and floodplain.
- Consider the rapid deployment of non-toxic, absorbent materials during response and clean ups of traffic accidents on the bridge with complete spill and material removal.
- In the case of utility emergencies at bridge crossings, consider requirements for automatic shutoffs for all utilities that use the new bridge.
- Include descriptions of the silvery minnow in any educational materials provided on or under the new bridge over the Rio Grande.
- Discourage areas of non-native species (e.g., pigeon) roosting directly over Rio Grande.

RE-INITIATION NOTICE

This concludes formal consultation on the action described in the FHWA’s US 550 Proposed Action (Mattson et al. 2016; Parmenter 2016a, b; Bohannon Huston 2016a, b). As provided in 50 CFR § 402.16, re-initiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this BiOp; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this BiOp; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, such as the discovery of over 183 silvery minnows associated with the proposed activities, then operations causing such take must cease.
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Figure 1. Location and agency jurisdiction maps for the proposed US Highway 550 improvements and new bridge construction over the Rio Grande in the Town of Bernalillo, Sandoval County, New Mexico (Source: Parmenter 2016a,b).
Figure 2. US 550 project location on the U.S. Geological Survey, Bernalillo, New Mexico, 7.5 minute quadrangle map (Source Parmenter 2016a, b).
Figure 3. Overview of US 550 new bridge location with areas of potential construction impacts (Sources: Bohannan Huston 2016a and T. Botkin, NMDOT, 2016, written communication).
Figure 4. US 550 Utility plan view and vertical data for new bridge addition (Sources: after (modified) Bohannan Huston 2016b)
Figure 5. Proposed Action impacts to wetlands in the Action Area (Source Parmenter 2016b).
Figure 6. Location of West Subchannel and West Island in the Action Area (Parmenter 2016b).
Figure 7. Action Area for the US 550 new bridge Proposed Action (Source: Parmenter 2016a).
Figure 8. Photography of the Action Area near the US 550 Bridge (Source: Parmenter 2016a,b; Mattson et al. 2016).
Figure 9. Yearly silvery minnow mixture model estimates of density \( E(x) \), using October sampling-site data (1993-2015). Solid circles indicate modeled estimates and bars represent 95% confidence intervals. Dotted horizontal lines represent orders of magnitude. Gray diamonds indicated simple estimated of mean densities using the method of moments. (Dudley et al. 2015).
Attachment A: Entrapment Protocol for Silvery Minnow in Pools and Rescue
Apply to the FHWA/NMDOT US550 Reconstruction and Bridge Project Consultation No. 02ENNM00-2016-F-0626 valid until February 17, 2022

Biologists in possession of an active Federal Fish and Wildlife Permit (Section 10(A)(1)(a) permit for recovery activities), who is contracted by and working on behalf of the New Mexico Department of Transportation (NMDOT; or Federal Highway Administration), may, monitor, observe, pursue, and attempt to rescue up to 54,891 isolated, trapped, or stranded Rio Grande Silvery Minnows (*Hybognathus amarus*) that may occur with ephemeral channels, in any areas isolated by construction activities, in areas behind silt curtains, or other construction areas in or near the channel, and any backwater features restored as part of the silvery minnow habitat mitigation activities within the NMDOT rights-of-way at, or below, the US 550 Bridge. A thorough visual examination and appropriate materials for netting of both ephemeral water features (and other sites associated with construction activities, as appropriate) will be conducted by the biologist, as directed by NMDOT, to look for the presence of silvery minnows. This includes pools isolated by equipment or by lack of flow of any depth where potential silvery minnow entrapment may have occurred.

1. Monitoring for silvery minnow entrapment in construction areas, or restored features may occur from July 1 through April 15 during construction, or at any time up until February 17, 2022, following spring runoff events, after large precipitation events, or after other flow events that could introduce water into an area, and result in isolated pool(s) containing silvery minnows as water recedes.

2. Monitoring at restored features or during site activities will be done using best judgment and the timing and frequency monitoring and rescue will be done in coordination with the NMDOT Project Manager and the Service's New Mexico Ecological Services Field Office (NMESFO) staff, as appropriate.

3. Monitoring will be conducted until such time as (a) the site is dry, (b) all silvery minnows are removed from the isolated pool, or (c) flows increase such that the isolated pool becomes reconnected to the main channel.

4. If isolated pools occur at restored features that may contain silvery minnows, a permitted fisheries biologist will lead the effort to seine these pools and determine (a) the presence or absence of silvery minnows, and (b) the potential number present. Silvery minnows collected during seining of isolated pools will then be released into continuous parts of the river.
5. Should silvery minnows be observed as having died (based on lack of movement with gentle prodding) then the biologist will observe and record the species identification, standard length, reproductive condition, and health condition of silvery minnows that have perished; the pool depth, other dimensions, and any observations of water quality information will be recorded to the extent possible. Biologists will make and report any observations of silvery minnow health, such as whether fish exhibit signs of compromised health due to disease (e.g., fungus, Lernia, hemorrhagic lesions), anemia (i.e., emaciation), or physical deformity. Any dead or dying silvery minnows will be enumerated and counts will be maintained for all collections separately for each pool. A handheld global positioning system (GPS) unit with sub-meter accuracy will be used to record pool locations. Photography is encouraged. After notification to the Service’s NMESFO staff, any dead silvery minnows may be collected by the permitted biologist and preserved in 10% formalin and later transferred to a 5% buffered solution for accession to the University of New Mexico Museum of Southwestern Biology.

6. The findings of any activities conducted under this entrapment monitoring will be immediately reported to NMDOT and NMESFO, and subsequently included in the annual report for Consultation No. 02ENNM00-2016-F-0626.

7. If silvery minnow take is met or exceeded (based on Consultation No. 02ENNM00-2016-F-0626 Incidental Take Statement) in these pools or at the restored features, the Service will be contacted before continuing with any further silvery minnow monitoring activity.

8. Biologists conducting silvery minnow entrapment monitoring and rescue must possess a valid Federal Fish and Wildlife Permit and adhere to all of its terms and conditions.