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In Reply Refer To:
AESO/SE
02EAAZ00-2013-F-0016

August 22, 2013

Ms. Sally Diebolt, Chief
U.S. Army Corps of Engineers
Arizona Branch Regulatory Division
3636 North Central Avenue, Suite 900
Phoenix, Arizona 85012

RE: Filleman Crossing Biological Opinion

Dear Ms. Diebolt:

Thank you for your request for formal consultation with the U.S. Fish and Wildlife Service (FWS) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). Your request was dated April 11, 2013, and received by us on April 15, 2013. Your letter states that Souder Miller and Associates (SMA), on behalf of the Gila Watershed Partnership, submitted an application for a Section 404 Clean Water Act Permit through the U.S. Army Corps of Engineers (Corps) to construct an at-grade road crossing in Eagle Creek. The Filleman Crossing project would be located on a private inholding within the Apache-Sitgreaves National Forests (ASNFs) in Greenlee County, Arizona. The proposed action may affect the Gila chub (*Gila intermedia*), loach minnow (*Tiaroga cobitis*), and spikedace (*Meda fulgida*) and designated critical habitats for these three species. You also determined that the proposed action would have no effect on the southwestern willow flycatcher (*Empidonax traillii extimus*). FWS reviews of “no effect” determinations are not required; therefore, this species is not addressed further.

On July 12, 2013, we received your letter dated July 9, 2013, requesting that we consider modifying the action area to be reduced to only include the right-of-way for Forest Road (FR) 217 and change the construction area footprint. After reviewing your letter and the biological assessment (BA) we changed the construction area footprint to be 0.15 acre at FR 217, which is 6,600 square feet of the right-of-way. We considered your request that we modify the extent of the action area; however, section 7 requires that we evaluate and consider all direct and indirect impacts that may occur as a result of proposed actions identified in the BA. We believe the action area described in the biological opinion considers all direct and indirect effects of proposed action. We included additional information to support our reason and justification of the action area below.

This biological opinion is based on information provided in the April 11, 2013, BA and other sources of information. Literature in this biological opinion is not a complete bibliography of all literature available on the species of concern, bridge construction on streams or rivers and its effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office.

Consultation History

January 17, 2013	We discussed our review of the biological assessment with the Corps and expressed the need for additional information from SMA in order to initiate section 7 consultation.
April 11, 2013	The Corps sent a final biological assessment on the effects of the proposed action and requested formal consultation.
May 9, 2013	We sent a draft biological opinion to the Corps for review.
July 12, 2013	We received a letter from the Corps on the draft biological opinion with comment including a request to change the action area.
August 2, 2013	We received an email from Jan Holder confirming changes to the construction timeframe.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The Corps proposes to issue a Section 404 Clean Water Act Permit to authorize the Filleman Crossing project, which will stabilize and armor Eagle Creek at Forest Service Road 217 (FR 217) in Greenlee County, Arizona. The Filleman Crossing would be constructed within the FR 217 right-of-way on a private inholding within ASNFs.

The Filleman Crossing project includes the one-time repair and improvement of FR 217 with riprap materials designed to withstand a 100-year storm event. Previous repairs at the crossing continue to wash out during flood events. Construction of the project will be completed by Greenlee County staff. The anticipated start of construction is dependent on river conditions (e.g., after snow melt and during low-flow). The proposed construction timeline is between five and seven weeks (the maximum timeframe described in the BA) and will begin anytime as long as low flow conditions are met. Proposed actions are to be completed prior to April 30, 2014.

The right-of-way for the road is 60 feet wide. The riprap erosion control measures are planned to be 43 feet wide (a maximum of eight feet deep) in the direction of the stream flow, and approximately 110 feet long in the direction of the centerline of the road. Within the right-of-way, the following steps are necessary for stream diversion and preparation of the construction footprint:

1) Install culverts outside of the active stream so that the stream will flow in the culverts after the upstream and downstream concrete barriers are installed.

2) Install concrete barriers at the upstream and downstream limits of the right-of-way in the flowing stream. Once the concrete barriers are in place they will function as in-stream cofferdams. Some leveling of the stream bed may be required. The length of the concrete barriers is approximately 105 feet. By placing the barriers in the stream, stream flow will begin to enter the diversion culverts which are installed at a level to collect the stream flow. The upstream barrier will be installed and stabilized first, and then the downstream barrier will be installed.

3) Place filter fabric over both sides of the concrete barriers by hand to seal the flow through the barriers and filter sediment from entering or leaving the work area.

4) Once the stream is fully diverted into the diversion culverts, dry the work area by pumping from an excavated sump in the work area to a location at the downstream edge of the work area. The pumped water will be discharged into a sediment control area just outside the right-of-way.

5) Excavate materials from the stream bed (between barriers) and place it just behind the concrete barriers to fully divert the stream into the culverts.

6) Monitor the stability of the upstream and downstream cofferdam formed by the concrete barriers and add soil behind the barriers as needed. No soil will be disturbed outside the right-of-way.

7) Monitor the success of the stream diversion efforts and revise culvert size if needed. The culverts have been sized to carry a flow of 70 cubic feet per second (cfs).

After installing the stream diversion outlined above, the riprap improvements will be constructed within a dry excavation. All the improvements will be constructed to match the existing profile and cross section of the bottom of the existing channel.

Significant rainfall events could impede the construction process; therefore, Greenlee County will monitor the weather during the construction and if flood flows are expected to occur, equipment will be removed from the stream area and placed on high ground out of the floodplain. Because the culverts are sized to carry a flow of 70 cfs, it will be difficult to manage flows in excess of 75 cfs. Should flows exceeding 70 cfs occur, crews will stabilize the excavation with on-site riprap and stop all work. After high flows, crews will reestablish the controls at the work area and resume construction.

Construction Minimization Measures

1) Greenlee County will wait at least 24 hours after installing the upstream concrete barriers before installation of the downstream concrete barriers. This will allow the stream to recover to background conditions for suspended sediment prior to installation of the downstream barriers.

2) Should flooding conditions be predicted for the construction area, Greenlee County will cease work and secure the construction equipment out of the floodplain. In addition, Greenlee County will follow the requirements of the 401 Water Quality Certifications for an Arizona Stream published by the Arizona Department of Environmental Quality. By following these requirements, Greenlee County will ensure that their construction efforts comply with the requirements of the Clean Water Act.

3) Fueling, maintenance, and storage of equipment will occur out of the 100-year floodplain to prevent contaminants from entering Eagle Creek.

4) Construction crews will be advised to check any excavations left overnight for animals that may have become trapped, before backfilling excavated areas.

5) To reduce downstream turbidity during construction of the project, heavy equipment operations within the Upper Eagle Creek will be kept to the minimum extent possible (~23 days).

6) SMA will discuss pumping activities with Greenlee County prior to construction. The location of the pump inflow will be screened to prevent fish species from entering the area.

7) SMA will design and implement a project erosion control plan to limit erosion of surface soils from the work area.

8) After construction activities are completed, the disturbed land surface will be restored with native plants and grass seed to provide vegetative cover for erosion control.

STATUS OF THE SPECIES AND CRITICAL HABITAT

Gila Chub

Gila chub (*Gila intermedia*) was listed as endangered with critical habitat on November 11, 2005 (USFWS 2005). The final rule cites collection records, historical habitat data, the 1996 Arizona Game and Fish Department Gila chub status review (Weedman et al. 1996), and USFWS information documenting currently occupied habitat to conclude that Gila chub has been eliminated from 85 to 90 percent of formerly occupied habitat. It was also estimated that 90 percent of the currently occupied habitat is degraded due to the presence of nonnative species and land management actions. Due to fragmented and often small population sizes, extant populations are susceptible to environmental conditions such as drought, flood events, and wildfire. Primary threats to Gila chub such as predation by and competition with nonnative organisms and secondary threats identified as habitat alteration, destruction, and fragmentation are all factors identified in the final rule that contribute to the consideration that Gila chub is likely to become extinct throughout all or a significant portion of its range (USFWS 2005).

Background

Gila chub is a member of the roundtail chub (*G. robusta*) complex that also includes headwater chub (*G. nigra*). The roundtail chub complex has had a turbulent and controversial taxonomic history that includes an assortment of classification schemes. Much of the debate has centered on whether the complex represents a number of nominal species or subspecies of *G. robusta.* Further discussion on classification of Gila chub can be found in Minckley (1973). Miller (1945) following the arrangement of Jordan and Evermann (1896), supported full generic rank for the genus Gila (Baird and Girard) with a "*Gila robusta* complex" that included Gila chub. Miller (1946) considered Gila chub to be an "ecological subspecies" of *G. robusta* (i.e., *G. r. intermedia*) characteristic of the small tributaries they inhabit. Rinne (1969, 1976), using univariate analyses of morphological and meristic characters, argued for recognition of both *G. robusta* and *G. intermedia* as distinct species and against the ecological subspecies concept. This approach was supported by some (e.g. Minckley 1973), but it was not until further evidence was generated by DeMarais (1986, 1995) that the specific status for *G. intermedia* was generally accepted. DeMarais (1995) supported continued recognition of *G. intermedia* based on the following arguments: 1) phenotypic extremes between *G. intermedia* and *G. robusta* are widely divergent and each possesses many morphologically uniform populations; (2) the geographic distributions of both species is an overlapping mosaic, therefore not satisfying traditional geographic criteria; and (3) contiguous populations of *G. intermedia* and *G. robusta* show no evidence of genetic exchange, thus each species maintains its evolutionary independence.

Gila chub is a thick-bodied species, chunky in aspect, whereas roundtail chub is slender and elongate, and headwater chub is intermediate in meristic and morphometric characteristics (Rinne 1969, 1976, Minckley 1973, DeMarais 1986, Minckley and DeMarais 2000, Minckley and Marsh 2009). Females can reach 250 mm in total length (TL), but males rarely exceed 150 mm (Minckley 1969, 1973, Rinne and Minckley 1991, Schultz and Bonar 2006). Body coloration is typically dark overall, sometimes black or with diffuse, longitudinal stripes, with a lighter belly speckled with gray. The lateral scales often appear to be darkly outlined, lighter in center. Breeding males, and to a lesser extent females, develop red or orange on lower parts of the head and body and on bases of the pectoral, pelvic and anal fins.

While most reproductive activity by Gila chub occurs during late spring and summer, in some habitats it may extend from late winter through early autumn (Minckley 1973). Schultz and Bonar (2006) data from Bonita and Cienega creeks suggested that multiple spawning attempts per year per individual were likely, with a major spawn in late February to early March followed by a secondary spawn in autumn after monsoon rains. Reproductive activities in Monkey Spring (now extirpated) reportedly occurred for longer periods than in other populations, as breeding appeared to last virtually all season (Minckley 1969, 1973, 1985). Bestgen (1985) concluded that temperature was the most significant environmental factor triggering spawning.

Spawning probably occurs over beds of submerged aquatic vegetation or root wads. Minckley (1973) observed a single female closely followed by several males over a bed of aquatic vegetation in a pond. Nelson (1993) also suspected deep pools with vegetation in Cienega Creek were important sites for spawning but did not witness any associated behavior near submerged vegetation.

Gila chub is considered a habitat generalist (Schultz and Bonar 2006), and commonly inhabits pools in smaller steams, cienegas, and artificial impoundments throughout its range in the Gila River basin at elevations between 609 and 1,676 m (2,000 to 5,500 ft) (Miller 1946, Minckley 1973, Rinne 1975, Weedman et al. 1996). Common riparian plants associated with these populations include willows (*Salix* spp.), tamarisk (*Tamarix* spp.), cottonwoods (*Populus* spp.), seep-willow (*Baccharis glutinosa*), and ash (*Fraxinus* spp.). Typical aquatic vegetation includes watercress (*Nasturtium officinale*), horsetail (*Equisetum* spp.), rushes (*Juncus* spp.), and speedwell (*Veronica anagallis-aquatica*) (USFWS 1983, Weedman et al. 1996).

Gila chub is a highly secretive species, remaining near cover including undercut banks, terrestrial vegetation, boulders, root wads, fallen logs, and thick overhanging or aquatic vegetation in deeper waters, especially pools (Rinne and Minckley 1991, Nelson 1993, Weedman et al. 1996). Recurrent flooding and a natural hydrograph are important in maintaining Gila chub habitats and in helping the species maintain a competitive edge over invading nonnative aquatic species (Propst et al. 1986, Minckley and Meffe 1987). They can survive in larger steam habitats, such as the San Carlos River, and artificial habitats, like the Buckeye Canal (Minckley 1985, Rinne and Minckley 1991, Stout et al. 1970, Rinne 1976), and they interact with spring and small-stream fishes regularly (Meffe 1985).

Young Gila chub are active throughout the day and feed on small invertebrates as well as aquatic vegetation (especially filamentous algae) and organic debris (Bestgen 1985, Griffith and Tiersch 1989, Rinne and Minckley 1991). Adult Gila chub are crepuscular feeders, consuming a variety of terrestrial and aquatic invertebrates, and fishes (Griffith and Tiersch 1989, Rinne and Minckley 1991). Benthic feeding may also occur, as suggested by presence of small gravel particles.

Gila chub evolved in a fish community with low species diversity and where few predators existed, and as a result developed few or no mechanisms to deal with predation (Carlson and Muth 1989). This species is known to be associated with speckled dace (*Rhinichthys osculus*), longfin dace (*Agosia chrysogaster*), desert sucker (*Pantosteus clarki*), Sonora sucker (*Catostomus insignis*), Gila topminnow (*Poeciliopsis occidentalis*), desert pupfish (*Cyprinodon macularius*), and Monkey Spring pupfish (*Cyprinodon arcuatus*). Prior to the widespread introduction of nonnative fishes, Gila chub was probably the most predatory fish within the habitats it occupied. In the presence of the nonnative green sunfish (*Lepomis cyanellus*) in lower Sabino Creek, Arizona, Gila chub failed to recruit young (Dudley and Matter 2000). Direct predation by green sunfish on young Gila chub was the acknowledged cause of this observation.

<u>Status and Distribution</u>
Historically, Gila chub was recorded from nearly 50 rivers, streams and spring-fed tributaries throughout the Gila River basin in southwestern New Mexico, central and southeastern Arizona,

and northern Sonora, Mexico (Miller and Lowe 1967, Rinne and Minckley 1970, Minckley 1973, Rinne 1976, DeMarais 1986, Sublette et al. 1990, Weedman et al. 1996); and, occupancy of Gila chub throughout its range was more dense, and currently-occupied sites were likely more expansive in distribution (Hendrickson and Minckley 1985, Minckley 1985, Rinne and Minckley 1991). Gila chub now occupies an estimated 10 to 15 percent of its historical range (Weedman et al. 1996, USFWS 2005) and approximately 25 of these current localities are considered occupied, but all are small, isolated and face one or more threats (Weedman et al. 1996, USFWS 2005). The biological status of several of these populations is uncertain, and the number of localities currently occupied may overestimate the number of remnant populations in that some might not persist if its core connected population was extirpated.

Agua Fria River Subbasin

The Agua Fria subbasin is the system furthest downstream in the Gila River basin that currently supports or is historically known to have supported Gila chub. This subbasin sustains or recently sustained four remnant Gila chub populations. The Agua Fria River mainstem was historically occupied, but that population is now considered extirpated. The four extant populations are Indian Creek, Little Sycamore Creek, Silver Creek (with replicates Larry and Lousy Canyon), and Sycamore Creek. In 1996, all remnant populations were considered threatened, and two of the four were considered unstable (Weedman et al. 1996).

In Silver Creek, a natural fish barrier (waterfall) has prevented invasion of green sunfish into the uppermost reaches, but the protected reach has only a few kilometers (km) of perennial water, and the reach below is infested with nonnative green sunfish (Weedman et al. 1996). Natural barriers on Sycamore Creek have protected a portion of the population from nonnative fishes, but nonnative rainbow trout (*Oncorhynchus mykiss*) is present upstream, and Gila chub may be functionally extirpated below the lowermost barrier where a suite of warmwater nonnative fishes reside (Weedman et al. 1996). The Gila chub population in Little Sycamore Creek inhabits two short perennial reaches totaling only about one km in length, but nonnative fishes have not been recorded within collections. The Indian Creek population was not detected until 1995, and in 2005 a portion of the population was salvaged as a precaution following the Cave Creek Fire Complex and later successfully returned. Weedman et al. (1996) noted that cattle grazing and recreational uses within some of the streams may create additional threats to the populations. The replicated populations in Lousy and Larry canyons seem to be doing well, and there are no threats from nonnative fishes.

Verde River Subbasin

The Verde subbasin drainage includes the north-central Gila River basin between the Agua Fria and Salt subbasins. The Verde mainstem downstream from Sullivan Lake is mostly perennial to its confluence, and several large tributary systems contribute perennial flows, primarily from the eastern portion of the drainage. Gila chub populations are recently known from only four remnant sites within the Verde subbasin: Red Tank Draw, Spring Creek, Walker Creek, and Williamson Valley Wash. A population historically collected from Big Chino Wash is considered extirpated. There have been no replications of any Verde subbasin populations to date.

Williamson Valley Wash was tentatively considered extirpated by Weedman et al. (1996), but Bagley (2002) captured 50 individuals from the site in 2001. Spring Creek appears stable, and no nonnative fishes recently have been recorded from above a low (approximately 0.5 meter) diversion dam located near the mouth. Walker Creek appears stable and nonnative-free based on a number of surveys conducted between 1978, 2001, 2003, and 2007.

Santa Cruz River Subbasin

Gila chub populations are known from three remnant sites (Cienega Creek, Sabino Canyon, and Sheehy Spring) in the Santa Cruz subbasin (USFWS 2005). The population in Cienega Creek and its tributaries is the largest and most geographically widespread. The Sabino Creek population experienced recent bottlenecking associated with post-fire runoff, although the population was replicated into nearby Romero Canyon. Sheehy Spring is a small system that likely never supports more than approximately 1,000 adults. Gila chub also was known historically from Monkey Spring and the mainstem Santa Cruz River, but these populations are now considered extirpated.

Cienega Creek is protected against nonnative fishes by at least two natural barriers, and the Gila chub population appears stable. However, headcutting along lower Wood Canyon threatens to capture Cienega Creek, which would initiate headward erosion up Cienega Creek that likely would significantly diminish Gila chub habitat. Gila chub habitat in Sabino Creek seems to be recovering since the Aspen Fire in 2003, and the stream is protected against upstream invasions of nonnative fishes by a low-head dam. Sheehy Spring has been invaded by nonnative mosquitofish, which has displaced Gila topminnow, but the species does not appear to be significantly affecting Gila chub. Sheehy Spring, however, is a tiny drainage and is close to the mainstem Santa Cruz River, possibly enhancing its potential for upstream invasions.

San Pedro River Subbasin

The San Pedro River Subbasin includes the entire San Pedro River watershed upstream from the confluence with Gila River. Gila chub populations are known from three remnant sites (Hot Springs Canyon, O’Donnell Canyon, and Redfield Canyon) in the San Pedro River Subbasin (USFWS 2005). Hot Springs Canyon and O’Donnell Canyon populations are protected behind constructed fish barriers, and a barrier on Redfield Canyon is expected to be constructed during 2013 or 2014. At least four, and possibly as many as six, of the nine historically-known populations within the subbasin are considered extirpated.

Upper Gila River Subbasin

Upper Gila River Subbasin includes the entire Gila River watershed upstream of the Salt River confluence, exclusive of the Santa Cruz and San Pedro subbasins. Major subdrainages include the San Carlos, San Simon, San Francisco, and upper Gila rivers (including its three forks).

There are six remnant populations of Gila chub within this unit, and five historically-occupied streams are considered extirpated. The six populations are Blue River (San Carlos), Eagle, Bonita, Harden Cienega, and Dix creeks; and, Turkey Creek, New Mexico (USFWS 2005). The Blue River (San Carlos) population is entirely on San Carlos Apache Tribal (SCAT) lands, but there is little information available regarding its status. There are constructed fish barriers on Bonita and Dix creeks, although nonnatives remain present in lower Bonita Creek. Harden Cienega appears free of nonnatives, although there is no barrier preventing their encroachment. The Eagle Creek population was significantly impacted by severe runoff following the 2011 Wallow Fire. The Turkey Creek population appears large and relatively stable, although rainbow trout inhabits the upper reaches and some warmwater nonnative species inhabit the lower reaches.

<u>Critical Habitat</u>

Critical habitat for Gila chub is designated for approximately 160.3 miles of stream reaches in Arizona and New Mexico that includes cienegas, headwaters, spring-fed streams, perennial streams, and spring-fed ponds. Critical habitat includes the area of bankfull width plus 300 feet on either side of the banks. The bankfull width is the width of the stream or river at bankfull discharge (i.e., the flow at which water begins to leave the channel and move into the floodplain) (Rosgen 1996, USFWS 2005). Critical habitat is organized into seven areas or river units:

Area 1 - Upper Gila River, Grant County, New Mexico, and Greenlee County, Arizona, includes Turkey Creek (New Mexico), Eagle Creek, Harden Cienega Creek, and Dix Creek;
Area 2 - Middle Gila River, Gila and Pinal Counties Arizona, consists of Mineral Creek;
Area 3 - Babocomari River, Santa Cruz County, Arizona includes O'Donnell Canyon and Turkey Creek (Arizona);
Area 4 - Lower San Pedro River, Cochise and Graham counties, Arizona, includes Bass Canyon, Hot Springs Canyon, and Redfield Canyon;
Area 5 - Lower Santa Cruz River, Pima County, Arizona, includes Cienega Creek, Mattie Canyon, Empire Gulch, and Sabino Canyon;
Area 6 - Upper Verde River, Yavapai County, Arizona, includes Walker Creek, Red Tank Draw, Spring Creek, and Williamson Valley Wash; and
Area 7 - Agua Fria River, Yavapai County, Arizona, includes Little Sycamore Creek, Sycamore Creek, Indian Creek, Silver Creek, Lousy Canyon, and Larry Creek (USFWS 2005).

There are seven primary constituent elements (PCEs) of critical habitat, which include those habitat features required for the physiological, behavioral, and ecological needs of the species (USFWS 2005):

1) Perennial pools, areas of higher velocity between pools, and areas of shallow water among plants or eddies all found in headwaters, springs, and cienegas, generally of smaller tributaries;

2) Water temperatures for spawning ranging from 63 degrees Fahrenheit (°F) to 75 °F, and seasonally appropriate temperatures for all life stages (varying from about 50°F to 86 °F;

3) Water quality with reduced levels of contaminants, including excessive levels of sediments adverse to Gila chub health, and adequate levels of pH (e.g. ranging from 6.5 to 9.5), dissolved oxygen (i.e., ranging from 3.0 parts per million (ppm) to 10.0 ppm) and conductivity (i.e., 100 millimhos (mmhos) to 1,000 mmhos);

4) Prey base consisting of invertebrates (i.e., aquatic and terrestrial insects) and aquatic plants (i.e., diatoms and filamentous green algae);

5) Sufficient cover consisting of downed logs in the water channel, submerged aquatic vegetation, submerged large tree root wads, undercut banks with sufficient overhanging vegetation, large rocks and boulders with overhangs, a high degree of stream bank stability, and a healthy, intact riparian vegetation community;

6) Habitat devoid of nonnative aquatic species detrimental to Gila chub or habitat in which detrimental nonnative species are kept at a level that allows Gila chub to continue to survive and reproduce; and

7) Streams that maintain a natural flow pattern including periodic flooding.

Consultation History

Our information indicates that, rangewide, more than 32 consultations have been completed or are underway for actions affecting Gila chub. These opinions primarily include the effects of grazing, water developments, fire, species control efforts, recreation, sportfish stocking, native fish restoration efforts, and mining.

Loach Minnow

Loach minnow (*Tiaroga cobitis)* was reclassified as an endangered species on February 23, 2012 (77 FR 10810), after originally being listed as a threatened species on October 28, 1986 ((51 FR 39468). Critical habitat was designated (March 8, 1994 - 59 FR 10898) and redesignated (April 25, 2000 – 65 FR 24328; March 21, 2007 – 72 FR 13356) in response to legal concerns and policy changes (see summary discussion at 75 FR 66482, p. 66485). The current critical habitat designation was published simultaneously with the reclassification of loach minnow to endangered status (77 FR 10810).

Background

Loach minnow is a small fish from the minnow family Cyprinidae. Loach minnow are olivaceous in color, and highly blotched with darker spots. Whitish spots are present at the front and back edges of the dorsal fin, and on the dorsal and ventral edges of the caudal fin. A black spot is usually present at the base of the caudal fin. Breeding males have bright red-orange coloration at the bases of the paired fins and on the adjacent body, on the base of the caudal lobe, and often on the abdomen. Breeding females are usually yellowish on the fins and lower body (Minckley 1973, USFWS 1991).

The limited taxonomic and genetic data available for loach minnow indicate there are substantial differences in morphology and genetic makeup between remnant loach minnow populations. Tibbets (1993) concluded that results from mitochondrial DNA (mtDNA) and allozyme surveys indicate variation for loach minnow follows drainage patterns, suggesting little gene flow among rivers. The levels of divergence present in the data set indicated that populations within rivers are unique, and represent evolutionarily independent lineages. The main difference between the mtDNA and allozyme data was that mtDNA suggest that the San Francisco/Blue and Gila groups of loach minnow are separate, while the allozyme data places the Gila group within the San Francisco/Blue group. Tibbets (1993) concluded that the level of divergence in both allozyme and mtDNA data indicated that all three main populations (Aravaipa Creek, Blue/San Francisco Rivers, and Gila River) were historically isolated and represent evolutionarily distinct lineages.

Loach minnow is a bottom-dwelling inhabitant of shallow, swift water over gravel, cobble, and rubble substrates (Rinne 1989, Propst and Bestgen 1991). Loach minnow uses the spaces between, and in the lee of, larger substrate for resting and spawning (Propst et al. 1988, Propst and Bestgen 1991, Rinne 1989). It is rare or absent from habitats where fine sediments fill the interstitial spaces (Propst and Bestgen 1991). Some studies have indicated that the presence of filamentous algae may be an important component of loach minnow habitat (Barber and Minckley 1966). Loach minnow feeds exclusively on aquatic insects (Schreiber 1978, Abarca 1987). Loach minnow live two to three years with reproduction occurring primarily in the second summer of life (Minckley 1973, Sublette et al. 1990). Spawning occurs March through May (Britt 1982, Propst et al. 1988); however, under certain circumstances loach minnow also spawn in the autumn (Vives and Minckley 1990). The eggs of loach minnow are attached to the underside of a rock that forms the roof of a small cavity in the substrate on the downstream side. Limited data indicate that the male loach minnow may guard the nest during incubation (Propst et al. 1988, Vives and Minckley 1990).

<u>Distribution</u>

Loach minnow are believed to occupy approximately 15 to 20 percent of their historical range, and are now restricted to portions of the Gila River and its tributaries, the West, Middle, and East Fork Gila River (Grant, Catron, and Hidalgo Counties, New Mexico) (Paroz and Propst 2007, Propst 2007, Propst et al. 2009); the San Francisco and Tularosa rivers and their tributaries Negrito and Whitewater creeks (Catron County, New Mexico) (Propst et al. 1988, Arizona State University (ASU) 2002, Paroz and Propst 2007, Propst 2007, the Blue River and its tributaries Dry Blue, Campbell Blue, Pace, and Frieborn creeks (Greenlee County, Arizona and Catron County, New Mexico) (Miller 1998, ASU 2002, Carter 2005, Carter 2008a, pers. comm., Clarkson et al. 2008, Robinson 2009a, Aravaipa Creek and its tributaries Turkey and Deer creeks (Graham and Pinal Counties, Arizona) (Stefferud and Reinthal 2005, Eagle Creek (Graham and Greenlee Counties, Arizona), (Knowles 1994, Bagley and Marsh 1997, Marsh et al. 2003, Carter et al. 2007, Bahm and Robinson 2009, and the North Fork East Fork Black River (Apache and Greenlee Counties, Arizona) (Leon 1989, Lopez 2000, pers. comm., Gurtin 2004, pers. comm., Carter 2007a, Robinson et al. 2009, and possibly the White River and its tributaries, the East and North Fork White River (Apache, Gila, and Navajo Counties, Arizona) (Table 1, on the following page).

Loach minnow have recently been placed in additional streams as part of the recovery efforts for the species. In 2007, loach minnow were translocated into Hot Springs Canyon, in Cochise County, Arizona, and Redfield Canyon, in Cochise and Pima Counties, Arizona, and these streams were subsequently augmented (Robinson 2008a, Orabutt 2009, pers. comm., Robinson et al. 2010a, Robinson et al. 2010b, Robinson 2011a pers. comm.). Both Hot Springs and Redfield canyons are tributaries to the San Pedro River. Augmentation efforts have been suspended in Redfield Canyon due to drought and a lack of adequate flowing water. Augmentation efforts have been suspended at Hot Springs Canyon to allow managers to better evaluate if recruitment of loach minnow is occurring without further augmentation. Monitoring will continue at this site, and future augmentations may occur if needed.

In 2007, loach minnow were translocated into Fossil Creek, within the Verde River subbasin (Carter 2007b), with additional fish added in 2008 and 2011 (Carter 2007b, Carter 2008b, Robinson 2009b, Boyarski et al. 2010, Robinson 2011b). In 2008, loach minnow were translocated into Bonita Creek, a tributary to the Gila River in Graham County, Arizona (Blasius 2008 pers. comm., Robinson 2008b pers. comm.). Augmentations at Bonita Creek have been temporarily suspended due to re-invasion of by nonnative species above the fish barrier. We anticipate that augmentations with additional fish will occur for the next several years at these sites, if adequate numbers of fish are available, and habitats remain suitable. Monitoring at each of these sites is ongoing; however, insufficient time has elapsed to allow us to determine if these translocation efforts will ultimately be successful and result in establishment of new populations of loach minnow.

Table 1. Stream occupancy for loach minnow.

Unit	Occupied at time of listing or documented as occupied since listing	Currently occupied	Translocated/ Reintroduced Population
Unit 1 – Verde River Subbasin			
Verde River	No	No	No
Granite Creek	No	No	No
Oak Creek	No	No	No
Beaver and Wet Beaver Creek	No	No	No
West Clear Creek	No	No	No
Fossil Creek	No	Uncertain	Yes
Unit 2 – Salt River Subbasin			
White River Mainstem	Yes	Yes	No
East Fork White River	Yes	Yes	No
East Fork Black river	No	No	No
North Fork East Fork Black River	Yes	Yes	No
Boneyard Creek	Yes	No	No
Coyote Creek	No	Yes	No

Unit 3 – San Pedro River Subbasin			
San Pedro River	No	No	No
Hot Springs Canyon	No	Yes	Yes
Bass Canyon	No	No	No
Redfield Canyon	No	Uncertain	Yes
Aravaipa Creek	Yes	Yes	No
Deer Creek	Yes	Yes	No
Turkey Creek	Yes	Yes	No
Unit 4 – Bonita Creek Subbasin			
Bonita Creek	No	Uncertain	Yes
Unit 5 – Eagle Creek Subbasin			
Eagle Creek	Yes	Yes	No
Unit 6 – San Francisco River Subbasin			
San Francisco River	Yes	Yes	No
Tularosa River	Yes	Yes	No
Negrito River	Yes	Yes	No
Whitewater Creek	Yes	No	No
Unit 7 – Blue River Subbasin			
Blue River	Yes	Yes	No
Campbell Blue Creek	Yes	Yes	No
Little Blue Creek	Yes	No	No
Pace Creek	Yes	Yes	No
Frieborn Creek	Yes	Yes	No
Dry Blue Creek	Yes	Yes	No
Unit 8 – Gila River Subbasin			
Gila River	Yes	Yes	No
West Fork Gila River	Yes	Yes	No
Middle Fork Gila River	Yes	Yes	No
East Fork Gila River	Yes	Yes	No
Mangas Creek	Yes	Yes	No
Bear Creek	Yes	Yes	No

Critical Habitat

When critical habitat was designated in 2012, the Fish and Wildlife Service determined the PCEs for loach minnow. PCEs include those habitat features required for the physiological, behavioral, and ecological needs of the species. The PCEs describe appropriate flow regimes, velocities, and depths; stream microhabitats; stream gradients; water temperatures; and acceptable pollutant and nonnative species levels (see 77 FR 10810), which are summarized in Table 2, on the following page.

Table 2. Primary Constituent Elements (PCEs) for Loach Minnow.

PCE	Description
Flows	Perennial flows or interrupted stream courses that are periodically dewatered but serve as connective corridors between occupied or seasonally occupied habitats
Depth	Generally less than 3.3 feet
Velocities	Slow to swift velocities between 0.0 and 31.5 inches per second
Stream Microhabitats	Pools, runs, riffles, and rapids
Substrate	Gravel, cobble, and rubble with low or moderate amounts of fine sediment and substrate embeddedness
Gradient	Less than 2.5 percent
Elevation	8,200 feet or less
Water Temperatures	46.4 to 77 degrees Fahrenheit
Pollutants	No or low levels present
Nonnative Aquatic Species	None, or present at levels sufficiently low as to allow persistence of loach minnow
Flow Regime	Natural and unregulated, or if modified or regulated, regimes that allow for adequate river functions, such as flows capable of transporting sediments.

The loach minnow critical habitat designation includes eight units based on river subbasins, including the Verde River, Salt River, San Pedro, Bonita Creek, Eagle Creek, San Francisco River, Blue River, and Gila River subbasins. Occupancy within these units is described in Table 1 (See 77 FR 10810 for additional detail on occupancy by subbasin).

Our information indicates that, rangewide, more than 390 consultations have been completed or are underway for actions affecting spikedace and loach minnow, which often co-occur. The majority of these opinions concerned the effects of road and bridge construction and maintenance, grazing, water developments, fire, species control efforts, or recreation. There are a high number of consultations for urban development and utilities, however, these projects typically do not result in significant adverse effects to the species but we may provide technical assistance review only for conservation. Small numbers of projects occur for timber, land acquisition, agriculture, sportfish stocking, flooding, Habitat Conservation Planning, native fish restoration efforts, alternative energy development, and mining.

Spikedace

Spikedace (*Meda fulgida*) was reclassified as an endangered species on February 23, 2012 (77 FR 10810), after originally being listed as a threatened species on July 1, 1986 (51 FR 23769). Critical habitat was designated (March 8, 1994 - 59 FR 10906) and redesignated (April 25, 2000 - 65 FR 24328; March 21, 2007 - 72 FR 13356) in response to legal concerns and policy changes (see summary discussion at 75 FR 66482, p. 66485). The current critical habitat designation was published simultaneously with the reclassification of spikedace to endangered status(77 FR 10810).

Background

Spikedace is a small silvery fish whose common name alludes to the well-developed spine in the dorsal fin (Minckley 1973). Spikedace live in flowing water with slow to moderate velocities over sand, gravel, and cobble substrates (Propst et al. 1986, Rinne and Kroeger 1988). Specific habitat for this species consists of shear zones where rapid flow borders slower flow, areas of sheet flow at the upper ends of mid-channel sand/gravel bars, and eddies at the downstream riffle edges (Propst et al. 1986). Spikedace spawns from March through May with some yearly and geographic variation (Barber et al. 1970, Anderson 1978, Propst et al. 1986). Actual spawning has not been observed in the wild, but spawning behavior and captive studies indicate eggs are laid over gravel and cobble where they adhere to the substrate. Spikedace lives about two years with reproduction occurring primarily in one-year old fish (Barber et al. 1970, Anderson 1978, Propst et al. 1986). It feeds primarily on aquatic and terrestrial insects (Schreiber 1978, Barber and Minckley 1983, Marsh et al. 1989). Additional details on habitat preferences are provided in the 2012 critical habitat designation (77 FR 10810).

Distribution

The spikedace was once common throughout much of the Gila River basin, including the mainstem Gila River upstream of Phoenix, and the Verde, Agua Fria, Salt, San Pedro, and San Francisco subbasins. Habitat destruction and competition and predation by nonnative aquatic species reduced its range and abundance (Miller 1961, Lachner et al. 1970, Ono et al. 1983, Moyle 1986, Moyle et al. 1986, Propst et al. 1986). Spikedace are now restricted to portions of the upper Gila River (Grant, Catron, and Hidalgo Counties, New Mexico); Aravaipa Creek (Graham and Pinal Counties, Arizona); Eagle Creek (Graham and Greenlee Counties, Arizona); and the Verde River (Yavapai County, Arizona) (Marsh et al. 1990, Brouder 2002 pers. comm., Stefferud and Reinthal 2005, Paroz et al. 2006, Propst 2007).

In 2007, spikedace were translocated into Hot Springs Canyon, in Cochise County, Arizona, and Redfield Canyon, in Cochise and Pima Counties, Arizona, and these streams were subsequently augmented (Robinson 2008a, Robinson 2008b pers. comm., Orabutt 2009 pers. comm., Robinson 2009a, Robinson et al. 2010a, Robinson et al. 2010b, Robinson 2011a pers. comm.). Both Hot Springs and Redfield canyons are tributaries to the San Pedro River. Augmentation efforts have been suspended in Redfield Canyon due to drought and a lack of adequate flowing water. Augmentation efforts have been suspended at Hot Springs Canyon to allow managers to better evaluate if recruitment of spikedace is occurring without further augmentation. Monitoring will continue at this site, and future augmentations may occur if needed.

Spikedace were translocated into Fossil Creek, a tributary to the Verde River in Gila County, Arizona in 2007, and were subsequently augmented in 2008 and 2011 (Carter 2007, Carter 2008, Robinson 2009b, Boyarski et al. 2010, Robinson 2011b).

In 2008, spikedace were translocated into Bonita Creek, a tributary to the Gila River in Graham County, Arizona (Blasius 2008 pers. comm., Robinson et al. 2009), and were repatriated to the upper San Francisco River in Catron County, New Mexico (Propst 2010 pers. comm.).

Augmentations at Bonita Creek have been temporarily suspended due to re-invasion by nonnative species above the fish barrier. We anticipate that augmentations with additional fish will occur for the next several years at all sites, if adequate numbers of fish are available and habitats remain suitable. Monitoring at each of these sites is ongoing; however, insufficient time has elapsed to allow us to determine if these translocation efforts will ultimately be successful and result in establishment of new populations of spikedace in these locations.

Spikedace is now common only in Aravaipa Creek in Arizona (Arizona State University (ASU) 2002, Reinthal 2008 pers. comm., Reinthal 2011) and one section of the Gila River south of Cliff, New Mexico (NMDGF 2008, Propst et al. 2009). The Verde River is presumed occupied; however, the last captured fish from this river was from a 1999 survey (Brouder 2002 pers. comm. AGFD 2004). Spikedace from the Eagle Creek population have not been seen for over a decade (Marsh 1996), although they are still thought to exist in numbers too low for the sampling efforts to detect (Carter et al. 2007, see Minckley and Marsh 2009). The Middle Fork Gila River population is thought to be very small and has not been seen since 1991 (Jakle 1992), but sampling is localized and inadequate to detect a sparse population. Table 3 summarizes streams occupancy for spikedace.

Planning among several State and Federal agencies is underway for restoration of native fish species, including spikedace, in the Blue River through construction of a barrier that will exclude nonnative fish from moving upstream from the lower San Francisco River, and allow for translocation of spikedace. Barrier construction was completed in mid-2012, and plans are underway to translocate spikedace to the Blue River.

Table 3. Occupancy of Subbasins by Spikedace.

Unit	Occupied at time of listing or documented as occupied after listing	Current Occupied	Translocated/ Reintroduced Population
Unit 1 - Verde River Subbasin			
Verde River	Yes	Yes	No
Granite Creek	No	No	No
Oak Creek	No	No	No
Beaver and Wet Beaver Creek	No	No	No
West Clear Creek	No	No	No
Fossil Creek	No	Uncertain	Yes
Unit 2 – Salt River Subbasin			
Salt River Mainstem	No	No	No
Tonto Creek	No	No	No
Greenback Creek	No	No	No
Rye Creek	No	No	No
Spring Creek	No	No	No
Rock Creek	No	No	No

Unit 3 – San Pedro River Subbasin			
San Pedro River	No	No	No
Hot Springs Canyon	No	Yes	Yes
Bass Canyon	No	No	No
Redfield Canyon	No	Uncertain	Yes
Aravaipa Creek	Yes	Yes	No
Deer Creek	No	No	No
Turkey Creek	No	No	No
Unit 4 – Bonita Creek Subbasin			
Bonita Creek	No	Uncertain	Yes
Unit 5 – Eagle Creek Subbasin			
Eagle Creek	Yes	Yes	No
Unit 6 – San Francisco River Subbasin			
San Francisco River	No	Uncertain	Yes
Unit 7 – Blue River Subbasin			
Blue River	No	No	Yes
Campbell Blue Creek	No	No	No
Little Blue Creek	No	No	No
Pace Creek	No	No	No
Frieborn Creek	No	No	No
Dry Blue Creek	No	No	No
Unit 8 – Gila River Subbasin			
Gila River	Yes	Yes	No
West Fork Gila River	Yes	Yes	No
Middle Fork Gila River	Yes	Yes	No
East Fork Gila River	Yes	Yes	No
Mangas Creek	Yes	No	No

Taxonomic and genetic work on spikedace indicates there are substantial differences in morphology and genetic makeup between remnant spikedace populations. Remnant populations occupy isolated fragments of the Gila basin and are isolated from each other. Anderson and Hendrickson (1994) found that spikedace from Aravaipa Creek are morphologically distinguishable from spikedace from the Verde River, while spikedace from the upper Gila River and Eagle Creek have intermediate measurements and partially overlap the Aravaipa and Verde populations. Mitochondrial DNA and allozyme analyses have found similar patterns of geographic variation within the species (Tibbets 1992, Tibbets 1993).

Critical Habitat

When critical habitat was designated in 2012, the Fish and Wildlife Service determined the PCEs for spikedace. PCEs include those habitat features required for the physiological, behavioral, and ecological needs of the species. The PCEs describe appropriate flow regimes, velocities, and depths; stream microhabitats; stream gradients; water temperatures; and acceptable pollutant and nonnative species levels (see 77 FR 10810), which are summarized in Table 4, on the following page.

Table 4. Primary Constituent Elements (PCEs) for Spikedace (77 FR 10810).

PCE	Description
Flows	Perennial, or interrupted stream courses that are periodically dewatered but serve as connective corridors between occupied or seasonally occupied habitats
Depth	Generally less than 3.3 feet (1 meter)
Velocities	Slow to swift, between 1.9 and 31.5 inches per second (5 and 80 centimeters/second)
Stream Microhabitats	Glides, runs, riffles, margins of pools and eddies
Substrate	Sand, gravel, and cobble, with low or moderate amounts of fine sediment and substrate embeddedness
Gradient	Less than approximately 1.0 percent
Elevation	Below 6,890 feet (2,100 meters)
Water Temperatures	Between 46.4 to 82.4 degrees Fahrenheit; 8.0 to 28.0 degrees Celsius
Pollutants	No or low levels present
Nonnative Aquatic Species	None, or present at levels sufficiently low as to allow persistence of spikedace
Flow Regime	Natural and unregulated, or if modified or regulated, regimes that allow for adequate river functions, such as flows capable of transporting sediments.

The spikedace critical habitat designation includes eight units based on river subbasins, including the Verde River, Salt River, San Pedro, Bonita Creek, Eagle Creek, San Francisco River, Blue River, and Gila River subbasins. Occupancy within these units is described in Table 3 (See 77 FR 10810 for additional detail on occupancy by subbasin). Critical habitat has been designated in each of these subbasins (See 77 FR 10810 for additional detail).

Our information indicates that, rangewide, more than 390 consultations have been completed or are underway for actions affecting spikedace and loach minnow, which often co-occur. The majority of these opinions concerned the effects of road and bridge construction and maintenance, grazing, water developments, fire, species control efforts, or recreation. There are a high number of consultations for urban development and utilities, however, these projects typically do not result in significant adverse effects to the species but we may provide technical assistance review only for conservation. Small numbers of projects occur for timber, land acquisition, agriculture, sportfish stocking, flooding, Habitat Conservation Planning, native fish restoration efforts, alternative energy development, and mining.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

DESCRIPTION OF THE ACTION AREA

US Forest Road 217 can be accessed from Highway 191. From here the road leads northwest and eventually turns north where Eagle Creek and FR 217 parallel Tribal lands. Continuing north, approximately seven miles south of Honeymoon campground, FR 217 traverses Eagle Creek via Filleman Crossing. The action area is larger than the footprint of the project area and represents all areas to be affected directly or indirectly by construction and associated activities described in the proposed action. The action area is defined as the 6,600 square feet (0.15 acre) construction area footprint at FR 217 crossing in Eagle Creek and extends 100 feet upstream and approximately one mile downstream of the crossing. The construction area footprint is the specific portion of the stream where equipment will be actively working within the Eagle Creek. The upstream and downstream extent of the action area considers the potential impacts that were evaluated in the BA under the heading "Impacts of the project on the stream" (on pages 21, 22, and 23) and forms the basis of our action area description. The following discussions were considered in our description of the action area:

1. "During installation and removal of the stream diversion concrete barriers, the upstream and downstream sections of the stream under the concrete barriers will be disturbed….SMA estimates the volume of sediment eroded by the flowing stream by this portion of the work will be approximately 5% of the total of volume material. This will equal 110 cubic feet for installation of the concrete barriers." The BA recognizes that with the average stream velocity of 1.5 feet per second, "only the very fine sediments less than 0.1 millimeters in size will be transported."

2. "Soil from the streambed will be placed behind the concrete barrier after the filter fabric is placed over the concrete barriers….The amount of soil placed behind the concrete barriers will be approximately 100 feet long by four feet high and five feet wide for both the upstream and downstream concrete barriers with a volume of 75 cubic yards."

3. "SMA proposes that it will not be possible to divert the flow from a 1-year storm or greater storms around the construction site." SMA also estimated that a 1-year storm would produce a stream flow velocity of five feet per second. "Based on an analysis of flow through the construction site, the 1-year storm will inundate the construction site and may erode some of the soil….this will contribute approximately 500 tons of soil to the watershed."

4. "It is planned that construction activities will occur during low flow periods in the channel of 50 to 75 CFS. The velocity of flow in the channel during these periods varies from 1.5 to 2.0 feet per second in the pool areas…Any sediment produced during construction activities (approximately 20 tons) will be deposited in the quiet pool areas downstream."

The proposed actions within Eagle Creek are confined to the construction footprint which is 60 feet wide and approximately 110 feet long squared. The BA also determined that specific actions will occur or have indirect effects beyond the construction area footprint (as described in numbers one through four above). We believe the preparation of the streambed and placement of barriers within the stream (see number one above) and soil placed on the upstream side of the barrier (see number two above) will cause smaller fines to disperse and deposit a distance that is not expected to exceed 100 feet upstream. These impacts will most likely occur as soil (75 cubic yards) is placed behind the concrete barriers in the wetted portion of Eagle Creek. Under normal operating conditions, the BA recognizes (number four) that construction activities will produce approximately 20 tons of sediment that "will be deposited downstream". The BA also recognizes the possibility of a 1-year storm event occurring during the construction period that will contribute 500 tons of soil to the watershed (number three). Regardless of the contributing factor, we must evaluate and consider the impacts from all proposed actions in Eagle Creek. We recognize that a storm event is capable of depositing sediment a greater distance compared to low flow conditions. The 500 tons is likely to be a mixture of rock, sand, and fine sediment. Fine particles in turbulent waters are transported mainly in suspension, with the finest sediments primarily moving at the velocity of flowing water to a point far downstream from the place of origin (Colby 1963). In stream flow velocities of five feet per second (1-year storm event), suspended sediment could travel a distance of one mile in approximately 17 minutes. Therefore, we believe it is reasonable to conclude that a storm event will likely distribute project area sediment at least one mile downstream with the finer particles traveling the greatest distance.

STATUS OF THE SPECIES WITHIN THE ACTION AREA

Gila Chub

Status of the species and factors affecting the species and critical habitat in the action area

Within the action area existing populations of Gila chub occur within the Eagle Creek drainage. Several surveys have occurred for Gila chub in Eagle Creek. In 2006, Arizona State University sampled eight sites on the upper portion of Eagle Creek. A total of 85 Gila chub were collected; 26 at the Honeymoon Camp site, 57 at the first road crossing downstream of Honeymoon, and two at the second road crossing downstream of Honeymoon. In 2009, the ASNFs found Gila chub in Eagle Creek from Honeymoon Campground downstream to just above Willow Creek. Overall, few individuals were found and the numbers decreased the further downstream sampling occurred. Marsh and Associates surveyed Eagle Creek in the past three years and did not capture any Gila chub during their survey efforts (Marsh and Associates 2011, 2012, and 2013). The post Wallow fire effects of ash in Eagle Creek has dissipated and moved through the system and water quality is expected to be near background conditions. The action area has species preferred habitat, and in general the critical habitat is intact with most PCEs contributing to species conservation although with some diminished capacity of stream conditions such as reduced pool depth or size following the 2011 Wallow Fire. The reason for the species overall decline is from ongoing nonnative fish competition and more recently effects (sediment and ash) from large scale wildfires within the watershed.

In addition to the actions above that have contributed to current habitat conditions, wildfires continue to have adverse effects to Gila chub and its critical habitat within the action area. The 2007 Chitty Wildfire resulted in significant watershed and stream impacts from heavy sediment and ash flow post fire within the East Eagle and Eagle Creek drainages (http://www.fws.gov/southwest/es/arizona/Documents/Biol_Opin/070338_ChittyFire.pdf). These impacts are evident from the reduction in survey numbers within Eagle Creek discussed previously. There have been similar watershed and stream impacts to East Eagle and Eagle Creek drainages from the 2011 Wallow Fire and associated emergency stabilizations. Surveys were completed by Marsh and Associates (2011) within the upper Eagle Creek between Honeymoon and Sheep Wash on June 22, 2011, post Wallow Fire, and after a significant rainfall event that peaked near 300 cfs. These surveys were conducted to determine species composition, distribution, and relative abundance. Gila chub were not captured during any of the survey efforts and surveyors noted the water clarity was significantly affected by ash and sediment from post Wallow Fire runoff. However, given the available habitat throughout the drainage and the overall health of the stream, we believe the species persists in Eagle Creek.

Loach Minnow

Status of the species and factors affecting the species and critical habitat in the action area

Loach minnow have not been found in the Eagle Creek drainage in over a decade and surveys by Marsh and Associates in the past three years did not capture any loach minnow (Marsh and Associates 2011, 2012, and 2013). Although recent survey efforts have not detected loach minnow, Filleman Crossing is located within the vicinity where they were previously identified and we believe they still occupy Eagle Creek in numbers low enough as to not be detected through sampling efforts. The post fire effects of ash in Eagle Creek has dissipated and moved through the system and water quality is expected to be near background conditions. However, long term effects from large scale wildfires within the watershed along with nonnative fish competition continue to exert pressure on the population in Eagle Creek. In general, suitable habitat occurs in the drainage. The critical habitat is intact with most PCEs functioning although there may be continuing impacts to some stream conditions such as substrate embeddedness that continues to impact be impacted following the 2011 Wallow Fire.

In addition to the actions above that have contributed to current habitat conditions, wildfires continue to have adverse effects to loach minnow and its critical habitat within the action area. The 2007 Chitty Wildfire resulted in significant watershed and stream impacts from heavy sediment and ash flow post fire within the East Eagle and Eagle Creek drainages (http://www.fws.gov/southwest/es/arizona/Documents/Biol_Opin/070338_Chitty Fire.pdf). These impacts likely contribute to the survey numbers within Eagle Creek discussed previously. There have been similar watershed and stream impacts to East Eagle and Eagle Creek from the 2011 Wallow Fire and associated emergency stabilizations. Surveys by Marsh and Associates

(2011) within the upper Eagle Creek between Honeymoon and Sheep Wash were conducted June 22, 2011, post Wallow Fire, and after a significant rainfall event that peaked near 300 cfs. These surveys were conducted to determine species composition, distribution, and relative abundance. No loach minnow were captured during any of the survey efforts and surveyors noted the water clarity was significantly affected by ash and sediment from post Wallow Fire runoff.

Spikedace

Status of the species and factors affecting the species and critical habitat in the action area

Spikedace have not been found in the Eagle Creek drainage in over two decades and surveys by Marsh and Associates in the past three years did not capture any spikedace (Marsh and Associates 2011, 2012, and 2013). It is believed spikedace may still persist on portions of Eagle Creek; however, no survey data are available. Although recent survey efforts did not detected spikedace, we believe they still occupy Eagle Creek in numbers low enough as to not be detected through sampling efforts. The post fire effects of ash in Eagle Creek has dissipated and moved through the system and water quality is expected to be near background conditions. However, long term effects from large scale wildfires within the watershed along with nonnative fish competition continue to exert pressure on the population in Eagle Creek. The critical habitat is intact with most PCEs functioning, although there is some diminished capacity of stream conditions such as substrate embeddedness following the 2011 Wallow Fire.

In addition to the actions above that have contributed to current habitat conditions, wildfires continue to have adverse effects to spikedace and its critical habitat within the action area. The 2007 Chitty Wildfire resulted in significant watershed and stream impacts from heavy sediment and ash flow post fire within the East Eagle and Eagle Creek drainages (http://www.fws.gov/southwest/es/arizona/Documents/Biol_Opin/070338_ChittyFire.pdf). These impacts are evident from the survey numbers within Eagle Creek discussed previously. There have been similar watershed and stream impacts to East Eagle and Eagle Creek drainages from the 2011 Wallow Fire and associated emergency stabilizations. Surveys by Marsh and Associates (2011) within the upper Eagle Creek between Honeymoon and Sheep Wash were conducted June 22, 2011, post Wallow Fire, and after a significant rainfall event that peaked near 300 cfs. These surveys were conducted to determine species composition, distribution, and relative abundance. Spikedace were not captured during any of their survey efforts and surveyors noted the water clarity was significantly affected by ash and sediment from post Wallow Fire runoff.

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action that will be added to the environmental baseline. 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. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

We note that this biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statute and the August 6, 2004, Ninth Circuit Court of Appeals decision in Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service (No. 03-35279) to complete the following analysis with respect to critical habitat.

Gila chub, spikedace, and loach minnow and their associated critical habitats occur within the action area. The footprint of the project activities that directly impact the streambed is estimated to be 6,600 square feet. Direct impacts to species, their food resources, the stream channel, and other habitat parameters within Eagle Creek could occur from construction equipment leveling the stream bed, installation of concrete barriers and filter fabric, removal of water between the concrete barriers, placement of excavation of materials behind the concrete barrier, in-stream road construction improvements, removal of all the equipment following the completion of the road crossing, and sediment disturbance from the project.

Indirect effects, occur outside the footprint of the proposed action, and include impacts on the physical environment inhabited by Gila chub, spikedace, and loach minnow and their associated critical habitats within the action area. As proposed, construction activities will occur during low flow periods of approximately 50 to 75 cfs. In the BA, SMA estimates that during low flow periods, approximately 20 tons of sediment from the construction site will be deposited in the downstream areas. The BA provides estimates of suspended sediment concentrations (SSC) that are anticipated to occur within and downstream of the project area. SMA estimates the installment of the concrete barriers will produce 110 cubic feet of sediment or approximately 24.2 milligrams/liter (mg/L) of SSC in the stream over a 24-hour period. After the barriers are installed, SMA estimates the placement of excavated soil behind each barrier could amount to 20mg/L of SSC over a 24-hour period. The final sediment producing action includes the removal of the barriers post-construction and is estimated to be less than 15 mg/L of SSC in the stream.

Because of the project timeframe (up to seven weeks), it is possible a rainfall event could occur during the construction process and produce a greater than average stream flow event in the project area. Based on an analysis of flow through the construction site, SMA estimates a one-year storm will inundate and could erode some of the soil at the construction site. This could potentially contribute 500 tons of soil to the watershed and increase the SSC in the stream to 1,250 mg/L. Although the flooding impact from a high rainfall event is not expected to occur we consider this a low-risk, potential indirect effect that would result from construction operations within Eagle Creek.

Previous attempts to repair or fix the roadway crossing have been temporary and require ongoing repair and instream work that impacts aquatic species and the downstream water quality, including sedimentation, in Eagle Creek. The construction design of the new road crossing and material placed in the stream is intended to withstand future flooding events; therefore long-term beneficial effects are anticipated to occur from this proposed project by minimizing the need for repeated instream work.

Gila Chub

The construction area footprint in Eagle Creek is a low water crossing that is void of habitat (i.e. undercut banks, terrestrial vegetation, boulders, etc.) preferred by Gila chub or suitable for spawning. For this reason the number of Gila chub within the construction area footprint is expected to be low. Although Gila chub were not collected between 2011 and 2013, the species is a habitat generalist and may occur in undercut banks, terrestrial vegetation, boulders, root wads, fallen logs, and thick overhanging or aquatic vegetation in deeper waters. Gila chub is a highly secretive species, and likely still found in various locations within Eagle Creek. We consider the impacts from the equipment and the initial placement and set-up of the barriers are actions that could directly affect Gila chub. However, because the construction area footprint is not preferred habitat for Gila chub, we expect they are moving through, rather than occupying the area, and will likely avoid or escape the direct impacts from construction equipment and actions associated with barrier placement. There is a possibility for project construction to result in entrapment that causes harassment, injury, or mortality.

Once the barriers are in place, the creek will be diverted through a culvert capable of maintaining appropriate flows downstream of the project area. These actions are not anticipated to adversely affect aquatic species or habitat below the barriers. After the barriers are installed and stream flow is diverted, a pump with an inflow screen will be used to remove any water that remains between the barriers. The potential exists for Gila chub to become trapped between the barriers. If this were to occur, water that is pumped from between the barriers to an off-site location would harm or kill Gila chub through the loss of water. Spawning habitat does not occur within the construction area footprint; therefore, adverse effect to Gila chub eggs is not expected to occur within this area.

Provided no flooding occurs during construction operations, 20 tons of total sediment are expected to impact pool habitat for Gila chub. This 20 ton estimate includes impacts from the placement of excavated soil behind each barrier (20mg/L of SSC over a 24-hour period) which would contribute to water quality impacts upstream and downstream of the project area footprint. Depending on the construction timeframe these impacts could spread upstream and downstream any time within the five- to seven-week period. If flooding occurs, an additional 500 tons of sediment could contribute to upstream and downstream impacts in Eagle Creek and would occur over a shorter time period compared to normal construction operations. The final rule states that excessive sediment has the potential to fill backwaters and deep pools used by Gila chub (USFWS 2005). Excessive sediment in pool areas will reduce the available pool habitat utilized by Gila chub, adversely affecting the species and its habitat within Eagle Creek.

A short-term pulse of excessive sediment will also adversely affect water quality and critical habitat for Gila chub. We believe the impacts of sediment distributed downstream of the project area will adversely affect Gila chub critical habitat PCEs related to water quality (PCE 3) and prey base (PCE 4). Although these impacts are detrimental, we anticipate they will be short-term and seasonal flooding is expected to return the action area to pre-construction conditions.

Loach Minnow

The construction area footprint in Eagle Creek is a low water crossing that likely provides appropriate habitat (i.e. shallow, gravel, cobble and rubble substrate) preferred by loach minnow. We consider the impacts from the equipment and the initial placement and set-up of the barriers are actions that could directly affect loach minnow. While we consider Eagle Creek occupied by loach minnow, albeit at low numbers, we believe occupancy within the construction area footprint is low and/or sporadic. Suitable spawning habitat occurs within the construction area footprint and the proposed actions will not occur within the spawning season (March through May). However, since the construction area is a road crossing we expect the daily use by vehicles would render the area unsuitable for loach minnow. For these reasons, we expect loach minnow, if present in the action area during construction, will likely avoid or escape the direct impacts from construction equipment and actions associated with barrier placement. The possibility of entrapment that causes harassment, injury, or mortality from project construction may still occur.

Once the barriers are in place, the creek will be diverted through a culvert capable of maintaining appropriate flows downstream of the project area. These actions are not anticipated to adversely affect aquatic species or habitat below the barriers. After the barriers are installed and stream flow is diverted, a pump with an inflow screen will be used to remove any water that remains between the barriers. Water that is pumped from between the barriers to an off-site location would harm or kill any fish in the area, although given the low numbers, we do not anticipate this occurring to loach minnow.

Provided no flooding occurs during construction operations, 20 tons of total sediment are expected to impact habitat for loach minnow. This 20 ton estimate includes impacts from the placement of excavated soil behind each barrier (20mg/L of SSC over a 24-hour period) which would contribute to water quality impacts upstream and downstream of the project area footprint. Depending on the construction timeframe these impacts could spread upstream and downstream any time within the five- to seven-week period. If flooding occurs, an additional 500 tons of sediment could contribute to upstream and downstream impacts in Eagle Creek and would occur over a shorter time period compared to normal construction operations. Nonetheless, 20 or even 500 tons of sediment could enter the watershed and adversely affect loach minnow, their eggs, and their habitat in Eagle Creek. However, as noted above, loach minnow are believed to be present at low numbers in Eagle Creek overall, and we believe it is unlikely that they would be present in the action area during construction activities.

Loach minnow prefer habitat free from fine sediment beneath rocks for resting and spawning. The 2012 final rule states that road construction, including excavation associated with maintenance and repairs in active stream channels can both harm eggs, compress substrates for adult loach minnow, and increase sedimentation (USFWS 2012). The proposed actions that result in downstream sediment production are likely to cause indirect effects to any loach minnow in the action area and adversely affecting habitat needed for resting and spawning. The impacts of sediment distributed downstream of the project area will also adversely affect loach minnow critical habitat PCEs related to substrate embeddedness. Although these impacts are detrimental to critical habitat, they will be short-term, and seasonal flooding is expected to return the action area to pre-construction conditions.

Spikedace

The construction area footprint in Eagle Creek is a low water crossing that likely provides appropriate habitat (i.e. slow to moderate water flow over sand, gravel, and cobble substrate) preferred by spikedace. We consider the impacts from the equipment and the initial placement and set-up of the barriers are actions that could directly affect spikedace. While we consider Eagle Creek occupied by spikedace, albeit at low numbers, we believe occupancy within the construction area footprint is low and/or sporadic. Suitable spawning habitat occurs within the construction area footprint and the proposed actions will not occur within the spawning season (March through May). However, since the construction area is a road crossing we expect the daily use by vehicles would render the habitat unsuitable for spikedace. For these reasons, we expect spikedace, if present in the action area during construction, will likely avoid or escape the direct impacts from construction equipment and actions associated with barrier placement. The possibility of entrapment that causes harassment, injury, or mortality from project construction is low, but may still occur.

Once the barriers are in place, the creek will be diverted through a culvert capable of maintaining appropriate flows downstream of the project area. These actions are not anticipated to adversely affect aquatic species or habitat below the barriers. After the barriers are installed and stream flow is diverted, a pump with an inflow screen will be used to remove any water that remains between the barriers. Water that is pumped from between the barriers to an off-site location would harm or kill any fish in the area; however, given the low numbers, we do not anticipate this occurring to spikedace.

Provided no flooding occurs during construction operations, 20 tons of total sediment are expected to impact downstream habitat for spikedace. This 20 ton estimate includes impacts from the placement of excavated soil behind each barrier (20mg/L of SSC over a 24-hour period) which would contribute to water quality impacts upstream and downstream of the project area footprint. Depending on the construction timeframe these impacts could spread upstream and downstream any time within the five- to seven-week period. If flooding occurs, an additional 500 tons of sediment could contribute to upstream and downstream impacts in Eagle Creek and would occur over a shorter time period compared to normal construction operations. Nonetheless, 20 or even 500 tons of sediment would enter the watershed and adversely affect spikedace, their eggs, and their habitat in Eagle Creek. However, as noted above, spikedace are believed to be present in low numbers in Eagle Creek overall, and it is unlikely that they would be present in the action area during construction activities.

Spikedace prefer habitat with low to moderate amounts of fine sediment and substrate emebeddedness; and sediment produced from construction activities could alter the substrate size, making the area unsuitable for spikedace and egg development (USFWS 2012). The 2012 final rule states that road construction, including excavation associated with maintenance and repairs in active stream channels can both harm eggs, compress substrates for adult spikedace, and increase sedimentation (USFWS 2012). The proposed actions that result in upstream and downstream sediment production could cause indirect effects to spikedace spawning habitat within the action area. The impacts of sediment distributed downstream of the project area will also adversely affect spikedace critical habitat PCE related to substrate embeddedness. Although these impacts are detrimental to critical habitat, they are short-term, and seasonal flooding is expected to return the action area to pre-construction conditions.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in 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 Act.

Non-Federal actions that are likely to occur in the action area include unregulated recreational activities such as camping and off-highway vehicle use. These activities could cause additional disturbance to the watershed; however, the impacts of these activities are considered to be minimal. Actions on private lands may include water diversions, groundwater pumping, and livestock grazing. The extent of these activities and the associated impacts within the action area are unknown.

CONCLUSION

After reviewing the current status of the species, the environmental baseline for the action area, the effects of the proposed Filleman Crossing project and the cumulative effects, it is our biological opinion that Filleman Crossing project as proposed, is not likely to jeopardize the continued existence of Gila chub, loach minnow, or spikedace, nor are they anticipated to result in the destruction or adverse modification of critical habitat for these species.

Our determination is based on the following rational:

1. The total area affected by the construction action is a minor part of the total habitat area supporting Gila chub, loach minnow, and spikedace. The effects to Eagle Creek crossing location are not permanent and habitat values will be recovered after all equipment is removed.

2. The construction minimization measures included in the proposed action reduce the impact of sediment and contaminants during the construction period.

3. The road crossing improvements are designed to stabilize the crossing and resist erosive forces of future flooding conditions within Eagle Creek. Impairment to PCE's will be restricted to one mile and are not expected to reduce the conservation value of critical habitat for Gila chub, loach minnow, and spikedace.

4. Spikedace and loach minnow are rare in the stream, and their presence in the proposed action area at the time of construction is unlikely.

The conclusions of this biological opinion are based on full implementation of the project as described in the Description of the Proposed Action section of this document, including any minimization measures that were incorporated into the project design.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act 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 (50 CFR 17.3) 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 (50 CFR 17.3) 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 taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

AMOUNT OR EXTENT OF TAKE

<u>Gila chub</u>
Take in the forms of harm and/or harassment resulting in temporary downstream habitat modification and injury or death of Gila chub is reasonably certain to occur, as explained in the effects of the action. However, we anticipate incidental take of Gila chub will be difficult to detect for the following reasons:

- The low numbers of Gila chub within Eagle Creek make it difficult to determine that take will occur from construction operations.

- Dead or impaired individual are difficult to find due to their small size and the likelihood for carcasses to be carried downstream or scavenged.

Therefore, we cannot quantify the amount of direct take that will occur from heavy equipment and barrier installation associated with this proposed action.

Because incidental take of Gila chub will be difficult to detect during construction operations, estimating the amount or extent of take is impossible and any attempt to quantify take would be biologically meaningless. For this reason we describe take in terms of impacts from the proposed action, and use surrogate measures to identify when take has been exceeded. We anticipate that take will occur within the wetted portion of the construction area footprint including habitat downstream within Eagle Creek because: 1) pools in areas downstream of the FR 217 crossing are likely to be reduced in size from sediment produced during construction operations; 2) Gila chub present in the construction area footprint may be crushed from heavy machinery and barrier placement in Eagle Creek.

Incidental take is associated with the construction operations within Eagle Creek that will occur within a seven week period. At the Filleman Crossing, we anticipate impacts, as described above, to occur over 6,600 square feet. Take will be considered to have been exceeded if any additional occupied Gila chub habitat is disturbed from construction operations or sedimentation, as described above, during implementation of the proposed action.

Loach minnow

While loach minnow may be present in the action area, we anticipate that they are present in Eagle Creek in very low numbers and/or sporadically in the action area. The overall footprint of the action is small, and the project is of short duration. Given the low probability of loach minnow being present at the time of construction, and the limited duration and scope of the proposed action, we are unable to conclude with reasonable certainty that the proposed action will result in incidental take of loach minnow.

Spikedace

While spikedace may be present in the action area, we anticipate that they are present in very low numbers and/or sporadically within the action area. The overall footprint of the action is small, and the project is of short duration. Given the low probability of spikedace being present at the time of construction, and the limited duration and scope of the proposed action, we are unable to conclude with reasonable certainty that the proposed action will result in incidental take of spikedace.

EFFECT OF TAKE

In the accompanying biological opinion, the FWS determined that this level of anticipated take is not likely to result in jeopardy to Gila chub or destruction or adverse modification of its critical habitat.

REASONABLE AND PRUDENT MEASURES AND TERMS AND CONDITIONS

The construction minimization measures and Corps Nationwide Permit conditions (i.e., erosion and sediment control measures, staging areas, and equipment maintenance) included in the proposed action are appropriate to minimize the take of Gila chub and additional reasonable and prudent measures and terms and conditions to reduce incidental take are not needed.

Disposition of Dead or Injured Listed Species

Upon locating a dead, injured, or sick listed species initial notification must be made to the FWS's Law Enforcement Office, 2545 West Frye Road, Chandler, Arizona, 85224, (telephone: 480/967-7900) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care and in handling dead specimens to preserve the biological material in the best possible state.

CONSERVATION RECOMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act 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.

1. After placement of the cofferdams in the upstream and downstream portion of the project area; a qualified fisheries biologist with the appropriate Arizona Game and Fish Department and FWS permits should seine any pools left as a result of the diversion to salvage fish left in the pools. All fish salvaged from pools should be moved downstream of the project area. This will occur prior to pumping the remaining water outside of the diversion area.

REINITIATION NOTICE

This concludes formal consultation on the actions outlined in the request. As provided in 50 CFR §402.16, reinitiation 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 opinion; (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 opinion; 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, any operations causing such take must cease pending reinitiation.

We appreciate your efforts to identify and minimize effects to listed species from this project. For further information, please contact Ryan Gordon (x225) or Mary Richardson (x242). We also encourage the Corps to continue to coordinate this project with the AGFD. Please refer to the consultation number, 02EAAZ00-2013-F-0016, in future correspondence concerning this project.

Sincerely,

/s/ Mike Martinez for

Steven L. Spangle
Field Supervisor

Ms. Sally Diebolt, Chief

cc: Chief, Habitat Branch, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ
Souder Miller and Associates, Safford, AZ (Attn: Robert Porter)
Gila Watershed Partnership, Safford, AZ (Attn: Jan Holder)

Biologist, Apache-Sitgreaves National Forest, Clifton Ranger District, Duncan, AZ
(Attn: Lance Brown)

Ecopy – M. Richardson, R. Gordon

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