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50 CFR Part 17

Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Spikedace (Meda fulgida) and the Loach Minnow (Tiaroga cobitis); Final Rule

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

RIN 1018–AU33

Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Spikedace (Meda fulgida) and the Loach Minnow (Tiaroga cobitis)

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), are designating critical habitat for the spikedace (*Meda fulgida*) and loach minnow (*Tiaroga cobitis*) pursuant to the Endangered Species Act of 1973, as amended (Act). In total, approximately 522.2 river miles (mi) (840.4 kilometers (km)) are designated as critical habitat. Critical habitat is located in Catron, Grant, and Hidalgo Counties in New Mexico, and Apache, Graham, Greenlee, Pinal, and Yavapai Counties in Arizona.

DATES: This final rule is effective April 20, 2007.

ADDRESSES: Comments and materials received, as well as supporting documentation used in the preparation of this final rule, are available for public inspection, by appointment, during normal business hours at the U.S. Fish and Wildlife Service, Arizona Ecological Services Field Office, 2321 West Royal Palm Road, Suite 103, Phoenix, AZ 85021–4951. The final rule, economic analysis, environmental assessment, and more-detailed color maps of the critical habitat designation are also available via the Internet at *http://www.fws.gov/arizonaes/*. Geographic Information System (GIS) files of the critical habitat maps are also available via the Internet at *http://criticalhabitat.fws.gov/*.

FOR FURTHER INFORMATION CONTACT: Steven L. Spangle, Field Supervisor, U.S. Fish and Wildlife Service, Arizona Ecological Services Field Office, 2321 West Royal Palm Road, Suite 103, Phoenix, AZ 85021–4951 (telephone 602–242–0210; facsimile 602–242–2513). Persons who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 800–877–8339, 7 days a week and 24 hours a day.

SUPPLEMENTARY INFORMATION:

Background

It is our intent to discuss only those topics directly relevant to designation of critical habitat in this rule. For more information on the spikedace or the loach minnow, refer to the previous final critical habitat designation for the spikedace and loach minnow published in the **Federal Register** on April 25, 2000 (65 FR 24328).

Spikedace

Description and taxonomy. The spikedace is a member of the minnow family Cyprinidae. The spikedace was first collected in 1851 from the Rio San Pedro in Arizona and was described from those specimens in 1856 by Girard. It is the only species in the genus Meda. The spikedace is a small, slim fish less than 3 inches (in) (75 millimeters (mm) in length (Sublette et al. 1990, p. 136). It is characterized by an olive gray to brownish back and silvery sides with vertically elongated black specks. Spikedace have spines in the dorsal fin (Minckley 1973, pp. 82, 112, 115).

Distribution and Habitat. Spikedace are found in moderate to large perennial streams, where they inhabit shallow riffles (shallow areas in a streambed causing ripples) with sand, gravel, and rubble substrates (Barber and Minckley 1966, p. 321; Propst et al. 1986, p. 12; Rinne and Kroeger 1988, p. 1). Recurrent flooding and a natural hydrograph (physical conditions, boundaries, flow, and related characteristics of water) are very important in maintaining the habitat of spikedace and in helping the species maintain a competitive edge over invading nonnative aquatic species (Minckley and Meffe 1987, p. 103–104; Propst et al. 1986, pp. 3, 81, 85).

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. It occupies suitable habitat in both the mainstem reaches and moderate-gradient tributaries, up to approximately 6,500 feet (ft) (2,000 meters (m)) in elevation (Chamberlain 1904, p. 8; Cope and Yarrow 1875, pp. 641–642; Gilbert and Scofield 1898, pp. 487, 497; Miller 1960 and Hubbs, pp. 32–33).

Habitat destruction and competition and predation by nonnative aquatic species have severely reduced its range and abundance. It is now restricted to portions of the upper Gila River and the East, West, and Middle Forks of the Gila River in New Mexico and the middle Gila River, lower San Pedro River, Aravaipa Creek, Eagle Creek, and the Verde River in Arizona (Anderson 1978, pp. 14–17, 61–62; Bestgen 1985, p. 6; Jakle 1992, p. 6; Marsh et al. 1989, pp. 2–3; Paroz et al. 2006, pp. 26, 37–41, 62–67; Propst et al. 1986, p. 1; Sublette et al. 1990, pp. 138–139), and is only commonly found in surveys of Aravaipa Creek and some parts of the upper Gila River in New Mexico (Arizona Game and Fish Department (AGFD) 2004; Arizona State University 2002; Propst 2002, pp. 4, 16–33, Appendix II—Table 2; Propst et al. 1986, p. iv; Rienthal 2006, p. 2). Based on the available maps and survey information, we estimate its present range to be approximately 10 to 15 percent or less of its historical range, and the status of the species within occupied areas ranges from common to very rare. Recent data indicate the population in New Mexico has declined in recent years (Paroz et al. 2006, p. 56). Table 1 summarizes critical habitat areas designated as critical habitat in this final rule for spikedace, as well as potential threats and records of spikedace within those areas.

Loach Minnow

Description and taxonomy. The loach minnow is a member of the minnow family Cyprinidae. The loach minnow was first collected in 1851 from the Rio San Pedro in Arizona and was described from those specimens in 1865 by Girard (pp. 191–192). The loach minnow is a small, slender, elongated fish less than 3 in (80 mm) in length. It is olive colored overall, with black mottling or splotches. Breeding males have vivid red to red-orange markings on the bases of fins and adjacent body, on the mouth and lower head, and often on the abdomen (Minckley 1973, p. 134; Sublette et al. 1990, p. 186).

Distribution and Habitat. Loach minnow are found in small to large perennial streams, and use shallow, turbulent riffles with primarily cobble on the bottom in areas of swift currents (Minckley 1973, p. 134; Propst and Bestgen 1991, p. 32; Propst et al. 1988, pp. 36–43; Rinne 1989, p. 111). The loach minnow uses the space between, and in the lee (sheltered) side of rocks for resting and spawning. It is rare or absent from habitats where fine sediments fill the interstitial spaces (small, narrow spaces between rocks or other substrate) (Propst and Bestgen 1991; p. 33). Recurrent flooding and a natural hydrograph are very important in maintaining the habitat of loach minnow and in helping the species maintain a competitive edge over invading nonnative aquatic species (Propst and Bestgen 1991, pp. 33, 37).

The loach minnow was once locally common throughout much of the Gila River basin, including the mainstem Gila River upstream of Phoenix, and the Verde, Salt, San Pedro, and San Francisco subbasins (Minckley 1973, p. 133–134; Lee et al. 1980, p. 365). It

occupies suitable habitat in both the mainstem reaches and moderate-gradient tributaries, up to about 8,200 ft (2,500 m) in elevation. Habitat destruction and competition and predation by nonnative aquatic species have severely reduced its range and abundance (Carlson and Muth 1989, pp. 232–233; Fuller et al. 1990, p. 1; Lachner et al. 1970, p. 22; Miller 1961, pp. 365, 377, 397–398; Minckley 1973, p. 135; Moyle 1986, pp. 28–34; Moyle et al. 1986, pp. 416–423; Ono et al. 1983, p. 90; Propst et al. 1988, p. 2, 64). It is now restricted to portions of the upper Gila, the San Francisco, and Tularosa rivers in New Mexico; and the Blue River and its tributaries Dry Blue, Campbell Blue, Little Blue, Pace, and Frieborn creeks; Aravaipa Creek and its tributaries Turkey and Deer creeks; Eagle Creek; East Fork White River; and the Black River and the North Fork East Fork Black River in Arizona (Bagley et al. 1998, pp. 3–6, 8; Bagley et al. 1995, multiple survey records; Barber and Minckley 1966, p. 321; Britt 1982, pp. 6–7; Leon 1989, p. 1; Marsh et al. 1989, pp. 7–8; Paroz et al. 2006, pp. 26, 37–41, 62–67; Propst et al. 1988, pp. 12–17; Propst and Bestgen 1991, p. 29; Propst 1996, multiple survey records; Springer 1995, pp. 6–7, 9–10), and is only common in Aravaipa Creek and the Blue River in Arizona, and limited portions of the upper San Francisco River, the upper Gila River, and Tularosa River in New Mexico (Paroz et al. 2006, pp. 55–60; Propst and Bestgen 1991, pp. 29, 37). The present range of the loach minnow is estimated at 10 percent of its historical range (Propst et al. 1988, p. 12), and the status of the species within occupied areas ranges from common to very rare. Table 1 summarizes critical habitat areas designated for loach minnow, as well as potential threats and records of loach minnow within those areas.

TABLE 1.—LOCATIONS OF SPIKEDACE AND LOACH MINNOW STREAM SEGMENTS DESIGNATED AS CRITICAL HABITAT, THREATS TO THE SPECIES, LAST YEAR OF DOCUMENTED OCCUPANCY, AND SOURCE OF OCCUPANCY INFORMATION

Spikedace and/or loach minnow critical habitat areas	Threats	Last year occupancy confirmed	Critical habitat distance in mi (km)	Source
Complex 1—Verde River				
Verde River—Spikedace	Nonnative fish species, grazing, water diversions.	1999	43.0 mi (69.2 km)	AGFD 2004; ASU 2002; Brouder 2002, p. 1.
Complex 2—Black River Complex				
Boneyard Creek—Loach minnow.	Recreational pressures, nonnative fish species, recent fire and related retardant application, ash, and sediment.	1996	1.4 mi (2.3 km)	AGFD 2004; ASU 2002.
East Fork Black—Loach minnow.	Recreational pressures, nonnative fish species, recent fire and related retardant application, ash, and sediment.	2004	12.2 mi (19.7 km)	AGFD 2004; ASU 2002.
North Fork East Fork Black—Loach minnow.	Recreational pressures, nonnative fish species, recent fire and related retardant application, ash, and sediment.	2004	4.4 mi (7.1 km)	AGFD 2004; ASU 2002; Bagley et al. 1995, multiple surveys; Lopez 2000, p. 1.
Complex 3—Middle Gila/Lower San Pedro/Aravaipa Creek				
Aravaipa Creek—Spikedace and Loach minnow.	Fire, some recreational pressure, nonnative pressures, water diversion, contaminants.	2005	28.1 mi (45.3 km)	ADEQ 2006; AGFD 2004; ASU 2002; Rienthal 2006, pp. 2–3.
Deer Creek—Loach minnow.	Fire, some recreational pressure, low nonnative pressures.	2005	2.3 mi (3.6 km)	AGFD 2004; ASU 2002; Rienthal 2006, p. 2.
Turkey Creek—Loach minnow.	Fire, some recreational pressure, nonnative pressures.	2005	2.7 mi (4.3 km)	AGFD 2004; ASU 2002; Rienthal 2006, p. 2.
Gila River—Ashurst-Hayden Dam to San Pedro Spikedace	Water diversions, grazing, nonnative fish species.	1991	39.0 mi (62.8 km)	AGFD 2004; ASU 2002; Jakle 1992, p. 6.
San Pedro River (lower)—Spikedace.	Water diversions, grazing, nonnative fish species, mining.	1966 (directly connected to Aravaipa Creek, with records from 2005).	13.4 mi (21.5 km)	AGFD 2004; ASU 2002.
Complex 4—San Francisco and Blue Rivers				
Eagle Creek—Loach minnow.	Grazing, nonnative fish species, water diversions, mining.	1997	17.7 mi (28.5 km)	AGFD 2004; ASU 2002; Bagley and Marsh 1997, pp. 1–2; Knowles 1994, pp. 1–2, 5; Marsh et al. 2003, pp. 666–668.

TABLE 1.—LOCATIONS OF SPIKEDACE AND LOACH MINNOW STREAM SEGMENTS DESIGNATED AS CRITICAL HABITAT, THREATS TO THE SPECIES, LAST YEAR OF DOCUMENTED OCCUPANCY, AND SOURCE OF OCCUPANCY INFORMATION—Continued

Spikedace and/or loach minnow critical habitat areas	Threats	Last year occupancy confirmed	Critical habitat distance in mi (km)	Source
San Francisco River—Loach minnow.	Grazing, water diversions, nonnative fish species, road construction and maintenance, channelization.	2005	126.5 mi (203.5 km)	AGFD 2004; ASU 2002; Paroz et al. 2006, p. 67; Propst 2002, p. 13; Propst 2005, p. 10; Propst 2006, p. 2.
Tularosa River—Loach minnow.	Grazing, watershed disturbances.	2002	18.6 mi (30.0 km)	ASU 2002; Propst 2002, p. 9; Propst 2005, p. 6.
Frieborn Creek—Loach minnow.	Dispersed livestock grazing.	1998	1.1 mi (1.8 km)	ASU 2002.
Negrito Creek—Loach minnow.	Grazing, watershed disturbances.	1998	4.2 mi (6.8 km)	Miller 1998, pp. 4–5.
Whitewater Creek—Loach minnow.	Grazing, watershed disturbances.	1984 (directly connected to the San Francisco River, with records from 2005).	1.1 mi (1.8 km)	ASU 2002; Propst et al. 1988, p.15.
Blue River—Loach minnow.	Water diversions, nonnative fish species, livestock grazing, road construction.	2004	51.1 mi (82.2 km)	AGFD 2004; ASU 2002; Carter 2005; Propst 2002, p. 4.
Campbell Blue Creek—Loach minnow.	Grazing, nonnative fish species.	2004	8.1 mi (13.1 km)	AGFD 2004; ASU 2002; Carter 2005.
Little Blue Creek—Loach minnow.	Grazing, nonnative fish species.	1981 (directly connected to the Blue River, with records from 2004).	2.8 mi (4.5 km)	AGFD 2004; ASU 2002.
Dry Blue Creek—Loach minnow.	Grazing	2001	3.0 mi (4.8 km)	ASU 2002; Propst 2006, p. 2.
Pace Creek—Loach minnow.	Grazing, nonnative fish species.	1998	0.8 mi (1.2 km)	ASU 2002.
Complex 5—Upper Gila River				
East Fork Gila River—Spikedace and Loach minnow	Grazing, nonnative fish species, ash flows from wildfires.	2000, 1998	26.1 mi (42.0 km)	ASU 2002; Propst 2002, p. 27; Propst et al. 1998, p.14–15; Propst 2006, pp. 2.
Upper Gila River—Spikedace and Loach minnow.	Recreation, roads, grazing, nonnative fish species, water diversion.	2005	94.9 mi (152.7 km)	ASU 2002; Propst 2002, pp. 4, 31.
Middle Fork Gila River—Spikedace and Loach minnow.	Nonnative fish species, Grazing, ash flows from wildfires.	1995, 1998	7.7 mi (12.3 km), 11.9 mi (19.1 km).	ASU 2002; Paroz et al. 2006, p. 63; Propst 2002, p. 22; Propst, 2006, p. 2.
West Fork Gila River—Spikedace and Loach minnow.	Nonnative fish species, roads, ash flows from wildfires.	2005, 2002	7.7 mi (12.4 km)	ASU 2002; Paroz et al. 2006, p. 64; Propst 2002, p. 18; Propst 2006, p. 2.

Previous Federal Actions

We previously published a final critical habitat designation on April 25, 2000 (65 FR 24328). In *New Mexico Cattle Growers' Association and Coalition of Arizona/New Mexico Counties for Stable Economic Growth* v. *United States Fish and Wildlife Service*, CIV 02–0199 JB/LCS (D.N.M), the plaintiffs challenged the April 25, 2000, critical habitat designation for the spikedace and loach minnow because the economic analysis had been prepared using the same methods which the Tenth Circuit had held to be invalid. The Center for Biological Diversity joined the lawsuit as a Defendant-Intervenor. The Service agreed to a voluntary vacatur of the critical habitat designation, except for the Tonto Creek Complex. On August 31, 2004, the United States District Court for the District of New Mexico set aside the April 25, 2000, critical habitat designation in its entirety and remanded it to the Service for preparation of a new proposed and final designation. On December 20, 2005, we published a proposed critical habitat designation (70 FR 75546).

For more information on previous Federal actions concerning the spikedace and loach minnow, including listing documents published in 1985 and 1986 (50 FR 25380, June 18, 1985; 51 FR 39468, October 28, 1986; 51 FR 23769, July 1, 1986) as well as the first critical habitat designation in 1994 (59 FR 10898, March 8, 1994; 59 FR 10906, March 8, 1994), refer to the critical habitat designation published in the **Federal Register** on April 25, 2000 (65 FR 24328).

Summary of Comments and Recommendations

We requested written comments from the public on the proposed designation of critical habitat for the spikedace and loach minnow on December 20, 2005 (70 FR 75546), and in two notices to reopen the comment period on June 6, 2006 (71 FR 32496) and October 4, 2006 (71 FR 58574). We also contacted appropriate Federal, State, and local agencies; scientific organizations; and other interested parties and invited them to comment on the proposed rule. We requested information on the current status, distribution, and threats

to the spikedace and loach minnow, as well as information on the status of other aquatic species in the historical range of the spikedace and loach minnow. We requested this information in order to make a final critical habitat determination based on the best available scientific and commercial data. We also requested information on proposed exclusions of various areas from the final critical habitat designation. In addition, we held public hearings on June 13 and 20, 2006, in Silver City, NM, and Camp Verde, AZ, respectively, to solicit comments on the proposed rule. We published newspaper articles inviting public comment and announcing these public hearings in the *Arizona Republic*, *Arizona Daily Star*, *Camp Verde Bugle*, *Sierra Vista Herald*, *Tucson Citizen*, *Verde Independent*, and *White Mountain Independent* in Arizona, and the *Albuquerque Journal*, *Albuquerque Tribune*, and *Silver City Daily Press* in New Mexico.

During the first public comment period, which opened on December 20, 2005, and closed on February 21, 2006, we received 23 comments directly addressing the proposed critical habitat designation (e-mails, letters, and faxes). Of these, we received two comments from peer reviewers, three from Federal agencies, five from Tribes, one from a State agency, seven from organizations, and five from individuals. We also received two requests for public hearings. During the second comment period, which opened on June 6, 2006, and closed on July 6, 2006, we received 39 comments. Of these latter comments, 2 were from Federal agencies, 3 from State agencies, and 34 from organizations or individuals. During the third comment period, which opened on October 4, 2006, and closed on October 16, 2006, we received 11 comment letters. Of these comments, three were from Federal agencies and eight from organizations and individuals.

Of the written comments received during the first comment period, four supported, eight were opposed, and six included comments or information but did not express support for or opposition to the proposed critical habitat designation. Of the written comments received during the second comment period, nine supported, 23 were opposed, and seven included comments or information but did not express support for or opposition to the proposed listing and critical habitat designation. Written comments received during the third comment period were specific to the proposals to exclude portions of various streams due to receipt of management plans for those streams. Of these written comments, two supported exclusions in Eagle Creek and the upper Gila River, three opposed these exclusions, four proposed additional exclusions in other areas, and three included comments or information but did not express support for or opposition to the proposed exclusions.

We also received numerous comments on the content and soundness of the environmental assessment and economic analysis. For the environmental assessment, comments focused on the adequacy of completing an environmental assessment rather than an environmental impact statement, the inadequacy of the comment period and opportunities for public participation, the use of the 300-foot buffer for the lateral extent of the designation, the application of the destruction or adverse modification language, the adequacy of the discussion of impacts of the proposed action to water use and water rights, the range of alternatives covered, and the economic information provided in the environmental assessment.

Comments on the economic analysis included the suggestion that we failed to estimate benefits of the proposed designation; the adequacy and scope of the analysis; impacts to small business entities, ranching and farming communities, and water use and water rights; the Regulatory Flexibility Act; the Verde River and estimated costs and benefits of including it in the final designation; and Tribal lands and impacts to Tribes.

Responses to comments were grouped into three categories below. Peer review comments are listed first, followed by comments received from the States. Comments received from the public are listed last. Because staff from the New Mexico Department of Game and Fish (NMDGF) responded as peer reviewers, their comments are listed in the peer review section, while those of the AGFD are listed under State comments.

Peer Review

In accordance with our policy published on July 1, 1994 (59 FR 34270), we solicited expert opinions from 13 knowledgeable individuals with scientific expertise that included familiarity with the species, the geographic region in which the species occurs, and conservation biology principles. These individuals represented Federal agencies, State agencies, university researchers, or themselves as private individuals. We received responses from two of the peer reviewers, one as a private individual and the other in the capacity of an individual who works for the New Mexico Department of Game and Fish. Peer review comments focused on the reduction in the proposed critical habitat designation from previous designations, the area encompassed by critical habitat, and potential threats to the species, including the need to expand ''nonnative fish'' to include ''nonnative aquatic species.''

We reviewed all comments received from the peer reviewers and the public for substantive issues and new information regarding critical habitat for the spikedace and loach minnow, and addressed them in the following summary.

Peer Reviewer Comments

(1) *Comment:* The reduction in stream miles of critical habitat proposed for designation from that previously designated for the spikedace and loach minnow provides no incentive for land and resource management agencies to launch projects that would restore conditions for the enhancement of spikedace and loach minnow. All of the major stream course and complexes, and many of the smaller tributaries, have potential to provide elements necessary for the recovery of these species and should be included in critical habitat.

Our response: The Service's process for designating critical habitat has evolved since prior designations of critical habitat for the spikedace and loach minnow. As required by section 4(b)(1)(A) of the Act, we used the best scientific and commercial data available in determining areas for designation as critical habitat.

(2) *Comment:* In primary constituent element (PCE) 4, ''nonnative fish'' should be modified to include any and all nonnative aquatic species, including the current component of nonnative fishes and those that may become established in the future, as well as crayfishes, macroinvertebrates, parasites, and disease-causing pathogens.

Our response: We agree and we have changed ''nonnative aquatic fishes'' in the final rule to ''nonnative aquatic species.'' In addition, language has been added addressing additional nonnatives and their sources, as well as their potential effects on the native fish community.

(3) *Comment:* Designating critical habitat serves positive purposes. The prohibition against adverse modification is a powerful tool to protect unoccupied seasonal or migratory habitat and unoccupied habitat for population expansion as part of recovery. The most effective benefit from designating critical habitat is the impetus it provides to agencies and people to initiate conservation activities for the target

species and voluntarily curtail adverse impacts. No evidence is provided concluding that the (1) jeopardy standard is sufficient to protect habitat better than a critical habitat designation, (2) that critical habitat designation provides no education benefits better obtained otherwise, or (3) that conservation can be better achieved through implementing management plans rather than through implementing section 7 and other provisions of the Act.

Our response: Designation of critical habitat is one tool for managing listed species habitat. In addition to the designation of critical habitat, we have determined that other conservation mechanisms including the recovery planning process, section 6 funding to States, section 7 consultations, management plans, Safe Harbor agreements, and other on-the-ground strategies contribute to species conservation. We believe these other conservation measures provide greater incentives and often greater conservation. Please see ''Exclusions under Section 4(b)(2) of the Act'' for additional discussion.

(4) *Comment:* The Service should reclassify both species to endangered status, as a warranted but precluded finding was published in 1994. Both species have experienced significant reductions in range and abundance since that time, and their status in the wild continues to deteriorate. Reclassification would recognize the precarious status of the species and give higher priority for recovery actions.

Our response: We agree and in the 2006 Candidate Notice of Review (CNOR) (71 FR 53756; September 12, 2006) we resubmit our 12-month finding where we determine that reclassification of both the spikedace and loach minnow is warranted but precluded by other higher priority listing actions. The 2006 CNOR provides a detailed discussion of why these listing actions are precluded by other higher priority listing actions. We note that Federal and State agencies and other cooperators are continuing with recovery actions for the spikedace and loach minnow in a concerted effort to improve the status of these two fish.

(5) *Comment:* No information is presented on effects of wildfire on habitats (PCEs) each species occupies. Since 2000, wildfires have burned much of the West Fork Gila River watershed, fine sediment deposition has increased noticeably, and abundance of both spikedace and loach minnow have declined substantially at a permanent site on West Fork Gila River that is annually sampled.

Our response: We have added wildfire to the threats discussion within the unit descriptions below and within Table 1 as a threat to the West Fork Gila River.

(6) *Comment:* The lateral extent of the areas proposed for critical habitat is logical considering the dynamic nature of streams in the Gila River basin, and the scientific understanding of the role flood plains play in stream course functioning. Defining a measurable width that is wide enough to incorporate flood flows beyond the bankfull width is reasonable.

Our response: We agree with the commenter on this point.

State Comments

(7) *Comment:* We suggest a rewording of the statement regarding water quality in the PCE section for both spikedace and loach minnow to not require low levels of pollutants in the water. As written, these statements could be interpreted to mean that low levels of pollutants are needed.

Our response: We agree with this comment, and have revised the wording in the discussion of PCEs in the final rule to indicate that suitable water quality for spikedace and loach minnow will contain no or only minimal pollutant levels.

(8) *Comment:* The Arizona Department of Transportation requests that the Service provide estimated acreages of proposed critical habitat for each habitat complex. The total mileage figures are inconsistent and total miles should be provided for spikedace and loach minnow. The total mileages in Table 3 for New Mexico and Arizona are reversed.

Our response: Because fishes occupy stream habitat, we have determined it is more appropriate to quantify the delineation in terms of stream miles rather than total acres. All mileage figures throughout the rule and in the tables have been checked for consistency and adjusted where necessary.

General Comments Issue 1: Biological Concerns

(9) Some commentors have noted that we have misinterpreted or over-extrapolated information from various sources, in particular the proposed rule did not appear to include any studies that specifically define ranges for ''fine sediment'' or ''substrate embeddedness''; therefore, the phrase ''low or moderate amounts'' appears open to subjective interpretation.

Our response: For purposes of critical habitat designation, low to moderate amount of substrate embeddedness means embeddedness that does not preclude deposition of eggs among sand and gravel for spikedace, or on the undersurfaces of large rocks for loach minnow. Please see the discussion under ''Substrates'' for both spikedace and loach minnow for additional information.

(10) *Comment:* The statement within the proposed rule that ''Flooding, as part of a natural hydrograph, temporarily removes nonnative fish species, which are not adapted to flooding'' is an over-generalization. Minckley and Meffe (1987) concluded that nonnative fishes fared poorly in canyon reaches by noting that some nonnative species like green sunfish and smallmouth bass rebounded quickly from floods because they were stream-adapted. Flooding may also kill or displace native fishes. Some native fishes exhibit the potential to reproduce quickly after flooding, which could account for some of the effects reported by Minckley and Meffe (1987).

Our response: We have adjusted the text to better reflect Minckley and Meffe (1987).

(11) *Comment:* The most thriving populations of these fishes tend to be in flood blasted, warm, shallow, braided channel refugia and at places where vehicles splashed through streams, inside corrals (through which streams flowed), and in river channels within mine sites which are regularly bulldozed. The loach minnow is thriving on private land at a mine where heavy trucks cross the road several times a day, resulting in an area that is shallow and full of sediment.

Our response: We disagree with this conclusion. While spikedace and/or loach minnow are sometimes found in association with low water crossings, and while flooding is an important component of habitat maintenance for these species, we are not aware of any locations where they occur in streams flowing through corrals or within mine sites which are regularly bulldozed. We currently have survey records dating from the late 1800s to the present for these species, as well as numerous studies that detail the habitat requirements for the species, all of which indicate that they occur in habitat different than that described by the commenter.

(12) *Comment:* The Gila River is not critical habitat for the minnows because extreme flood waters may kill small fish. Small streams are better suited for small fish, because large fish will predate on the smaller fish.

Our response: Please refer to the discussion on ''Flooding'' below under the PCE discussion for spikedace. As noted in that discussion, Minckley and

Meffe (1987, p. 99–100) studied the differential responses of native and nonnative fishes in seven unregulated and three regulated streams or stream reaches that were sampled before and after major flooding. They noted that fish faunas of canyon-bound reaches of unregulated streams invariably shifted from a mixture of native and nonnative fish species to predominantly, and in some cases exclusively, native forms after large floods.

(13) *Comment:* One commenter notes that many of these minnows can be seen in the Gila River.

Our response: While spikedace and loach minnow do occur in the Gila River, it is important to note that the ''minnows'' seen in the Gila River may or may not be spikedace or loach minnow. There are approximately 235 species of fishes that are within the minnow family, Cyprinidae, in North America (Bond 1979, p. 170). Spikedace and loach minnow are members of this family. Other small-bodied, native minnows which are more commonly found within the Gila River include longfin dace (*Agosia chrysogaster*) and speckled dace (*Rhinichthys osculus*). These fish, even as adults, can be confused with spikedace and loach minnow. There are several other species which are technically minnows and may be confused with spikedace and loach minnow when young. These include native roundtail chub (*Gila robusta*) and nonnative common carp (*Cyrpinus carpio*), goldfish (*Carassius auratus*), and fathead minnow (*Pimephales promelas*) (Lee *et al.* 1980, pp. 140–367).

(14) *Comment:* Spikedace were last seen in the Verde River in 1999. They may already be extinct.

Our response: Because the last record for spikedace on the Verde River was from 1999, this area still meets the 10-year occupancy criteria used in developing the critical habitat. We are also aware of gaps in the survey record in which spikedace were not found for greater than 10 years, but then reappeared. Surveys do not allow for 100 percent detection of a species, particularly for species such as spikedace that are hard to detect.

General Comments Issue 2: Procedural and Legal Compliance

(15) *Comment:* Several commenters requested a 60-day extension of the comment period, or indicated that two public hearings and the comment periods provided were inadequate to provide comment on the proposed rule, draft economic analysis, and the draft environmental assessment.

Our response: We believe the three comment periods allowed for adequate opportunity for public comment. A total of 100 days was provided for document review and the public to submit comments.

(16) *Comment:* Reintroduction of the spikedace and loach minnow to the Verde River will result in killing and poisoning of the non-native fish, leaving the public with a non-fishable river. The general public will be banned from setting foot or paddling on the river area or using the Verde River for recreation.

Our response: The designation of critical habitat does not entail reintroduction efforts of spikedace or loach minnow. In addition, designation of critical habitat does not set up wildlife refuges or preserves, or require the exclusion of all other uses. Critical habitat was designated previously on the Verde River for spikedace and loach minnow from 2000 to 2004, during which time recreation and use of this area by the public continued.

(17) *Comment:* The Service appears inconsistent in their critical habitat designations in terms of the lateral extent of the critical habitat designation. There is no reference for best scientific evidence in the determination of 300 ft (91.4 m) as lateral extent. Prior rulings for razorback sucker, Colorado pikeminnow, humpback chub, and bonytail chub define the lateral extent of critical habitat as the 100-year floodplain where PCEs occur, with the caveat that potential areas of critical habitat should be evaluated on a case by case basis. The final ruling for woundfin and Virgin River chub use the 100-year floodplain.

Our response: Although we considered using the 100-year floodplain, as defined by the Federal Emergency Management Agency (FEMA), we found that it was not included on standard topographic maps, and the information was not readily available from FEMA or from the U.S. Army Corps of Engineers for the areas designated as critical habitat, possibly due to the remoteness of various stream reaches. Therefore, we selected the 300-foot lateral extent, rather than some other delineation, for three reasons: (1) The biological integrity and natural dynamics of the river system are maintained within this area (i.e., the floodplain and its riparian vegetation provide space for natural flooding patterns and latitude for necessary natural channel adjustments to maintain appropriate channel morphology and geometry, store water for slow release to maintain base flows, provide protected side channels and other protected areas, and allow the river to meander within its main channel in response to large flow events); (2) conservation of the adjacent riparian area also helps provide nutrient recharge and protection from sediment and pollutants; and (3) vegetated lateral zones are widely recognized as providing a variety of aquatic habitat functions and values (e.g., aquatic habitat for fish and other aquatic organisms, moderation of water temperature changes, and detritus for aquatic food webs) and help improve or maintain local water quality (see U.S. Army Corps of Engineers' final notice concerning Issuance and Modification of Nationwide Permits, March 9, 2000, 65 FR 12818–12899). Please see the section entitled ''Lateral Extent'' below for more information. In addition, in more recent rules we have used the 300 ft (91.4 m) width to define the lateral extent of critical habitat for the Rio Grande silvery minnow (February 19, 2003; 68 FR 8088), the Gila chub (November 2, 2005; 70 FR 66664), and the Arkansas River shiner (October 13, 2005; 70 FR 59808).

(18) *Comment:* A designation of 300 ft (91.4 m) may impact roads or facilities. Roads or facilities impacted by flooding may require periodic maintenance. Additionally, if a river shifts in response to flooding, critical habitat would have to shift and potentially affect the rebuilding of diversion structures. The proposed rule does not address what happens when a river channel moves.

Our response: Prior critical habitat designations for spikedace and loach minnow from 2000 to 2004 did not prevent maintenance or rebuilding of structures damaged by flooding nor will this final designation. Where critical habitat is designated, activities funded, authorized, or carried out in these areas by Federal action agencies that may affect the PCEs of the critical habitat, may require consultation pursuant to section 7 of the Act. The purpose of the consultation is not to stop activities from occurring, but to ensure that such activities do not result in jeopardy to listed species or adverse modification of critical habitat. When determining final critical habitat map boundaries, we made every effort to avoid including developed areas such as buildings, paved areas, and other structures that lack any PCEs for the spikedace and loach minnow. Any such structures and the land under them inadvertently left inside critical habitat boundaries of this final rule are excluded by text and are not designated as critical habitat. Specifically, lands located within the boundaries of the critical habitat designation, but that do not contain any of the PCEs essential to the conservation of the spikedace and loach minnow

include: Existing paved roads; bridges; parking lots; railroad tracks; railroad trestles; water diversion and irrigation canals outside natural stream channels; active sand and gravel pits; regularly cultivated agricultural land; and residential, commercial, and industrial developments.

Critical habitat includes the area of bankfull width plus 300 ft (91.4 m) on either side of the banks. Should the active channel meander or shift we anticipate that it would still be contained within the 300 foot (91.4 m) lateral extent of the designation (i.e. our current critical habitat boundary); thus we do not find that critical habitat will shift as a result.

(19) *Comment:* The 300 ft (91.4 m) lateral extent likely represents an expansion of critical habitat to areas that are not necessarily riparian habitat, particularly on small streams.

Our response: Although the spikedace and loach minnow cannot be found in the riparian areas when they are dry, these areas are periodically flooded and provide habitat during high-water periods. These areas also contribute to PCEs 1 and 2 and contain PCEs 3 and 5. As noted in response to 18 above, vegetated lateral zones are widely recognized as providing a variety of aquatic habitat for fish and other aquatic organisms, moderation of water temperature changes, and detritus for aquatic food webs, and help improve or maintain local water quality.

(20) *Comment:* The 300 ft (91.4 m) designation needs additional defining. It is unclear if it is to be measured up to the slope of the bank or horizontally on a map. In many reaches of the specific rivers and streams in the designation, the flowing channels are confined within narrow canyon bottoms, and a 300 ft (91.4 m) buffer in some cases extends several hundred feet vertically up the side of the canyon. In addition, bankfull width, while scientifically valid and useful, may be hard to determine in the field.

Our response: Critical habitat includes the area of bankfull width plus 300 ft (91.4 m) on either side of the banks, except where bordered by a canyon wall. Since a canyon wall is not defined as a PCE for the spikedace and loach minnow it would not be considered critical habitat. The 300 foot lateral extent is not for the purpose of creating a ''buffer zone.'' Rather, it defines the lateral extent of those areas we have determined contain or contribute to the features (PCEs 3 and 5) that are essential to the conservation of these species (e.g., water quality, food source, etc.).

(21) *Comment:* The Service is inconsistent in its treatment of, and fails to properly analyze the impacts of, groundwater wells and other potential detrimental activities that are located outside the 300 ft (91.4 m) lateral extent of critical habitat.

Our response: Activities funded, authorized, or carried out by Federal action agencies that may affect the PCEs of the critical habitat, may require consultation pursuant to section 7 of the Act. Thus, groundwater pumping activities may require consultation pursuant to section 7 of the Act if the action agency determines that the activity may affect the PCEs for the spikedace or loach minnow, regardless of whether the activity is occurring within or outside the critical habitat designation.

(22) *Comment:* The Service should designate the areas within the active floodplain that are necessary to support the PCEs of spikedace and loach minnow critical habitat for the recovery of the species, as demonstrated by the best available science. We suggest that the Service look at hydrogeomorphic and biological features to determine the width along each segment where the PCEs are likely to exist. Such information may include specific return intervals (5-, 10-, 50-year events), floodplain features (ordinary high water mark), or floodplain vegetation as indicators of important habitat, which can be mapped in the field along with bankfull flow width.

Our response: As noted in our response to comment 17 above, we do not have this type of information available to us and thus we selected the 300 ft (91.4 m) lateral extent as the best available science to map the areas that contain or contribute to the features that are essential to the conservation of these species.

(23) *Comment:* The best scientific information currently available recognizes that for most native fish species, conservation cannot be achieved without eliminating or greatly suppressing nonnative fishes (Clarkson et al. 2005). The common nonnative fish occupying the same or overlapping geographic areas with spikedace and loach minnow are known to compete with or prey on all life stages of native fish (Pacey and Marsh 1998). Thus, where nonnative fishes have high abundance, and where there is limited opportunity or ability for the Service to manage these nonnative species due to physical constraints of the river system or political/social constraints, these segments are unlikely to provide important habitat for any of the spikedace and loach minnow life stages regardless of the condition of other PCEs. Nonnatives are especially a problem for the San Francisco River, Gila River, and Eagle Creek.

Our response: Critical habitat designation is not the process through which we rule out habitat suitability due to threats, but the process through which we identify habitat that provides for one or more of the life history functions of the species. As defined in section 3(5)(A) of the Act, critical habitat means ''(i) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of the Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection.'' During the designation process, the Service identifies threats to the best of our ability where they exist. Identification of a threat within an area does not mean that that area is no longer suitable, rather that special management or protections may be required. If an area contains sufficient PCEs to provide for one or more of the life history functions of spikedace or loach minnow, and if it was occupied at the time the species was listed and is currently occupied, it is reasonable to include it within a proposed critical habitat designation. The need to address a particular threat, such as nonnative fishes, in a portion of the critical habitat designation may or may not arise in the future. Further, describing both the areas which support PCEs and the threats to those areas assists resource managers in their conservation planning efforts for threatened and endangered species like spikedace and loach minnow.

(24) *Comment:* Absent clear scientific evidence that intermittent stream reaches are used by spikedace or loach minnow to move between occupied habitats, and are critical to their recovery, the fifth PCE should not be included as part of the final designation.

Our response: It was not our intent to imply that spikedace or loach minnow occupy intermittent reaches when water is not present. We included interconnected waters because spikedace and loach minnow have the ability to move between populated, wetted areas, at least during certain flow regimes or seasons. Because streams provide continuous habitat when connected, and because fish are mobile, it is reasonable to conclude that intermittent areas, when wetted, may be used during fish movement. In addition, some complexes include stream reaches that play a role in the overall health of

the aquatic ecosystem, and therefore, the integrity of upstream and downstream spikedace and loach minnow habitat. Again, because stream habitat is continuous, actions taking place in an intermittent portion of the channel can have effects in upstream and downstream areas. Inclusion of these intervening areas assures protection of adjacent, perennial reaches.

(25) *Comment:* There is no record or document that summarizes or describes in detail the PCE conditions that the Service used as a decision-making tool to select reaches.

Our response: As stated under the ''Critical Habitat'' subheading in the final rule, the areas included within the proposed critical habitat designation are based not only on PCE conditions, but also on whether or not an area was occupied at listing and may require special management considerations or protections. There is no single record or document that summarizes this information. Instead, the Service looked at various databases and survey records to determine occupancy, as well as habitat descriptions at various locations. We relied on information provided in survey reports and research documents to describe conditions at various locations. This information was then synthesized to develop the proposed critical habitat designation.

(26) *Comment:* As a final step before the issuance of the proposed rule, the Service should have ranked the suitable habitat to determine which areas possess the highest quality of PCEs. Based on this ranking, the Service would then have published the proposed rule designating the portions of suitable habitat needed to achieve recovery goals. The proposed rule would have also described areas of suitable habitat identified by the Service but not included in the proposed rule.

Our response: The regulations governing critical habitat designations do not require ranking of suitable habitat. With species such as spikedace and loach minnow, whose current distribution is severely reduced compared to historical distribution, determining the highest quality of PCEs is not a useful tool in developing a recommendation, and inclusion of only the highest ranking areas would not be sufficient for recovery of these species. The Service has developed a rule set that we have determined identifies those areas to be included as final critical habitat. We have coupled that rule set with the best scientific and commercial information available regarding species distribution, habitat parameters, and life history, and have included those areas within the designation.

(27) *Comment:* The preamble articulates the following important concept: ''Where a subset of PCEs are present (e.g., water temperature during spawning), only those PCEs present at designation will be protected.'' This concept should be reflected in the rule language itself. The proposal is not always clear as to what PCEs are present in each stretch of river. For example, with respect to the 39 mile stretch of the Gila River included in the proposal, the preamble states only that it contains ''one or more'' of four PCEs. This creates uncertainty about what PCEs are present in which segments, which could in turn cause difficulties in future section 7 consultations regarding possible adverse effects on critical habitat.

Our response: Within the discussion immediately following Table 1, PCEs are described for each complex. For example, for the 39 mile stretch of the Gila River addressed in this comment, the proposed rule states that ''Those portions of the Gila River proposed for designation contain one or more of the PCEs, including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., pools, riffles).'' This information should be useful in future section 7 consultations.

(28) *Comment:* Page 75556 of the proposed rule states ''Where a subset of the PCEs are present (e.g., water temperature during spawning), only those PCEs present at the time of designation will be protected.'' Implementation of this misguided approach negates the conservation value of the critical habitat designation because lack of perennial water, appropriate stream habitat, or high abundance of predatory nonnative fish precludes the survival or recovery of spikedace or loach minnow. We believe the Service needs to fully consider the implication of this language in the Proposed Rule, and reevaluate the proposed reaches in light of the need to contain all PCEs at the time of designation, especially those reaches that contain high numbers of nonnative fish species.

Our response: Stream complexes as part of this final rule making were designated based on sufficient PCEs being present to support spikedace and loach minnow life processes. Some complexes contain all PCEs and support multiple life processes. Some segments contain only a portion of the PCEs necessary to support the spikedace and loach minnow's particular use of that habitat. Where a subset of the PCEs are present (such as water temperature during migration flows), it has been noted that only PCEs present at designation will be protected.

(29) *Comment:* With respect to the PCEs, an additional quantitative value that should be measured is the large wood present in a system.

Our response: We agree that large wood is an important factor to analyze in assessing riparian ecosystem health; however, we are not aware of any data at this time that illustrates what amount of large woody debris within a system would constitute ideal conditions for spikedace and loach minnow. Should such information be developed in the future, it would be another useful factor in evaluating river system health and habitat suitability for spikedace and loach minnow.

(30) *Comment:* Flow velocity values should be in feet per second, which is a more appropriate field estimate and ensures greater accuracy between readings and reader. These values can also be better correlated with historical and stream gauge data.

Our response: While it may be more useful to report flow velocity values in feet per second, it is our practice to use values and units of measurement as they were reported by the author of the research summarized.

(31) Microhabitat flows are highly related to habitat complexity. Though it is appropriate to define these flows, there should be more emphasis on habitat complexity and the functions needed to create it such as floodplain interaction, riparian condition, and large wood recruitment.

Our response: We believe the final rule accomplishes both of these objectives. We have chosen to consider overall riparian health, as well as floodplain interaction and stream health, by including riparian vegetation and floodplain areas within the critical habitat designation, as encompassed by the 300 foot lateral zone. In addition, we have attempted to define key components of occupied habitat, as defined in the PCEs. One of those components relates to flow velocities. We have incorporated the information we have relevant to spikedace and loach minnow within the rule.

(32) *Comment:* Because microhabitat is variable and transient, gradient values should be more generalized and at the geomorphic reach level.

Our response: We are required to use the best scientific and commercial information available. At this time, no assessment of gradient values at a geomorphic reach level has been completed for occupied or suitable spikedace and loach minnow habitat.

(33) *Comment:* In evaluating riparian habitat, there should be two or more native, riparian-obligate woody species and two or more riparian-obligate herbaceous species present and vigorous (Winward 2000). In terms of species diversity, all four age classes of native, riparian-obligate woody species must be present and vigorous. These classes are seedling/sprout, young/sapling, mature/decadent, and dead (Winward 2000).

Our response: We agree that a diversity of composition leads to healthier riparian habitat; however, we do not have sufficient information of this type tied to occupied spikedace and loach minnow critical habitat to use in developing an individual PCE. The individual PCEs represent the actual physical and biological parameters of habitat used by the fish.

(34) *Comment:* Conflicting comments were received on the temperature ranges listed within the PCEs for spikedace and loach minnow. In summary, we received comments that the PCE temperature range is broader (35 to 85 °F) than the literature indicates (48.2 and 71.6 °F), with the potential net effect being an extension of stream reaches both upstream and downstream from areas actually likely to support the species. A second commenter noted that the Bonar et al. (2005) study found 100 percent survival of loach minnow at 28 °C (82 °F) and 100 percent survival of spikedace at 30 °C (86 °F) corresponded quite well with upper limits in the proposed rule PCEs. A third commenter noted that appropriate values should be a maximum seven day average.

Our response: We have reviewed the study completed by the University of Arizona (Bonar et al. 2005) and incorporated its findings into discussions of temperature tolerances within the final rule. The PCEs serve as guidelines to resource managers in evaluating the suitability of areas for spikedace and loach minnow. Temperature ranges provided are based on the studies completed at various occupied locations, and adequately represent the habitat most suitable for spikedace and loach minnow. In most instances, resource managers do not have the ability to develop seven day averages. With respect to broadening the range of the species by incorporating too wide a range of suitable temperatures, we note that we are using the Act's standard of best available scientific information, and should temperatures at these sites be found at the high point of the range provided in this PCE, it would already be within an area occupied by the species, so the species' range would not be broadened.

(35) *Comment:* Water depths of 1 to 30 inches are specified as a PCE for adult, juvenile, and larval loach minnow. No data or references are cited to support any specific range of depths. Additionally, pools aren't appropriate for spikedace and loach minnow, but are suitable for predatory non-natives that are significantly detrimental.

Our response: Water depths are known for all occupied spikedace and loach minnow sites, as discussed below. Therefore, the range described in the PCEs reflects the range considered to provide suitable habitat for these fishes by biologists familiar with the species.

Spikedace and loach minnow are less likely to use pool habitat than other types of habitat, however, Sublette et al. (1990, p. 138) and Propst et al. (1986, p. 40) note that spikedace juveniles and larvae are occasionally found in quiet pools or backwaters lacking streamflow (Sublette et al. 1990, p. 138). Barber et al. (1970, pp. 11–12) also noted that female spikedace occupy deeper pools and eddies during portions of the breeding season. In addition, Schreiber (1978, pp. 40–41) found that the availability of pool and run habitats affects availability of prey species consumed by loach minnow.

(36) *Comment:* Virtually any perennial stream above 3,000 feet elevation in Arizona displays the characteristics cited by the Service in its PCEs and thus they are not particularly helpful in identifying the areas necessary for the conservation of the spikedace and loach minnow.

Our response: The PCEs are based on the range of criteria developed following review of research conducted at occupied spikedace and loach minnow sites. Use of the PCEs alone may result in the inclusion of most streams above 3,000 feet in elevation. However, coupled with occupancy information and the geographic range of the species, we are able to identify final critical habitat for the spikedace and loach minnow.

(37) *Comment:* Flood magnitude and frequency deserve careful consideration and incorporation as part of a ''flood frequency and magnitude'' PCE. The Service has failed to include important hydrologic features in the analysis of current habitat for spikedace and loach minnow.

Our response: We agree that flooding is a key process in maintaining suitable habitat components for spikedace and loach minnow, and have addressed this in PCE 2. A PCE focused strictly on flooding would be difficult to define, as there is considerable variability in the flood magnitude and frequency of different systems. More importantly, flooding itself would be inappropriate as a PCE as flooding is a process that maintains the necessary components of occupied habitat, whereas PCEs are the features essential to the conservation of the species. We determine those physical and biological features that are essential to the conservation of a given species and that may require special management considerations or protection, rather than looking at the processes that aid in developing those features 50 CFR 424.12(b).

(38) *Comment:* Although the five PCEs appear to be generally correct, they are describing fine-grained characteristics applicable to a square-meter by square-meter assessment. Only two PCEs are coarse-grained; (1) reaches devoid of nonnative fish, and (2) stream reaches that flow sporadically and provide connective corridors between occupied and seasonally occupied reaches. The other PCEs are focused on the biological requirements for individual fish, rather than the population or the species to which it belongs.

Our response: We disagree with the commenter on this point. It is true that the PCEs focus on the biological needs of the individual fish, but collectively, the biological needs of the fish represent the biological needs of the species. As previously noted, critical habitat, as stated in the Act, is defined as ''* * * specific areas * * * on which are found the physical or biological features (I) essential to the conservation of the species * * *.'' The Service has determined that the PCEs, as defined by studies in occupied areas, define the features essential to the conservation of the species.

(39) *Comment:* We request exclusion of all areas within roadway right-of-ways or easement limits because section 7 is required in these areas for projects affecting threatened and endangered species. Designation within right-of-ways would have no additional benefit.

Our response: Developed lands, including roadway right-of-ways, do not contain the PCEs essential to the conservation of the spikedace and loach minnow. Federal action agencies are only required to consult on activities they authorize, fund, or carry out that may affect the physical or biological features determined in this rule to be essential to conservation of these fish. See also response to comment 18 above.

(40) *Comment:* The Bureau of Reclamation lands are on the lower San Pedro River and not the Gila River. This mistake is also continued in the regulation promulgation section.

Our response: According to GIS landownership layers from the Arizona

Land Resource Information System of the Arizona State Land Department, the Bureau of Reclamation lands referenced by the commenter are on the Gila River beginning at Township 4 South, Range 13 West, section 3.

(41) *Comment:* The critical habitat designation allows for exclusions when special management considerations are not required based on management plans. This policy should allow for land management agencies to adopt species management plans.

Our response: In this final rule, our exclusion of areas covered by management plans was made pursuant to section 4(b)(2) of the Act, where we determined that the benefits of exclusion outweighed the benefits of inclusion. These determinations were not hindered by landownership.

(42) Ten years is insufficient to determine presence or absence of spikedace and loach minnow given the elusiveness of the species, the difficulty of obtaining a thorough sampling of remote streams with difficult access, and the low efficiency of sampling techniques. There is greater biological support to use a period of 20 to 40 years as the standard for determining ''occupancy.''

Our response: We believe a period of 10 years is reasonable to determine occupancy based on the fact that both species are difficult to detect in surveys, surveys have been infrequent or inconsistent because many of the areas where they occur are remote, and we have areas where these species were not detected for long periods of time (44 years) and then detected again. Specifically, the methodology used considers a stream segment occupied if the spikedace or loach minnow has been detected in the last 10 years or if the stream segment is connected to a stream segment with spikedace or loach minnow records within the last 10 years. For example, we consider the lower San Pedro River and the Gila River ''occupied'' due to their connections with Aravaipa Creek, an area where we have documented records of these fish from within the last 10 years. We have determined our methodology is reasonable to determine areas that meet the definition of critical habitat.

(43) *Comment:* With respect to occupancy, we do question the assumption that all stream segments with a ''direct connection'' to occupied areas are themselves occupied. There is little scientific basis for this assumption.

Our response: The language within the rule states ''We consider an area to be occupied by the spikedace or loach minnow if we have records to support occupancy within the last 10 years, or where the stream segment is directly connected to a segment with occupancy records from within the last 10 years.'' While we do not have occupancy records for these connected areas within the last 10 years, we believe it is reasonable to consider these connected areas to be occupied for the purposes of critical habitat as they are part of a larger contiguous complex with documented occupancy within the last 10 years. We consider it reasonable because of the elusiveness of the species, the difficulty of obtaining a thorough sampling of remote streams with difficult access, and the low efficiency of sampling techniques.

(44) *Comment:* The North Fork of the White River and the mainstem White River downstream of the confluence of the North and East Forks should be included in the designation. Records of loach minnow within the last 10 years exist for both streams.

Our response: These stream segments occur on Tribal lands and we have no information available to us to conclude that these areas meet the definition of critical habitat for the loach minnow. Please see ''Relationship of Critical Habitat to Tribal Lands'' below for additional discussion of Tribal management plan and protections that exist for these fish on those lands.

(45) *Comment:* The Service should use wording similar to that used in the 2000 critical habitat designation which states ''We have determined the primary constituent elements essential to the conservation of spikedace include, but are not limited to * * *.'' This provides for inclusion of new scientific information without the need for cumbersome and expensive reproposal of critical habitat.

Our response: We have determined the revised language provides more specifics and certainty about the PCEs, and any revisions to a regulation as a result of new information may only be made through a new rulemaking process.

(46) *Comment:* The proposed rule incorrectly paraphrases the regulatory definition of destruction or adverse modification of critical habitat. The paraphrased definition limits analysis of destruction or adverse modification to ''those physical or biological features that were the basis for determining the habitat to be critical'', a limitation not found in the regulatory definition. Instead, the regulatory definition directly addresses effects to the critical habitat rather than a surrogate. The paraphrased definition also omits the regulatory definition's inclusion of diminution of the values of ''both the survival and recovery of a listed species.''

Our response: The Service no longer relies on the regulatory definition of adverse modification of critical habitat. Instead the Service relies on the statutory provision of the Act to complete the analysis on critical habitat. Please see ''General Principles of Section 7 Consultations Used in the 4(b)(2) Balancing Process'' below for additional information.

(47) *Comment:* There is no ''sufficiently unregulated hydrograph'' on the Gila River below its confluence with the San Pedro River. We do not believe the PCEs identified by the Service in the proposal are present in this stretch. This section of the Gila River (below the San Pedro) should be removed from the critical habitat designation.

Our response: While it may not contain all of the PCEs, we have determined it currently supports one or more of them (i.e., low gradient, appropriate water temperatures, and pool, riffle, run, and backwater components), and because of this and its proximity to occupied areas, it remains in the designation.

(48) *Comment:* We dispute the claim that spikedace occupancy of the Verde River was confirmed as recently as 1999. No spikedace have been confirmed from the Verde River since at least 1995. Thus, the Verde River does not meet the Service's own criteria for critical habitat because there are no records within the last 10 years.

Our response: The 1999 record is considered by the Service as a confirmed record. The spikedace in question was captured and identified by a qualified AGFD fisheries biologist (AGFD 2004).

(49) *Comment:* The large amount of privately owned land that is included in the proposal is too great of a restriction of use.

Our response: Critical habitat does not affect private actions on private lands. A designation of critical habitat requires that Federal action agencies consult with the Service on activities that they fund, authorize, or carry out that may affect critical habitat. We note that the designated 105 mi (170 km) for spikedace and the 126 mi (203 km) for loach minnow of private lands is part of, not in addition to, the total 522 mi (840 km).

(50) *Comment:* The adverse impacts of critical habitat on non-Federal rights and interests were exacerbated under Gifford Pinchot, which increases the impact of a critical habitat designation on water and land uses by creating a heightened standard for the

''destruction or adverse modification'' of critical habitat. More activities that require a Federal permit or other approval will violate section 7(a)(2) of the Act and will require formal consultation. When combined with the Service's use of section 7(a)(2) to ''Federalize'' and control non-Federal projects, Gifford Pinchot will dramatically increase the economic impacts caused by the critical habitat designation.

Our response: We recognize that under the Gifford Pinchot decision, critical habitat designations may provide greater benefits to the recovery of a species. This relates to the court's ruling that the two standards (e.g. jeopardy and adverse modification) are distinct and that adverse modification evaluations require consideration of impacts on the recovery of species. As such, where appropriate, we analyze or consider the effects of the Gifford Pinchot decision in this rule, the economic analysis, and the environmental assessment. For example, in light of the uncertainty concerning the regulatory definition of adverse modification, our current methodological approach to conducting economic analyses of our critical habitat designations is to consider all conservation-related costs. This approach would include costs related to sections 4, 7, 9, and 10 of the Act, and should encompass costs that would be considered and evaluated in light of the *Gifford Pinchot* ruling. Additionally, in this critical habitat designation, we are designating areas that are occupied, as defined elsewhere in this rule, by one or both species; thus, there is already a requirement for consultation with the Service over any water and land use actions that may affect these species. The purpose of the consultation process is not to ''Federalize'' private projects, but to ensure that federally-sponsored activities do not jeopardize listed species or adversely modify or destroy designated critical habitat.

(51) *Comment:* The Gila Settlement and associated agreements allow the State of New Mexico to divert for consumptive use 14,000 acre feet of water originally set aside under the Central Arizona Project authorizing legislation. The diversion of this additional 14,000 acre-feet of water almost doubles current adjudicated withdrawal from the Gila and San Francisco rivers and could significantly impair river function and riparian conditions and threaten native species such as the loach minnow and spikedace.

Our response: The Service is an active partner on the Gila and San Francisco Rivers Technical Subcommittee, which is evaluating the environmental impacts of these water diversions from the upper Gila and San Francisco rivers. Considerations for spikedace and loach minnow are prominent in those discussions. We have identified water diversions as a threat for spikedace and loach minnow within this complex.

(52) *Comment:* The Upper Eagle Creek Watershed Association has developed a watershed plan in collaboration with the Forest Service and the Arizona Department of Environmental Quality. This plan has addressed the loach minnow and spikedace as endangered fish that may occupy areas covered by the plan. The plan guides the community, permittees, and agencies in developing the Upper Eagle Creek Watershed into its greatest potential for all species. On the basis of this plan and the partnership with the people on the land with all agencies, it would be best to exclude Eagle Creek from the critical habitat designation.

Our response: We appreciate the efforts the Upper Eagle Creek Watershed Association has taken to work collaboratively with the Forest Service, cooperators, and the Service. Unfortunately, the Upper Eagle Creek Watershed Management Plan was received on the last day of the third comment period, and was still in draft form. For these reasons, we are not able to consider the plan as a basis for excluding Eagle Creek at this time. We understand it is the intention of the Association to finalize and implement the plan, and we look forward to working cooperatively with the Association in these efforts. Once the plan has been finalized and implemented, we have the option of excluding those portions of Eagle Creek covered by the plan. As discussed in ''Exclusions under Section 4(b)(2) of the Act'' below, we have excluded other portions of Eagle Creek from critical habitat based on other information available to us.

(53) *Comment:* The Blue River should be excluded from critical habitat in order to ensure that the ongoing coordination between the Service and the Blue River Native Fisheries, Research and Education Center is unencumbered.

Our response: At this time we have no documentation, such as a management plan, to evaluate in terms of a potential exclusion of the Blue River from the critical habitat designation. Additionally, the majority of property along the Blue River is under Forest Service management and management activities for the conservation of the spikedace and loach minnow would require coordination with the Forest Service. We fully intend to continue our ongoing coordination with the Blue River Native Fisheries, Research and Education Center. The designation of critical habitat is a separate process which will not hinder these efforts and we commend the Center for their interest in conserving the Blue River.

(54) *Comment:* The Service should remove the Middle Verde River from the final rule and retain the Upper Verde River segment as critical habitat based on: (1) The current biological conditions within each river segment to conserve the spikedace; (2) the existing physical barrier (i.e., Allen Ditch Diversion) between the Upper and Middle Verde River, which likely precludes movement and connectivity between reaches; (3) the prevailing technical feasibility and fisheries management emphasis of each river segment; and (4) the high potential economic burden to groundwater and surface water users in the Middle Verde River (i.e., Verde Valley) compared to the Upper Verde River.

Our response: Pursuant to section 4(b)(2) of the Act we have excluded the lower portion of the Verde River based on economic costs. See exclusion discussion below.

(55) *Comment:* One of the requirements of critical habitat is that these areas should be ''protected from disturbance or are representative of the historic geographical and ecological distributions of a species (50 CFR § 424.12(b)(1)–(5); 70 FR 75551; December 20, 2005).'' In other words, if suitable locations are available elsewhere, it does not make sense to designate critical habitat along stream reaches that are already impacted by land or water use activities or will soon be impacted by those activities. The Service applied this criterion in some places (e.g., the upper San Pedro River, p. 75546) and portions of the Black River complex (p. 75560) that were found to have too high an abundance of nonnative fish to be important habitat), but did not apply it in others (i.e., middle Verde River, Gila River, and lower San Pedro River). The Service should apply this criteria and standards consistently to evaluate each PCE among all potentially suitable habitats in a transparent process.

Our response: We do not agree that critical habitat should not be designated in areas that have experienced some level of impact to the habitat. As previously stated, designation of critical habitat focuses on the areas that contain the PCEs and provide for the conservation of the species, rather than the threats that may be present in an area. Thus, our methodology focuses on

occupied areas that contain the PCEs and not on the type or level of threat that occur in these areas. In addition, we note that we have limited suitable habitat remaining for these species such that additional suitable locations are not available elsewhere. See also our response to comment 58 below.

(56) *Comment:* Bear Creek should be designated as loach minnow critical habitat from its junction with the Gila River upstream to the junction with its tributaries Cherry Creek and Little Cherry Creek.

Our response: As noted in the notice to reopen the comment period published on June 6, 2006 (71 FR 32498, p. 32496), we did not propose Bear Creek because of the timeframe for completion of the final rule and associated documents. Information on occupancy of Bear Creek was received late in the process. Should critical habitat be revised in the future, Bear Creek would be considered for inclusion.

(57) *Comment:* Due to seasonal lack of water flows, Eagle Creek is unsuitable habitat for designation below the Gila and Salt River base line to the confluence with Willow Creek. Additionally, from Willow Creek to the Phelps Dodge diversion dam, flows are augmented to provide fresh water for mining operations and for potable use at the Morenci and Clifton townsites. This portion of Eagle Creek does not qualify for designation because: (1) These augmented flows do not provide a natural, unregulated hydrograph that allow for adequate river functions; (2) flow velocities are frequently higher than those required for these native fish; (3) pool, riffle, run, and backwater components are not present; and (4) non-native fish dominate this reach to an extent detrimental to natives and prevents the persistence or even occupancy of loach minnow or spikedace.

Our response: We do not agree with this comment. While this portion of Eagle Creek has been modified by both addition of flows and by the diversion structure, suitable habitat still exists. As stated previously, we consider those areas that meet our definition of occupancy and support one or more of the PCEs as areas the meet the definition of critical habitat. Eagle Creek met these criteria. As discussed below, we have excluded portions of Eagle Creek pursuant to section 4(b)(2) of the Act.

(58) *Comment:* Areas without threats such as the San Francisco and the middle reach of the mainstem Gila River do not require special management considerations or protection and thus can not be designated as critical habitat under the Act. The critical habitat designation will not protect the loach minnow from the threat of nonnatives and therefore special management is not required.

Our response: The Act does not require that critical habitat alleviate threats to the species. We have determined that various threats are present in all the rivers we proposed as critical habitat, as identified in Table 1. As required by the Act and the definition of critical habitat, we provide a discussion of known threats for each area to indicate that the biological and physical features essential to the conservation for these fish may require special management considerations or protection.

(59) *Comment:* Habitat requirements for both of the species are different and the Service should recognize this and not combine them.

Our response: We agree that there are differences in the habitat requirements of both species and we have distinguished this in our PCEs for each of the fish. We note that it is not unusual for streams to support habitat types for both the spikedace and loach minnow, often within the same reach, and some streams are occupied by both species (e.g., the Gila River and Aravaipa Creek).

(60) *Comment:* The proposed rule states that ''individual streams are not isolated, but are connected with others to form areas or complexes.'' This statement does not hold true for Complex 4. Eagle Creek is currently isolated from the San Francisco and Blue River complexes by a diversion dam. The Blue River will become inaccessible to upstream migration from the rest of the complex if a proposed fish barrier is constructed on the Blue River.

Our response: We have clarified the language in this final rule to indicate that collections of streams in proximity to each other were grouped together to form a category called ''complexes.'' Streams need not be hydrologically connected in order to be grouped together.

(61) *Comment:* No spikedace have been observed in Eagle Creek for 17 years, thus the segment does not meet the criteria for occupancy.

Our response: We agree, as the last record for spikedace in Eagle Creek was in 1989. Thus, critical habitat for spikedace in Eagle Creek has been removed from the final rule. However, Eagle Creek is considered critical habitat for the loach minnow. As discussed in the exclusion section below, portions of Eagle Creek have been excluded from the final rule.

(62) *Comment:* For spikedace, the Verde River from Tapco Diversion Dam down to Fossil Creek should be excluded. Although spikedace were found in 1999 in areas upstream, they have not been found downstream of the Sycamore Creek confluence in over 20 years. Although this area is connected to the occupied areas upstream, the Tapco Dam and numerous nonnative fishes occupy this reach and may serve to disconnect it from the upstream areas.

Our response: We believe the Verde River meets the definition of critical habitat for spikedace as we consider this area occupied based on occupancy records from 1999. Additionally, the Verde contains one or more of the PCEs including appropriate flow velocities, gradients, temperatures, habitat components (pool, riffle, run and backwater), and an abundant aquatic insect food base, and it requires special management or protection. However, pursuant to section 4(b)(2) of the Act, we have excluded the lower portion of the Verde River (see ''Exclusions under Section 4(b)(2) of the Act'' below).

(63) *Comment:* Regarding definition of adverse modification, the Service's definition erroneously eliminates congressional intent that critical habitat designations provide protection not just to survival of a species but to its recovery as well. It was the opinion of the court that ''the purpose of establishing 'critical habitat' is for government to carve out territory that is not only necessary for the species' survival but also important for the species' recovery.'' (*Sierra Club* v. *USFWS*, 245 F.3d 434 (5th Cir. 2001). The proposed rule for spikedace and loach minnow rejects that approach and relies on Service policy limiting critical habitat to only those areas occupied by the species.

Our response: The Act states, at section 3(5)(c), that except in particular circumstances determined by the Secretary, critical habitat shall not include the entire geographical area which can be occupied by the threatened or endangered species. Thus, it is not the intent of the Act that we designate critical habitat in all areas that have the potential to become suitable habitat or in all areas of historic habitat. We have determined that our methodology for determining those areas containing features essential to the conservation of the spikedace and loach minnow complies with the intent of the Act and does not include all areas which can be occupied. Our methodology resulted in areas being proposed as critical habitat that are within the geographical range occupied by the spikedace and loach minnow and

that contain the biological or physical features essential to their conservation and that may require special management.

(64) *Comment:* The approach proposed by the Service for determining whether to exclude Tribal lands from the final rule places undue weight on the argument that inclusion of Tribal lands will compromise government-to-government relations, to the potential detriment of species conservation goals. Additionally, under relevant Federal court precedent in Arizona, the Service is not permitted to rely upon assurances by the tribes that habitat will be ''adequately managed'' through the implementation of Tribal management plans as a basis for exclusion.

Our response: We disagree. See below for our analyses of the exclusion of Tribal lands pursuant to section 4(b)(2) of the Act.

(65) *Comment:* Ten days is not enough time to review all of these new documents. There should be a delay in designating critical habitat until the information can be properly reviewed.

Our response: We agree that the last comment period was shorter than we would have preferred. However, we have an obligation to submit for publication a final rule on December 20, 2005, and thus we were not able to accommodate a longer comment period. In addition, we believe the three comment periods allowed for adequate opportunity for public comment. A total of 100 days was provided for document review and the public to submit comments.

(66) *Comment:* The Phelps Dodge plans should undergo peer review and revision before being considered as sufficient conservation management.

Our response: Although formal peer review of management plans is not conducted or required, the documents are available for public review and comment during the open comment period.

(67) *Comment:* Phelps Dodge's Management Plan does not assure the maintenance of the PCEs for the spikedace and loach minnow.

Our response: We have determined the formation of this working relationship will promote the conservation of the loach minnow and spikedace and their PCEs on Phelps Dodge's property. See exclusion section below for a more detailed discussion of their management plans and analysis of this exclusion.

(68) *Comment:* The proposed rule is an inappropriate venue for changing the regulatory definition of section 7 consultation ''baseline.'' Section 7 regulations (51 FR 19958) define environmental baseline to include 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 projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. The proposed rule would expand that definition to include ''ongoing Federal actions at the time of designation'' regardless of whether they have already undergone formal or early section 7 consultation.

Our response: The language referenced above has been removed from this final rule.

General Comments Issue 3: National Environmental Policy Act Compliance

(69) *Comment:* We believe the analysis in the draft environmental assessment to be simplistic and conclusory (See *Middle Rio Grande Conservancy Dist.* v. *Norton*). The impacts on the environment will be significant and controversial. The critical habitat designation as proposed is likely to result in adverse impacts on riparian areas, not only within the critical habitat itself, but also in the areas located upstream and downstream. The impacts on water use and management are significant and controversial.

Our response: We determined through the EA that the overall environmental effects of this action are insignificant. An EIS is required only if we find that the proposed action is expected to have a significant impact on the human environment. The completed studies, evaluations, and public outreach conducted by the Service have not identified impacts resulting from the proposed designation of critical habitat that are clearly *significant.* The Service has afforded substantial public input and involvement, with two public hearings and open houses. Each of these events had a small participation level by the public (less than 10 in Arizona, less than 20 in New Mexico, and less than 30 written comments on the draft environmental assessment). Based on our analysis and comments received from the public, we prepared a final EA and made a Finding of No Significant Impact (FONSI), negating the need for preparation of an EIS. We have determined our EA is consistent with the spirit and intent of NEPA. The final EA, FONSI, and final economic analysis provide our rationale for determining that critical habitat designation would not have a significant effect on the human environment. Those documents are available for public review (see **ADDRESSES** section).

(70) *Comment:* The draft EA fails to consider the impacts of critical habitat on the Arizona Water Settlements Act of 2004, which authorizes the exchange of Central Arizona Project (CAP) water diverted from the Colorado River into New Mexico from the Gila River. The project is reasonably foreseeable because New Mexico recently negotiated and executed an exchange agreement. The draft EA (p. 45) acknowledges the project but fails to discuss the impacts.

Our response: Page 49 of the EA states that the San Carlos Apache Tribe is concerned that the designation of critical habitat for the spikedace and loach minnow would further complicate the procedure for getting the CAP project approved. The Bureau of Reclamation states that this project would be reevaluated before an exchange could occur and a new consultation is likely.

(71) *Comment:* The Service failed to consider a reasonable range of alternatives to the proposed action in its EA.

Our response: We disagree. The draft EA considered a no-action alternative and several action alternatives and analyzed the adverse and beneficial environmental impacts of each.

(72) *Comment:* One alternative that seems worthy of consideration is the designation of known occupied habitat, rather than the designation of an entire stream based upon limited sightings in a limited area (e.g., Eagle Creek) or consideration of designating only Federal lands. The Service's failure to ''rigorously explore'' and evaluate reasonable alternatives is per se arbitrary and capricious.

Our response: We disagree. The alternatives considered are consistent with the purpose and need of the action of designating critical habitat. In compliance with the Act, we must propose for designation those areas that we have determined are essential, as well as those areas containing features essential, to the conservation of the spikedace and loach minnow. Only considering Federal lands for designation would not, in this case, comply with the intent of the Act. As discussed elsewhere in this rule, the areas proposed for designation were based on our definition of occupancy. See also response to comment 71 above.

(73) *Comments:* In the NEPA analysis, it should be recognized that there are positive aspects that have been observed from human culture and interaction. That analysis is required by law.

Our response: The purpose of a NEPA analysis is to determine the potential impacts of a proposed set of alternative actions on the human environment. It is not the purpose of NEPA to evaluate the positive aspects of humans and their environment.

General Comments Issue 4: Economic Analysis

General Methodology

(74) *Comment:* Two commenters recommend that the Economic Analysis discuss impact estimates for the Verde River unit as two separate subunits: An Upper Verde reach from Sullivan Dam to the Allen Diversion and a Lower Verde reach from the Allen Diversion to Fossil Creek.

Our response: The Final Economic Analysis (FEA) incorporates new information received, and separates costs associated with the Upper Verde and Lower Verde River segments where possible. This distinction is made most apparent in sections 7 and 8, and Appendix B of the FEA.

(75) *Comment:* One commenter states that the economic analysis fails to quantify the benefits associated with critical habitat designation. The commenter further states that although the Verde Valley Complex is singled out as the reach where the largest impacts will occur, there is no basis for this conclusion without exploring the ''net impacts'' through incorporation of benefit estimates and comparisons to baseline.

Our response: Section 4(b)(2) of the Act requires the Secretary to designate critical habitat based on the best scientific data available after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. The Service believes that society places a value on conserving any and all threatened and endangered species and the habitats upon which they depend. In our 4(b)(2) analysis below, we discuss the economic benefits of excluding portions of the Verde River and the conservation benefits related to the inclusion of this stream segment. Although, in this case, we are not able to quantify the monetary value of critical habitat benefits in the Verde Valley Complex, we did consider the benefits that may be derived from a critical habitat designation when considering an exclusion pursuant to section 4(b)(2).

The Service's approach for estimating economic impacts includes both economic efficiency and distributional effects. The measurement of economic efficiency is based on the concept of opportunity costs, which reflect the value of goods and services foregone in order to comply with the effects of the designation (e.g., lost economic opportunity associated with restrictions on land use). Where data are available, the economic analysis does attempt to measure the net economic impact. For example, if the fencing of spikedace and loach minnow habitat to restrict riparian access for cattle is expected to result in an increase in the number of individuals visiting the site for wildlife viewing, then the analysis would attempt to net out the positive, offsetting economic impacts associated with their visits (e.g., impacts that would be associated with an increase in tourism spending). However, no data were found that would allow for the measurement of such an impact, nor was such information submitted during the public comment period.

(76) *Comment:* One commenter states that many of the economic impacts attributed to spikedace and loach minnow critical habitat in the Verde Valley could be attributed to razorback sucker critical habitat.

Our response: To the extent possible, the FEA distinguishes costs related specifically to spikedace and loach minnow conservation where multiple species are the subject of a single conservation effort or section 7 consultation. In the case that another species clearly drives a project modification or conservation effort, the associated costs are appropriately not attributed to the spikedace and loach minnow. In Section 6, the FEA includes language that clarifies that the Verde River is designated as critical habitat for the razorback sucker.

Recreational Activities

(77) *Comment:* One commenter expressed concern that the designation of critical habitat will cause a loss of recreational activities on units such as the Verde River.

Our response: Potential changes to recreational activities are discussed in Section 6 of the FEA. Potential impacts on recreational fishing losses are specifically discussed and estimated in Section 6.4.2 of the FEA. Potential costs associated with lost recreational fishing activity on the two stream segments where non-native fish stocking currently occurs are estimated to be $0 to $8.6 million, using a discount rate of seven percent. As noted in Section 6.1.2, the future impact of proposed critical habitat on the stocking regimes in affected reaches is unknown, as is the reduction in fishing activity that would occur if stocking is curtailed. Further, it is unknown whether non-native trout may be replaced with stocked native fish (e.g. Gila trout). Thus, this analysis estimates the value of angler days at risk if sportfish stocking were discontinued on these reaches as part of the high end estimates.

(78) *Comment:* One commenter states concerns that the Economic Analysis does not take into consideration the past effects of fishing closures on the Blue River and Eagle Creek on local businesses. The comment states that one store in Greenlee County closed as a result of reduced fishing activity.

Our response: Section 6.1.1 of the FEA states that ''the AZGFD ceased stocking of sportfish in Eagle Creek and the Blue River in Apache-Sitgreaves National Forest due to native fish considerations in the late 1990s and began stocking endangered Gila trout in these reaches instead. Spikedace and loach minnow were among numerous species considered when these stocking cessations were put in place. Although several citizens at a public hearing held in Thatcher, Arizona, in 1999 voiced disappointment that the sites are no longer stocked, these changes in stocking have not affected the overall number of fish stocked in Arizona. However, there may have been consumer surplus losses associated with these closures because anglers may now take trips to less preferred sites. It should be noted that any past impacts would have occurred prior to this critical habitat rule taking effect.'' Section 6 and Appendix B of the FEA now highlight that the curtailment of stocking in these reaches has caused some economic impacts on local businesses.

Water Use and Grazing Issues

(79) *Comment:* One commenter states that exclusion of livestock from riparian areas using fencing has actually had an adverse effect on the spikedace and loach minnow.

Our response: The Economic Analysis recognizes that some controversy surrounds the issue of the impacts of livestock on native fish species. Section 4.1 of the FEA now states that ''in public comments, private ranchers have suggested that current management has been successful at mitigating the negative effects of grazing on spikedace and loach minnow habitat and that further limitation of grazing would create conditions conducive to non-native species. Some commenters have also suggested that fencing may be detrimental to the species.''

(80) *Comment:* One commenter stated that estimates of riparian fencing and maintenance costs in the Economic Analysis are low.

Our response: As presented in Section 4.4 of the FEA, fencing and maintenance costs were developed using numerous published sources, as well as through discussions with both Forest Service and BLM. Fencing costs are presented as a range between $1,500 and $15,000 per river mile of fence construction, with an additional $110 to $2,600 in fence maintenance.

(81) *Comment:* One commenter suggests that data in the Economic Analysis on agricultural establishments in Greenlee County are incorrect. The commenter provides information on ranching operations on Eagle Creek. The comment states that the Four Drag Ranch, Seven Cross A Ranch, Anchor Ranch, Double Circle Ranch, and Tule Ranch are located on Eagle Creek.

Our response: Appendix B, Exhibits B–2, B–3, and B–4 provide data on the number of farm operations, number of ranching operations, and annual sales by county, as reported by the National Agricultural Statistics Survey. Section 2 presents the number of establishments and employees in the Agriculture, Forestry, Hunting, and Fishing Support industries, as reported by the U.S. Census. A note was added to Exhibit 2–7 that clarifies the source of the data used and also refers readers to Appendix B, Exhibits B–2 through B–4. Although specific ranches are not named, Section 4 estimates that impacts on grazing activities on Eagle Creek may range from $5,000 to $126,000 over the next 20 years (discounted at seven percent).

(82) *Comment:* One commenter states that the potential loss of the ability to divert surface water and possibly groundwater is the most important economic, social, and environmental consideration in the Verde River unit, and that the cost associated with such a loss of water is not calculated into the examples provided in Chapter 7 of the Draft Economic Analysis.

Our response: Chapter 7 of the FEA focuses on potential impacts to residential and commercial development construction activities in critical habitat areas. Issues related to water use are discussed in Chapter 3 of the analysis. Section 3.5.1 specifically discusses water use in the Verde Valley, and provides estimates of the number of potentially affected surface water users and groundwater wells. Potentially affected agricultural lands within the Verde River Complex are valued at between $3.1 million and $30.3 million.

(83) *Comment:* One commenter states that the Economic Analysis did not discuss decreed water rights associated with surface water diversion ditches and how those decreed rights will be adversely impacted by the critical habitat designation, or what data will be relied upon in determining subflow.

Our response: Section 3 of the Economic Analysis states that future impacts on water users are possible due to spikedace and loach minnow conservation efforts if less water is made available for diversion to accommodate the spikedace and loach minnow. The analysis also states that there are currently no data that indicate whether existing or future diversions of water (including groundwater use) reduce stream flow or modify hydrologic conditions to a degree that adversely impact the spikedace and loach minnow or their habitat. In addition, hydrologic models are unavailable to assess the role of any specific groundwater pumping activity or surface water diversion in determining stream flow or other hydrologic conditions within critical habitat. As such, this analysis does not quantify the probability or extent to which water use would need to be curtailed or modified to remedy impacts on spikedace and loach minnow. It does, however, provide information on the potential scale of the economic impacts that could occur if requirements associated with spikedace and loach minnow conservation result in changes in water diversions or conveyance.

Specifically, the analysis addresses potential impacts on water used for irrigated agriculture. The analysis states that it is possible that irrigation activities could be affected if farmers make efforts to maintain adequate water quantity and flow for the spikedace and loach minnow in the future. Because agricultural water use comprises 98 percent of surface water use and 81 percent of groundwater use in counties that contain critical habitat, it appears most likely that, if additional water supplies are needed for these species, they would come from current agricultural water use. Thus, the analysis assumes that to accommodate spikedace and loach minnow, farmers may give up water and cease to farm, resulting in losses of agricultural land value. Should irrigated agriculture be curtailed to accommodate spikedace and loach minnow, approximately 830 acres within proposed critical habitat, or 6,310 acres that fall in the vicinity of critical habitat that are currently irrigated for cropland agriculture could be retired from production. The irrigated crop production at risk of being lost is valued at approximately $4.5 million ($2005) within proposed critical habitat areas, or approximately $38.5 million ($2005) including lands that rely on water diverted from proposed critical habitat. Thus, the total cropland value potentially foregone ($38.5 million in $2005) is included in high end estimates of impacts on water use.

(84) *Comment:* One commenter states that nothing was included on the costs to retire farm and ranchland along the San Pedro River.

Our response: Section 3 of the Economic Analysis identifies, to the extent possible, water users potentially affected by spikedace and loach minnow conservation efforts. Exhibit 3–7 includes a description of 64 acres of cropland that fall within the San Pedro River segment, and 720 acres of cropland that fall within the vicinity of proposed critical habitat. These acres are valued at $394,000 to $4.5 million (2005 dollars).

(85) *Comment:* Two commenters state that the Economic Analysis fails to consider impacts of the rule on the Arizona Water Settlements Act of 2004, Public Law 108–451.

Our response: Section 3.5.5 of the FEA provides additional detail provided by the commenters about the 2004 Arizona Water Settlements Act (Pub. L. 108–451) as it relates to the proposed stretch of the Gila River in New Mexico.

(86) *Comment:* One commenter states that the Economic Analysis makes no attempt to quantify the impacts to farming activities in the Gila Valley. The commenter further states that the Service cannot simply declare that, due to data and model limitations, the analysis is not able to answer the question of whether impacts to water users are likely.

Our response: Section 3.5.3 of the FEA discusses potential impacts of spikedace and loach minnow conservation activities on the Middle Gila/Lower San Pedro/Aravaipa Creek Complex (Complex 3). As stated in the analysis, ''approximately 135 acres of lands used for cropland irrigation are located within Complex 3, and 1,220 acres are located in the valley that contains proposed critical habitat. The value of croplands in proposed critical habitat is approximately $11,000, while lands in the vicinity of proposed critical habitat are valued at approximately $7.5 million. Approximately $15,000 in Natural Resource Conservation Service funding was allocated to farms in proposed critical habitat areas on these segments in 2005.'' The value of these at-risk agricultural lands are included in impact estimates for this unit. Thus, while the Economic Analysis does not identify the likelihood of these impacts, it does quantify them and include them in potential future cost estimates.

(87) *Comment:* One commenter states that the projected project modification costs are estimated at $13,500 per water

project resulting from the critical habitat designation, and that this estimate is based on estimates of costs at Fort Huachuca. The commenter states that project modification costs at Fort Huachuca are costing ''tens-of-millions of dollars.'' The commenter states that Phelps Dodge has recently incurred costs in excess of one million dollars for southwestern willow flycatcher mitigation, and thus water project cost estimates for spikedace and loach minnow critical habitat are low.

Our response: The FEA includes specific cost estimates for particular water projects expected to occur within proposed critical habitat areas in Chapter 3 of the FEA. Typical project modifications for water projects in the past have included minimizing activities within the wetted channel, ensuring no pollutants enter surface waters, replanting riparian vegetation, monitoring for up to ten years, and conducting research studies. Future project modifications are assumed to be similar to those associated with a low-flow gauge installation to measure flow in the Verde River that occurred as part of a section 404 permit from U.S. Army Corps of Engineers, or $13,500 per project. Costs associated with the past consultation on Fort Huachuca are not included as part of these estimates, nor are they included in the analysis, as Fort Huachuca falls well outside the boundaries of proposed critical habitat, and downstream of proposed habitat areas. Quantified costs associated with water-related projects also include potential costs associated with costs of retiring agricultural cropland in order to provide sufficient water for the species. Potential costs to municipal, industrial and Tribal water use are also discussed, but not quantified. Expenditures made on behalf of the southwestern willow flycatcher are not relevant to this analysis.

Mining Impacts

(88) *Comment:* One commenter states that the Economic Analysis failed to adequately evaluate impacts to mining operations and water use in the arid southwest as a result of the proposed designation, resulting in a dramatic understatement of economic impacts. The commenter commissioned a report that estimates economic impacts to Phelps's Dodge's operations at the Tyrone Mine alone to exceed $100 million.

Our response: Section 5 of the FEA evaluates potential impacts to mining operations. Section 3 of the analysis addresses impacts to water use that may occur in order to protect the spikedace and loach minnow. Specifically, the analysis states that:

''While few active mineral mining activities occur within the proposed critical habitat, the mining industry has expressed concern that water use by existing or potential mining operations could be affected by endangered species conservation activities, particularly the designation of critical habitat. Critical to an understanding of the potential for impacts on water diversions or conveyance is an understanding of the probability and magnitude of any such changes. As detailed in this section, there is currently no data that indicates whether existing or future diversions of water for mining activities (including groundwater use) reduces stream flow or modifies hydrologic conditions to a degree that adversely impacts the spikedace and loach minnow or their habitat. In addition, hydrologic models are unavailable to assess the role of any specific mining facility's groundwater pumping or surface water diversions in determining stream flow or other hydrologic conditions within critical habitat. As such, this analysis does not quantify the probability or extent to which water use for mining purposes would need to be curtailed or modified to remedy impacts on spikedace and loach minnow.

Given these data and model limitations, this analysis does not answer the question of whether impacts to mining operations are likely (i.e., the probability of such impacts), or define the expected magnitude of these impacts. It does, however, provide information on the potential scale of the economic impact that could occur if requirements associated with spikedace and loach minnow conservation result in changes in water diversions or conveyance. Specifically, to allow for an understanding of the economic activities that could be at risk if modifications to water use or conveyance are required, this analysis provides data on the location of mining activities potentially associated with CHD (critical habitat designation) areas, as well as data on the regional economic importance of these operations.''

The commenter provides hypothetical situations in which water currently used by mining operations may be lost to mining activities, and calculates a value of the lost water rights and associated replacement costs. While we do not disagree that, should the water be lost to mining activities, such costs could occur, there remains considerable uncertainty as to the likelihood of such events. Nonetheless, the revised analysis includes estimates of potential losses provided by the commenter in Section 5 of the analysis, to provide additional context for understanding the potential magnitude of impacts, should they occur.

(89) *Comment:* One commenter states that the Economic Analysis does not identify all of the Phelps Dodge mines that may be affected by critical habitat designation. Potentially affected mines include Morenci Mine, Tyrone Mine, Christmas Mine, and United Verde Mine. The commenter further states that the Economic Analysis does not consider potential effects to Phelps Dodge grazing and agricultural activities related to proposed critical habitat.

Our response: Section 5 of the Draft Economic Analysis identified the Morenci Mine, the Tyrone Mine, and the Christmas Mine as being potentially affected by proposed critical habitat. Because the United Verde Mine falls outside of proposed critical habitat and has been inactive since 1953, it was not specifically described in the Draft Economic Analysis. The FEA now includes a discussion of impacts to United Verde Mine along with the other mines. As described by the commenter, current activities at the United Verde Mine area primarily include leasing water to agricultural activities. Potential impacts of proposed critical habitat on agricultural water use are addressed in Section 3 of the FEA. Potential impacts of proposed critical habitat on ranching activities, for all landowners, are addressed in Section 4 of the FEA.

(90) *Comment:* One commenter states that the Economic Analysis fails to consider the replacement costs associated with water users that may be impacted by the critical habitat designation. These costs are extremely high because water supplies in the west are scarce and not easily replaceable. Other costs relating to impacts on water use not considered include search, infrastructure, and lost profits from curtailed operations at mining facilities.

Our response: The revised analysis includes estimates of potential losses provided by the commenter in Section 5 of the analysis. As stated in Response 87, it is not contested that, should water be lost to mining activities as a result of conservation activities for the spikedace and loach minnow, costs to the mining industry would be incurred. However, considerable uncertainty exists as to the likelihood, magnitude, and specific costs of water losses.

Small Business Impacts

(91) *Comment:* One commenter states that the Economic Analysis would be clearer if it reported the number of developers that are likely to be affected in the small business analysis.

Our response: Appendix B, Small Business and Energy Impacts Analyses, considers the extent to which the analytic results presented in the main body of the FEA reflect potential future impacts to small businesses. Appendix B has been revised to provide additional details about the number of developers

potentially affected by proposed critical habitat designation.

(92) *Comment:* One commenter states that the Economic Analysis would be stronger if it provided data on the impact of critical habitat on small entities that thrive on the area's recreational activities. To collect such information, the commenter suggests that the Service seek public input on the reduction of fishing activity if stocking is curtailed.

Our response: Appendix B considers the extent to which the analytic results presented in the main body of the FEA reflect potential future impacts to small businesses. As stated in the Appendix, ''the future impact of proposed CHD on the stocking regimes in these reaches is unknown, as is the reduction in fishing activity that would occur if stocking is curtailed. Further, it is unknown whether non-native fish stocking may be replaced with catchable native fish stocking (e.g. Apache trout). Thus, this analysis estimates the value of angler days at risk if sportfish stocking were discontinued on these reaches as part of the high end estimates. Angling trips are valued at approximately $8.6 million over 20 years (or $816,000 annually), assuming a discount rate of 7 percent. It should be noted that because State fish managers typically identify alternative sites for stocked fish when areas are closed to stocking, these angler days are likely to be redistributed to other areas rather than lost altogether. Thus, the high-end estimate does not consider the possibility that rather than not fishing at all, recreators will visit alternative, less desirable fishing sites. Existing models of angler behavior in these areas were not available to refine this estimate.'' The Appendix further states that ''if, as in the high-end estimate of impacts, angler trips to the two stream reaches that currently stock non-native fish are not undertaken, localized impacts on anglers and, in turn, small businesses that rely on fishing activities could occur. These impacts would be spread across a variety of industries including food and beverage stores, food service and drinking places, accommodations, transportation, and sporting goods.'' To conduct a survey of specific potential effects of closures is beyond the scope of this analysis. The revised Appendix does, however, include a reference to public comment received regarding a past store closure that occurred due to past area closures.

(93) *Comment:* One commenter states that the average number of acres in farms applied in the small business analysis is skewed due to the inclusion of a few very large (non small-business) farms. The commenter suggests that using the median farm size would improve results. The commenter also states that, because the Economic Analysis does not provide data on the impacts on beef cattle ranching operations, it is difficult to determine whether there will be a significant impact on this industry. The commenter also states that using the average revenues of all ranching operations, including both large and small business, likely skews the average to the upper end by including a few large ranches.

Our response: Appendix B considers the extent to which the analytic results presented in the main body of the FEA reflect potential future impacts to small businesses. Appendix B has been revised to estimate the number of affected farms using average revenues as well as using median revenues. Appendix B does provide data on the impact to beef cattle ranching operations, including revenue data for beef cattle ranching operations, the number of ranches in each county, and the expected impact of the proposed rule on these entities. While specific revenue data for affected small beef cattle ranches is not readily available, a proxy for this is developed in the revised Appendix by eliminating the revenue outlier (Pinal County) from the average revenue estimates. This results in an estimate of average revenues for small ranches in the region of $42,500. The analysis therefore estimates that approximately 72 small ranching operations may experience a reduction in revenues of between 0.9 and 22 percent of annual revenues annually. These ranches represent 4.7 percent of ranches in affected counties, or one percent of ranches in New Mexico and Arizona.

(94) *Comment:* One commenter states that estimated average revenue for ranchers in Greenlee County of $133,000 is incorrect, and that, given the current drought, it is likely to be too high.

Our response: Appendix B of the FEA lists the average revenues for cattle and calf ranches in Greenlee County as $19,100. We have incorporated an acknowledgement that revenue is dependent on, and may fluctuate with, natural conditions such as drought.

(95) *Comment:* One commenter states that there is no attempt to define baseline conditions in order to conduct a ''with'' and ''without'' analysis as prescribed by Executive Order 12866.

Our response: The economic analysis estimates the total cost of species conservation activities without subtracting the impact of pre-existing baseline regulations (i.e., the cost estimates are fully co-extensive). In 2001, the U.S. 10th Circuit Court of Appeals instructed the Service to conduct a full analysis of all of the economic impacts of proposed critical habitat designation, regardless of whether those impacts are attributable co-extensively to other causes (*New Mexico Cattle Growers Ass'n* v. *U.S.F.W.S.*, 248 F.3d 1277 (10th Cir. 2001)). The economic analysis complies with direction from the U.S. 10th Circuit Court of Appeals.

Summary of Changes From Proposed Rule

Based upon our review of the public comments, economic analysis, environmental assessment, issues addressed at the public hearings, and any new relevant information that may have become available since the publication of the proposal, we reevaluated our proposed critical habitat designation and made changes as appropriate. Other than minor clarifications and incorporation of additional information on the species' biology, status, and threats, this final rule differs from the proposal by the following:

(1) We excluded lands of the San Carlos Apache, White Mountain Apache, and Yavapai-Apache Tribes pursuant to section 4(b)(2) of the Act (see ''Exclusions Under Section 4(b)(2) of the Act'' section below).

(2) We excluded lands owned by the Phelps Dodge Corporation on the Gila River and Eagle Creek pursuant to section 4(b)(2) of the Act (see ''Exclusion Under Section 4(b)(2) of the Act'' section below.)

(3) We excluded a portion of the Verde River pursuant to section 4(b)(2) of the Act (see ''Exclusion Under Section 4(b)(2) of the Act'' section below.)

(4) We modified the primary constituent elements for clarity and to reflect additional information received during the public comment period.

(5) We made technical corrections to township, range, section legal descriptions, the confluence point of the East Fork Black and North Fork East Fork Black rivers, and the upstream endpoint on Eagle Creek. Overall mileage from the proposed to the final designation was slightly reduced by approximately 0.5 river miles as a result of these corrections.

(6) Eagle Creek is no longer included in the designation of critical habitat for the spikedace, as further review of the available information shows this area does not meet our definition of occupied, and therefore does not meet

our criteria for defining critical habitat for the spikedace.

Critical Habitat

Critical habitat is defined in section 3 of the Act as—(i) The specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) that may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. Conservation, as defined under section 3 of the Act, means to use and the use of all methods and procedures necessary that bring any endangered species or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with scientific resources management such as research, census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and transplantation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, regulated taking.

Critical habitat receives protection under section 7 of the Act through the prohibition against destruction or adverse modification of critical habitat with regard to actions carried out, funded, or authorized by a Federal agency. Section 7 requires consultation on Federal actions that are likely to result in the destruction or adverse modification of critical habitat. The designation of critical habitat does not affect land ownership or establish a refuge, wilderness, reserve, preserve, or other conservation area. Such designation does not allow government or public access to private lands. Section 7 is a purely protective measure and does not require implementation of restoration, recovery, or enhancement measures.

To be included in a critical habitat designation, the habitat within the area occupied by the species must first have features that are essential to the conservation of the species. Critical habitat designations identify, to the extent known, using the best scientific data available, habitat areas that provide essential life cycle needs of the species (i.e., areas on which are found the primary constituent elements, as defined at 50 CFR 424.12(b)).

Habitat occupied at the time of listing may be included in critical habitat only if the features essential to the conservation of the species therein may require special management or protection. Thus, we do not include areas where existing management is sufficient to conserve the species. (As discussed below, such areas may also be excluded from critical habitat pursuant to section 4(b)(2).) Accordingly, when the best available scientific data do not demonstrate that the conservation needs of the species require additional areas, we will not designate critical habitat in areas outside the geographical area occupied by the species at the time of listing. An area currently occupied by the species but that was not known to be occupied at the time of listing will likely, but not always, be essential to the conservation of the species and, therefore, included in the critical habitat designation.

The Service's Policy on Information Standards Under the Endangered Species Act, published in the **Federal Register** on July 1, 1994 (59 FR 34271), along with Section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Pub. L. 106–554; H.R. 5658) and the associated Information Quality Guidelines issued by the Service provide criteria and establish procedures to ensure that decisions made by the Service represent the best scientific data available. They require Service biologists, to the extent consistent with the Act and with the use of the best scientific data available, to use primary and original sources of information as the basis for recommendations to designate critical habitat. When determining which areas are critical habitat, the Service generally uses the listing package as a primary source of information. Additional information sources include the recovery plan for the species, articles in peer-reviewed journals, conservation plans developed by States and counties, scientific status surveys and studies, biological assessments, or other unpublished materials and expert opinion or personal knowledge. All information is used in accordance with the provisions of Section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Pub. L. 106–554; H.R. 5658) and the associated Information Quality Guidelines issued by the Service.

Section 4 of the Act requires that we designate critical habitat on the basis of the best scientific and commercial data available. Habitat is often dynamic, and species may move from one area to another over time. Furthermore, we recognize that designation of critical habitat may not include all of the habitat areas that may eventually be determined to be necessary for the recovery of the species. For these reasons, critical habitat designations do not signal that habitat outside the designation is unimportant or may not be required for recovery.

Areas that support populations, but are outside the critical habitat designation, will continue to be subject to conservation actions implemented under section 7(a)(1) of the Act and to the regulatory protections afforded by the section 7(a)(2) jeopardy standard, as determined on the basis of the best available information at the time of the action. Federally funded or permitted projects affecting listed species outside their designated critical habitat areas may still result in jeopardy findings in some cases. Similarly, critical habitat designations made on the basis of the best available information at the time of designation will not control the direction and substance of future recovery plans, habitat conservation plans, or other species conservation planning efforts if new information available to these planning efforts calls for a different outcome.

Primary Constituent Elements

In accordance with section 3(5)(A)(i) of the Act and regulations at 50 CFR 424.12, in determining which areas to propose as critical habitat, we consider those physical and biological features (primary constituent elements (PCEs)) that are essential to the conservation of the species, and within areas occupied by the species at the time of listing, that may require special management considerations and protection. These include, but are not limited to, space for individual and population growth and for normal behavior; food, water, air, light, minerals or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, or rearing of offspring; and habitats that are protected from disturbance or are representative of the historical, geographical, and ecological distributions of a species.

We determined the primary constituent elements for spikedace and loach minnow from studies on their habitat requirements and population biology including, but not limited to, Barber et al. 1970, pp. 10–12; Minckley 1973; Anderson 1978, p. 7, 17, 31–37, 41, 54; Barber and Minckley 1983, pp. 34–39; Turner and Tafanelli 1983, pp. 15–20; Propst et al. 1986, p. 40–72, 82–83; Hardy et al. 1990, pp. 19–20, 39; Douglas et al. 1994, pp. 12–14; Rinne

and Stefferud 1996, p. 14–17; and Velasco 1997, pp. 5–6.

Spikedace

The specific primary constituent elements required for the spikedace are derived from the biological needs of the species as described in the Background section of this document and below.

Space for Individual and Population Growth and Normal Behavior

Habitat Preferences

Spikedace have differing habitat requirements through their various life stages. Generally, adult spikedace prefer intermediate-sized streams with moderate to swift currents over sand, gravel, and cobble substrates (i.e., stream bottoms). Preferred water depths of adults are less than 11.8 in (30 cm) (Barber and Minckley 1966, p. 321; Minckley 1973, p. 114; Anderson 1978, p. 17; Rinne and Kroeger 1988, p. 1; Hardy 1990, pp. 19–20, 39; Sublette et al. 1990, p. 138; Rinne 1991, pp. 8–10; Rinne 1999, p. 6). As discussed below, larval and juvenile spikedace occupy different habitats than adults.

Flow Velocities. Studies on flow velocity have been completed on the Gila River, Aravaipa Creek, and the Verde River. In these studies, flows measured in habitat occupied by adult spikedace ranged from 23.3 to 70.0 cm/second (9.2–27.6 in/second) (Barber and Minckley 1966, p. 321; Hardy 1990, pp. 19–20, 39; Propst et al. 1986, p. 41; Rinne 1991, pp. 9–10; Rinne and Kroeger 1988, p. 1; Schreiber 1978, p. 4). Studies on the Gila River indicated that juvenile spikedace occupy areas with velocities of approximately 16.8 cm/second (6.6 in/second) while larval spikedace were found in velocities of 8.4 cm/second (3.3 in/second) (Propst et al. 1986, p. 41).

Propst et al. 1986 (pp. 47–49) examined flow velocities in occupied spikedace habitats as they varied by season. During the warm season (June–November), occupied spikedace habitats in the Gila River had mean flow velocities of 19.3 in/second (49.1 cm/second) at one site and 7.4 in/second (18.8 cm/second) at the second site. During the cold season (December–May), mean flow velocities at these same sites were 15.5 in/second (39.4 cm/second) and 8.4 in/second (21.4 cm/second). It is believed that spikedace seek areas in the stream that offer warmer water temperatures during cooler seasons to offset their decreased metabolic rates. Where water depth remains fairly constant throughout the year (*e.g.,* the first site), slower velocities provided pockets of warmer water temperatures in the stream. In areas of fairly constant flow velocities (e.g., the second site), warmer water temperatures were found in those portions of the stream with shallower water (Propst et al. 1986, pp. 47–49).

Larval and juvenile spikedace, which occupy different habitats than adults, tend to occupy shallow, peripheral portions of streams that have slower currents (Anderson 1978, p.17; Propst et al. 1986, pp. 40–41). Once they emerge from the gravel of the spawning riffles, spikedace larvae disperse to stream margins where water velocity is very slow or still. Larger larval and juvenile spikedace (those fish 1.0 to 1.4 inches (25.4 to 35.6 mm) in length) occurred over a greater range of water velocities than smaller larvae, but still occupied water depths of less than 12.6 inches (32.0 cm) (Propst et al. 1986, p. 40). Juveniles and larvae are also occasionally found in quiet pools or backwaters (e.g., pools that are connected with, but out of, the main river channel) lacking streamflow (Sublette et al. 1990, p. 138).

Outside of the breeding season, which occurs between April and June, eighty percent of the spikedace collected in a Verde River study used run and glide habitat. For this study, a glide was defined as a portion of the stream with a lower gradient (0.3 percent), versus a run which had a slightly steeper gradient (0.3–0.5 percent) (Rinne and Stefferud 1996, p. 14). Spikedace in the Gila River were most commonly found in riffle areas of the stream with moderate to swift currents (Anderson 1978, p. 17) and some run habitats (J.M. Montgomery 1985, p. 21), as were spikedace in Aravaipa Creek (Barber and Minckley 1966, p. 321).

Seasonal differences in habitats utilized by spikedace have been noted in the upper Gila drainage, for both the winter and breeding seasons. For example, spikedace were found to use shallower habitats (<6.6 inches, <16.8 cm) in the winter, and deeper habitats (6.6 to 12.6 inches, 16.8–32.0 cm) during warmer months (Propst et al. 1986, p. 47).

Specific habitat usage has been noted for the breeding season as well. During the breeding season, female and male spikedace become segregated, with females occupying deeper pools and eddies and males occupying riffles flowing over sand and gravel beds in water approximately 3.1 to 5.9 inches (7.9–15.0 cm) deep. Females then enter the riffles occupied by the males before ova are released into the water column (Barber et al. 1970, pp.11–12).

Streams in the southwestern United States have a wide fluctuation in flows and some are periodically dewatered. While portions of stream segments included in this designation may experience dry periods, they are still considered important because the spikedace is adapted to stream systems with fluctuating water levels. While they can not persist in dewatered areas, spikedace will use these areas as connective corridors between occupied or seasonally occupied habitat when they are wetted.

Substrates. Spikedace are known to occur in areas with low to moderate amounts of fine sediment and substrate embeddedness (filling in of spaces by fine sediments), which are important features for healthy development of eggs. Spawning has been observed in areas with sand and gravel beds and not in areas where fine materials of a particle size less than sand coats the sand or gravel substrate, as described above. Additionally, low to moderate fine sediments ensure that eggs remain well-oxygenated and will not suffocate due to sediment deposition (Propst et al. 1986, p. 40).

Spikedace were found over sand and gravel substrates in the glide-run and low-gradient riffle habitats in both the upper Verde (Rinne and Stefferud 1996, p. 21) and the upper Gila (Propst et al. 1986, p. 40; Rinne and Deason 2000, p. 106). In a study of a small portion of the Verde River, spikedace were found in glide-run habitats where substrates were characterized by approximately 29 percent sand or fines (silty sand) (Rinne 2001, p. 68). In other studies of the Verde River over a two-year period, spikedace were found in areas with a percentage of fine content substrate that varied from 1 to 28 percent (Rinne 2001, p. 68). Neary et al. (1996, p. 24) noted that spikedace were found in habitats with substrates of less than 10 percent sand. While there is some variability in the percent of sand or fine substrate in occupied spikedace habitat, Neary et al. (1996, p. 24) concluded that, based on the higher density of spikedace present in areas with lower percentages of sand in the substrate, spikedace favored habitats with lower sand content.

Substrates are, in part, a reflection of the gradients and velocities of the streams in which they are found. Sand and gravel typically decrease as gradient and velocity increase (Rinne and Stefferud 1996, p. 14). Spikedace numbers in the Verde River increased almost three times (from 18 to 52 individuals) when the fine component of the substrate decreased from about 27 percent down to 7 percent (Neary et al. 1996, p. 26), indicating that spikedace prefer habitats with lower amounts of fines. Sand content in all glide-run

spikedace habitats in the Verde and Gila Rivers in 2000 was 18 and 20 percent (Rinne 2001, p. 68). However, because substrates are determined in part by gradient and velocity of the stream, the type of substrate should not be used alone in determining suitable spikedace habitat.

Sixty percent of spikedace larvae in the Gila River were found over sand-dominated substrates, while 18 percent were found over gravel, and an additional 18 percent found over cobble-dominated substrates. While 45 percent of juvenile spikedace were found over sand substrates, an additional 45 percent of the juveniles were found over gravel substrates, with the remaining 9 percent associated with cobble-dominated substrates (Propst et al. 1986, p. 40).

The degree of substrate embeddedness may also affect the prey base for spikedace. As discussed below, mayflies constitute a significant portion of the spikedace diet. Suitable habitat for some mayflies includes pebbles or gravel for clinging (Pennak 1978, p. 539). Excess sedimentation would cover or blanket smaller pebbles and gravel, resulting in a lack of suitable habitat for mayflies, and a subsequent decrease in available prey items for spikedace.

Flooding. Rainfall in the southwest is generally characterized as bimodal, with winter rains of longer duration and less intensity and summer rains of shorter duration and higher intensity. As we discuss below, periodic flooding appears to benefit spikedace in three ways: (1) Removing excess sediment from some portions of the stream; (2) removing nonnative fish species from a given area; and (3) increasing prey species diversity.

Flooding in Aravaipa Creek has resulted in the transport of heavier loads of sediments such as cobble, gravel, and sand that are deposited where the stream widens, gradient flattens, and velocity and turbulence decrease. Dams formed by such deposition can temporarily cause water to back up and break into braids downstream of the dam. The braided areas provide excellent nurseries for larval and juvenile fishes (Velasco 1997, pp. 28–29).

On the Gila River in New Mexico, flows fluctuate seasonally with snowmelt, causing spring pulses and occasional floods, and late-summer or monsoonal rains producing floods of varying intensity and duration. These high flows benefit spikedace spawning and foraging habitat (Propst et al. 1986, p. 3) as described above. Peak floods can modify channel morphology and sort and rearrange stream bed materials (Stefferud and Rinne 1996, p. 80).

Floods likely benefit native fish by breaking up embedded bottom materials (Mueller 1984, p. 355). A study of the Verde River analyzed the effects of flooding in 1993 and 1995, finding that these floods had notable effects on both native and nonnative fish species. Among other effects, these floods on the Verde River either stimulated spawning or enhanced recruitment of three of the native species or may have eliminated one of the nonnative fish species (Rinne and Stefferud 1997, pp. 159, 162; Stefferud and Rinne 1996, p. 80).

Minckley and Meffe 1987 (pp. 99, 100) found that flooding, as part of a natural hydrograph, may temporarily remove nonnative fish species, which are not adapted to flooding. Thus flooding consequently removes the competitive pressures of nonnative fish species on native fish species which persist following the flood. Minckley and Meffe (1987, p. 99–100) studied the differential responses of native and nonnative fishes in seven unregulated and three regulated streams or stream reaches that were sampled before and after major flooding noted that fish faunas of canyon-bound reaches of unregulated streams invariably shifted from a mixture of native and nonnative fish species to predominantly, and in some cases exclusively, native forms after large floods. Samples from regulated systems indicated relatively few or no changes in species composition due to releases from upstream dams at low, controlled volumes. However, during emergency releases, effects to nonnative fish species were similar to those seen with flooding on unregulated systems.

There is some variability in fish response to flooding. Some nonnative species, such as smallmouth bass (*Micropterus dolomieui*) and green sunfish (*Lepomis cyanellus*), appear to be partially adapted to flooding, and often reappear in a few weeks (Minckley and Meffe, p. 100). In addition, Stefferud and Rinne (1996, p. 75) found that late-winter flooding affected the entire fish community, either stimulating reproduction or promoting recruitment (at least among the larger-size fishes), and possibly eliminating some nonnative species.

The onset of flooding also corresponds with an increased diversity of food items for spikedace. Reductions in the mainstream invertebrates, such as mayflies, cause the fish to expand its food base in an opportunistic manner. In addition, inflowing flood waters carry terrestrial invertebrates, such as ants, bees, and wasps (Hymenopterans), into aquatic areas (Barber and Minckley 1983, p.39).

Stream Gradient. Spikedace occupy streams with low to moderate gradients (Propst et al. 1986, p. 3; Rinne and Stefferud 1996, p. 14; Stefferud and Rinne 1996, p. 21; Sublette et al. 1990, p. 138). Specific gradient data are generally lacking, but the gradient of occupied portions of Aravaipa Creek and the Verde River varied between approximately 0.3 to <1.0 percent (Barber et al. 1970, p. 10; Rinne and Kroeger 1988, p. 2; Rinne and Stefferud 1996, p. 14).

Habitat Protected From Disturbance or Representative of the Historic Geographical and Ecological Distribution of a Species

Nonnative aquatic species. One of the primary reasons for the decline of native species is the presence of nonnative fishes. Fish evolution in the arid American west is linked to disruptive geologic and climatic events that acted in concert over evolutionary time to decrease the availability and reliability of aquatic ecosystems. The fragmentation and reduction of aquatic ecosystems resulted in a fish fauna that was both diminished and restricted in the arid west. Lacking exposure to a wider range of species, western species seem to lack the competitive abilities and predator defenses developed by fishes from regions where more species are present (Douglas et al. 1994, pp. 9–10). The introduction and spread of nonnative species has been identified as one of the major factors in the continuing decline of native fishes throughout North America and particularly in the southwestern United States (Miller 1961, p. 365, 377, 397–398; Lachner et al. 1970, p. 22; Ono et al. 1983, p. 90; Moyle 1986, pp. 28–34; Moyle et al. 1986, pp. 416–423; Carlson and Muth 1989, pp. 232–233; Fuller et al. 1990, p. 1). Miller et al. (1989, p. 1) concluded that nonnative species were a causal factor in 68 percent of the fish extinctions in North America in the last 100 years. For 70 percent of those fish still extant, but considered to be endangered or threatened, introduced nonnative species are a primary cause of the decline (Lassuy 1995, p. 392). In Arizona, release or dispersal of recently introduced nonnative aquatic organisms is a continuing phenomenon (Rosen et al. 1995, pp. 255–256, 258; U.S. Fish and Wildlife Service 2001a, pp. 26–32). Aquatic nonnative species are introduced and spread into new areas through a variety of mechanisms, intentional and accidental, authorized and unauthorized. Mechanisms for nonnative dispersal in the southwestern

United States include interbasin water transfer, sport fish stocking, aquaculture, aquarium releases, baitbucket release (release of fish used as bait by anglers), and biological control (e.g., the introduction of one species to control another species) (U.S. Fish and Wildlife Service 2001a, pp. 13, 37).

In the Gila River basin, introduction of nonnatives is considered a major factor in the decline of all native fish species (Minckley 1985, p. 20–21; Williams et al. 1985, p. 1; Minckley and Deacon 1991, p. 17). Aquatic and semi-aquatic mammals, reptiles, amphibians, crustaceans, mollusks (snails and clams), insects, zoo- and phytoplankton, parasites, disease organisms, algae, and aquatic and riparian vascular plants that are outside of their historical range have all been documented to adversely affect aquatic ecosystems (Cohen and Carlton 1995, pp. 1–8). As described below, the nonnative fishes have been demonstrated to pose a significant threat to Gila River basin native fishes, including spikedace and loach minnow (Minckley 1985, p. 108–109; Williams et al. 1985, p. 19). The aquatic ecosystem of the central Gila River basin has relatively small streams with warm water and low gradients, and many of the native aquatic species are small in size. Therefore, much of the threat to native fishes comes from small nonnative fish species, as has also been noted for southern Nevada aquatic ecosystems (Deacon et al. 1964, p. 385). Examples of this are the impacts of mosquitofish (*Gambusia affinis*) and red shiner (*Cyprinella lutrensis*), which may compete with or prey upon native fish in the Gila River basin (Meffe 1985, p. 173–174, 176–180; Douglas et al. 1994, pp. 13–17).

The effects of nonnative fish competition on spikedace can be classified as either interference or exploitive. Interference competition occurs when individuals directly affect others, such as by fighting, producing toxins, or preying upon them (Schoener 1983, p. 257). Exploitive competition occurs when individuals affect others indirectly, such as through use of common resources (Douglas et al. 1994, p. 14).

Nonnative fishes known to occur within the historical range of the spikedace include channel catfish (*Ictalurus punctatus*), flathead catfish (*Pylodictis olivaris*), red shiner, fathead minnow (*Pimephales promelas*), green sunfish (*Lepomis cyanellus*), largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieui*), rainbow trout (*Oncorynchus mykiss*), mosquitofish, carp (*Cyprinus carpo*), bluegill (*Lepomis macrochiris*), yellow bullhead (*Ameiurus natalis*), black bullhead (*Ameiurus melas*), and goldfish (*Carassius auratus*) (AGFD Native Fish Database 2005, ASU 2002). Additionally, as discussed below, nonnative parasites introduced incidentally with nonnative species may threaten spikedace populations. Although parasites are normal in fish populations and typically do not cause mortality in their host, the effects of nonnative parasites can be significant, especially when combined with other stressors such as poor habitat conditions (U.S. Geological Survey 2004, p. 1; 2005, p. 2–3).

There is evidence of the negative impacts of nonnative predators on native fishes for several stream reaches. The effect of nonnative fish preying on natives such as spikedace is classified as interference competition. Channel catfish, flathead catfish, and smallmouth bass all prey on native fishes including spikedace, as evidenced by prey remains of native fishes in the stomachs of these predatory species (Propst et al. 1986, p. 82, Bonar et al. 2004, p. 13, 16–21). Native fish species declines appear linked to increases in nonnative fish species. For example, in 1949, 52 spikedace were collected at Red Rock while channel catfish composed only 1.65 percent of the 607 fish collected. However, in 1977, only six spikedace were located at the same site, and the percentage of channel catfish had risen to 14.5 percent of 169 fish collected. The decline of spikedace and the increase of channel catfish is likely related (Anderson 1978, p. 51) because of this correlation and the evidence of predation by catfish on spikedace.

Similar interactions between native and nonnative fishes were observed in the upper reaches of the East Fork of the Gila River. In this system, native fish were limited, with spikedace being rare or absent, while nonnative channel catfish and smallmouth bass were moderately common prior to 1983 and 1984 floods. Post-1983 flooding, adult nonnative predators were generally absent and spikedace were collected in moderate numbers in 1985 (Propst et al. 1986, p. 83).

Green sunfish (*Lepomis cyanellus*) is also thought to be a predator, likely responsible for replacement of natives like spikedace, through predation. While no direct studies have been completed on predation by green sunfish on spikedace, they are a known predator that occurs within occupied spikedace areas.

Interference competition occurs with species such as red shiner. Red shiner appear to be particularly detrimental to spikedace because although spikedace and shiners are naturally separated by geography (i.e., allopatric), they occupy essentially the same habitat types. Red shiner has an inverse distribution pattern to spikedace in that, generally, where red shiner is present, spikedace are absent (Minckley 1973, p. 138). Where the two species occur together, there is evidence of displacement of spikedace to less suitable habitats that it otherwise did not occupy (Marsh et al. 1989, pp. 67, 107). As a result, if red shiners are present, suitable habitat available for spikedace is reduced. Range expansion and species recovery may then be curtailed due to red shiner presence.

One study focused on potential impacts of red shiner on spikedace in three areas; (1) Portions of the Gila River and Aravaipa Creek having only spikedace; (2) a portion of the Verde River where spikedace and red shiner have co-occurred for three decades; and (3) a portion of the Gila River where red shiner recently invaded areas and where spikedace had never been recorded. The study indicated that, for reaches where only spikedace were present, spikedace displayed a preference for slower currents and smaller particles in the substrate than were generally available throughout the Gila River and Aravaipa Creek systems. Where red shiner occur in the Verde River, the study showed that red shiner occupied waters that were generally slower and with smaller particle size in the substrate than were, on average, available in the system. The study concludes that spikedace, where co-occurring with red shiner, move into currents swifter than those selected when in isolation, while red shiner occupy the slower habitat, whether they are alone or with spikedace (Douglas et al. 1994, pp. 14–16).

Western mosquitofish were introduced outside of their native range to help control mosquitoes. Because of their aggressive and predatory behavior, mosquitofish may negatively affect populations of small fish through predation and competition (Courtenay and Meffe 1989, p. 320, 322, 324). Introduced mosquitofish have been particularly destructive in the American west where they have contributed to the elimination or decline of populations of federally threatened and endangered species, such as the Gila topminnow (*Poeciliopsis occidentalis occidentalis*) (Courtenay and Meffe 1989, p. 323–324).

The Asian tapeworm (*Bothriocephalus acheilognathi*) was introduced into the United States via imported grass carp in the early 1970s. It has since become well established in

the southeast and mid-southern United States and has been recently found in the southwest including the Gila Basin. The definitive host in the life cycle of the Asian tapeworm is cyprinid (fish in the minnow family) fishes. There is a potential threat to spikedace as well as to the other native fishes in Arizona because of the presence of this parasite in the Gila Basin and the presence of cyprinid fish. The Asian tapeworm affects fish health in several ways. The direct impacts to fish are through impeding digestion of food as it passes through the intestinal track, and loss of nutrients as the worm feeds off the fish; large enough numbers of worms cause emaciation and starvation. An indirect effect is that weakened fish are more susceptible to infection by other pathogens. This parasite can infest many species of fish and is carried into new areas along with nonnative fishes or native fishes from contaminated areas. Asian tapeworm may be a significant source of mortality of other fish species in the Colorado River basin (U.S. Geological Survey 2004, p. 1, 2005, p. 2).

Anchor worm (*Lernaea cyprinacea*) (Copepoda), also a nonnative species, is an external parasite, and is unusual in that it has little host specificity, infecting a wide range of fishes and amphibians. Additionally, infection has been known to kill large numbers of fish due to tissue damage and secondary infection of the attachment site (Hoffnagle and Cole 1997, p. 24). Presence of this parasite in the Gila River basin is a threat to the Gila chub and other native fish. In July 1992, the Bureau of Land Management (BLM) found Gila chub that were heavily parasitized by *Lernaea cyprinacea* in Bonita Creek. These fish were likely more susceptible to parasites due to physiological stress as a result of degraded habitat and decreased water flows due to water withdrawals. Creef and Clarkson (1993, p. 1, p. 5) suspected that infestations by *Lernaea cyprinacea* caused high mortality of stocked native fish, razorback sucker (*Xyrauchen texanus*) and Colorado pikeminnow (*Ptycocheilus lucius*).

The nonnative parasite *Ichthyophthirius multifiliis* (''Ich'') is a potential threat to spikedace. ''Ich'' disease has occurred in some Arizona streams, probably favored by high temperatures and crowding as a result of drought (Mpoame 1982, p. 46). This protozoan becomes embedded under the skin and within the gill tissues of infected fish. When the ''Ich'' matures, it leaves the fish, causing fluid loss, physiological stress, and sites that are susceptible to infection by other pathogens. If ''Ich'' is present in large enough numbers they can also impact respiration because of damaged gill tissue. This parasite has been observed on the Sonora sucker (*Catostomus insignis*), a species common throughout the Gila River basin, and ''Ich'' does not appear to be hostspecific, so it could be transmitted to other species. ''Ich'' is known to be present in Aravaipa Creek (Mpoame 1982, p. 46).

Food

Food Items. Spikedace are active, highly mobile fish that visually inspect drifting materials both at the surface and within the water column. Gustatory inspection, or taking potential prey items into the mouth before either swallowing or rejecting it, is also common (Barber and Minckley 1983, p. 37). Prey body size is small, typically ranging from 0.08 to 0.20 inches (2 to 5 mm) long (Anderson 1978, p. 36).

Stomach content analysis of spikedace determined that mayflies, caddisflies, true flies, stoneflies, and dragonflies are all prey items for spikedace. In one Gila River study, the frequency of occurrence was 71 percent for mayflies, 34 percent for true flies, and 25 percent for caddisflies (Propst et al. 1986, p. 59). A second Gila River study of four samples determined that total food volume was comprised of 72.7 percent mayflies, 17.6 percent caddisflies, and 4.5 percent true flies (Anderson 1978, pp. 31–32). At Aravaipa Creek, mayflies, caddisflies, true flies, stoneflies, and dragonflies were all prey items for spikedace, as were some winged insects and plant materials (Schreiber 1978, pp. 12–16, 29, 35–37).

At Aravaipa Creek, spikedace consumed a total of 36 different prey items. Mayflies constituted the majority of prey items, followed by true flies. Of the mayflies consumed, 36.5 percent were adults, while 33.3 percent were nymphs. Terrestrial invertebrates, including ants, wasps, and spiders, were also consumed, as were beetles, true bugs, caddisflies, and water fleas (Barber and Minckley 1983, pp. 34–38).

Spikedace diet varies seasonally (Barber and Minckley 1983, pp. 34–35). Mayflies dominated stomach contents in July, but declined in August and September, increasing in importance again between October and June. When mayflies were available in lower numbers, spikedace consumed a greater variety of foods, including true bugs, true flies, beetles, and spiders.

Spikedace diet varies with age class as well. Young spikedace, which measure less than 0.9 inches (22.9 mm) long, fed on a diversity of small-bodied invertebrates occurring in and on sediments along the margins of the creek. True flies were found most frequently, but water fleas and aerial adults of aquatic and terrestrial insects also provide significant parts of the diet. As juveniles grow and migrate into the swifter currents of the channel, mayfly nymphs (invertebrates between the larval and adult life stages, similar to juveniles) and adults increase in importance (Barber and Minckley 1983, pp. 36–37).

Spikedace are very dependent on aquatic insects for sustenance, and the production of the aquatic insects consumed by spikedace occurs mainly in riffle habitats (Propst et al. 1986, p. 59). As a result, habitat selection influences food items found in stomach content analyses. Spikedace in pools had eaten the least diverse foods while those from riffles contained a greater variety of taxa, indicating that the presence of riffles in good condition and abundance help to ensure that a sufficient number and variety of prey items will continue to be available for spikedace (Barber and Minckley 1983, pp. 36–37, 40).

Aquatic invertebrates that constitute the bulk of the spikedace diet have specific habitat parameters of their own. Mayflies, which constituted the largest percentage of prey items, spend their immature stages in fresh water. Mayfly nymphs occur in all types of fresh waters, wherever there is an abundance of oxygen, but they are most characteristic of shallow water. Mayflies found in spikedace stomach content analyses consisted of individuals from several genera, with individuals from the genus *Baetidae* constituting the highest percentage of prey from the mayfly order in the study by Schreiber (1978, p. 36). *Baetidae* are free-ranging species of rapid waters that maintain themselves in currents by clinging to pebbles. Spikedace also consumed individuals from two other mayfly genera (*Heptageniidae* and *Ephemerellidae*), which are considered ''clinging species'' as they cling tightly to stones and other objects and may be found in greatest abundance in crevices and on the undersides of stones (Pennak 1978, p. 539). The importance of gravel and cobble substrates is illustrated by the fact that these prey species, which make up the bulk of the spikedace diet, require these surfaces to persist.

Water Quality

Pollutants. Water with no or only minimal pollutant levels is essential for the survival of spikedace. Spikedace occur in areas where mining, agriculture, livestock operations, and

road construction and use are prevalent. Various pollutants are associated with these types of activities. For spikedace, waters should have low levels of pollutants such as copper, arsenic, mercury and cadmium; human and animal waste products; pesticides; suspended sediments; and gasoline or diesel fuels (Baker 2005). In addition, for freshwater fish, dissolved oxygen should generally be greater than 3.5 cubic centimeters per liter (cc/l) (Bond 1979, p. 215). Below this, some stress may occur.

Fish kills have been documented in the San Francisco River (Rathbun 1969, pp. 1–2) and the San Pedro River (Eberhardt 1981, pp. 1–4, 6–9, 11–12, 14, 16, and Tables 2–8), both of which are within the species' historical range. In both instances, leaching ponds associated with copper mines released waters into the streams, resulting in elevated levels of toxic chemicals. For the San Pedro River, this included elevated levels of iron, copper, manganese, and zinc. Both incidents resulted in die-offs of species inhabiting the streams. Eberhardt (1981, pp. 1, 3, 9, 10, 14–15) notes that no bottom-dwelling aquatic insects, live fish, or aquatic vegetation of any kind were found for a 60-mi (97 km) stretch of river in the area affected by the spill. Rathbun (1969, pp. 1–2) reported similar results for the San Francisco River. The possibility for similar accidents, or pollution from other sources, exists throughout the ranges of these species due to their proximity to mines, communities, agricultural areas, and major transportation routes.

Temperature. Temperatures of occupied spikedace habitat vary with time of year. In May, water temperatures at Aravaipa Creek were uniformly 66.2 °F (19 °C) (Barber et al. 1970, p. 11). Summer water temperatures remained at no more than 80.6 °F (27 °C) at Aravaipa Creek (Barber et al. 1970, p. 14), and at a mean of 66.7 °F (19.3 °C) between June and November on the Gila River in the Forks area (at the Middle, West, and East Forks) and 69.4 °F (20.8 °C) in the Cliff-Gila Valley (Propst et al. 1986, p. 47). Winter water temperatures ranged between 69.1 °F (20.6 °C) in November down to 48.0 °F (8.9 °C) in December at Aravaipa Creek (Barber and Minckley 1966, p. 316). Between December and May, mean temperature in the Forks area was 46.0 °F (7.8 °C), and 53.1 °F (11.7 °C) in the Cliff-Gila Valley (Propst et al. 1986, p. 57). The overall range represented by these measures is between 46–80.6 °F (7.8–27.0 °C).

Recent studies by the University of Arizona focused on temperature tolerances of spikedace. In the study, fish were acclimated to a given temperature, and then temperatures were increased by 1 °C (33.8 °F) per day until test temperatures were reached. The study determined that no spikedace survived exposure of 30 days at 34 or 36 °C (93.2 or 96.8 °F), and that 50 percent mortality occurred after 30 days at 32.1 °C (89.8 °F). In addition, growth rate was slowed at 32 °C (89.6 °F), as well as at lower test temperatures of 10 °C and 4 °C (50 and 39.2 °F). Multiple behavioral and physiological changes were observed indicating that fish became stressed at 30, 32, and 33 °C (86, 89.6, and 91.4 °F) treatments. The study concludes that temperature tolerance in the wild may be lower due to the influence of additional stressors, including disease, predation, competition, or poor water quality. Survival of fish in the fluctuating temperature trials in the study likely indicates that exposure to higher temperatures for short periods during a day would be less stressful to spikedace. The study concludes that 100 percent survival of spikedace at 30 °C (86 °F) in the experiment suggests that little juvenile or adult mortality would occur due to thermal stress if peak water temperatures remain at or below that level (Bonar et al. 2005, pp. 7–8, 29–30).

Reproduction and Rearing of Offspring

As discussed above under flow velocities, spikedace use a variety of habitat types within the channel during their reproductive cycle and at various life stages. Although not typically associated with pools, pools are used by female spikedace during the breeding season while males remained in riffle habitats. Females leave the pools, generally on the downstream end of the riffle, and swim upstream to males in riffle habitat (Barber et al. 1970, pp.11–12). Unlike loach minnow that deposit their eggs in a hole or depression, spikedace spawn in shallow riffles and scatter their gametes (reproductive cells) into the water column. Spikedace eggs are adhesive and develop among the gravel and cobble of the riffles following spawning. Spawning in riffle habitat ensures that the eggs are well oxygenated and are not normally subject to suffocation by sediment deposition due to the swifter flows found in riffle habitats. However, after the eggs have adhered to the gravel and cobble substrate, excessive sedimentation could cause suffocation of the eggs (Propst et al. 1986, p. 40).

Primary Constituent Elements for the Spikedace

Pursuant to our regulations, we are required to identify the known physical and biological features (primary constituent elements) essential to the conservation of the spikedace. All stream complexes designated as critical habitat for the spikedace are occupied, are within the species' historic geographic range, and contain sufficient PCEs to support at least one life history function.

Based on our current knowledge of the life history, biology, and ecology of the species and the requirements of the habitat to sustain the essential life history functions of the species, we have determined that the primary constituent elements essential to the conservation of the spikedace are:

1. Permanent, flowing water with no or low levels of pollutants, including:

a. Living areas for adult spikedace with slow to swift flow velocities between 20 and 60 cm/second (8 and 24 in/second) in shallow water between approximately 10 cm (4 in) and 1 meter (40 in) in depth, with shear zones where rapid flow borders slower flow, areas of sheet flow (or smoother, less turbulent flow) at the upper ends of mid-channel sand/gravel bars, and eddies at downstream riffle edges;

b. Living areas for juvenile spikedace with slow to moderate water velocities of approximately 18 cm/second (8 in/second) or higher in shallow water between approximately 3 cm (1.2 in) and 1 meter (40 in) in depth;

c. Living areas for larval spikedace with slow to moderate flow velocities of approximately 10 cm/second (4 in/second) or higher in shallow water approximately 3 cm (1.2 in) to 1 meter (40 in) in depth; and

d. Water with dissolved oxygen levels greater than 3.5 cc/l and no or minimal pollutant levels for pollutants such as copper, arsenic, mercury, and cadmium; human and animal waste products; pesticides; suspended sediments; and gasoline or diesel fuels.

2. Sand, gravel, and cobble substrates with low or moderate amounts of fine sediment and substrate embeddedness. Suitable levels of embeddedness are generally maintained by a natural, unregulated hydrograph that allows for periodic flooding or, if flows are modified or regulated, a hydrograph that allows for adequate river functions, such as flows capable of transporting sediments.

3. Streams that have:

a. Low gradients of less than approximately 1.0 percent;

b. Water temperatures in the approximate range of 35 to 86 °F (1.7 to

30.0 °C) (with additional natural daily and seasonal variation);

c. Pool, riffle, run, and backwater components; and

d. An abundant aquatic insect food base consisting of mayflies, true flies, caddisflies, stoneflies, and dragonflies.

4. Habitat devoid of nonnative aquatic species or habitat in which nonnative aquatic species are at levels that allow persistence of spikedace.

5. Areas within perennial, interrupted stream courses that are periodically dewatered but that serve as connective corridors between occupied or seasonally occupied habitat and through which the species may move when the habitat is wetted.

Units are designated based on sufficient PCEs being present to support one or more of the species's life history functions. Some units contain all PCEs and support multiple life processes, while some units contain only a portion of the PCEs necessary to support the species' particular use of that habitat. Where a subset of the PCEs is present at the time of designation, this rule protects those PCEs and thus the conservation function of the habitat.

Loach Minnow

The specific primary constituent elements required for the loach minnow are derived from the biological needs of the species as described in the Background section of this proposal and below.

Space for Individual and Population Growth and Normal Behavior

As noted for the spikedace above, streams in the Southwestern United States have a wide fluctuation in flows and resulting habitat conditions at different times of the year. Loach minnow persist in these varying conditions and, as discussed below, several studies have documented habitat conditions at occupied sites.

Habitat Preferences

Flow Velocities. Loach minnow live on the bottom of small to large rivers, preferring shallow, swift, and turbulent riffles, living and feeding among clean, loose, gravel-to-cobble substrates (Anderson and Turner 1977, pp. 2, 6–7, 9, 12–13; Barber and Minckley 1966, p. 315; Britt 1982, pp. 10–13, 29–30; Lee et al. 1980, p. 365; Marsh et al. 2003, p. 666; Minckley 1981, p. 165; Velasco 1997, p. 28). Loach minnow are sometimes associated with filamentous (threadlike) algae, which are attached to the stream substrates (Anderson and Turner 1977, p. 5; Lee et al. 1980, p. 365; Minckley 1981, p. 165). Specific habitat use varies with the life stage of the fish, as well as geographic location. As noted below, researchers have documented a range of flows in areas occupied by loach minnow.

Water Depth and Flow Velocities. One study found loach minnow in varying water depths by lifestage, with water depth being 15.5 cm (6.1 in) for eggs, 10.6 cm (4.2 in) for larvae, 16.8 cm (6.6 in) for juveniles, and 18.3 cm (7.2 in) for adults (Propst et al. 1988, p. 38).

Flow rate studies have been completed on the Gila River, Tularosa River, San Francisco River, Aravaipa Creek, and Deer Creek. Measured flows in habitat occupied by adult loach minnow ranged from 9.6 to 31.2 in/second (24.4 to 79.2 cm/second) (Barber and Minckley 1966, p. 321; Propst et al. 1988, pp. 32, 36–39; Propst and Bestgen 1991, p. 33; Rinne 1989, pp. 112, 116). There is geographic variation in flow velocities used by adult loach minnow. Adult loach minnow in the Gila River preferred velocities of 1.2 to 14.4 in/second (3.0 to 36.6 cm/second), while those in Aravaipa Creek preferred velocities of 15.6 to 20.4 in/second (39.6 to 51.8 cm/second). This may be due to the fact that there were considerably more areas of slow velocity available to loach minnow in the Gila River, and that there was more and larger cobble substrate in the Gila River, which creates more habitat of slower velocities for loach minnow to use (Turner and Tafanelli 1983, pp. 15–20).

Juvenile loach minnow generally occurred in areas where velocities were similar to those used by adults; however, these areas had faster velocities than those used by larvae. In the Gila, San Francisco, and Tularosa rivers, juveniles occupied areas with mean velocities ranging between 1.2 and 33.6 in/second (3.0 and 85.3 cm/second) (Propst et al. 1988, pp. 37–38; Propst and Bestgen 1991, p. 32; Rinne 1989, p. 111; Turner and Tafanelli 1983, p. 26). Larval loach minnow move from the rocks under which they spawned to areas with slower velocities than the main stream after emergence, typically remaining in areas with significantly slower velocities than juveniles and adults. Larval loach minnow in the Gila, San Francisco, and Tularosa rivers occupied areas that were shallower and significantly slower than areas where eggs were found. In the Gila, San Francisco, and Tularosa rivers, and Aravaipa Creek, larval loach minnow occupied areas with flow velocities ranging from 3.6 to 19.2 in/second (9.1 to 48.8 cm/second) (Propst et al. 1988, p. 37; Propst and Bestgen 1991, p. 32).

The use of riffle habitat has been documented in Aravaipa Creek (Barber and Minckley 1966, p. 321; Rinne 1989, pp. 113, 116; Velasco 1997, pp. 5–6; Vives and Minckley 1990, pp. 451–452), Eagle Creek (Marsh et al. 2003, p. 666), Tularosa River (Propst et al. 1984, pp. 7–12), and the Gila and San Francisco rivers (Britt 1982, pp. 1, 5, 10–12, 29; Propst and Bestgen 1991, p. 32; Propst et al. 1984, pp. 7–12; Propst et al. 1988, pp. 36–39). Loach minnow prefer shallow, swift, and turbulent riffles. However, loach minnow also occur in stream segments that contain pool, riffle, and run habitats on the Blue, upper Gila, and San Francisco rivers (AGFD 1994, pp. 1, 5–11; Bagley et al. 1995, pp. 11, 13, 16, 17, 22; J.M. Montgomery 1985, p. 21).

Substrates. Loach minnow in Aravaipa Creek occurred over a gravel-pebble substrate with materials ranging between 3 to 16 mm (0.12 to 0.63 in) in diameter and, except in the summer, were associated with the larger sizes of available substrate. The use of larger substrates was disproportionately greater than expected based on overall availability of substrate size in the stream, indicating that loach minnow have a preference for the larger substrate and tend to use these substrate areas rather than areas with smaller substrate (Rinne 1989, pp. 112–114). For portions of the upper Gila River occupied by loach minnow in 1999 and 2000, substrates were characterized by gravel-pebble and cobble substrates, with 70 percent of the sites having a gravel-pebble substrate, and 14 percent of the sites having cobble substrate (Rinne 2001, p. 69).

Loach minnow in Aravaipa Creek and the Gila River appeared to prefer cobble and gravel, avoiding areas dominated by sand or finer gravel. This may be due to the fact that loach minnow maintain a relatively stationary position on the bottom of a stream in flowing water. An irregular bottom, such as that created by cobble or larger gravels, creates pockets of lower water velocities around larger rocks where loach minnow can remain stationary with less energy expenditure (Turner and Tafanelli 1983, pp. 24–25). In the Gila and San Francisco rivers, the majority of loach minnow captured occurred in the upstream portion of a riffle rather than in the central and lower depositional sections of the riffle. This is likely due to the availability of interstitial spaces in the cobble-rubble substrate, which became filled with sediment more quickly in the central and lower sections of a riffle section as suspended sediment begins to settle to the stream bottom (Propst et al. 1984, p. 12).

Loach minnow use different substrates during different life stages. Eggs occurred primarily on large gravel

to rubble, while larvae were found where substrate particles were smaller than substrates used by embryos. Juvenile fish occupy areas with substrates of larger particle size than larvae. Adults exhibited a narrower preference for substrates than did juveniles, and were most commonly associated with gravel to cobble substrates (Propst et al. 1988, pp. 36–39; Propst and Bestgen 1991, pp. 32–33).

As noted above, streams in the southwestern United States have a wide fluctuation in flows and are periodically dewatered. While portions of stream segments included in this designation may experience dry periods, they are still considered important because the loach minnow is adapted to this changing environment and will use these areas as connective corridors when they are wetted.

Flooding. In areas where substantial diversions or impoundments have been constructed, loach minnow are less likely to occur (Propst et al. 1988, pp. 63–64, Propst and Bestgen 1991, p. 37). This is in part due to habitat changes caused by the construction of the diversions, and in part due to the reduction of beneficial effects of flooding on loach minnow habitat. Flooding appears to positively affect loach minnow population dynamics by resulting in higher recruitment (reproduction and survival of young) and by decreasing the abundance of nonnative fishes (Stefferud and Rinne 1996, p. 1).

The construction of water diversions, by increasing water depth, has reduced or eliminated riffle habitat in many stream reaches. In addition, loach minnow are generally absent in stream reaches affected by impoundments. While the specific factors responsible for this is not known, it is likely related to modification of thermal regimes, habitat, food base, or discharge patterns (Propst et al. 1988, p. 64; Minckley 1973, pp. 1–11).

Flooding also cleans, rearranges, and rehabilitates important riffle habitat (Propst et al. 1988, pp. 63–64). Flooding allows for the scouring of sand and gravel in riffle areas, which reduces the degree of embeddedness of cobble and boulder substrates (Britt 1982, p. 45). Excessive sediment in the bedload, or that sediment that moves by sliding or rolling along the bed of the stream (Leopold et al. 1992, p. 180) is typically deposited at the downstream undersurfaces of cobble and boulder substrate components where flow velocities are lowest, and can result in a higher degree of embeddedness (Rinne 2001, p. 69). Following flooding, cavities created under cobbles by scouring action of the flood waters provides enhanced spawning habitat for loach minnow.

Studies on the Gila, Tularosa, and San Francisco rivers found that flooding is primarily a positive influence on native fish, and apparently had a positive influence on the relative abundance of loach minnow (Britt 1982, p. 45). Rather than following a typical pattern of winter mortality and population decline, high levels of loach minnow recruitment occurred after the flood, and loach minnow relative abundance remained high through the next spring. Flooding enhanced and enlarged loach minnow habitat, resulting in a greater survivorship of individuals through winter and spring (Propst et al. 1988, p. 51). Similar results were observed on the Gila and San Francisco rivers following flooding in 1978 (Britt 1982, p. 45).

Natural flooding may also reduce the negative impacts of nonnative fish species on loach minnow. During significant floods, nonnative species introduced into western streams were either displaced or destroyed, while native species were able to maintain their position in or adjacent to channel habitats, persist in micro refuges or recolonize should they be displaced (Britt 1982, p. 46; Minckley and Meffe 1987, p. 97).

Stream Gradient. In addition to the availability of riffle habitat, gradient may influence the distribution and abundance of loach minnow. In studies of the San Francisco River, Gila River, Aravaipa Creek, and the Blue River, loach minnow occurred in stream reaches where the gradient was generally low, ranging from 0.3 to 2.2 percent (Rinne 1989, p. 109; Rinne 2001, p. 69).

Habitat Protected From Disturbance or Representative of the Historic Geographical and Ecological Distribution of a Species

Nonnative aquatic species. As noted under the discussion of nonnative fish species in the spikedace primary constituent elements section above, nonnative aquatic species have been introduced for a variety of reasons, resulting in interference or exploitive competition. Interference competition, such as predation, may result from interactions between loach minnow and nonnative channel and flathead catfish. Omnivorous channel catfish of all sizes move into riffles to feed, preying on the same animals most important to the loach minnow diet. Juvenile flathead catfish also feed in riffles in darkness. Flathead catfish are piscivorous, even when small. Loach minnow remains were found in the digestive tracts of channel catfish (Propst et al. 1988, p. 64; Propst and Bestgen 1991, p. 36).

Exploitive competition, or competition for actual resources (Schoener 1983, p. 257), may occur between loach minnow and red shiner, as red shiner is the nonnative fish species most likely to occur in stream habitats occupied by small loach minnow. Red shiners occur in all places known to be formerly occupied by loach minnow, and are absent or rare in places where loach minnow persists. Because of this, red shiner has often been implicated in the decline of loach minnow, as well as other native fishes. Loach minnow habitat is markedly different from that of the red shiner, so interaction between the two species was unlikely to cause shifts in habitat use by loach minnow (Marsh et al. 1989, p. 39). Studies indicate that, instead, red shiner move into voids left when native fishes such as loach minnow are extirpated due to habitat degradation in the area (Bestgen and Propst 1987, p. 209). This may preclude occupancy of this area by loach minnow in the future, should habitat conditions improve.

Prior to 1960, the Glenwood-Pleasanton reach of the Gila River supported a native fish community of eight different species. Post-1960, four of these species became uncommon, and ultimately three of them were extirpated. In studies completed between 1961 and 1980, it was determined that loach minnow was less common than it had been, while diversity of the nonnative fish community had increased in comparison to the pre-1960 period. Following 1980, red shiner, fathead minnow, and channel catfish were all regularly collected. Drought and diversions for irrigation resulted in a decline in habitat quality, with canyon reaches retaining habitat components for native species. However, establishment of nonnative fishes in the canyon reaches then reduced the utility of these areas for native species (Propst et al. 1988, pp. 51–56).

The discussion on spikedace includes information on other nonnative aquatic species such as Asian tapeworm, anchor worm, and Ich, which are also detrimental to loach minnow.

Food

Food Items. Loach minnow are opportunistic, benthic insectivores that obtain their food from riffle-dwelling larval mayflies, black flies, and true flies, as well as from larvae of other aquatic insect groups such as caddisflies and stoneflies. Loach minnow in the Gila, Tularosa, and San Francisco rivers

consumed primarily true flies and mayflies, with mayfly nymphs being an important food item throughout the year. Mayfly nymphs constituted the most important food item throughout the year for adults studied on the Gila and San Francisco Rivers, while true fly larvae were most common in the winter months (Propst et al. 1988, p. 27; Propst and Bestgen 1991, p. 35). In Aravaipa Creek, loach minnow consumed 11 different prey items, including mayflies, stoneflies, caddisflies, and true flies. Mayflies constituted the largest percentage of their diet during this study except in January, when true flies made up 54.3 percent of the total food volume (Schreiber 1978, pp. 40–41).

Loach minnow consume different prey items during their various life stages. Both larvae and juveniles primarily consumed true flies, which constituted approximately 7 percent of their food items in one year, and 49 percent the following year. Mayfly nymphs were also an important dietary element at 14 percent and 31 percent during a one-year study. Few other aquatic macroinvertebrates were consumed (Propst et al. 1988, p. 27). In a second study, true fly larvae and mayfly naiads constituted the primary food of larval and juvenile loach minnow (Propst and Bestgen 1991, p. 35).

The availability of pool and run habitats affects availability of prey species. While most of the food items of loach minnow are riffle species, two are not, including true fly larvae and mayfly nymphs. Mayfly nymphs, at times, made up 17 percent of the total food volume of loach minnow in a study at Aravaipa Creek (Schreiber 1978, pp. 40–41). The presence of a variety of habitat types is therefore important to the persistence of loach minnow in a stream, even while they are typically associated with riffles.

Water Quality

Pollutants. Water with no or only minimal pollutant levels is important for the conservation of loach minnow. As with spikedace, loach minnow occur in areas where mining, agriculture, livestock operations, and road construction are prevalent activities. Various pollutants are associated with these types of activities. For loach minnow, waters should have low levels of pollutants, such as copper, arsenic, mercury, and cadmium; human and animal waste products; pesticides; suspended sediments; and gasoline or diesel fuels (Baker 2005). In addition, for freshwater fish, dissolved oxygen should generally be greater than 3.5 cc/l (Bond 1979, p. 215). Below this, some stress may occur.

Fish kills associated with previous mining accidents are detailed under the spikedace PCEs above. These incidents occurred within the historical range of the loach minnow.

Temperatures. Loach minnow have a fairly narrow range in temperature tolerance, and their upstream distributional limits in some areas may be linked to low winter stream temperature (Propst et al. 1988, p. 62). Suitable temperature regimes appear to be fairly consistent across geographic areas. Studies of Aravaipa Creek, East Fork White River, the San Francisco River, and the Gila River determined that loach minnow were present in areas with water temperatures in the range of 48.2 to 71.6 °F (9 to 22 °C) (Britt 1982, p. 31; Leon 1989, p. 1; Propst et al. 1988, p. 62; Propst and Bestgen 1991, p. 33; Vives and Minckley 1990, p. 451).

Recent studies by the University of Arizona focused on temperature tolerances of loach minnow. In the study, fish were acclimated to a given temperature, and then temperatures were increased by 1 °C (33.8 °F) per day until test temperatures were reached. The study determined that no loach minnow survived 30 days at 32 °C (89.6 °F), and that 50 percent mortality occurred after 30 days at 30.6 °C (87.1 °F). In addition, growth rate was slowed at 28 °C and 30 °C (82.4 and 86.0 °F) in comparison to growth at 25 °C (77 °F), indicating that loach minnow were stressed at sub-lethal temperatures. Survival of fish in the fluctuating temperature trials of the study likely indicates that exposure to higher temperatures for short periods during a day would be less stressful to loach minnow. The study concludes that temperature tolerance in the wild may be lower due to the influence of additional stressors, including disease, predation, competition, or poor water quality. The study concludes that 100 percent survival of loach minnow at 28 °C (82.4 °F) suggests that little juvenile or adult mortality would occur due to thermal stress if peak water temperatures remain at or below that level (Bonar et al. 2005, pp. 6–8, 28, 33).

Reproduction and Rearing of Offspring

Habitat conditions needed for reproduction and rearing of offspring include appropriate flow velocities, substrates, sediment levels, and riffle availability. Loach minnow place eggs in areas with mean velocities ranging between 2.4 to 15.6 in/second (3.0 to 39.6 cm/second) in the Gila, San Francisco, West Fork, Middle Fork, and East Fork Gila rivers (Britt 1982, pp. 29–30; Propst et al. 1988, p. 25; Propst and Bestgen 1991, p. 34). Fungal infections developed on egg masses found in slow-velocity waters of less than 2.4 in/second (6.2 cm/second) (Propst et al. 1988, p. 25; Propst and Bestgen 1991, p. 34). Once hatched, areas of slower flows appear important to larval loach minnow as they have been found in slower-velocity stream margins (Propst et al. 1988, pp. 37–38).

Substrate type is important to spawning as well. While loach minnow spawning occurs in the same riffle habitat that adults occupy, it is the substrate that determines its suitability for spawning. Eggs are deposited on the undersurface of rocks or cobbles. Rocks are generally flattened, have smooth surfaces, and are angular. Rocks which have eggs attached are generally embedded on their upstream side in the substrate. Eggs placed under rocks in the Gila River, San Francisco River, and Aravaipa Creek were placed on the underside of rocks in nest cavities formed by rocks of varying sizes (Britt 1982, pp. 29, 31; Propst et al. 1988, p. 21; Vives and Minckley 1990, pp. 451–452).

Loach minnow spawning is the life history stage most affected by sediment or fines (Rinne 2001, p. 69). Because deposition of eggs occurs on the downstream undersurfaces of cobble and boulder substrate components, excessive fines in the bedload of a system can fill in the areas where eggs would otherwise be deposited, especially in areas of slower velocities.

Primary Constituent Elements for the Loach Minnow

Pursuant to our regulations, we are required to identify the known physical and biological features (primary constituent elements) essential to the conservation of the loach minnow. All stream complexes designated as critical habitat for the loach minnow are considered occupied, within the species' historic geographic range, and contain sufficient PCEs to support at least one life history function.

Based on our current knowledge of the life history, biology, and ecology of the species and the requirements of the habitat to sustain the essential life history functions of the species, we have determined that the primary constituent elements essential to the conservation of the loach minnow are:

1. Permanent, flowing water with no or minimal pollutant levels, including:

a. Living areas for adult loach minnow with moderate to swift flow velocities between 9.0 to 32.0 in/second (24 to 80 cm/second) in shallow water between approximately 1.0 to 30 inches

(3 cm to 75 cm) in depth, with gravel, cobble, and rubble substrates;

b. Living areas for juvenile loach minnow with moderate to swift flow velocities between 1.0 and 34 in/second (3.0 and 85.0 cm/second) in shallow water between approximately 1.0 to 30 inches (3 cm to 75 cm) in depth with sand, gravel, cobble, and rubble substrates;

c. Living areas for larval loach minnow with slow to moderate velocities between 3.0 and 20.0 in/second (9.0 to 50.0 cm/second) in shallow water with sand, gravel, and cobble substrates;

d. Spawning areas with slow to swift flow velocities in shallow water where cobble and rubble and the spaces between them are not filled in by fine dirt or sand; and

e. Water with dissolved oxygen levels greater than 3.5 cc/l and no or minimal pollutant levels for pollutants such as copper, arsenic, mercury, and cadmium; human and animal waste products; pesticides; suspended sediments; and gasoline or diesel fuels.

2. Sand, gravel, and cobble substrates with low or moderate amounts of fine sediment and substrate embeddedness. Suitable levels of embeddedness are generally maintained by a natural, unregulated hydrograph that allows for periodic flooding or, if flows are modified or regulated, a hydrograph that allows for adequate river functions, such as flows capable of transporting sediments.

3. Streams that have:

a. Low gradients of less than approximately 2.5 percent;

b. Water temperatures in the approximate range of 35 to 82 °F (1.7 to 27.8 °C) (with additional natural daily and seasonal variation);

c. Pool, riffle, run, and backwater components; and

d. An abundant aquatic insect food base consisting of mayflies, true flies, black flies, caddisflies, stoneflies, and dragonflies.

4. Habitat devoid of nonnative aquatic species or habitat in which nonnative aquatic species are at levels that allow persistence of loach minnow.

5. Areas within perennial, interrupted stream courses that are periodically dewatered but that serve as connective corridors between occupied or seasonally occupied habitat and through which the species may move when the habitat is wetted.

Units are designated based on sufficient PCEs being present to support one or more of the species' life history functions. Some units contain all PCEs and support multiple life processes, while some units contain only a portion of the PCEs necessary to support the species' particular use of that habitat. Where a subset of the PCEs is present at the time of designation, this rule protects those PCEs and thus the conservation function of the habitat.

Methods

As required by section 4(b) of the Act, we used the best scientific data available in determining areas that contain the features essential to the conservation of the spikedace and loach minnow. In designating critical habitat for the spikedace and loach minnow, we solicited information from knowledgeable biologists and reviewed recommendations contained in State wildlife resource reports. We also reviewed the available literature pertaining to habitat requirements, historical localities, and current localities of the two species. We used data in reports submitted during section 7 consultations, research published in peer-reviewed articles and presented in academic theses and agency reports, and regional GIS data layer coverages.

We have also reviewed historical and current occurrence data, information pertaining to habitat requirements for these species, scientific information on the biology and ecology of the two species, general conservation biology principles, and scientific information cited in the Recovery Plans for these two species. Of particular importance, we reviewed databases, published literature, and field notes to determine the historical and current occurrence data for the two species. The SONFishes Database (ASU 2002) details occurrence records from the 1800s through 1999. The Heritage Database Management System (HDMS) (AGFD 2004) contains information for Arizona with some overlap of SONFishes records, as well as records from 1999 through 2004. Agency and researcher field notes and published literature contain additional information on completed surveys and species detections.

Criteria for Defining Critical Habitat

We are designating critical habitat on lands within the geographical range occupied at the time of listing and currently occupied by either, or in some cases both, the spikedace and loach minnow. We consider an area to be occupied by the spikedace or loach minnow if we have records to support occupancy within the last 10 years, or where the stream segment is directly connected to a segment with occupancy records from within the last 10 years (this is described within each unit description below). The three connected areas (see Table 1 above) included in the designation are within the historical range of the species, contain one or more of the PCEs required by spikedace or loach minnow, have been occupied in the past, and are directly connected to a stream segment with records of occupancy from 2004 or 2005 (see Table 1 above). For the following reasons we believe that these areas are occupied for the purposes of this critical habitat designation: (1) The areas are directly connected to stream segments with recent occupancy records (2004 and 2005); (2) the stream segments are connected and the fish can move between them; (3) surveys have been infrequent or inconsistent and spikedace and loach minnow can be difficult to detect in surveys; and (4) we have other streams in which the species were not detected for long periods before being detected again [e.g., Eagle Creek, where there was a 44 year gap between loach minnow detections (see Marsh et al. 2003, p. 666)]. We believe a period of 10 years is reasonable to determine occupancy based on the fact that both species are difficult to detect in surveys, surveys have been infrequent or inconsistent because many of the areas where they occur are remote, and as noted above, we have areas where these species were not detected for long periods of time (44 years) and then detected again. The life expectancy of spikedace and loach minnow is 2 to 3 years. A period of 10 years would represent a time period that provides for three to four generations of spikedace and loach minnow.

We divided the overall historical range into five river complexes, and each critical habitat stream segment was derived from within these larger complexes. We believe this is a reasonable approach because populations in mainstem tributaries may access a wider geographic area by moving into smaller tributaries, while populations in tributaries are afforded the ability to disperse to other tributaries via the mainstem river within that complex. Overall, the complexes included herein provide coverage throughout the historical range of the species, with exceptions for areas that were excluded for specific reasons, as detailed below (see ''Exclusions under Section 4(b)(2) of the Act'' section below). The critical habitat designation constitutes our best assessment of areas that contain sufficient features (PCEs) essential to the conservation of spikedace and loach minnow and that require special management or protection.

We are designating critical habitat in areas that we have determined to be occupied at the time of listing, and that

contain sufficient primary constituent elements to support life history functions essential for the conservation of the species. Lands were included in the designation based on sufficient PCEs being present to support the life processes of the species. Some lands contain all PCEs and support multiple life processes. Some lands contain only a portion of the PCEs necessary to support the particular use of that habitat. In determining whether an area contains sufficient PCEs, the Service looked at various databases and survey records to determine occupancy, as well as habitat descriptions at various locations. We relied on information provided in survey reports and research documents to describe conditions at various locations. This information was then synthesized to develop the critical habitat designation.

When determining final critical habitat map boundaries, we made every effort to avoid including developed areas such as buildings, paved areas, and other structures that lack any PCEs for the spikedace and loach minnow. Any such structures and the land under them inadvertently left inside critical habitat boundaries of this final rule are excluded by text and are not designated as critical habitat. Therefore, Federal actions limited to these areas would not trigger section 7 consultation, unless they affect the species or primary constituent elements in adjacent critical habitat.

Lateral Extent

The areas designated as critical habitat are designed to provide sufficient riverine and associated floodplain area for breeding, non-breeding, and dispersing adult spikedace and loach minnow, as well as for the habitat needs of juvenile and larval stages of these fishes. In general, the primary constituent elements of critical habitat for spikedace and loach minnow include the riverine ecosystem formed by the wetted channel and the adjacent floodplains within 300 lateral feet on either side of bankfull stage, except where bounded by canyon walls. Areas within the lateral extent also contribute to PCEs 1 and 2 (water quality) and contain PCEs 3 (food source) and 5 (provide areas where the fish may move through when wetted). Spikedace and loach minnow use the riverine ecosystem for feeding, sheltering, and cover while breeding and migrating. This designation takes into account the naturally dynamic nature of riverine systems and floodplains (including riparian and adjacent upland areas) that are an integral part of the stream ecosystem. For example, riparian areas are seasonally flooded habitats (i.e., wetlands) that are major contributors to a variety of vital functions within the associated stream channel (Federal Interagency Stream Restoration Working Group 1998, Brinson et al. 1981, pp. 2–61, 2–69, 2–72, 2–75, 2–84 to 2–85). They are responsible for energy and nutrient cycling, filtering runoff, absorbing and gradually releasing floodwaters, recharging groundwater, maintaining streamflows, protecting stream banks from erosion, and providing shade and cover for fish and other aquatic species. Healthy riparian and adjacent upland areas help ensure water courses maintain the habitat important for aquatic species (e.g., see U.S. Forest Service 1979, pp. 18, 109, 158, 264, 285, 345; Middle Rio Grande Biological Interagency Team 1993, pp. 64, 89, 94), including the spikedace and loach minnow. Habitat quality within the mainstem river channels in the historical range of the spikedace and loach minnow is intrinsically related to the character of the floodplain and the associated tributaries, side channels, and backwater habitats that contribute to the key habitat features (e.g., substrate, water quality, and water quantity) in these reaches. We have determined that a relatively intact riparian area, along with periodic flooding in a relatively natural pattern, is important for maintaining the PCEs necessary for long-term conservation of the spikedace and loach minnow.

The lateral extent (width) of riparian corridors fluctuates considerably between a stream's headwaters and its mouth. The appropriate width for riparian buffer strips has been the subject of several studies (Castelle et al. 1994). Most Federal and State agencies generally consider a zone 23–46 m (75–150 ft) wide on each side of a stream to be adequate (NRCS 1998; Moring *et al.* 1993; Lynch *et al.* 1985), although buffer widths as wide as 152 m (500 ft) have been recommended for achieving flood attenuation benefits (Corps 1999). In most instances, however, riparian buffer zones are primarily intended to reduce (i.e., buffer) detrimental impacts to the stream from sources outside the river channel. Consequently, while a riparian corridor 23–46 m (75–150 ft) in width may function adequately as a buffer, it is likely inadequate to preserve the natural processes that provide spikedace and loach minnow primary constituent elements.

The lateral extent of streams was set at 300 ft (91.4 m) to either side of bankfull stage to accommodate stream meandering and high flows, and in order to ensure that this designation contained the features essential to the conservation of the species. Bankfull stage is defined as the upper level of the range of channel-forming flows which transport the bulk of the available sediment over time. Bankfull stage is generally considered to be that level of stream discharge reached just before flows spill out onto the adjacent floodplain. The discharge that occurs at bankfull stage, in combination with the range of flows that occur over a length of time, govern the shape and size of the river channel (Rosgen 1996, pp. 2–2 to 2–4; Leopold 1997, pp. 62–63, 66). The use of bankfull stage and 300 ft (91.4 m) on either side recognizes the naturally dynamic nature of riverine systems, recognizes that floodplains are an integral part of the stream ecosystem, and contains the area and associated features essential to the conservation of the species. A relatively intact floodplain, along with the periodic flooding in a relatively natural pattern, is an important element in the conservation of spikedace and loach minnow.

We determined the 300-foot lateral extent for several reasons. First, the implementing regulations of the Act require that critical habitat be defined by reference points and lines as found on standard topographic maps of the area (50 CFR 424.12). Although we considered using the 100-year floodplain, as defined by the Federal Emergency Management Agency (FEMA), we found that it was not included on standard topographic maps, and the information was not readily available from FEMA or from the Army Corps of Engineers for the areas we are proposing to designate. We suspect this is related to the remoteness of many of the stream reaches where these species occur. Therefore, we selected the 300-foot lateral extent, rather than some other delineation, for three biological reasons: (1) The biological integrity and natural dynamics of the river system are maintained within this area (i.e., the floodplain and its riparian vegetation provide space for natural flooding patterns and latitude for necessary natural channel adjustments to maintain appropriate channel morphology and geometry, store water for slow release to maintain base flows, provide protected side channels and other protected areas, and allow the river to meander within its main channel in response to large flow events); (2) conservation of the adjacent riparian area also helps provide important nutrient recharge and protection from sediment and pollutants; and (3) vegetated lateral zones are widely recognized as

providing a variety of aquatic habitat functions and values (e.g., aquatic habitat for fish and other aquatic organisms, moderation of water temperature changes, and detritus for aquatic food webs) and help improve or maintain local water quality (see U.S. Army Corps of Engineers' final notice concerning Issuance and Modification of Nationwide Permits, March 9, 2000, 65 FR 12818–12899).

Among other things, the floodplain provides space for natural flooding patterns and latitude for necessary natural channel adjustments to maintain channel morphology and geometry. We conclude that a relatively intact riparian area, along with periodic flooding in a relatively natural pattern, is important in maintaining the stream conditions necessary for long-term survival and recovery of the spikedace and loach minnow.

Conservation of the river channel alone is not sufficient to ensure the survival and recovery of the spikedace and loach minnow. For the reasons discussed above, we believe the riparian corridors adjacent to the river channel provide an important function within the areas designated as critical habitat.

Special Management Considerations or Protections

When designating critical habitat, we assess whether the areas determined to be occupied at the time of listing, contain the primary constituent elements and may require special management considerations or protection. We believe each area included in this final designation requires special management and protections as described in our unit descriptions and Table 1.

Special management considerations for each area will depend on the threats to the spikedace and/or loach minnow in that critical habitat area. For example, threats requiring special management include nonnative fish species and the continued spread of nonnative fishes into spikedace or loach minnow habitat. Other threats requiring special management include threat of fire, retardant application during the fire, and excessive ash and sediment following the fire. On-going improper livestock grazing can be a threat to spikedace and loach minnow and their habitats. Poor water quality and adequate quantities of water for all life stages of spikedace and loach minnow threaten these fish and may require special management actions or protections. The construction of water diversions, by increasing water depth, has reduced or eliminated riffle habitat in many stream reaches. In addition, loach minnow are generally absent in stream reaches affected by impoundments. While the specific factor responsible for this is not known, it is likely related to modification of thermal regimes, habitat, food base, or discharge patterns. We have included below in our description of each of the critical habitat areas for the spikedace and loach minnow a description of the threats occurring in that area requiring special management or protections.

When determining critical habitat boundaries, we made every effort to avoid the designation of developed areas such as buildings, paved areas, boat ramps and other structures that lack PCEs for spikedace and loach minnow. Any such structures do not contain the PCEs and are not considered part of the critical habitat designation. This also applies to the land on which such structures sit directly. Therefore, Federal actions limited to these areas would not trigger section 7 consultations, unless they affect the species and/or PCEs in adjacent critical habitat.

Critical Habitat Designation

Below are tables and descriptions of the critical habitat segments, including discussion of excluded and exempted areas within each segment. For each stream reach, the upstream and downstream boundaries are described. Additionally, critical habitat includes the stream channels within the identified stream reaches and areas within these reaches and, as described above, the area of bankfull width plus 300 lateral feet on either side of bankfull width, except when the floodplain is narrow and bounded by canyon walls. This 300-foot width defines the lateral extent of each area of critical habitat that contains sufficient PCEs (3 and 5) to provide for one or more of the life history functions of the spikedace and loach minnow.

The critical habitat designation for both spikedace and loach minnow includes five complexes totaling approximately 522.2 mi (840.4 km) of stream reaches (see Tables 1 and 2). The spikedace and loach minnow critical habitat areas described below constitute our best assessment at this time of areas determined to be occupied at the time of listing, that contain the primary constituent elements and may require special management, and those additional areas that were not occupied at the time of listing but are currently occupied and contain the features essential to the conservation of the species. Unless otherwise indicated, the following areas identified in Table 1 and in the unit descriptions below, are designated as critical habitat for both spikedace and loach minnow (see the ''Regulation Promulgation'' section of this rule below for exact descriptions and distances of boundaries). The designation includes portions of 8 streams for spikedace and 21 streams for loach minnow; however, individual streams are not isolated, but are grouped with others to form areas or ''complexes.''

Table 2 below provides approximate area (mi/km) determined to meet the definition of critical habitat for the spikedace and loach minnow by State.

TABLE 2.—APPROXIMATE CRITICAL HABITAT IN STREAM MILES (MI) AND KILOMETERS (KM) BY STATE AND LANDOWNER

Landowner	Arizona mi (km)	New Mexico mi (km)	Total mi (km)
Federal	170.4 (274.2)	167.7 (269.9)	338.1 (544.1)
State	8.0 (12.9)	1.3 (2.1)	9.3 (15)
Tribal	2.1 (3.4)	0 (0)	2.1 (3.4)
Private	90.2 (145.1)	82.5 (132.8)	172.7 (277.9)
Total	270.7 (435.6)	251.5 (404.8)	522.2 (840.4)

TABLE 3.—AREAS DETERMINED TO MEET THE DEFINITION OF CRITICAL HABITAT FOR THE SPIKEDACE AND LOACH MINNOW AND THE AREAS EXCLUDED FROM THE FINAL CRITICAL HABITAT DESIGNATION

[ac (ha)/mi (km)]

State or geographic area	Area meeting the definition of critical habitat (mi/km)	Area excluded from the final critical habitat designation (mi/km)
Arizona	373.7 (601.5)	103.1 (165.9)
New Mexico	258.8 (416.4)	7.3 (11.7)
Total	632.5 (1017.9)	110.3 (177.5)

The approximate area encompassed within each critical habitat unit is shown in Table 4.

TABLE 4.—CRITICAL HABITAT UNITS DESIGNATED FOR THE SPIKEDACE AND LOACH MINNOW

[Area estimates reflect all land within critical habitat complexes]

Critical habitat unit	Mi	Km
1. Verde River	43.0	69.2
2. Black River	18.1	29.1
3. Lower San Pedro/Gila River/Aravaipa Creek	85.5	137.5
4. Gila Box/San Francisco River	235.0	378.2
5. Upper Gila River	140.6	226.3
Total	522.2	840.4

Complex 1—Verde River Complex—Yavapai County, Arizona

Spikedace have been detected in the Verde River Complex since 1890. The Verde River was known to be occupied by spikedace at the time of listing, and is still considered to be occupied based on surveys documenting spikedace presence as recently as 1999. This complex was also historically occupied by loach minnow, with records from 1890 and 1938 (ASU 2002, Brouder 2002, AGFD 2004). At this time, the tributary streams of the Verde River are believed to be unoccupied by both species and are not being included as critical habitat. The Verde River Complex is unusual in that a relatively stable thermal and hydrologic regime is found in the upper river and in Fossil Creek, one of the tributaries to the Verde River. Also, spikedace in the Verde River are genetically distinct from all other spikedace populations (Tibbets 1993, pp. iii-iv, 34–35; Anderson and Hendrickson 1994, p. 154). The Verde River contains one or more of the primary constituent elements, including shear zones, sheet flow, and eddies, and an appropriate prey base. In addition, the lateral extent of each segment within this complex of critical habitat contains sufficient PCEs (3 and 5) to provide for one or more of the life history functions of the spikedace and loach minnow. The continuing presence of spikedace and the existence of features that are essential to the conservation of the species create a high potential for restoration of loach minnow to the Verde River system. Threats to this critical habitat area requiring special management and protections include water diversions, improper livestock grazing, and nonnative fish species (see Table 1 above).

The landownership of this complex consists of large blocks of U.S. Forest Service lands in the upper and lower reaches, with significant areas of private ownership in the Verde Valley. There are also lands belonging to Arizona State Parks, Yavapai Apache Tribe, and the AGFD. The Verde River divides the west and east halves of the Prescott National Forest, and passes by or through the towns of Camp Verde, Middle Verde, Bridgeport, Cottonwood, and Clarkdale.

Verde River Complex—Spikedace Only—43 mi (69.2 km) of river extending from the Prescott and Coconino National Forest boundary with private lands upstream to Sullivan Dam at Township 17 North, Range 2 West, section 15. Sullivan Dam is at the upstream limit of perennial flow in the mainstem of the Verde River. Perennial flow results from a series of river-channel springs and from Granite Creek. The Verde River contains features essential to the conservation of the spikedace between its headwaters and Fossil Creek. These portions of the Verde River provide a relatively stable thermal and hydrologic regime suitable for spikedace. Below Fossil Creek, the Verde River has a larger flow and is thought to offer little suitable habitat (i.e., does not contain sufficient PCEs) for spikedace or loach minnow. The Verde River below Fossil Creek is within the historical range for both species, and comments on previous critical habitat designations from the U.S. Forest Service indicated this stretch of the river may offer substantial value for spikedace and loach minnow recovery. We will continue to seek further information regarding the Verde River and its role in conservation for these two species and may consider designation of the Verde River below Fossil Creek in future potential revisions of critical habitat. At this time, however, we are excluding all land south of the Coconino and Prescott National Forest boundaries at the upper end of the Verde Valley due to disproportionate economic concerns (see Exclusions under Section 4(b)(2) below).

Complex 2—Black River Complex—Apache and Greenlee Counties, Arizona

The Salt River Sub-basin represents a significant portion of loach minnow historical range; however, loach minnow have been extirpated from all but a small portion of the Black and White rivers. The Black River Complex is considered important because it is the only remaining population of loach minnow on public lands in the Salt River Sub-basin.

We are designating streams within this complex as critical habitat for loach minnow only. At this time, spikedace are not known to historically occupy areas at this elevation; however, the data on maximum elevation for spikedace are not definitive and if information becomes available that differs from that currently available, the Black River Complex may be reevaluated for spikedace critical habitat designation in a future revision. Portions of the sub-basin are unsuitable, either because of topography or because of the presence of reservoirs, stream channel alteration by humans, or overwhelming nonnative fish populations. However, other areas within the sub-basin remain suitable. Complex 2 was not known to be occupied at listing, with first detections of loach minnow occurring in 1996. It is currently occupied by loach minnow

(Bagley et al. 1995, multiple surveys; Lopez 2000, p. 1; ASU 2002; AGFD 2004). Because the range of loach minnow has been severely reduced, and only a few streams remain occupied, the Black River Complex is considered essential to the loach minnow. In addition, Complex 2 supports one or more of the PCEs for loach minnow, including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., riffles, runs). In addition, the lateral extent of each segment within this complex of critical habitat contains sufficient PCEs (3 and 5) to provide for one or more of the life history functions of the spikedace and loach minnow. Threats in this complex requiring special management or protections include improper livestock grazing, nonnative fish, recreation, and sedimentation including that from a recent fire that destroyed vegetation (see Table 1). The ownership of this complex is predominantly U.S. Forest Service, with a few small areas of private land. All streams within the complex are within the boundaries of the Apache-Sitgreaves National Forest and include lands of the White Mountain Apache Tribe.

(1) East Fork Black River—Loach Minnow Only—12.2 mi (19.7 km) of river extending from the confluence with the West Fork Black River upstream to the confluence with an unnamed tributary approximately 0.51 mi (0.82 km) downstream of the Boneyard Creek confluence. This area is considered occupied based on records from 1996, it is connected to the North Fork East Fork Black River with documented loach minnow records from 2004, and contains one or more of the primary constituent elements including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., riffles, runs).

(2) North Fork East Fork Black River—Loach Minnow Only—4.4 mi (7.1 km) of river extending from the confluence with the East Fork Black River upstream to the confluence with an unnamed tributary. This area is occupied by loach minnow based on surveys documenting presence of loach minnow as recently as 2004. Above the unnamed tributary, the river has finer substrate and lacks riffle habitat, making it unsuitable for loach minnow.

(3) Boneyard Creek—Loach Minnow Only—1.4 mi (2.3 km) of creek extending from the confluence with the East Fork Black River upstream to the confluence with an unnamed tributary. Boneyard Creek contains one or more of the primary constituent elements, including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., riffles, runs). This area is considered to be occupied based on records from 1996; it is also connected to the North Fork East Fork Black River which has documented loach minnow records from 2004. This area represents part of the only occupied complex in the Salt River basin.

(4) East Fork White River—Loach Minnow Only—12.5 mi (20.1 km) of the East Fork White River extending from the confluence with the North Fork White River and the East Fork White River at Township 5 North, Range 22 East, section 35 upstream to Township 5 North, Range 23 East, southeast quarter of section 13. This area was occupied by loach minnow at the time of listing and is reported to be currently occupied by the White Mountain Apache Tribe. This segment of the East Fork White River contains sufficient features to support one or more of the life history functions of the loach minnow that may include appropriate gradient, temperature, habitat types (pool, riffle, run, etc.), and low levels of non-natives. Threats in this segment requiring special management or protections include water diversions and recreation. The entirety of this reach is located on lands belonging to the White Mountain Apache Tribe. A management plan for loach minnow has been in place on these lands since 2000. On the basis of this plan and our partnership with the White Mountain Apache Tribe, we are excluding this area from final critical habitat pursuant to section 4(b)(2) of the Act (see ''Relationship of Critical Habitat to Tribal Lands'' section below for additional information).

Complex 3—Middle Gila/Lower San Pedro/Aravaipa Creek Complex—Pinal and Graham Counties, Arizona

The portions of this complex designated as critical habitat are within the geographical range occupied by both spikedace and loach minnow at their listing and currently. Spikedace and loach minnow have been present within this complex since 1943, with occupancy confirmed most recently in 2006 (ASU 2002, AGFD 2004, Rienthal 2006, p. 2–3). The portions of the Gila and San Pedro rivers included within this complex were not known to be occupied at listing, with the first detection on the Gila River occurring in 1991 (Jakle 1992, p. 6). However, this area is connected via the San Pedro River to Aravaipa Creek, which contains one of the largest remaining populations of spikedace, and is therefore considered to be occupied for the purposes of critical habitat. Because the distribution of spikedace is reduced to populations in the Verde River, Aravaipa Creek, and the Gila River in New Mexico, all remaining populations are considered important to the species. This complex contains one or more of the PCEs for both species including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., riffles, runs). In addition, the lateral extent of each segment within this complex of critical habitat contains sufficient PCEs (3 and 5) to provide for one or more of the life history functions of the spikedace and loach minnow. Ongoing actions requiring special management or protections in this area include wildfire, some recreational pressure, low nonnative pressures, water diversions, and contaminants issues. Aravaipa Creek supports the largest remaining spikedace and loach minnow populations in Arizona. Threats in this complex requiring special management or protections include water diversions, improper livestock grazing, nonnative fish, recreation, and mining (see Table 1). This area includes extensive BLM land as well as extensive private land, some State of Arizona lands, and a small area of allotted land, used by the San Carlos Apache Tribe. The lower portions of the Gila River are Bureau of Reclamation lands.

(1) Gila River—Spikedace Only—39.0 mi (62.8 km) of river extending from the Ashurst-Hayden Dam upstream to the confluence with the San Pedro River. Spikedace were located in the Gila River in 1991 (Jakle 1992, p. 6), and the Gila River is connected with Aravaipa Creek, which supports the largest remaining spikedace population. Those portions of the Gila River designated as critical habitat contain one or more of the primary constituent elements, including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., glides, runs, eddies). Above the confluence with the San Pedro River, flow in the Gila River is highly regulated by the Coolidge Dam and does not contain the features essential to the conservation of either species. Below the confluence, the input of the San Pedro provides a sufficiently unregulated hydrograph, which is a feature essential to the conservation of the spikedace. Threats in this area requiring special management or protections include water diversions, improper livestock grazing, and nonnative fish species. This river is part of the complex that contains the largest remaining population of spikedace and loach

minnow and contains the features essential to the conservation of the species.

(2) Lower San Pedro River—Spikedace Only—13.4 mi (21.5 km) of river extending from the confluence with the Gila River upstream to the confluence with Aravaipa Creek. This area was occupied at the time of listing and is considered to be occupied as it is directly connected with Aravaipa Creek, which supports the largest remaining spikedace population. This portion of the San Pedro River contains one or more of the primary constituent elements, including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., glides, runs, eddies). Existing flow in the river comes from surface and subsurface contributions from Aravaipa Creek. Threats in this area requiring special management or protections include water diversions, nonnative fish, improper livestock grazing, and mining. This river is part of the complex that contains the largest remaining population of spikedace and loach minnow and contains the features essential to the conservation of the species.

(3) Aravaipa Creek—28.1 mi (45.3 km) of creek extending from the confluence with the San Pedro River upstream to the confluence with Stowe Gulch, which is where the upstream limit of sufficient perennial flow ends for either species. Aravaipa Creek was occupied by both spikedace and loach minnow at the time of listing and continues to support a substantial population of both species (Rienthal 2006, p. 1–2). Aravaipa Creek contains one or more of the primary constituent elements, including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., runs, riffles, glides, eddies). Threats in this area requiring special management or protections include water diversions, nonnative fish, and recreational pressures (see Table 1).

(4) Turkey Creek—Loach Minnow Only—2.7 mi (4.3 km) of creek extending from the confluence with Aravaipa Creek upstream to the confluence with Oak Grove Canyon. This creek was occupied at the time of listing and is currently occupied by loach minnow (Rienthal 2006, p. 2–3). Turkey Creek contains one or more of the primary constituent elements, including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., riffles, runs). Threats to this area requiring special management or protections are generally the same as for Aravaipa Creek, and include water diversions, nonnative fish, and recreational pressure (see Table 1). This creek is part of the complex that contains the largest remaining population of spikedace and loach minnow and contains the features essential to the conservation of the species.

(5) Deer Creek—Loach Minnow Only—2.3 mi (3.6 km) of creek extending from the confluence with Aravaipa Creek upstream to the boundary of the Aravaipa Wilderness. This stream was occupied at the time of listing and is currently occupied by loach minnow. Deer Creek contains one or more of the primary constituent elements essential to the conservation of loach minnow, including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., riffles, runs). The threats to loach minnow in this area are similar to those for Aravaipa Creek, including water diversions, nonnative fish, and recreation. This creek is part of the complex that contains the largest remaining population of spikedace and loach minnow and contains the features essential to the conservation of the species.

Complex 4—San Francisco and Blue Rivers Complex—Graham and Greenlee Counties, Arizona and Catron County, New Mexico

The streams in this complex are within the geographical range occupied by the loach minnow and the spikedace. The Blue River system and adjacent portions of the San Francisco River constitute the longest stretch of occupied loach minnow habitat unbroken by large areas of unsuitable habitat. Loach minnow have been present in this complex since 1840 up to the present, including at its listing (Miller 1998, pp. 4–5; ASU 2002; AGFD 2004; Carter 2005, pp. 1–9; Propst 2005, p. 6; Propst 2006, p. 2). Within this complex, Eagle Creek was known to be occupied by spikedace at its listing (ASU 2002; Marsh et al. 2003, pp. 666–668; AGFD 2004), while Frieborn, Negrito, and Pace creeks were not known to be occupied at the time of listing. For the areas not known to be occupied at the time of listing, each of these areas is currently occupied by loach minnow, supports one or more of the PCEs, and is connected to a stream that is also currently occupied. Because the distribution of loach minnow has been severely reduced, these creeks are considered essential to the species. Streams in this complex contain one or more of the PCEs for both species including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., riffles, runs). In addition, the lateral extent of each segment within this complex of critical habitat contains sufficient PCEs (3 and 5) to provide for one or more of the life history functions of the spikedace and loach minnow. Threats in this complex requiring special management are described in the individual stream reaches below. This complex contains extensive U.S. Forest Service land, some BLM land, and scattered private, State of Arizona, and NMDGF lands.

(1) Eagle Creek—Loach Minnow Only—44.8 mi (71.9 km) of creek extending from the Phelps-Dodge Diversion Dam upstream to the confluence of Dry Prong and East Eagle creeks, including lands of the San Carlos Apache Reservation and the Phelps Dodge Corporation. Eagle Creek was occupied by spikedace and loach minnow at the time of listing. The most current records of occupancy in Eagle Creek are from 1997 for loach minnow and 1989 for spikedace. Eagle Creek contains one or more of the primary constituent elements essential to the conservation of loach minnow, including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., riffles, runs). Threats within this area that require special management or protections include water diversions, improper livestock grazing, nonnative fish, and mining (see Table 1).

A section of Eagle Creek approximately 17.2 mi (27.7 km) long occurs on the San Carlos Apache Reservation. We have received a management plan from the San Carlos Apache Tribe addressing native fishes. On the basis of this plan and our partnership with the San Carlos Apache Tribe, we are excluding this area from final critical habitat pursuant to section 4(b)(2) of the Act (see ''Relationship of Critical Habitat to Tribal Lands'' section below for additional information). An additional 9.9 mi (15.7 km) are owned by the Phelps Dodge Corporation. We received a management plan from Phelps Dodge addressing management for spikedace and loach minnow. On the basis of this plan, we are excluding their lands from the final critical habitat designation pursuant to section 4(b)(2) of the Act (see ''Exclusions under Section 4(b)(2) of the Act'' for additional information).

(2) San Francisco River—Loach Minnow Only—126.5 mi (203.5 km) of river extending from the confluence with the Gila River upstream to the mouth of The Box, a canyon above the town of Reserve. Loach minnow occupied the San Francisco River at the time of listing and occupy it presently,

with occupancy verified in 2005. The San Francisco River contains one or more of the primary constituent elements essential to the conservation of loach minnow, including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., riffles, runs). Threats to this area requiring special management or protections include water diversions, improper livestock grazing, and nonnative fish species (see Table 1).

(3) Tularosa River—Loach Minnow Only—18.6 mi (30.0 km) of river extending from the confluence with the San Francisco River upstream to the town of Cruzville. Above Cruzville, the river does not contain the features essential to the conservation of the species because of the small size of the stream and a predominance of fine substrates. This area includes one or more of the primary constituent elements essential to the conservation of loach minnow, including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., riffles, runs). The Tularosa River was occupied at the time of listing and is known to be currently occupied based on records as recent as 2002. Threats to the species and its habitat in this area that require special management or protections include grazing and nonnative fish (see Table 1).

(4) Negrito Creek—Loach Minnow Only—4.2 mi (6.8 km) of creek extending from the confluence with the Tularosa River upstream to the confluence with Cerco Canyon. Above this area, the creek does not contain the features essential to the conservation of the species because of gradient and channel morphology. Negrito Creek has been occupied since listing, with the most recent record from 1998 (Service 2005). In addition, this area is directly connected to the Tularosa River, which has occupancy records as recent as 2002. Negrito Creek contains one or more of the primary constituent elements essential to the conservation of loach minnow, including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., riffles, runs). Threats to this area requiring special management or protections include improper livestock grazing and nonnative fish (see Table 1).

(5) Whitewater Creek—Loach Minnow Only—1.1 mi (1.8 km) of creek extending from the confluence with the San Francisco River upstream to the confluence with the Little Whitewater Creek. Upstream of this area the river does not contain the features essential to the conservation of the species because of gradient and channel changes that make the portion above Little Whitewater Creek unsuitable for loach minnow. In addition, low water temperatures likely influence the upstream distributional limits (Propst 2006, p. 2). Whitewater Creek was occupied at the time of listing, and is connected with the San Francisco River, which has documented loach minnow records as recent as 2001. This area does support one or more primary constituent elements for loach minnow, including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., riffles, runs). Threats to this area include grazing and nonnative fish (see Table 1).

(6) Blue River—Loach Minnow Only—51.1 mi (82.2 km) of river extending from the confluence with the San Francisco River upstream to the confluence of Campbell Blue and Dry Blue creeks. The Blue River was occupied at the time of listing and continues to be occupied by loach minnow (Carter 2005, pp. 1–9). The Blue River contains one or more of the primary constituent elements essential to the conservation of loach minnow, including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., riffles, runs). Planning is underway among several State and Federal agencies for reintroduction of native fishes, including spikedace, in the Blue River, and thus the Blue River may be considered for spikedace critical habitat in future revisions of the designation. Threats in this area include water diversions, improper livestock grazing, nonnative fish, and roads (see Table 1).

(7) Campbell Blue Creek—Loach Minnow Only—8.1 mi (13.1 km) of creek extending from the confluence of Dry Blue and Campbell Blue creeks upstream to the confluence with Coleman Canyon. Areas above Coleman Canyon do not contain the features essential to the conservation of the species because the creek becomes steeper and rockier, making it unsuitable for loach minnow. Campbell Blue Creek is currently occupied (Carter 2005, pp. 1–9) and supports one or more of the velocities and appropriate gradients, substrates, depths, and habitat types (i.e., riffles, runs). Threats to this area requiring special management or protections include improper livestock grazing and nonnative fish species (see Table 1).

(8) Dry Blue Creek—Loach Minnow Only—3.0 mi (4.8 km) of creek extending from the confluence with Campbell Blue Creek upstream to the confluence with Pace Creek. Dry Blue Creek has been occupied by loach minnow since listing and is occupied with records dating from 2001. In addition, this area is connected with Campbell Blue Creek, which has documented loach minnow records as recent as 2004. This area also contains one or more of the primary constituent elements essential to the conservation of loach minnow, including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., riffles, runs). Threats to this area requiring special management or protections include improper livestock grazing and nonnative fish species (see Table 1).

(9) Pace Creek—Loach Minnow Only—0.8 mi (1.2 km) of creek extending from the confluence with Dry Blue Creek upstream to a barrier falls. Pace Creek has been occupied by loach minnow since listing and is considered currently occupied with the most recent record from 1998. This area also contains one or more of the primary constituent elements essential to the conservation of loach minnow, including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., riffles, runs). Threats to this area requiring special management or protections include improper livestock grazing and nonnative fish species (see Table 1).

(10) Frieborn Creek—Loach Minnow Only—1.1 mi (1.8 km) of creek extending from the confluence with Dry Blue Creek upstream to an unnamed tributary. Frieborn Creek has been occupied by loach minnow since listing and is currently occupied with the most recent record from 1998. This area also contains one or more of the primary constituent elements essential to the conservation of loach minnow, including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., riffles, runs). Threats to this area requiring special management or protections include improper livestock grazing and nonnative fish species (see Table 1).

(11) Little Blue Creek—Loach Minnow Only—2.8 mi (4.5 km) of creek extending from the confluence with the Blue River upstream to the mouth of a canyon. Little Blue Creek was occupied at the time of listing and is considered to be occupied as it is directly connected with the Blue River, which has documented loach minnow records as recent as 2004. This area also contains one or more of the primary constituent elements essential to the conservation of loach minnow including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., riffles, runs). Threats requiring special management or protections in this area

include grazing and nonnative fish (see Table 1).

Complex 5—Upper Gila River Complex—Grant, Catron, and Hidalgo Counties, New Mexico

Spikedace have been known to be present in this complex since 1935 and up through the present. Loach minnow have been known to be present in this complex since 1938 and up through the present. This complex was occupied by both spikedace and loach minnow at the time of listing (Propst et al. 1998, p. 14–15; ASU 2002; Propst 2002, p. 4, 22, 27, 31; Paroz et al. 2006, p. 63–64; Propst 2006, p. 2). This complex contains the largest remaining populations of both species in New Mexico. It is considered to represent the ''core'' of what remains of these species. Streams in this complex contain one or more of the PCEs for both species including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., riffles, runs). In addition, the lateral extent of each segment within this complex of critical habitat contains sufficient PCEs (3 and 5) to provide for one or more of the life history functions of the spikedace and loach minnow. Threats requiring special management or protections in this area are addressed in each of the individual stream segment descriptions below. The largest areas are on U.S. Forest Service land, with small private inholdings. There are large areas of private lands in the Cliff-Gila Valley, and the BLM administers significant stretches upstream of the Arizona/New Mexico border. There are also small areas of NMDGF, National Park Service, and State of New Mexico lands.

(1) Upper Gila River—102.2 mi (164.4 km) of river extending from the confluence with Moore Canyon (near the Arizona/New Mexico border) upstream to the confluence of the East and West Forks of the Gila River. The Gila River was occupied by spikedace and loach minnow at the time of listing and continues to be occupied by both species (ASU 2002, Propst 2002, pp. 2, 4, 29–33). The Gila River from its confluence with the West Fork Gila and East Fork Gila contains one or more primary constituent elements for spikedace and loach minnow, including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., riffles, runs, glides, eddies). Threats to this area requiring special management or protections include water diversions, improper livestock grazing, recreation, road construction, and nonnative fish species (see Table 1). Approximately 7.2 mi (11.6 km) along the Gila River are owned by the Phelps Dodge Corporation. We received a management plan from Phelps Dodge addressing management for spikedace and loach minnow for these areas. On the basis of this plan, we are excluding their lands from the final critical habitat designation pursuant to section 4(b)(2) of the Act, and because of economic impact concerns (see ''Exclusion under Section 4(b)(2) of the Act'' for additional information).

(2) East Fork Gila River—26.1 mi (42.0 km) of river extending from the confluence with the West Fork Gila River upstream to the confluence of Beaver and Taylor creeks. This area was occupied by both species at the time of listing and both species have been found there as recently as 2001. In addition, this area is connected to habitat currently occupied by spikedace and loach minnow on the West Fork of the Gila River. Portions of the East Fork Gila River contain one or more of the primary constituent elements essential to the conservation of spikedace and loach minnow including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., riffles, runs, glides, eddies). Threats to this area requiring special management or protections include improper livestock grazing, nonnative fish species, and ash flows from wildfires (See Table 1).

(3) Middle Fork Gila River—Spikedace Only—7.7 mi (12.3 km) of river extending from the confluence with the West Fork Gila River upstream to the confluence with Big Bear Canyon. This area is currently occupied (ASU 2002, Paroz et al. 2006, p. 63, Propst 2002, p. 22, Propst 2006, p. 2), and is connected to currently occupied habitat on the West Fork of the Gila River. The Middle Fork Gila River contains one or more of the primary constituent elements essential to the conservation of spikedace, including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., riffles, runs, glides, eddies). Threats to this area requiring special management or protections include improper livestock grazing, nonnative fish species, and ash flows and increased sediment loading following recent wildfires (See Table 1).

(4) Middle Fork Gila River—Loach Minnow Only—11.9 mi (19.1 km) of river extending from the confluence with the West Fork Gila River upstream to the confluence with Brothers West Canyon. This area is currently occupied (ASU 2002, Paroz et al. 2006, p. 63, Propst 2002, p. 22, Propst 2006, p. 2) and is connected to currently occupied habitat on the West Fork of the Gila River. Portions of the Middle Fork Gila River contain one or more primary constituent elements essential to the conservation of loach minnow, including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., riffles, runs). Threats to this area requiring special management or protections include grazing, nonnative fish species, and ash flows and increased sediment loading following wildfires (See Table 1).

(5) West Fork Gila River—7.7 mi (12.4 km) of river extending from the confluence with the East Fork Gila River upstream to the confluence with EE Canyon. This lower portion of the West Fork Gila River was occupied by both spikedace and loach minnow at the time of listing and continues to be occupied by both species. This area contains one or more primary constituent elements essential to the conservation of spikedace and loach minnow, including sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types (i.e., riffles, runs, glides, eddies). Above EE Canyon, the river does not contain the features essential to the conservation of the species due to gradient and channel morphology. Threats to this area requiring special management or protections include nonnative fish species and ash flows and increased sediment loading following wildfires (See Table 1).

Effects of Critical Habitat Designation

Section 7 Consultation

Section 7 of the Act requires Federal agencies, including the Service, to ensure that actions they fund, authorize, or carry out are not likely to destroy or adversely modify critical habitat. In our regulations at 50 CFR 402.02, we define destruction or adverse modification as ''a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical.'' However, recent decisions by the 5th and 9th Circuit Court of Appeals have invalidated this definition. Pursuant to current national policy and the statutory provisions of the Act, destruction or adverse modification is determined on the basis of whether, with implementation of the proposed Federal action, the affected critical habitat would remain functional (or retain the current ability for the primary constituent elements to be

functionally established) to serve the intended conservation role for the species.

Section 7(a) of the Act requires Federal agencies, including the Service, to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any is proposed or designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402.

Section 7(a)(4) of the Act requires Federal agencies to confer with us on any action that is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed critical habitat. This is a procedural requirement only. However, once a proposed species becomes listed, or proposed critical habitat is designated as final, the full prohibitions of section 7(a)(2) apply to any Federal action. The primary utility of the conference procedures is to maximize the opportunity for a Federal agency to adequately consider proposed species and critical habitat and avoid potential delays in implementing their proposed action because of the section 7(a)(2) compliance process, should those species be listed or the critical habitat designated.

Under conference procedures, the Service may provide advisory conservation recommendations to assist the agency in eliminating conflicts that may be caused by the proposed action. The Service may conduct either informal or formal conferences. Informal conferences are typically used if the proposed action is not likely to have any adverse effects to the proposed species or proposed critical habitat. Formal conferences are typically used when the Federal agency or the Service believes the proposed action is likely to cause adverse effects to proposed species or critical habitat, inclusive of those that may cause jeopardy or adverse modification.

The results of an informal conference are typically transmitted in a conference report while the results of a formal conference are typically transmitted in a conference opinion. Conference opinions on proposed critical habitat are typically prepared according to 50 CFR 402.14, as if the proposed critical habitat were designated. We may adopt the conference opinion as the biological opinion when the critical habitat is designated, if no substantial new information or changes in the action alter the content of the opinion (see 50 CFR 402.10(d)). As noted above, any conservation recommendations in a conference report or opinion are strictly advisory.

If a species is listed or critical habitat is designated, section 7(a)(2) of the Act requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of such a species or to destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency (action agency) must enter into consultation with us. As a result of this consultation, compliance with the requirements of section 7(a)(2) will be documented through the Service's issuance of: (1) A concurrence letter for Federal actions that may affect, but are not likely to adversely affect, listed species or critical habitat; or (2) a biological opinion for Federal actions that may affect, but are likely to adversely affect, listed species or critical habitat.

When we issue a biological opinion concluding that a project is likely to result in jeopardy to a listed species or the destruction or adverse modification of critical habitat, we also provide reasonable and prudent alternatives to the project, if any are identifiable. ''Reasonable and prudent alternatives'' are defined at 50 CFR 402.02 as alternative actions identified during consultation that can be implemented in a manner consistent with the intended purpose of the action, that are consistent with the scope of the Federal agency's legal authority and jurisdiction, that are economically and technologically feasible, and that the Director believes would avoid jeopardy to the listed species or destruction or adverse modification of critical habitat. Reasonable and prudent alternatives can vary from slight project modifications to extensive redesign or relocation of the project. Costs associated with implementing a reasonable and prudent alternative are similarly variable.

Regulations at 50 CFR 402.16 require Federal agencies to reinitiate consultation on previously reviewed actions in instances where a new species is listed or critical habitat is subsequently designated that may be affected and the Federal agency has retained discretionary involvement or control over the action or such discretionary involvement or control is authorized by law. Consequently, some Federal agencies may request reinitiation of consultation with us on actions for which formal consultation has been completed, if those actions may affect subsequently listed species or designated critical habitat or adversely modify or destroy proposed critical habitat.

Federal activities that may affect the spikedace and loach minnow or their designated critical habitat will require section 7 consultation under the Act. Activities on State, Tribal, local or private lands requiring a Federal permit (such as a permit from the Corps under section 404 of the Clean Water Act or a permit under section 10(a)(1)(B) of the Act from the Service) or involving some other Federal action (such as funding from the Federal Highway Administration, Federal Aviation Administration, or the Federal Emergency Management Agency) will also be subject to the section 7 consultation process. Federal actions not affecting listed species or critical habitat, and actions on State, Tribal, local, or private lands that are not federally-funded, authorized, or permitted, do not require section 7 consultations.

Application of the Jeopardy and Adverse Modification Standards for Actions Involving Effects to the Spikedase and Loach Minnow and Their Critical Habitat

Jeopardy Standard

Prior to and following designation of critical habitat, the Service has applied an analytical framework for spikedace and loach minnow jeopardy analyses that relies heavily on the importance of core area populations to the survival and recovery of the spikedace and loach minnow. The section 7(a)(2) analysis is focused not only on these populations but also on the habitat conditions necessary to support them.

The jeopardy analysis usually expresses the survival and recovery needs of the spikedace and loach minnow in a qualitative fashion without making distinctions between what is necessary for survival and what is necessary for recovery. Generally, if a proposed Federal action is incompatible with the viability of the affected core area population(s), inclusive of associated habitat conditions, a jeopardy opinion is warranted because of the relationship of each core area population to the survival and recovery of the species as a whole.

Adverse Modification Standard

For the reasons described in the Director's December 9, 2004 memorandum, the key factor related to the adverse modification determination is whether, with implementation of the proposed Federal action, the affected critical habitat would remain functional (or retain the current ability for the

primary constituent elements to be functionally established) to serve the intended conservation role for the species. Generally, the conservation role of spikedace and loach minnow critical habitat units is to support viable core area populations.

Section 4(b)(8) of the Act requires us to briefly evaluate and describe in any proposed or final regulation that designates critical habitat those activities involving a Federal action that may destroy or adversely modify such habitat, or that may be affected by such designation. Activities that may destroy or adversely modify critical habitat may also jeopardize the continued existence of the species.

Activities that may destroy or adversely modify critical habitat are those that alter the PCEs to an extent that the conservation value of critical habitat for the spikedace and loach minnow is appreciably reduced. Activities that, when carried out, funded, or authorized by a Federal agency, may affect critical habitat and therefore result in consultation for the spikedace and loach minnow include, but are not limited to:

(1) Channelization, impoundment, road and bridge construction, deprivation of substrate source, destruction and alteration of riparian vegetation, reduction of available floodplain, removal of gravel or floodplain terrace materials, and excessive sedimentation from mining, livestock grazing, road construction, timber harvest, off-road vehicle use, and other watershed and floodplain disturbances;

(2) actions that would significantly and detrimentally alter the water chemistry in any of the stream segments listed above could destroy or adversely modify the critical habitat of either or both species. Such activities include, but are not limited to, release of chemical or biological pollutants into the surface water or connected groundwater at a point source or by dispersed release (non-point source);

(3) actions that would introduce, spread, or augment nonnative fish species could destroy or adversely modify the critical habitat of either or both species; and

(4) actions that would result in the removal of water from waterways. Such activities include, but are not limited to, construction and operation of canals and interbasin water transfers.

We consider all of the units designated as critical habitat, as well as those that have been excluded, to contain features essential to the conservation of the spikedace and loach minnow. All units are within the geographic range of the species, all were occupied by the species at the time of listing, and are likely to be used by the spikedace and loach minnow. Federal agencies already consult with us on activities in areas currently occupied by the spikedace and loach minnow, or if the species may be affected by the action, to ensure that their actions do not jeopardize the continued existence of the spikedace and loach minnow.

Exclusions Under Section 4(b)(2) of the Act

Section 4(b)(2) of the Act states that critical habitat shall be designated, and revised, on the basis of the best available scientific data after taking into consideration the economic impact, national security impact, and any other relevant impact, of specifying any particular area as critical habitat. The Secretary may exclude an area from critical habitat if [s]he determines that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat, unless he determines, based on the best scientific data available, that the failure to designate such area as critical habitat will result in the extinction of the species. In making that determination, the Secretary is afforded broad discretion and the Congressional record is clear that in making a determination under the section the Secretary has discretion as to which factors and how much weight will be given to any factor.

Under section 4(b)(2), in considering whether to exclude a particular area from the designation, we must identify the benefits of including the area in the designation, identify the benefits of excluding the area from the designation, determine whether the benefits of exclusion outweigh the benefits of inclusion. If an exclusion is contemplated, then we must determine whether excluding the area would result in the extinction of the species. In the following sections, we address a number of general issues that are relevant to the exclusions we considered.

General Principles of Section 7 Consultations Used in the 4(b)(2) Balancing Process

The most direct, and potentially largest, regulatory benefit of critical habitat is that federally authorized, funded, or carried out activities require consultation pursuant to section 7 of the Act to ensure that they are not likely to destroy or adversely modify critical habitat. There are two limitations to this regulatory effect. First, it only applies where there is a Federal nexus—if there is no Federal nexus, designation itself does not restrict actions that destroy or adversely modify critical habitat. Second, it only limits destruction or adverse modification. By its nature, the prohibition on adverse modification is designed to ensure those areas that contain the physical and biological features essential to the conservation of the species or unoccupied areas that are essential to the conservation of the species are not eroded. Critical habitat designation alone, however, can not require active management efforts toward recovery.

Once consultation under section 7 of the Act is triggered, the process may conclude informally when the Service concurs in writing that the proposed Federal action is not likely to adversely affect the listed species or its critical habitat. However, if the Service determines through informal consultation that adverse impacts are likely to occur, then formal consultation would be initiated. Formal consultation concludes with a biological opinion issued by the Service on whether the proposed Federal action is likely to jeopardize the continued existence of a listed species or result in destruction or adverse modification of critical habitat, with separate analyses being made under both the jeopardy and the adverse modification standards. For critical habitat, a biological opinion that concludes in a determination of no destruction or adverse modification may contain discretionary conservation recommendations to minimize adverse effects to primary constituent elements, but it would not contain any mandatory reasonable and prudent measures or terms and conditions. Mandatory measures and terms and conditions to implement such measures are only specified when the proposed action would result in the incidental take of a listed animal species. Reasonable and prudent alternatives to the proposed Federal action would only be suggested when the biological opinion results in a jeopardy or adverse modification conclusion.

We also note that for 30 years prior to the Ninth Circuit Court's decision in Gifford Pinchot, the Service conflated the jeopardy standard with the standard for destruction or adverse modification of critical habitat when evaluating federal actions that affect currently occupied critical habitat. The Court ruled that the two standards are distinct and that adverse modification evaluations require consideration of impacts on the recovery of species. Thus, under the Gifford Pinchot decision, critical habitat designations may provide greater benefits to the recovery of a species. However, we believe the conservation achieved

through implementing management plans is typically greater than would be achieved through multiple site-by-site, project-by-project, section 7 consultations involving consideration of critical habitat. Management plans commit resources to implement long-term management and protection to particular habitat for at least one and possibly other listed or sensitive species. Section 7 consultations only commit Federal agencies to prevent adverse modification to critical habitat caused by the particular project, and they are not committed to provide conservation or long-term benefits to areas not affected by the proposed project. Thus, any management plan which considers enhancement or recovery as the management standard will often provide as much or more benefit than a consultation for critical habitat designation conducted under the standards required by the Ninth Circuit in the Gifford Pinchot decision.

The information provided in this section applies to all the discussions below that discuss the benefits of inclusion and exclusion of critical habitat in that it provides the framework for the consultation process.

Educational Benefits of Critical Habitat

A benefit of including lands in critical habitat is that the designation of critical habitat serves to educate landowners, State and local governments, and the public regarding the potential conservation value of an area. This helps focus and promote conservation efforts by other parties by clearly delineating areas of high conservation value for the spikedace and loach minnow. In general the educational benefit of a critical habitat designation always exists, although in some cases it may be redundant with other educational effects. For example, habitat conservation plans have significant public input and may largely duplicate the educational benefit of a critical habitat designation. This benefit is closely related to a second, more indirect benefit: That designation of critical habitat would inform State agencies and local governments about areas that could be conserved under State laws or local ordinances.

However, we believe that there would be little additional informational benefit gained from the designation of critical habitat for the exclusions discussed in this rule because these areas are included in this rule as having habitat containing the features essential to the conservation of the species. Consequently, we believe that the informational benefits are already provided even though these areas are not designated as critical habitat. Additionally, the purpose normally served by the designation, that of informing State agencies and local governments about areas that would benefit from protection and enhancement of critical habitat for the spikedace and loach minnow, is already well established among State and local governments, and Federal agencies in those areas that we are excluding from critical habitat in this rule on the basis of other existing habitat management protections.

The information provided in this section applies to all the discussions below that discuss the benefits of inclusion and exclusion of critical habitat.

Conservation Partnerships on Non-Federal Lands

Most federally listed species in the United States will not recover without the cooperation of non-Federal landowners. More than 60 percent of the United States is privately owned (National Wilderness Institute 1995), and at least 80 percent of endangered or threatened species occur either partially or solely on private lands (Crouse et al. 2002). Stein et al. (1995) found that only about 12 percent of listed species were found almost exclusively on Federal lands (90 to 100 percent of their known occurrences restricted to Federal lands) and that 50 percent of federally listed species are not known to occur on Federal lands at all.

Given the distribution of listed species with respect to land ownership, conservation of listed species in many parts of the United States is dependent upon working partnerships with a wide variety of entities and the voluntary cooperation of many non-Federal landowners (Wilcove and Chen 1998, Crouse et al. 2002, James 2002). Building partnerships and promoting voluntary cooperation of landowners is essential to understanding the status of species on non-Federal lands and is necessary to implement recovery actions such as reintroducing listed species, active management, and habitat protection.

Many non-Federal landowners derive satisfaction in contributing to endangered species recovery. The Service promotes these private-sector efforts through the Four Cs philosophy—conservation through communication, consultation, and cooperation. This philosophy is evident in Service programs such as HCPs, Safe Harbor Agreements, Candidate Conservation Agreements, Candidate Conservation Agreements with Assurances, and conservation challenge cost-share. Many private landowners, however, are wary of the possible consequences of encouraging endangered species to their property, and there is mounting evidence that some regulatory actions by the Federal government, while well-intentioned and required by law, can (under certain circumstances) have unintended negative consequences for the conservation of species on private lands (Wilcove et al. 1996, Bean 2002, Conner and Mathews 2002, James 2002, Koch 2002, Brook et al. 2003). Many landowners fear a decline in their property value due to real or perceived restrictions on land-use options where threatened or endangered species are found, and more specifically, when critical habitat is proposed or designated. Consequently, harboring endangered species is viewed by many landowners as a liability, resulting in anti-conservation incentives because maintaining habitats that harbor endangered species represents a risk to future economic opportunities (Main et al. 1999, Brook et al. 2003).

The purpose of designating critical habitat is to contribute to the conservation of threatened and endangered species and the ecosystems upon which they depend. The outcome of the designation, triggering regulatory requirements for actions funded, authorized, or carried out by Federal agencies under section 7 of the Act, can sometimes be counterproductive to its intended purpose on non-Federal lands. According to some researchers, the designation of critical habitat on private lands significantly reduces the likelihood that landowners will support and carry out conservation actions (Main et al. 1999, Bean 2002, Brook et al. 2003). The magnitude of this negative outcome is greatly amplified in situations where active management measures (such as reintroduction, fire management, control of invasive species) are necessary for species conservation (Bean 2002). A critical habitat designation cannot require such actions on the lands being exempted here.

The Service believes that the judicious use of excluding specific areas of non-federally owned lands from critical habitat designations can contribute to species recovery and provide a superior level of conservation than critical habitat alone. For example, less than 17 percent of Hawaii is federally owned, but the state is home to more than 24 percent of all federally listed species, most of which will not recover without State and private landowner cooperation. On the island of Lanai, Castle and Cooke Resorts, LLC,

which owns 99 percent of the island, entered into a conservation agreement with the Service. The conservation agreement provides conservation benefits to target species through management actions that remove threats (such as axis deer, mouflon sheep, rats, invasive nonnative plants) from the Lanaihale and East Lanai Regions. Specific management actions include fire control measures, nursery propagation of native flora (including the target species) and planting of such flora. These actions will significantly improve the habitat for all currently occurring species. Due to the low likelihood of a Federal nexus on the island, we believe that the benefits of excluding the lands covered by the MOA exceeded the benefits of including them. As stated in the final critical habitat rule for endangered plants on the Island of Lanai:

> On Lanai, simply preventing ''harmful activities'' will not slow the extinction of listed plant species. Where consistent with the discretion provided by the Act, the Service believes it is necessary to implement policies that provide positive incentives to private landowners to voluntarily conserve natural resources and that remove or reduce disincentives to conservation. While the impact of providing these incentives may be modest in economic terms, they can be significant in terms of conservation benefits that can stem from the cooperation of the landowner. The continued participation of Castle and Cooke Resorts, LLC, in the existing Lanai Forest and Watershed Partnership and other voluntary conservation agreements will greatly enhance the Service's ability to further the recovery of these endangered plants.

The Department of the Interior's Four C's philosophy—conservation through communication, consultation, and cooperation—is the foundation for developing the tools of conservation. These tools include conservation grants, funding for Partners for Fish and Wildlife Program, the Coastal Program, and cooperative-conservation challenge cost-share grants. Our Private Stewardship Grant program and Landowner Incentive Program provide assistance to private landowners in their voluntary efforts to protect threatened, imperiled, and endangered species, including the development and implementation of Habitat Conservation Plans (HCPs).

Conservation agreements with non-Federal landowners (HCPs, contractual conservation agreements, easements, and stakeholder-negotiated State regulations) enhance species conservation by extending species protections and providing for positive management actions beyond those that can be required through section 7 consultations. In the past decade we have encouraged non-Federal landowners to enter into conservation agreements, based on a view that we can achieve greater species conservation on non-Federal land through such partnerships than we can through coercive methods (61 FR 63854; December 2, 1996).

Relationship of Critical Habitat to Economic Impacts—Exclusions Under Section 4(b)(2) of the Act

This section allows the Secretary to exclude areas from critical habitat for economic reasons if he determines that the benefits of such exclusion exceed the benefits of designating the area as critical habitat, unless the exclusion will result in the extinction of the species concerned. Congress has provided this discretionary authority to the Secretary with respect to critical habitat. Although economic and other impacts may not be considered when listing a species, Congress has expressly required their consideration when designating critical habitat.

In making the following exclusions, we have in general considered that all of the costs and other impacts predicted in the economic analysis may not be avoided by excluding the area, because all of the areas in question are currently occupied by the listed species and there will be requirements for consultation under section 7 of the Act, or for permits under section 10 (henceforth ''consultation''), for any take of these species, and other protections for the species exist elsewhere in the Act and under State and local laws and regulations. In conducting economic analyses, we are guided by the 10th Circuit Court of Appeal's ruling in the New Mexico Cattle Growers Association case (248 F.3d at 1285), which directed us to consider all impacts, ''regardless of whether those impacts are attributable co-extensively to other causes.'' As explained in the analysis, due to possible overlapping regulatory schemes and other reasons, some elements of the analysis may also overstate some costs.

Conversely, the Ninth Circuit has recently ruled (*Gifford Pinchot,* 378 F.3d at 1071) that the Service's regulations defining ''adverse modification'' of critical habitat are invalid because they define adverse modification as affecting both survival and recovery of a species. The Court directed us to consider that determinations of adverse modification should be focused on impacts to recovery. While we have not yet proposed a new definition for public review and comment, compliance with the Court's direction may result in additional costs associated with the designation of critical habitat (depending upon the outcome of the rulemaking, as well as additional benefits to the species). In light of the uncertainty concerning the regulatory definition of adverse modification, our current methodological approach to conducting economic analyses of our critical habitat designations is to consider all conservation-related costs. This approach would include costs related to sections 4, 7, 9, and 10 of the Act, and should encompass costs that would be considered and evaluated in light of the *Gifford Pinchot* ruling.

In addition, we have received several credible comments on the economic analysis contending that it underestimates, perhaps significantly, the costs associated with this critical habitat designation. Both of these factors are a balancing consideration against the possibility that some of the costs shown in the economic analysis might be attributable to other factors, or are overly high, and so would not necessarily be avoided by excluding the area for which the costs are predicted from this critical habitat designation.

Relationship of Critical Habitat to Tribal Lands

In accordance with the Secretarial Order 3206, ''American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act'' (June 5, 1997); the President's memorandum of April 29, 1994, ''Government-to-Government Relations with Native American Tribal Governments'' (59 FR 22951); Executive Order 13175; and the relevant provision of the Departmental Manual of the Department of the Interior (512 DM 2), we believe that fish, wildlife, and other natural resources on tribal lands are better managed under tribal authorities, policies, and programs than through Federal regulation wherever possible and practicable. Based on this philosophy, we believe that, in many cases, designation of tribal lands as critical habitat provides very little additional benefit to threatened and endangered species. Conversely, such designation is often viewed by tribes as an unwanted intrusion into tribal self governance, thus compromising the government-to-government relationship essential to achieving our mutual goals of managing for healthy ecosystems upon which the viability of threatened and endangered species populations depend.

San Carlos Apache Tribe

The San Carlos Apache Tribe has one stream within its tribal lands, Eagle Creek, that is known to be currently

occupied by the spikedace and loach minnow and its tribal lands contain features that are essential to the conservation of the spikedace and loach minnow. The Tribe has completed and is implementing a Fisheries Management Plan (FMP) that includes specific management actions for the spikedace and loach minnow and conserves the PCEs. In this exclusion, we considered several factors, including our relationship with San Carlos Apache Tribe, and the degree to which the Tribe's FMP provides specific management for the spikedace and loach minnow. Tribal governments protect and manage their resources in the manner that is most beneficial to them. The San Carlos Apache Tribe exercises legislative, administrative, and judicial control over activities within the boundaries of its lands. Additionally, the Tribe has natural resource programs and staff and has enacted the FMP. In addition, as trustee for land held in trust by the United States for Indian Tribes, the Bureau of Indian Affairs (BIA) provides technical assistance to the San Carlos Apache Tribe on management planning and oversees a variety of programs on their lands. Spikedace and loach minnow conservation activities have been ongoing on San Carlos Apache tribal lands, and, prior to the completion of their FMP, their natural resource management was consistent with management of habitat for this species. The development and implementation of the efforts formalized in the San Carlos Apache Tribes FMP will continue with or without critical habitat designation.

The San Carlos Apache Tribe highly values its wildlife and natural resources, and is charged to preserve and protect these resources under the Tribal Constitution. Consequently, the Tribe has long worked to manage the habitat of wildlife on its tribal lands, including the habitat of endangered and threatened species. We understand that it is the Tribe's position that a designation of critical habitat on its lands improperly infringes upon its tribal sovereignty and the right to self-government.

The San Carlos Apache Tribes' FMP provides assurances and a conservation benefit to the spikedace and loach minnow. Implementation of the FMP will result in protecting all known spikedace and loach minnow habitat on San Carlos Tribal Land and assures no net habitat loss or permanent modification will occur in the future. The purpose of the FMP includes the long-term conservation of native fishes, including the spikedace and loach minnow, on tribal lands. The FMP outlines actions to conserve, enhance, and restore spikedace and loach minnow PCEs, including efforts to eliminate nonnative fishes from spikedace and loach minnow habitat, actions that could not be compelled by a critical habitat designation. All habitat restoration activities (whether it is to rehabilitate or restore native plants) will be conducted under reasonable coordination with the Service. All reasonable measures will be taken to ensure that recreational activities do not result in a net habitat loss or permanent modification of the habitat. All reasonable measures will be taken to conduct livestock grazing activities in a manner that will ensure the conservation of spikedace and loach minnow habitat. Within funding limitations and under confidentiality guidelines established by the Tribe, the Tribe will cooperate with the Service to monitor and survey spikedace and loach minnow habitat, conduct research, perform habitat restoration, remove nonnative fish species, or conduct other beneficial spikedace and loach minnow management activities.

White Mountain Apache Tribe

The White Mountain Apache Tribe has one stream within its tribal lands, East Fork White River, that is known to be currently occupied by loach minnow and its tribal lands contain features that are essential to the conservation of the loach minnow. The White Mountain Apache Tribe currently has a management plan in place for loach minnow. The plan was completed in 2000 and provides for, among other conservation measures, inventory and monitoring, water quality protection ordinance, captive propagation, and relocation to minimize loss from catastrophic events such as fire and drought. Prior to and since the plan was developed, the Tribe has actively managed for loach minnow. In this exclusion, we considered several factors, including our relationship with the White Mountain Apache Tribe, and the degree to which the Tribe's management plan provides specific management for the loach minnow and conserves its PCEs. Tribal governments protect and manage their resources in the manner that is most beneficial to them. The White Mountain Apache Tribe exercises legislative, administrative, and judicial control over activities within the boundaries of its lands. Additionally, the Tribe has natural resource programs and staff and has been managing for the conservation of the loach minnow. In addition, as trustee for land held in trust by the United States for Indian Tribes, the BIA provides technical assistance to the White Mountain Apache Tribe on management planning and oversees a variety of programs on their lands.

The White Mountain Apache Tribe highly values its wildlife and natural resources, and is charged to preserve and protect these resources under the Tribal Constitution. Consequently, the Tribe has long worked to manage the habitat of wildlife on its tribal lands, including the habitat of endangered and threatened species. We understand that it is the Tribe's position that a designation of critical habitat on its lands improperly infringes upon its tribal sovereignty and the right to self-government.

Yavapai Apache Tribe

The Yavapai Apache Tribe has long worked to protect the Verde River and its surrounding habitat as it flows on the lands of the Nation. The Nation is implementing strong conservation measures designed to preserve the Verde River and its riparian corridor for the benefit of all species, and in order to protect the traditional and cultural practices of the Nation. The Nation's continued efforts to work cooperatively with the Service to protect federally listed species have previously been demonstrated through adoption of a recent Southwestern Willow Flycatcher Management Plan, dated May 25, 2005. This document provides realistic and practicable objectives for protection of the riparian community on tribal lands. This habitat is coextensive with the habitat that was proposed for the spikedace. Because the existing Management Plan requires that the habitat of the Verde River be protected and preserved for the flycatcher, its protections similarly extend to the spikedace. In addition, the Tribe passed a resolution on June 15, 2006, confirming and declaring a riparian conservation corridor along the Verde River including 300 ft (91.4 m) on either side of the river. Within the conservation corridor stocking of non-native fishes is prohibited, and livestock grazing, construction and other activities shall be minimized to assure that no net loss of habitat for federally listed species such as the spikedace and loach minnow shall occur, and that no permanent modification of habitat important to listed species is allowed. The Tribe will also take all reasonable steps to coordinate with the Service regarding recreational activities, habitat restoration activities, or other activities that may impact the habitat important to the spikedace and loach minnow. The Tribe will monitor habitat, including

surveys for these fish and conduct research or other activities to provide a conservation benefit.

Below we determine, pursuant to a 4(b)(2) analysis, that those portions of the Verde River below the Prescott and Coconino National Forest boundary with private lands above the Verde Valley will be excluded from the final designation based upon economic costs. The Yavapai Apache tribal lands fall within this area, and are excluded as part of that overall exclusion. However, we also find pursuant to our analysis below that their lands should be excluded on the basis of our relationship with the Yavapai Apache Tribe, and the Tribe's management of the Verde River that we believe provides a conservation benefit to the spikedace.

(1) Benefits of Inclusion

Including lands of the San Carlos Apache Tribe, the White Mountain Apache Tribe, and the Yavapai Apache Tribe in critical habitat would provide some additional benefit from section 7 consultation, because we could consult via the BIA on actions that may adversely affect critical habitat. Activities covered in previous consultations include livestock grazing, recreation, fish stocking, fire management, bank stabilization projects, and conservation measures that benefited spikedace and/or loach minnow. These measures included monitoring, fence repair (to exclude cattle from overusing and thereby damaging habitat), and education programs to inform the public of the need to avoid actions that damage habitat. However, we note that because the spikedace and loach minnow are listed species and are found on these Tribal lands, section 7 consultation under the jeopardy standard will still be required if Tribal or BIA activities may adversely affect spikedace or loach minnow, regardless of whether these lands are included in the final critical habitat designation. As a result, we expect that inclusion of San Carlos Apache, White Mountain Apache, and the Yavapai Apache Tribe lands in the critical habitat designation would provide only that additional habitat protection accorded by critical habitat as discussed by the Ninth Circuit Court of Appeals in the Gifford Pinchot ruling discussed above.

Nevertheless, few additional benefits would be derived from including these Tribal Lands in the spikedace and loach minnow final critical habitat designation beyond what will be achieved through the implementation of their management plans. As noted above, the primary regulatory benefit of any designated critical habitat is that federally funded or authorized activities in such habitat require consultation pursuant to section 7 of the Act. Such consultation would ensure that adequate protection is provided to avoid destruction or adverse modification of critical habitat. These three tribes have already agreed under the terms of their management plans and by tribal resolution to protect riparian and aquatic communities, to ensure no net loss of habitat, to coordinate with the Service in order to prevent any habitat destruction, and to conduct activities consistent with the conservation of all native species, including the spikedace and loach minnow and their PCEs.

As discussed above, we expect that little additional educational benefit would be derived from designating San Carlos Apache, White Mountain Apache, and Yavapai Apache tribal lands as critical habitat. The additional educational benefits that might arise from critical habitat designation are largely accomplished through the multiple notice and comments which accompany the development of this critical habitat designation, as evidenced by the Tribes working with the Service to address habitat and conservation needs for the spikedace and loach minnow. Additionally, we anticipate that the Tribes will continue to actively participate in working groups, and provide for the timely exchange of management information. The educational benefits important for the long-term survival and conservation of the spikedace and loach minnow are being realized without designating this area as critical habitat. Educational benefits will continue on these lands whether or not critical habitat is designated because the Tribes already recognize the importance of those habitat areas to the spikedace and loach minnow.

Another possible benefit is the additional funding that may be generated for habitat restoration or improvement by having an area designated as critical habitat. In some instances, having an area designated as critical habitat may improve the ranking a project receives during evaluation for funding. The Tribes often require additional sources of funding in order to conduct wildlife-related activities. Therefore, having an area designated as critical habitat could improve the chances of the Tribes receiving funding for spikedace or loach minnow related projects. Additionally, occupancy by spikedace or loach minnow also provides benefits to be considered in evaluating funding proposals. Because there are areas of occupied habitat on these Tribal lands this may also help secure funding for management of these areas.

For these reasons, then, we believe that designation of critical habitat would provide some additional benefits.

(2) Benefits of Exclusion

The benefits of excluding San Carlos Apache, White Mountain Apache, and the Yavapai Apache tribal lands from critical habitat include: (1) The advancement of our Federal Indian Trust obligations and our deference to Tribes to develop and implement tribal conservation and natural resource management plans for their lands and resources, which includes the spikedace and loach minnow and other Federal trust species; (2) the maintenance of effective working relationships to promote the conservation of the spikedace and loach minnow and their habitats; (3) the allowance for continued meaningful collaboration and cooperation on spikedace and loach minnow management and other resources of interest to the Federal government; and (4) the provision of conservation benefits to riparian ecosystems and a host of species, including the spikedace and loach minnow and their habitat.

During the development of the spikedace and loach minnow critical habitat designation (and coordination for other critical habitat proposals), and other efforts such as conservation of native fish species in general, we have met and communicated with each of these Tribes to discuss how they might be affected by the regulations associated with spikedace and loach minnow conservation and the designation of critical habitat. As such, we established relationships with these Tribes specific to spikedace and loach minnow conservation. As part of our relationship, we provided technical assistance to the Tribes to develop measures to conserve the spikedace and loach minnow and their habitat on their lands. These measures are contained within their management plans and tribal resolution that we have in our supporting record. This proactive action was conducted in accordance with Secretarial Order 3206, ''American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act'' (June 5, 1997); the President's memorandum of April 29, 1994, ''Government-to-Government Relations with Native American Tribal Governments'' (59 FR 22951); Executive Order 13175; and the relevant provision of the Departmental Manual of the Department of the Interior (512 DM 2). We believe that the San Carlos Apache,

White Mountain Apache, and the Yavapai Apache Tribes should be the governmental entities to manage and promote the conservation of the spikedace and loach minnow on their lands. During our communication with the Tribes, we recognized and endorsed their fundamental right to provide for tribal resource management activities, including those relating to riparian aquatic ecosystems.

The designation of critical habitat on these Tribal lands would be expected to adversely impact our working relationship with them. In fact, during our discussions with the Tribes, we were informed that critical habitat would be viewed as an intrusion on their sovereign abilities to manage natural resources in accordance with their own policies, customs, and laws. To this end, we found that the Tribes would prefer to work with us on a government-to-government basis. We view this as a substantial benefit.

In addition to management/conservation actions described for the conservation of the spikedace and loach minnow, we anticipate future management/conservation plans to include conservation efforts for other listed species and their habitat. We believe that many Tribes are willing to work cooperatively with us to benefit other listed species, but only if they view the relationship as mutually beneficial. Consequently, the development of future voluntary management actions for other listed species will likely be contingent upon whether the San Carlos Apache, White Mountain Apache, and the Yavapai Apache Tribal lands are designated as critical habitat for the spikedace and loach minnow. Thus, the benefit of excluding these lands would be future conservation efforts that would benefit the spikedace and loach minnow as well as other listed species.

Another benefit of excluding these Tribal lands from the critical habitat designation includes relieving additional regulatory burden and costs associated with the preparation of portions of section 7 documents related to critical habitat. While the cost of adding these additional sections to assessments and consultations is relatively minor, there could be delays which can generate real costs to some project proponents. However, because in this case critical habitat is being excluded in occupied areas already subject to section 7 consultation and a jeopardy analysis, it is anticipated this reduction would be minimal.

(3) Benefits of the Exclusion Outweigh the Benefits of Inclusion

We find that the benefits of designating critical habitat for the spikedace and loach minnow on these Tribal lands are small in comparison to the benefits of the exclusion. Exclusion would enhance the partnership efforts focused on recovery of the spikedace and loach minnow within these river reaches. Excluding these areas also would reduce some of the administrative costs during consultation pursuant to section 7 of the Act. We discuss below additional economic costs and an exclusion of a portion of the Verde River that include tribal lands of the Yavapai Apache Nation.

(4) The Exclusion Will Not Result in Extinction of the Species

Because these river reaches on the Tribal lands are occupied by the spikedace and loach minnow, which are protected from take under section 9 of the Act, any actions that might kill spikedace or loach minnow, including habitat modification that would cause death of either species, must either undergo a consultation with the Service under the requirements of section 7 of the Act or receive a permit from us under section 10 of the Act. Additionally, we believe that the exclusion of these lands from critical habitat would not result in the extinction of the spikedace or loach minnow because their management outlines and the provisions of a resolution specifically address conservation of these species. The tribal management strategies outline actions to conserve, enhance, and restore spikedace and loach minnow habitat, including efforts to eliminate nonnative fishes from their habitat. Such efforts provide greater conservation benefit than would result from a designation of critical habitat. This is because section 7 consultations for critical habitat only consider listed species in the project area evaluated and Federal agencies are only committed to prevent adverse modification to critical habitat caused by the particular project and are not committed to provide conservation or long-term benefits to areas not affected by the proposed project. Such efforts provide greater conservation benefit than would result for designation as critical habitat. As a result, there is no reason to believe that this exclusion would result in extinction of the species.

Partnerships and Management Plans on Private Lands

The Phelps Dodge Corporation (Phelps Dodge) provided two management plans to the Service during the second open comment period. One plan was provided for Eagle Creek in southeastern Arizona, and the other is for portions of the middle Gila River in New Mexico. We provide a summary of each of these plans below.

Eagle Creek Management Plan

Phelps Dodge's lands along Eagle Creek are comprised of individual land parcels adjoining the southern boundary of the Apache-Sitgreaves National Forests and the eastern boundary of San Carlos Apache Tribe lands. The parcels are not entirely connected; there are intervening portions of Forest Service and other private lands between parcels of Phelps Dodge's lands.

The management plan would affect only those lands owned by Phelps Dodge. Phelps Dodge owns approximately 34 square miles of land around the upper portions of Eagle Creek; however, not all of lands encompass or are adjacent to Eagle Creek. Phelps Dodge owns land along approximately 11.0 mi (17.8 km) of Eagle Creek, which are covered by the management plan. The Service has determined that Eagle Creek currently supports one of more of the PCEs for loach minnow and is occupied by loach minnow. In addition, we determined (see Table 1) that nonnative aquatic species, water diversions, and mining are all potential threats within this area.

Phelps Dodge's water supply for its Morenci Mine operation is derived from a variety of water rights, including a Black River water transfer (supported by a Central Arizona Project exchange), several deep ground water wells, and surface water from Eagle Creek, which constitutes approximately six percent of the natural flow of that Creek.

Phelps Dodge indicates within the management plan that their overall goal is to operate its Eagle Creek water system to maintain perennial flows in Eagle Creek from the confluence of Willow Creek to the Phelps Dodge diversion dam to the extent it is legally, economically, and hydrologically reasonable to do so. Within the management plan, Phelps Dodge developed goals for both the loach minnow and spikedace within the Phelps Dodge reach. These goals regarding the two species include the following: (1) Monitoring distribution and abundance; (2) obtaining an understanding of the population dynamics as they relate to existing

habitat conditions and land use practices; (3) continuing historic land use practices and water supply practices which enhance water flows; and (4) consideration of habitat when deviating from such historic management practices. With respect to monitoring, Phelps Dodge has supported various biological surveys and studies on Eagle Creek, and intends to continue participating in such research projects in the near future. To gain a better understanding of the population dynamics of the loach minnow and spikedace, Phelps Dodge proposes to support the Rocky Mountain Research Station in its research.

Phelps Dodge further intends to utilize the management plan for loach minnow and spikedace by doing the following: (1) Form working relationships with others that promote the conservation of these fish and their habitat; (2) develop the opportunity for collaboration and cooperation on management issues and other resources of interest to the Federal government; and (3) provide conservation benefits to riparian ecosystems, including habitat that may be or may potentially become suitable.

To ensure continued conservation of spikedace and loach minnow in Eagle Creek, Phelps Dodge has also committed to regular coordination with the Service, which will include an annual summary to the Service regarding implementation of the management plan. Any deviations from the plan will be addressed, as will intended implementation of actions under the plan for the following year. Phelps Dodge will make all reasonable efforts to provide the Service with notice of any significant changes to the management of its water supply system that are outside the range of historic operating parameters discussed in the management plan. If any changes are required, Phelps Dodge will consider loach minnow and spikedace habitat and any comments received from the Service, and will make reasonable efforts to minimize adverse impacts to these fish and the PCEs to the extent legally, economically, and practically reasonable, so long as such actions do not impair their ability to hold, exercise, or modify their water rights.

Phelps Dodge will also make reasonable efforts to coordinate their water management activities by attending regularly scheduled fisheries management working group meetings to stay abreast of ongoing management issues and concerns within the overall Eagle Creek area. Phelps Dodge will also consider stream renovation projects for Eagle Creek should the Service decide to pursue them, provided they do not interfere with existing land and water use and rights.

Gila River Management Plan

The Gila River Management Plan covers riparian lands owned by Phelps Dodge in the middle reach of the mainstem Gila River south of Mogollon Creek in New Mexico. Land ownership in this area is principally Federal, with irregularly dispersed private and State lands.

The management plan would affect only those lands owned by Phelps Dodge. Phelps Dodge owns lands surrounding or bordering approximately 7.3 mi (11.7 km) of the mainstem Gila River. Some of the lands owned by Phelps Dodge in this area are leased for ranching and agriculture purposes, including the U-Bar Ranch. The Service has determined that these areas currently support one or more of the PCEs for spikedace and loach minnow, and both species currently occupy this portion of the stream. Those portions of the mainstem Gila River on Phelps Dodge lands support diversity and abundance of native fishes. In addition, this reach contains a high proportion of favorable habitat types for spikedace and loach minnow, including low gradient riffles and glide-runs. In addition, we determined (see Table 1) that recreation, roads, grazing, nonnative aquatic species, and water diversions are potential threats in this area that may require special management or protections.

Phelps Dodge's water rights and delivery system in this area have been developed and maintained to provide a dependable and adequate water supply for the operation of the Tyrone Mine. The delivery system consists of a diversion structure on the Gila River as well as a retention facility (Bill Evans Lake), and several wells. Surface water is diverted from the Gila River at the diversion structure for storage in Bill Evans Lake and transported via pipeline to the Tyrone Mine Facility.

Within the management plan, Phelps Dodge commits to the following: (1) Monitoring the distribution and abundance of the loach minnow and spikedace in the Gila River passing through the Phelps Dodge Reach; (2) obtaining an understanding of the population dynamics of the loach minnow and spikedace as they relate to existing habitat conditions and land use practices in the Gila River; (3) continuing historic land use practices and water supply practices which enhance water flows in the Phelps Dodge Reach, (4) and considering loach minnow and spikedace habitat when deviating from the historical management practices. These commitments will be carried out in the same manner as described above under the Eagle Creek Management Plan.

Within the management plan, Phelps Dodge commits to coordinating with the Service regarding management activities on their lands. This coordination will include an annual summary to the Service regarding implementation of the management plan. Any deviations from the plan will be addressed, as will the intended implementation of actions under the plan for the following year. The report will be provided to the Service during the first quarter of each calendar year.

Phelps Dodge will also make all reasonable efforts to provide the Service with notice of any significant changes to the management of its water supply system that are outside the range of historic operating parameters discussed in the management plan. If any changes are required, Phelps Dodge will consider loach minnow and spikedace habitat and any comments received from the Service, and will make reasonable efforts to minimize adverse impacts to the fish and their PCEs to the extent legally, economically, and practically reasonable, so long as such actions do not impair their ability to hold, exercise, or modify their water rights.

Phelps Dodge will also make reasonable efforts to coordinate their water management activities by attending regularly scheduled fisheries management working group meetings to stay abreast of ongoing management issues and concerns within the overall Gila River area. Phelps Dodge will also consider stream renovation projects for the Gila River should the Service decide to pursue them, provided they do not interfere with existing land and water uses and rights.

The following analysis applies to both the Eagle Creek and Gila River areas covered by the Phelps Dodge's management plans, referred to as Plans below.

(1) Benefits of Inclusion

There are few benefits in including areas covered by these Plans in the final critical habitat designation above those benefits that will be achieved through the implementation of these Plans, including voluntary management and restoration projects. As discussed above, the principal benefit of any area designated as final critical habitat is that activities adversely affecting critical habitat require consultation under section 7 of the Act if a Federal action is involved. Such consultation would ensure that adequate protection is

provided to avoid destruction or adverse modification of critical habitat.

As of the date of this final rule, the Service has not conducted any formal consultations that have directly addressed the impacts of mining activities in the areas proposed as critical habitat (Final Economic Analysis 2004, pg. 5–3). There have, however, been several informal consultations regarding surface mining since the listing of the species. In addition, the Service conducted one formal consultation on spikedace and razorback sucker (*Xyrauchen texanus*) regarding spillway repair to the Phelps Dodge Diversion dam on Eagle Creek in 1996. This consultation did not directly address impacts of the diversion dam itself, though the Service recommended that such a consultation be conducted. The consultation found that the proposed action was not likely to adversely affect the fish species, and recommended minimizing the use of heavy equipment in the wetted area, making reasonable efforts to ensure no pollutants enter surface water, catch and release of any spikedace found, as a well as monitoring activities.

The small number of previous section 7 consultations during the past 20 years since these species have been listed and while critical habitat was designated and the expectation that there will be will be few if any future projects with a Federal nexus gives us reasonable grounds to believe that critical habitat designation will create relatively few benefits for the spikedace and loach minnow in these areas. Since these areas covered by the Plans are privately owned, unless there is a Federal nexus in connection with activities occurring in these areas, the designation of critical habitat will not require consultation with the Service for such activities. It is possible that the maintenance of the Phelps Dodge Diversion dam could act as a Federal nexus for consultation because the diversion is likely subject to U.S. Army Corps of Engineers permit requirements. This could result in consultation, but because these areas are considered to be occupied by the species, consultation would already take place under the jeopardy standard (see ''General Principles of Section 7 Consultations Used in the 4(b)(2) Balancing Process'' above). Moreover, since the prior consultation on maintenance of this structure found it was ''unlikely to adversely affect'' the species, it is not reasonable to anticipate that a future consultation on maintenance of the structure would result in a finding of adverse modification of the critical habitat.

Another possible benefit is that the designation of critical habitat can serve to educate the public regarding the potential conservation value (species presence and their PCEs) of an area, and this may focus and contribute to conservation efforts by other parties by clearly delineating areas of high conservation value for certain species. Any information about the spikedace and loach minnow and its habitat that reaches a wide audience, including other parties engaged in conservation activities, would be considered valuable. However, Phelps Dodge is currently working with the Service to address the conservation of these fish and to avoid impacts to their habitat (PCEs), and the agreements they have offered would institutionalize that cooperation. Further, these areas were included in the proposed designation, which itself has reached a wide audience, and has thus provided information to the broader public about the conservation value of these areas. Thus, the educational benefits that might follow critical habitat designation have already been provided through the multiple notice and comments which accompanied the development of this critical habitat designation and previous designations. For these reasons, then, we believe that designation of critical habitat would have few, if any, additional benefits beyond those that will result from continued consultation for the presence of these species.

(2) Benefits of Exclusion

We believe that significant benefits would be realized by excluding these areas from the final critical habitat designation that include: (1) The continuance and strengthening of our relationship with Phelps Dodge to promote the conservation of the spikedace and loach minnow and their habitat; (2) the allowance for collaboration and cooperation in surveys, monitoring, and research as we work towards recovery of these species; and (3) the conservation benefits to the Gila River and Eagle Creek ecosystems and spikedace and loach minnow habitat that might not otherwise occur, all as set out in the Plans summarized above. Phelps Dodge is greatly concerned about the possible impacts of a critical habitat designation in this area (James 2006, p. 7, 10–20) and is offering these management plans as an alternative. It is unlikely they would proceed with them if these areas were designated as critical habitat.

Phelps Dodge, including the U-Bar Ranch that they own on the Gila River, is an important land manager within Eagle Creek and the Gila River watersheds. The surveys, monitoring, research, and commitment to collaborate with the Service on restoration projects within these areas document that conservation efforts will occur for these fish and their habitat. These activities and cooperation may not occur if we were to designate critical habitat on these private lands, and these actions cannot be compelled by the designation, particularly given the expectation that there would be a very limited, if any, federal nexus for having a consultation on private activities here. We believe that the results of these activities promote long-term protection and are aimed at conserving the spikedace and loach minnow in these areas. The benefits of excluding these areas from critical habitat will encourage the continued conservation, land management, and coordination with the Service. If these areas are designated as critical habitat, we may jeopardize future conservation, research, and information sharing for the recovery of the spikedace and loach minnow and likely not secure any offsetting benefits from the designation due to the apparent lack of a federal nexus to trigger consultation.

(3) Benefits of Exclusion Outweigh the Benefits of Inclusion

In summary, the benefits of including lands owned by Phelps Dodge in the final critical habitat designation are small, and are limited to minimal educational benefits and potentially some benefits through section 7 consultations. However, since these lands are privately owned, unless a Federal nexus exists, final critical habitat would not result in a section 7 consultation. The lack of previous section 7 consultations during the 20 years since these species have been listed in these areas being excluded from the final designation of critical habitat give us reasonable grounds to believe that such a Federal nexus is unlikely to occur, or would likely occur only for the subject of the prior consultation, which resulted in a finding of ''unlikely to adversely affect'' the species. We also note that the requirement of Federal agencies to consult with us on activities that may affect these species still exists, whether or not critical habitat is designated, since these areas are considered occupied. The benefits of excluding these areas from designation as critical habitat for the spikedace and loach minnow are significant, and include encouraging the continuation of monitoring, surveys, research, enhancement, and restoration activities that will benefit spikedace and loach

minnow PCEs. The exclusion of this area will likely also provide additional benefits to the species by encouraging a cooperative working relationship with Phelps Dodge. Although the benefits of these management plans are less than plans in other areas upon which exclusions are often made (i.e. habitat conservation plans), the likely lack of a Federal nexus for these lands means that the benefits of these plans still exceed by the considerable margin the benefits the species would receive from the designation. We accordingly find that the benefits of excluding these areas from the final critical habitat designation outweigh the benefits of their inclusion.

(4) Exclusion Will Not Result in Extinction of the Species

We have determined that exclusion of areas covered by these Plans on the Gila River and Eagle Creek will not result in extinction of these species. Any actions that might adversely affect the spikedace and loach minnow must undergo a consultation with the Service under the requirements of section 7 of the Act or receive a permit from us under section 10. The spikedace and loach minnow are protected from take under section 9. The exclusions leave these protections unchanged from those which would exist if the excluded areas were designated as final critical habitat. Phelps Dodge is committed to greater conservation measures on their land than would be available through the designation of critical habitat. Accordingly, we have determined that exclusion of these areas of Eagle Creek and the Gila River as discussed above under subsection 4(b)(2) of the Act will not cause the extinction of the species.

Economic Analysis

Section 4(b)(2) of the Act requires us to designate critical habitat on the basis of the best scientific information available and to consider the economic and other relevant impacts of designating a particular area as critical habitat. We may exclude areas from critical habitat upon a determination that the benefits of such exclusions outweigh the benefits of specifying such areas as critical habitat. We cannot exclude such areas from critical habitat when such exclusion will result in the extinction of the species concerned.

Following the publication of the proposed critical habitat designation, we conducted an economic analysis to estimate the potential economic effect of the designation. The draft analysis was made available for public review on June 6, 2006 (71 FR 32496). We accepted comments on the draft analysis until October 16, 2006.

The primary purpose of the economic analysis is to estimate the potential economic impacts associated with the designation of critical habitat for the spikedace and loach minnow. This information is intended to assist the Secretary in making decisions about whether the benefits of excluding particular areas from the designation outweigh the benefits of including those areas in the designation. This economic analysis considers the economic efficiency effects that may result from the designation, including habitat protections that may be coextensive with the listing of the species. It also addresses distribution of impacts, including an assessment of the potential effects on small entities and the energy industry. This information can be used by the Secretary to assess whether the effects of the designation might unduly burden a particular group or economic sector.

This analysis focuses on the direct and indirect costs of the rule. However, economic impacts to land use activities can exist in the absence of critical habitat. These impacts may result from, for example, local zoning laws, State and natural resource laws, and enforceable management plans and best management practices applied by other State and Federal agencies.

The economic analysis considers the economic impacts of conservation measures taken prior to and subsequent to the final listing and designation of critical habitat for the spikedace and loach minnow. Pre-designation impacts are typically defined as all management efforts that have occurred since the time of listing. The spikedace and loach minnow were listed on July 1 and October 28, 1986, respectively (51 FR 23769, 51 FR 39468). Our draft economic analysis found that the total post-designation costs associated with the five proposed critical habitat units are forecast to range from $25.2 to $100.3 million over 20 years, with discounted (7%) annual costs at $1.4 to $6.7 million annually (IEc 2006, p. ES–2). Estimated costs are primarily due to impacts on water use and management, species management, and recreation.

Based upon these estimates, we conclude in the final analysis, which reviewed and incorporated public comments, that no significant economic impacts are expected from the designation of critical habitat for spikedace and loach minnow, except for the Verde River, as discussed in further detail in the ''Verde River'' section below. A copy of the economic analysis is included in our supporting record and may be obtained by contacting the Arizona Ecological Services Field Office (see **ADDRESSES** section) or online at *http://www.fws.gov/southwest/es/arizona/.*

Verde River

As discussed in the ''Summary of Changes from the Proposed Rule'' section above, we have determined that proposed critical habitat on those portions of the Verde River below the Prescott and Coconino National Forest boundary with private lands will not be designated as final critical habitat due to the potential economic impact of designation. The economic analysis estimates the potential future impacts (2006–2025) associated with the entire stretch of the Verde River to be $64.59 million (undiscounted dollars). Although these costs do not account for variance in river miles or population, they are a full order of magnitude larger than the estimated impacts for any other stretch of river proposed as critical habitat, and represent more than half of the total estimated impacts ($100.3 million) for the entire proposed critical habitat designation. Estimated quantified costs on this reach primarily stem from potential impacts to agriculture, but also include impacts on development and recreation activities. Unquantified potential impacts could include impacts to water users, including Verde Valley municipalities and the City of Prescott.

The economic analysis indicates that most of these costs occur in the lower portion of the Verde River where the river runs through several communities in the Verde Valley that are experiencing rapid urban growth. Therefore, we are excluding from the final critical habitat designation the lower portion of the Verde River below the Prescott and Coconino National Forest boundary with private lands due to significant and disproportionate economic impacts.

We have reached this determination because we believe the benefits of excluding these segments from the final critical habitat designation outweigh the benefits of including them as critical habitat.

We have considered in making the lower Verde River exclusion that all of the costs estimated in the draft economic analysis may not be avoided by excluding this area. This is because this area is currently occupied by the spikedace and there will be requirements for consultation under section 7 of the Act or for permits under section 10 for any take of the species. Additionally, other protections for the species exist elsewhere in the Act and

under State and local laws and regulations.

(1) Benefits of Inclusion

The primary conservation value of the lower Verde River proposed critical habitat segment is to sustain existing populations. The area excluded from the final designation is currently considered occupied by the spikedace. If this area is designated as critical habitat, any actions with a Federal nexus which might adversely modify or destroy the critical habitat would require a consultation with us. However, inasmuch as this area is currently occupied by the spikedace, consultation for activities which might adversely impact the species, including possibly habitat modification (see definition of ''harm'' at 50 CFR 17.3) would be required even without the critical habitat designation. We recognize that consultation for critical habitat would likely provide some additional benefits to the species under the provision of the *Gifford Pinchot* decision.

As discussed above, we expect that little additional educational benefits would be derived from including this area as critical habitat. The additional educational benefits that might arise from critical habitat designation are largely accomplished through the multiple notice and comments which accompanied the development of this critical habitat designation and previous designations.

Designation of critical habitat in the lower Verde River might result in consultations with Federal agencies or as part of intra-Service consultations for HCPs that may lead to conservation activities for the spikedace; however, we believe any possible benefits would be minimal as derived from critical habitat because the spikedace is present in the Verde River and consultations are already likely to occur.

In summary, we believe that designating this proposed segment as final critical habitat would provide little additional Federal regulatory benefits for the species. Under the *Gifford Pinchot* decision, critical habitat designations may provide greater benefits to recovery of a species than was previously believed. Because the proposed critical habitat is occupied by the species, there must be consultation with the Service for any action which may adversely affect the species. Some improvements in habitat quality might result from a designation, but we believe that they would be minimal, as discussed above. The additional educational benefits which might arise from critical habitat designation are largely accomplished through the multiple notice and comments which accompanied the development of this regulation, and contact with the affected parties during development of the economic analysis.

(2) Benefits of Exclusion

The benefits of excluding the lower Verde River from critical habitat designation are avoidance in up to $64.59 million (undiscounted dollars) in possible economic impacts, as set out in the economic analysis. While the cost estimate of $64.59 million is an estimate of potential economic costs for the entire Verde River, we are only excluding the lower portion because we believe the lower portion of the Verde River accounts for some of the highest cost areas since this is where the river runs through several communities in the Verde Valley that are experiencing rapid urban growth. Additionally, as discussed below, we find that the upper portion of the Verde River is the most important for conservation of the spikedace because it accounts for 91 percent of the known locations of the spikedace in the Verde River.

We also believe that excluding these lands, and thus helping landowners and water users avoid the additional costs that would result from the designation, will contribute to a more positive climate for Habitat Conservation Plans and other active conservation measures. These generally provide greater conservation benefits than result from designation of critical habitat—even in the post-*Gifford Pinchot* environment—which requires only that the there be no adverse modification resulting from federally-related actions. Generally, positive conservation efforts by landowners contribute more towards recovery of species than the mere avoidance of adverse impacts required under a critical habitat designation.

(3) Benefits of Exclusion Outweigh the Benefits of Inclusion

We find that the benefits of designating final critical habitat for the spikedace on the lower portion of the Verde River are small in comparison to the benefits of exclusion. In making this finding, we have weighed the benefits of including the lower Verde River as final critical habitat against the possible costs imposed on private parties as a result of the final critical habitat designation.

We have therefore excluded these lands from the final critical habitat designation pursuant to section 4(b)(2) of the Act.

(4) Exclusion Will Not Result in Extinction of the Species

Because we consider the lower portion of the Verde River to be occupied by spikedace, a species protected from take under section 9 of the Act, any actions that might adversely affect or result in take of the spikdace, regardless of whether a Federal is present, must undergo a consultation with the Service under the requirements of section 7 of the Act or receive a permit from us under section 10 of the Act. This exclusion leaves these protections unchanged from those which would exist if the excluded areas were designated as critical habitat. Additionally, we have concluded that excluding this area from final critical habitat will not result in the extinction of the spikedace because this exclusion is only a small percentage of the overall critical habitat designation and, as noted above, 91 percent of the known locations of the spikedace occur in the upper Verde River, which is not being excluded from the final critical habitat designation.

Required Determinations

Regulatory Planning and Review

In accordance with Executive Order 12866, this document is a significant rule in that it may raise novel legal and policy issues, but will not have an annual effect on the economy of $100 million or more or affect the economy in a material way. Due to the tight timeline for publication in the **Federal Register**, the Office of Management and Budget (OMB) has not formally reviewed this rule. As explained above, we prepared an economic analysis of this action. We used this analysis to meet the requirement of section 4(b)(2) of the Act to determine the economic consequences of designating the specific areas as critical habitat. We also used it to help determine whether to exclude any area from critical habitat, as provided for under section 4(b)(2) of the Act, if we determine that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat, unless we determine, based on the best scientific data available, that the failure to designate such area as critical habitat will result in the extinction of the species.

Regulatory Flexibility Act (5 U.S.C. 601 et seq.)

Under the Regulatory Flexibility Act (5 U.S.C. 601 et seq.), as amended by the Small Business Regulatory Enforcement Fairness Act (5 U.S.C. 802(2)) (SBREFA), whenever an agency is required to publish a notice of

rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effects of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions). However, no regulatory flexibility analysis is required if the head of the agency certifies the rule will not have a significant economic impact on a substantial number of small entities. The SBREFA amended the Regulatory Flexibility Act (RFA) to require Federal agencies to provide a statement of the factual basis for certifying that the rule will not have a significant economic impact on a substantial number of small entities. The SBREFA also amended the RFA to require a certification statement.

Small entities include small organizations, such as independent nonprofit organizations; small governmental jurisdictions, including school boards and city and town governments that serve fewer than 50,000 residents; as well as small businesses, Small businesses include manufacturing and mining concerns with fewer than 500 employees, wholesale trade entities with fewer than 100 employees, retail and service businesses with less than $5 million in annual sales, general and heavy construction businesses with less than $27.5 million in annual business, special trade contractors doing less than $11.5 million in annual business, and agricultural businesses with annual sales less than $750,000. To determine if potential economic impacts to these small entities are significant, we considered the types of activities that might trigger regulatory impacts under this designation as well as types of project modifications that may result. In general, the term significant economic impact is meant to apply to a typical small business firm's business operations.

To determine if the rule could significantly affect a substantial number of small entities, we considered the number of small entities affected within particular types of economic activities (e.g., water management and use, livestock grazing, Tribal activities, residential and related development, species-specific management activities, recreation activities, fire management activities, mining, and transportation). We apply the ''substantial number'' test individually to each industry to determine if certification is appropriate. However, the SBREFA does not explicitly define ''substantial number'' or ''significant economic impact.'' Consequently, to assess whether a ''substantial number'' of small entities is affected by this designation, this analysis considers the relative number of small entities likely to be impacted in an area. In some circumstances, especially with critical habitat designations of limited extent, we may aggregate across all industries and consider whether the total number of small entities affected is substantial. In estimating the numbers of small entities potentially affected, we also considered whether their activities have any Federal involvement.

Designation of critical habitat only affects activities conducted, funded, or permitted by Federal agencies. Some kinds of activities are unlikely to have any Federal involvement and so will not be affected by critical habitat designation. In areas where the species is present, Federal agencies already are required to consult with us under section 7 of the Act on activities they fund, permit, or implement that may affect the spikedace or loach minnow. Federal agencies must also consult with us if their activities may affect critical habitat. Designation of critical habitat, therefore, could result in an additional economic impact on small entities due to the requirement to reinitiate consultation for ongoing Federal activities.

Our economic analysis of this designation evaluated the potential economic effects on small business entities and small governments resulting from conservation actions related to the listing of these species and proposed designation of their critical habitat. We evaluated small business entities in water management and use, livestock grazing activities, mining operations, management activities specific to spikedace and loach minnow, recreation, residential and related development, Tribes, transportation, and fire management. Based on our analysis, impacts are anticipated to occur in Tribes, agricultural crop production as it relates to water use and management, livestock grazing, residential and commercial development, and recreation. The following is a summary of the information contained in Appendix B of the economic analysis:

Tribes

The economic analysis estimates that future impacts resulting from spikedace and loach minnow conservation activities on Tribal lands could include administrative costs of consultations, surveys and monitoring, development of a Fisheries Management Plan, modifications to grazing, fire management, modifications to recreational activities, and potential project modifications to restoration activities. The economic analysis provides additional detail on anticipated impacts; however, because all Tribal lands have been excluded under section 4(b)(2), these costs will not be incurred.

Water Management and Use: Agricultural Crop Production

The economic analysis notes that spikedace and loach minnow conservation activities have not impacted crop production since the listing of the species in 1986. The economic analysis further notes that, because agricultural water use comprises 98 percent of surface water use and 81 percent of groundwater use in counties containing critical habitat for spikedace and loach minnow, it is likely that any additional water supplies needed for the species would come from agriculture. Therefore, the analysis focuses on a potential scenario under which farmers would give up agricultural water use in an effort to provide adequate water supply for the species, leading to reductions in crop production. The economic analysis notes that, because of the uncertainty involved in estimating the potential reduction in agricultural production, the scenario analyzed represents the high-end estimate of impacts to water users.

Should this scenario be realized, losses in land values associated with transitioning irrigated cropland to non-irrigated lands will likely result, and would range from $3,175 to $6,190 per acre, depending on the area in which critical habitat is located. A total of 6,310 acres of cropland are in the vicinity of proposed critical habitat (i.e., in the same valley), and 810 of those acres are located within the critical habitat designation itself. The average farm size in affected counties ranges from 1,300 acres to 7,800 acres. Assuming affected farms are average-sized for their counties, approximately one to five farms could experience reductions in crop production. Alternatively, the median farm size in affected counties ranges from 41 to 1,300 acres. Assuming affected farms are median-sized for their counties, approximately 4 to 199 farms could experience reductions in crop production. Under the assumption that all farms are small (1,884 farms across 5 counties), the estimate of future impacts (1 to 199) represents between less than 1 percent to 6.5 percent of total small farm operations in counties that contain spikedace and loach minnow critical habitat. The analysis assumes that affected farms are small, so that total future impacts represent less than

1 percent to 6.5 percent of total small farm operations in counties that contain spikedace and loach minnow habitat.

Livestock Grazing

The economic analysis notes that ranching operations holding Federal grazing allotment permits are anticipated to experience economic impacts as they implement species conservation requirements for grazing activities. The analysis assumes that each Federal grazing allotment falling within critical habitat is run by a unique ranching operation, so that approximately 76 ranching operations may be impacted annually. These 76 ranches represent 4.7 percent of ranches in the affected counties, or 1.0% of ranches in New Mexico and Arizona. Annual costs to each of these ranches would be between $390 and $9,200 per ranch. With average revenues per ranch in this region at $166,700, these losses represent between 0.2 and 5.5 percent of each ranch's estimated average revenues.

The analysis notes that approximately 72 small ranching operations may experience a reduction in revenues of between 0.9 and 22 percent of annual revenues annually. The analysis concludes that the extent to which these impacts are significant to any individual ranch depends on its financial conditions.

Residential and Commercial Development

The analysis for residential and commercial development concludes that impacts are likely to occur in the Verde River segment, as it contains a large amount of private land, a relatively large human population, and high projected population growth potential in the next 20 years. The analysis notes that it is likely that project modification costs associated with spikedace and loach minnow conservation activities would be passed from the developer to the existing landowner in the form of reduced prices for raw land. The landowners may be developers, farmers, ranchers, or simply individuals or families that are not registered businesses, and the analysis concludes that some of the existing landowners may be small entities.

Impacts to developers are estimated to include fencing costs, scientific studies, surveying and monitoring requirements, and possibly off-setting mitigation (habitat set-aside). Costs are estimated to range from $3.1 million to $4.8 million per large development, or $3,900 to $5,900 per housing unit ($190 to 300 annually, if costs are distributed evenly over 20 years). Total impacts to development activities are estimated at $3.4 to $5.2 million over 20 years, or $319,000 to $419,000 annually (assuming a discount rate of seven percent). The analysis concludes that up to 1,646 housing units could be built on approximately 2,880 privately owned acres within proposed critical habitat over the next 20 years in Yavapai County. The economic analysis provides additional detail on anticipated impacts; however, because we excluded the middle and lower portions of the Verde River under section 4(b)(2) of the Act, the majority of these costs will not be incurred.

Recreation

The analysis notes that areas currently stocked with nonnative sportfish include the Camp Verde area in the Verde River in Complex 1 and the East Fork Gila River in Complex 5. The analysis states that the future impact of the critical habitat designation on the stocking regimes in these areas is unknown, as is the reduction in fishing activity that would occur if stocking is curtailed, and whether or not nonnative fish stocking might be replaced with catchable native fish stocking (e.g., Apache trout). Because of these unknowns, the analysis evaluated the high-end cost of angler days at risk if sportfish stocking were discontinued in these reaches.

Angling trips are valued at $8.6 million over 20 years (or $816,000 annually), assuming a discount rate of seven percent. The analysis notes that State fish managers typically identify alternative sites for stocked fish when areas are closed to stocking, so that angler days are likely to be redistributed to other areas rather than lost altogether. The high-end estimate does not consider the possibility that recreators will visit alternative fishing sites.

The two stream reaches where impacts on recreation are anticipated to occur are in Yavapai County, Arizona, and Catron County, New Mexico. If angler trips to the two stream reaches are not lost, but instead are redistributed to other streams, then regional impacts on small businesses are likely to be minimal. If, as in the high-end estimate of impacts, angler trips to the two stream reaches are not undertaken, localized impacts on anglers, and in turn small businesses that rely on fishing activities, could occur. These impacts would be spread across a variety of industries including food and beverage stores, food service and drinking places, accommodations, transportation, and sporting goods. The analysis found that these industries generate approximately $829 million in total annual sales for these two counties. Based on 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation for Arizona and New Mexico, average expenditures per fishing trip are approximately $37, with the bulk of these expenditures occurring in the food service and gasoline industries. By multiplying this per-trip estimate by the number of fishing trips potentially lost due to spikedace and loach minnow conservation activities (0 to 13,260 days per year, assuming one day per trip), expenditures by these anglers are estimated to be up to $485,000 annually. The high-end estimate of annual loss of trip expenditures could therefore represent a loss of approximately 0.06 percent of annual revenues for affected businesses.

In general, two different mechanisms in section 7 consultations could lead to additional regulatory requirements for the approximately four small businesses, on average, that may be required to consult with us each year regarding their project's impact on the spikedace and loach minnow and their habitat. First, if we conclude, in a biological opinion, that a proposed action is likely to jeopardize the continued existence of a species or adversely modify its critical habitat, we can offer ''reasonable and prudent alternatives.'' Reasonable and prudent alternatives are alternative actions that can be implemented in a manner consistent with the scope of the Federal agency's legal authority and jurisdiction, that are economically and technologically feasible, and that would avoid jeopardizing the continued existence of listed species or result in adverse modification of critical habitat. A Federal agency and an applicant may elect to implement a reasonable and prudent alternative associated with a biological opinion that has found jeopardy or adverse modification of critical habitat. An agency or applicant could alternatively choose to seek an exemption from the requirements of the Act or proceed without implementing the reasonable and prudent alternative. However, unless an exemption were obtained, the Federal agency or applicant would be at risk of violating section 7(a)(2) of the Act if it chose to proceed without implementing the reasonable and prudent alternatives.

Second, if we find that a proposed action is not likely to jeopardize the continued existence of a listed animal or plant species, we may identify reasonable and prudent measures designed to minimize the amount or extent of take and require the Federal agency or applicant to implement such measures through non-discretionary

terms and conditions. We may also identify discretionary conservation recommendations designed to minimize or avoid the adverse effects of a proposed action on listed species or critical habitat, help implement recovery plans, or to develop information that could contribute to the recovery of the species.

Based on our experience with consultations pursuant to section 7 of the Act for all listed species, virtually all projects—including those that, in their initial proposed form, would result in jeopardy or adverse modification determinations in section 7 consultations—can be implemented successfully with, at most, the adoption of reasonable and prudent alternatives. These measures, by definition, must be economically feasible and within the scope of authority of the Federal agency involved in the consultation. We can only describe the general kinds of actions that may be identified in future reasonable and prudent alternatives. These are based on our understanding of the needs of the species and the threats it faces, as described in the final listing rule and this critical habitat designation. Within the final critical habitat units, the types of Federal actions or authorized activities that we have identified as potential concerns are carrying out, permitting, or funding of: Livestock grazing, road and bridge construction and maintenance, water diversions (including maintenance of diversion structures), recreation, gravel mining, burning and wildfires, mining, watershed disturbances, and the spread of nonnative aquatic species.

It is likely that a developer or other project proponent could modify a project or take measures to protect the spikedace and loach minnow. The kinds of actions that may be included if future reasonable and prudent alternatives become necessary include conservation set-asides, management of competing nonnative species, restoration of degraded habitat, and regular monitoring. These are based on our understanding of the needs of the species and the threats it faces, as described in the final listing rule and proposed critical habitat designation. These measures are not likely to result in a significant economic impact to project proponents.

In summary, we have considered whether this critical habitat designation would result in a significant economic effect on a substantial number of small entities. We have determined, for the above reasons and based on currently available information, that it is not likely to affect a substantial number of small entities. Federal involvement, and thus section 7 consultations, would be limited to a subset of the area designated. The most likely Federal involvement could include actions needing a section 404 permit under the Clean Water Act (e.g., livestock grazing, agricultural water developments, recreation). A regulatory flexibility analysis is not required.

Executive Order 13211

On May 18, 2001, the President issued Executive Order 13211 (Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use) on regulations that significantly affect energy supply, distribution, and use. Executive Order 13211 requires agencies to prepare Statements of Energy Effects when undertaking certain actions. This final rule to designate critical habitat for the spikedace and loach minnow is not expected to significantly affect energy supplies, distribution, or use. Therefore, this action is not a significant energy action, and no Statement of Energy Effects is required.

Unfunded Mandates Reform Act (2 U.S.C. 1501 et seq.)

In accordance with the Unfunded Mandates Reform Act (2 U.S.C. 1501 *et seq.*), the Service makes the following findings:

(a) This rule will not produce a Federal mandate. In general, a Federal mandate is a provision in legislation, statute or regulation that would impose an enforceable duty upon State, local, or Tribal governments, or the private sector and includes both ''Federal intergovernmental mandates'' and ''Federal private sector mandates.'' These terms are defined in 2 U.S.C. 658(5)–(7). ''Federal intergovernmental mandate'' includes a regulation that ''would impose an enforceable duty upon State, local, or tribal governments'' with two exceptions. It excludes ''a condition of federal assistance.'' It also excludes ''a duty arising from participation in a voluntary Federal program,'' unless the regulation ''relates to a then-existing Federal program under which $500,000,000 or more is provided annually to State, local, and tribal governments under entitlement authority,'' if the provision would ''increase the stringency of conditions of assistance'' or ''place caps upon, or otherwise decrease, the Federal Government's responsibility to provide funding'' and the State, local, or tribal governments ''lack authority'' to adjust accordingly. (At the time of enactment, these entitlement programs were: Medicaid; AFDC work programs; Child Nutrition; Food Stamps; Social Services Block Grants; Vocational Rehabilitation State Grants; Foster Care, Adoption Assistance, and Independent Living; Family Support Welfare Services; and Child Support Enforcement.) ''Federal private sector mandate'' includes a regulation that ''would impose an enforceable duty upon the private sector, except (i) a condition of Federal assistance; or (ii) a duty arising from participation in a voluntary Federal program.''

The designation of critical habitat does not impose a legally binding duty on non-Federal government entities or private parties. Under the Act, the only regulatory effect is that Federal agencies must ensure that their actions do not destroy or adversely modify critical habitat under section 7. While non-Federal entities who receive Federal funding, assistance, or permits or who otherwise require approval or authorization from a Federal agency for an action may be indirectly impacted by the designation of critical habitat, the legally binding duty to avoid destruction or adverse modification of critical habitat rests squarely on the Federal agency. Furthermore, to the extent that non-Federal entities are indirectly impacted because they receive Federal assistance or participate in a voluntary Federal aid program, the Unfunded Mandates Reform Act would not apply; additionally, critical habitat would not shift the costs of the large entitlement programs listed above on to State governments.

(b) The economic analysis discusses potential impacts of critical habitat designation for spikedace and loach minnow on water management activities, livestock grazing, Tribes, residential and commercial development activities, recreation activities, fire management activities, mining, and transportation activities. The analysis estimates that the total costs of the rule could range from $25.2 to $100.3 million in undiscounted dollars over 20 years. Impacts are largely anticipated to affect water use and management, recreation, and livestock. Impacts on small governments are not anticipated, or they are anticipated to be passed on to consumers in the form of price changes. Consequently, for the reasons discussed above, we do not believe that the designation of critical habitat for the spikedace and loach minnow will significantly or uniquely affect small government entities. As such, a Small Government Agency Plan is not required.

Takings

In accordance with Executive Order 12630 (''Government Actions and Interference with Constitutionally Protected Private Property Rights''), we have analyzed the potential takings implications of designating critical habitat for the spikedace and loach minnow in a takings implications assessment. The takings implications assessment concludes that this designation of critical habitat for these fish does not pose significant takings implications.

Federalism

In accordance with Executive Order 13132, this rule does not have significant Federalism effects. A Federalism assessment is not required. In keeping with Department of the Interior policies, we requested information from and coordinated development of this critical habitat designation with appropriate State resource agencies in Arizona and New Mexico. The designation of critical habitat in areas currently occupied by spikedace or loach minnow may impose nominal additional regulatory restrictions to those currently in place and, therefore, may have little incremental impact on State and local governments and their activities. The designation may have some benefit to these governments in that the areas containing features essential to the conservation of this species are more clearly defined, and the primary constituent elements of the habitat necessary to the conservation of this species are specifically identified. While making this definition and identification does not alter where and what federally sponsored activities may occur, it may assist local governments in long-range planning (rather than waiting for case-by-case section 7 consultations to occur).

Civil Justice Reform

In accordance with Executive Order 12988, the Department of the Interior's Office of the Solicitor has determined that this rule does not unduly burden the judicial system and does meet the requirements of sections 3(a) and 3(b)(2) of the Order. We are designating critical habitat in accordance with the provisions of the Endangered Species Act. This final rule uses standard property descriptions and identifies the primary constituent elements within the designated areas to assist the public in understanding the habitat needs of spikedace and loach minnow.

Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.)

This rule does not contain any new collections of information that require approval by OMB under the Paperwork Reduction Act. This rule will not impose record keeping or reporting requirements on State or local governments, individuals, businesses, or organizations. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

National Environmental Policy Act

It is our position that, outside the Tenth Circuit, we do not need to prepare environmental analyses as defined by the NEPA in connection with designating critical habitat under the Endangered Species Act of 1973, as amended. We published a notice outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244). This assertion was upheld in the courts of the Ninth Circuit (*Douglas County* v. *Babbitt,* 48 F.3d 1495 (9th Cir. Ore. 1995), cert. denied 116 S. Ct. 698 (1996). However, when the range of the species includes States within the Tenth Circuit, such as that of the spikedace and loach minnow, pursuant to the Tenth Circuit ruling in *Catron County Board of Commissioners* v. *U.S. Fish and Wildlife Service,* 75 F.3d 1429 (10th Cir. 1996), we undertake a NEPA analysis for critical habitat designation. We conducted a NEPA evaluation and notified the public of the draft document's availability on June 6, 2006 (71 FR 32496). We completed an environmental assessment and finding of no significant impact on the designation of critical habitat for the spikedace and loach minnow. The final documents are available and can be viewed online at *http://www.fws.gov/southwest/es/arizona/.*

Government to Government Relationship With Tribes

In accordance with the President's memorandum of April 29, 1994, ''Government-to-Government Relations with Native American Tribal Governments'' (59 FR 22951), Executive Order 13175, and the Department of Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. We have excluded all Tribal lands from the final critical habitat designation pursuant to section 4(b)(2) of the Act.

Secretarial Order 3206: American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act

The purpose of Secretarial Order 3206 (Secretarial Order) is to ''clarif(y) the responsibilities of the component agencies, bureaus, and offices of the Department of the Interior and the Department of Commerce, when actions taken under authority of the Act and associated implementing regulations affect, or may affect, Indian lands, tribal trust resources, or the exercise of American Indian tribal rights.'' If there is potential that a tribal activity could cause either direct or incidental take of a species proposed for listing under the Act, then meaningful government-to-government consultation will occur to try to harmonize the Federal trust responsibility to Tribes and tribal sovereignty with our statutory responsibilities under the Act. The Secretarial order also requires us to consult with Tribes if the designation of an area as critical habitat might impact tribal trust resources, tribally owned fee lands, or the exercise of tribal rights.

References Cited

A complete list of all references cited in this rulemaking is upon request from the Arizona Ecological Services Field Office (see **ADDRESSES** section above).

Authors

The primary authors of this package are the Arizona Ecological Services Office staff (see **ADDRESSES** section above).

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and record keeping requirements, Transportation.

Regulation Promulgation

■ Accordingly, we amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations as set forth below:

PART 17—[AMENDED]

■ 1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 16 U.S.C. 1531–1544; 16 U.S.C. 4201–4245; Pub. L. 99–625, 100 Stat. 3500; unless otherwise noted.

■ 2. Amend § 17.95(e) by revising the critical habitat entries for ''Loach Minnow (*Tiaroga cobitis*)'' and ''Spikedace (*Meda fulgida*)'' to read as follows:

§ 17.95 Critical habitat—fish and wildlife.

* * * * *

(e) *Fishes.*

* * * * *

Loach Minnow (Tiaroga Cobitis)

(1) Critical habitat units are depicted for Apache, Graham, Greenlee, and Pinal Counties, Arizona; and Catron, Grant, and Hidalgo Counties, New Mexico, on the maps and as described below.

(2) Within these areas, the primary constituent elements of critical habitat for loach minnow are the following:

(i) Permanent, flowing water with no or low levels of pollutants, including:

(A) Living areas for adult loach minnow with moderate to swift flow velocities between 9.0 to 32.0 in/second (24 to 80 cm/second) in shallow water between approximately 1.0 to 30 inches (3 cm to 75 cm) in depth, with gravel, cobble, and rubble substrates;

(B) Living areas for juvenile loach minnow with moderate to swift flow velocities between 1.0 and 34 in/second (3.0 and 85.0 cm/second) in shallow water between approximately 1.0 to 30 inches (3 cm to 75 cm) in depth with sand, gravel, cobble, and rubble substrates;

(C) Living areas for larval loach minnow with slow to moderate velocities between 3.0 and 20.0 in/second (9.0 to 50.0 cm/second) in shallow water with sand, gravel, and cobble substrates;

(D) Spawning areas with slow to swift flow velocities in shallow water where cobble and rubble and the spaces between them are not filled in by fine dirt or sand; and

(E) Water with dissolved oxygen levels greater than 3.5 cc/l and no or minimal pollutant levels for pollutants such as copper, arsenic, mercury, and cadmium; human and animal waste products; pesticides; suspended sediments; and gasoline or diesel fuels.

(ii) Sand, gravel, and cobble substrates with low or moderate amounts of fine sediment and substrate embeddedness. Suitable levels of embeddedness are generally maintained by a natural, unregulated hydrograph that allows for periodic flooding or, if flows are modified or regulated, a hydrograph that allows for adequate river functions, such as flows capable of transporting sediments.

(iii) Streams that have:

(A) Low gradients of less than approximately 2.5 percent;

(B) Water temperatures in the approximate range of 35 to 86 °F (1.7 to 30.0 °C) (with additional natural daily and seasonal variation);

(C) Pool, riffle, run, and backwater components; and

(D) An abundant aquatic insect food base consisting of mayflies, true flies, black flies, caddisflies, stoneflies, and dragonflies.

(iv) Habitat devoid of nonnative aquatic species or habitat in which nonnative aquatic species are at levels that allow persistence of loach minnow.

(v) Areas within perennial, interrupted stream courses that are periodically dewatered but that serve as connective corridors between occupied or seasonally occupied habitat and through which the species may move when the habitat is wetted.

(3) Each stream segment includes a lateral component that consists of 300 feet (91.4 meters) on either side of the stream channel measured from the stream edge at bank full discharge. This lateral component of critical habitat contains and contributes to the physical and biological features essential to the loach minnow and is intended as a surrogate for the 100-year floodplain.

(4) Critical habitat map areas. Data layers defining map areas, and mapping of critical habitat areas, was done using Arc GIS and verifying with USGS 7.5′ quadrangles. Legal descriptions for New Mexico and Arizona are based on the Public Lands Survey System (PLSS). Within this system, all coordinates reported for New Mexico are in the New Mexico Principal Meridian (NMPM), while those in Arizona are in the Gila and Salt River Meridian (GSRM). All mileage calculations were performed using GIS.

(5) **Note:** Index map of critical habitat units for loach minnow (Map 1) follows:

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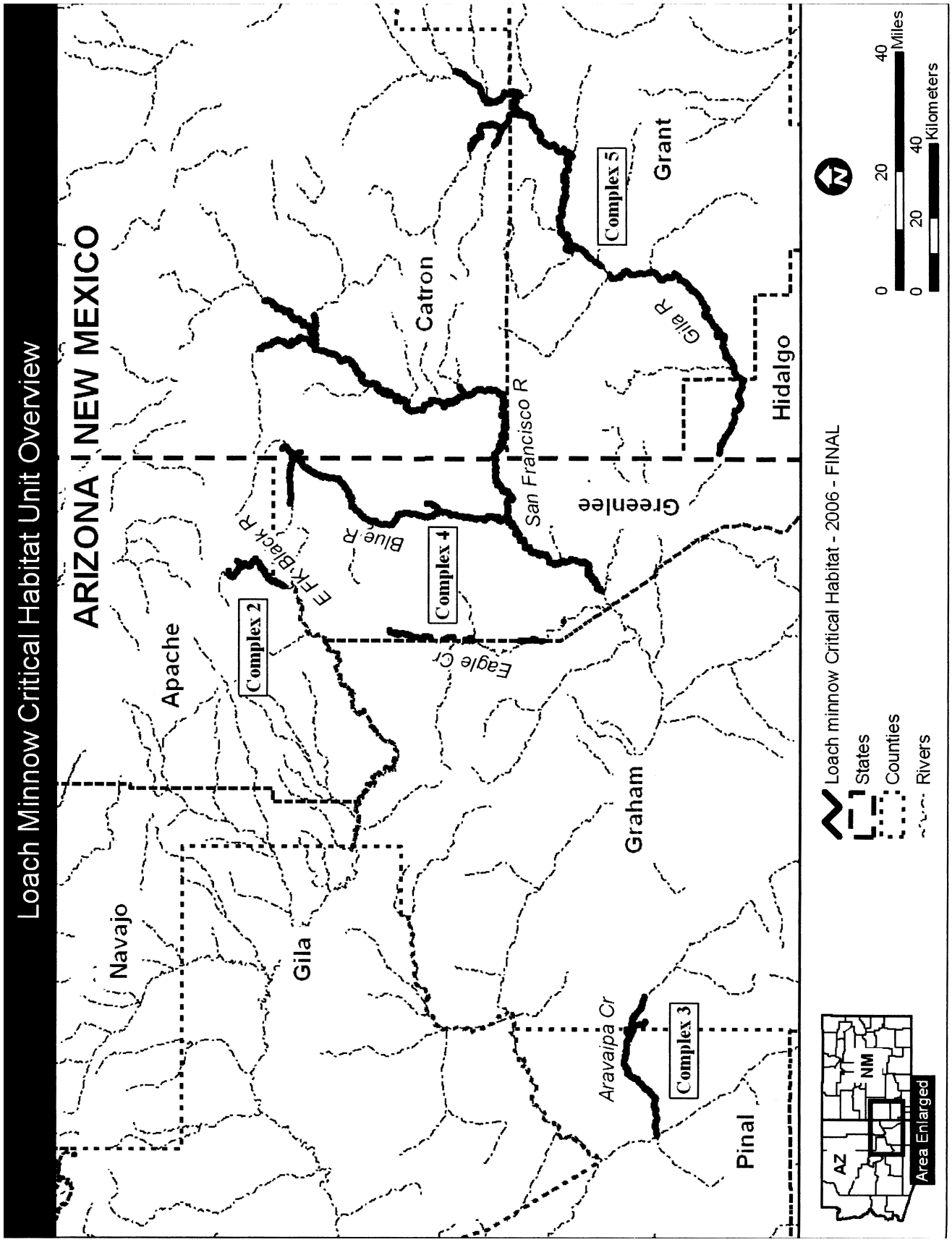


(6) Complex 2—Black River, Apache and Greenlee Counties, Arizona.

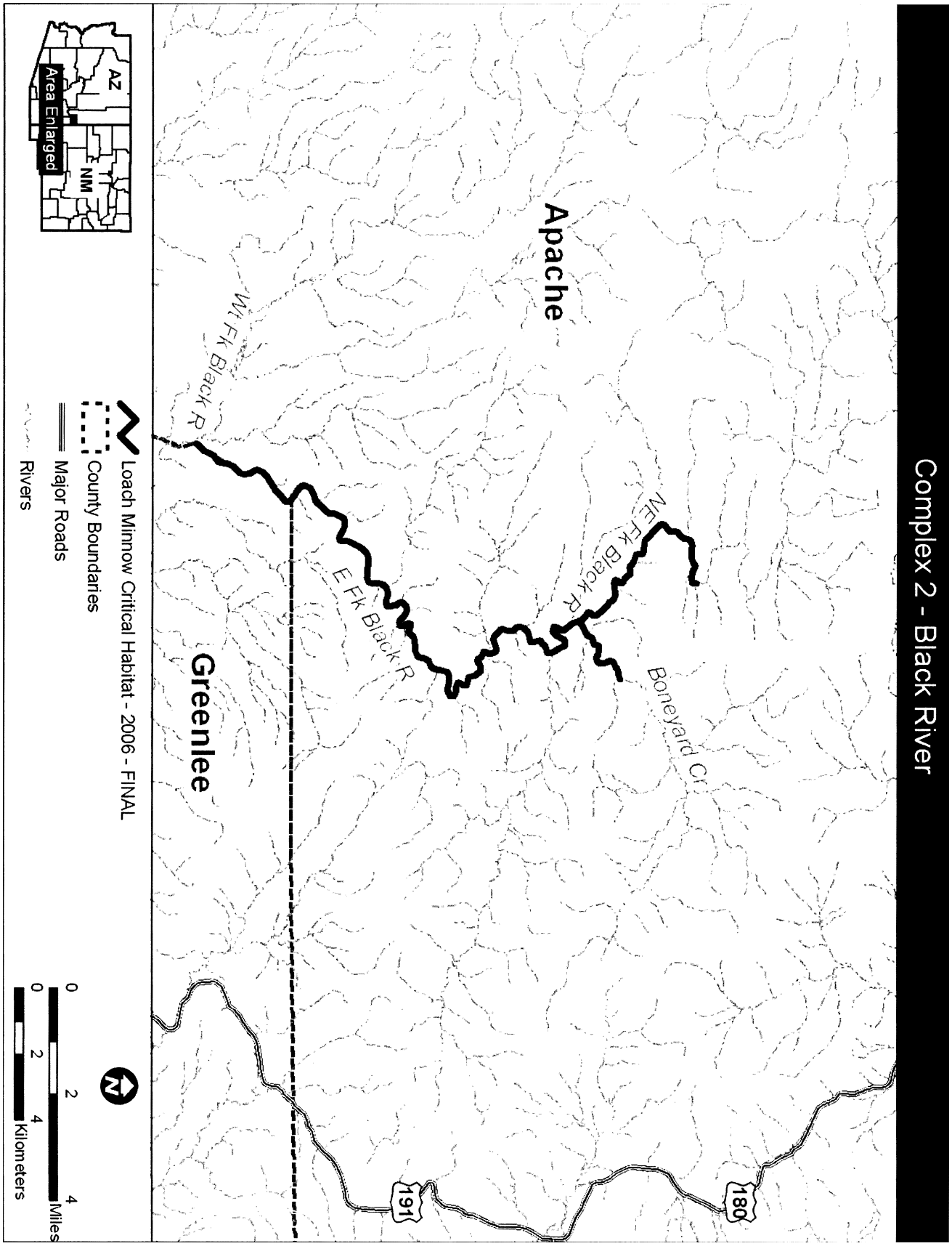
(i) East Fork Black River—12.2 mi (19.7 km) of river extending from the confluence with the West Fork Black River at Township 4 North, Range 28

East, section 11 upstream to the confluence with unnamed tributary approximately 0.51 mi (0.82 km) downstream of the Boneyard Creek confluence at Township 5 North, Range 29 East, section 5. Land ownership: U.S. Forest Service (Apache—Sitgreaves National Forest).

(ii) North Fork East Fork Black River—4.4 mi (7.1 km) of river extending from the confluence with East Fork Black River at Township 5 North, Range 29 East, section 5 upstream to the confluence with an unnamed tributary at Township 6 North, Range 29 East, section 30. Land ownership: U.S. Forest Service (Apache—Sitgreaves National Forest).

(iii) Boneyard Creek—1.4 mi (2.3 km) of creek extending from the confluence with the East Fork Black River at Township 5 North, Range 29 East, section 5 upstream to the confluence with an unnamed tributary at Township 6 North, Range 29 East, section 32. Land ownership: U.S. Forest Service (Apache—Sitgreaves National Forest).

(iv) **Note:** Map of Complex 2 (Black River) of loach minnow critical habitat (Map 2) follows:


Complex 2 - Black River
180
Boneyard Cr
NE Fk Black R
E Fk Black R
Apache
Greenlee
191
W Fk Black R
Loach Minnow Critical Habitat - 2006 - FINAL
County Boundaries
Major Roads
Rivers
0
2
4
Miles
0
2
4
Kilometers
AZ
NM
Area Enlarged

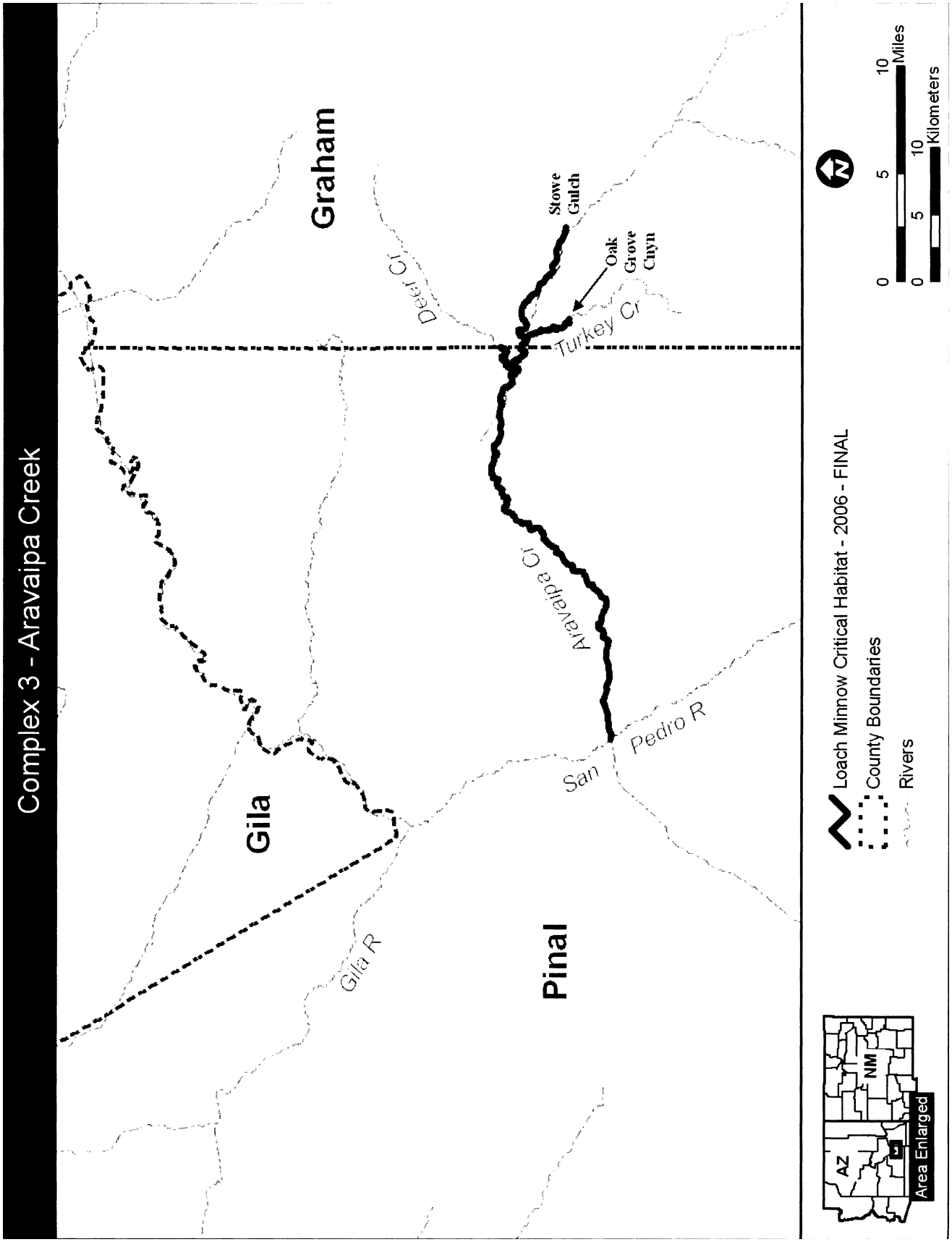
(7) Complex 3—Middle Gila/Lower San Pedro/Aravaipa Creek, Pinal and Graham Counties, Arizona.

(i) Aravaipa Creek—28.1 mi (45.3 km) of creek extending from the confluence with the San Pedro River at Township 7 South, Range 16 East, section 9 upstream to the confluence with Stowe Gulch at Township 6 South, Range 19 East, section 35. Land ownership: Bureau of Land Management, Tribal, and State lands.

(ii) Turkey Creek—2.7 mi (4.3 km) of creek extending from the confluence with Aravaipa Creek at Township 6 South, Range 19 East, section 19 upstream to the confluence with Oak Grove Canyon at Township 6 South, Range 19 East, section 32. Land ownership: Bureau of Land Management.

(iii) Deer Creek—2.3 mi (3.6 km) of creek extending from the confluence with Aravaipa Creek at Township 6 South, Range 18 East, section 14 upstream to the boundary of the Aravaipa Wilderness at Township 6 South, Range 19 East, section 18. Land ownership: Bureau of Land Management.

(iv) **Note:** Map of Complex 3 (Aravaipa Creek) of loach minnow critical habitat (Map 3) follows:


Complex 3 - Aravaipa Creek
Graham
Gila
Pinal
Stowe Gulch
Oak Grove Cnyn
Dead Cr
Turkey Cr
Aravaipa Cr
San Pedro R
Gila R
Loach Minnow Critical Habitat - 2006 - FINAL
County Boundaries
Rivers
0 5 10 Miles
0 5 10 Kilometers
AZ
NM
Area Enlarged

(8) Complex 4—San Francisco and Blue Rivers, Pinal and Graham Counties, Arizona, and Catron County, New Mexico.

(i) Eagle Creek—17.7 mi (28.5 km) of creek extending from the Phelps—Dodge Diversion Dam at Township 4 South, Range 28 East, section 23 upstream to the confluence of Dry Prong and East Eagle Creeks at Township 2 North, Range 28 East, section 29, excluding portions of the San Carlos Reservation. Land ownership: U.S. Forest Service (Apache—Sitgreaves National Forest), and private lands.

(ii) San Francisco River—126.5 mi (203.5 km) of river extending from the confluence with the Gila River at Township 5 South, Range 29 East, section 21 upstream to the mouth of The Box, a canyon above the town of Reserve, at Township 6 South, Range 19 West, section 2. Land ownership: Bureau of Land Management, U.S. Forest Service (Apache–Sitgreaves National Forest), State, and private lands in Arizona, and U.S. Forest Service (Gila National Forest) and private lands in New Mexico.

(iii) Tularosa River—18.6 mi (30.0 km) of river extending from the confluence with the San Francisco River at Township 7 South, Range 19 West, section 23 upstream to the town of Cruzville at Township 6 South, Range 18 West, section 12. Land ownership: U.S. Forest Service (Gila National Forest) and private lands.

(iv) Negrito Creek—4.2 mi (6.8 km) of creek extending from the confluence with the Tularosa River at Township 7 South, Range 18 West, section 19 upstream to the confluence with Cerco Canyon at Township 7 South, Range 18 West, section 21. Land ownership: U.S. Forest Service (Gila National Forest), and private lands.

(v) Whitewater Creek—1.1 mi (1.8 km) of creek extending from the confluence with the San Francisco River at Township 11 South, Range 20 West, section 27 upstream to the confluence with the Little Whitewater Creek at Township 11 South, Range 20 West, section 23. Land ownership: private lands.

(vi) Blue River—51.1 mi (82.2 km) of river extending from the confluence with the San Francisco River at Township 2 South, Range 31 East, section 31 upstream to the confluence of Campbell Blue and Dry Blue Creeks at Township 6 South, Range 20 West, section 6. Land ownership: U.S. Forest Service (Apache–Sitgreaves National Forest) and private lands in Arizona; U.S. Forest Service (Gila National Forest) in New Mexico.

(vii) Campbell Blue Creek—8.1 mi (13.1 km) of creek extending from the confluence of Dry Blue and Campbell Blue Creeks at Township 6 South, Range 20 West, section 6 in New Mexico upstream to the confluence with Coleman Canyon at Township 4 North, Range 31 East, section 32 in Arizona. Land ownership: U.S. Forest Service (Apache–Sitgreaves National Forest) and private lands in Arizona; U.S. Forest Service (Gila National Forest) in New Mexico.

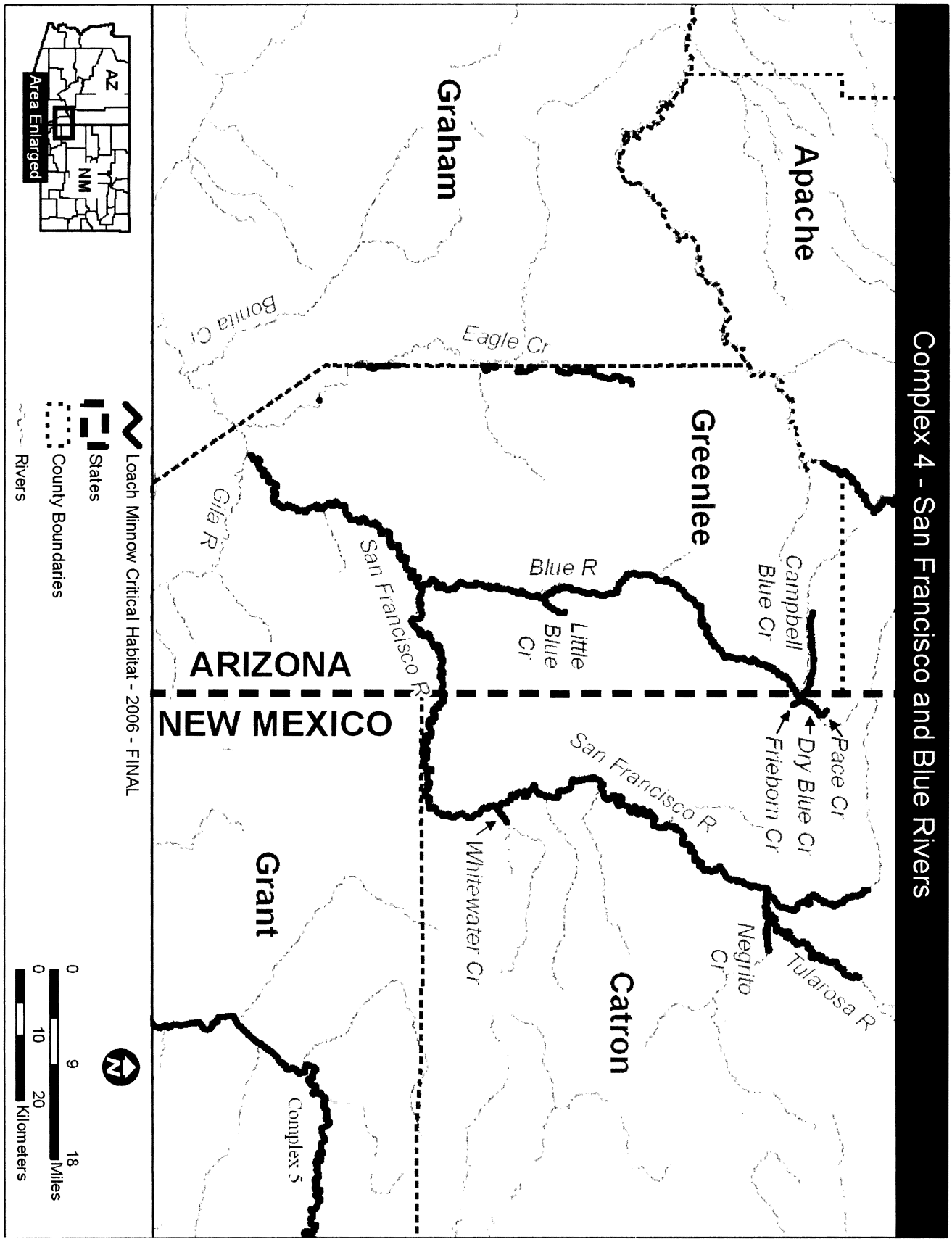
(viii) Dry Blue Creek—3.0 mile (4.8 km) of creek extending from the confluence with Campbell Blue Creek at Township 7 South, Range 21 West, section 6 upstream to the confluence with Pace Creek at Township 6 South, Range 21 West, section 28. Land ownership: U.S. Forest Service (Gila National Forest).

(ix) Pace Creek—0.8 mile (1.2 km) of creek extending from the confluence with Dry Blue Creek at Township 6 South, Range 21 West, section 28 upstream to a barrier falls at Township 6 South, Range 21 West, section 29. Land ownership: U.S. Forest Service (Gila National Forest).

(x) Frieborn Creek—1.1 mi (1.8 km) of creek extending from the confluence with Dry Blue Creek at Township 7 South, Range 21 West, section 6 upstream to an unnamed tributary at Township 7 South, range 21 West, section 8. Land ownership: U.S. Forest Service (Gila National Forest).

(xi) Little Blue Creek—2.8 mi (4.5 km) of creek extending from the confluence with the Blue River at Township 1 South, range 31 East, section 5 upstream to the mouth of a canyon at Township 1 North, Range 31 East, section 29. Land ownership: U.S. Forest Service (Apache–Sitgreaves National Forest).

(xii) **Note:** Map of Complex 4 (San Francisco and Blue Rivers) of loach minnow critical habitat (Map 4) follows:


Complex 4 - San Francisco and Blue Rivers
Apache
Graham
Greenlee
Catron
Grant
ARIZONA
NEW MEXICO
Campbell Blue Cr
Pace Cr
Dry Blue Cr
Frieborn Cr
Blue R
Little Blue Cr
San Francisco R
Whitewater Cr
Negrito Cr
Tularosa R
Eagle Cr
Bonita Cr
Gila R
Complex 5
Area Enlarged
AZ
NM
Loach Minnow Critical Habitat - 2006 - FINAL
States
County Boundaries
Rivers
0 9 18 Miles
0 10 20 Kilometers

(9) Complex 5—Upper Gila River Complex, Catron, Grant, and Hidalgo Counties, New Mexico.

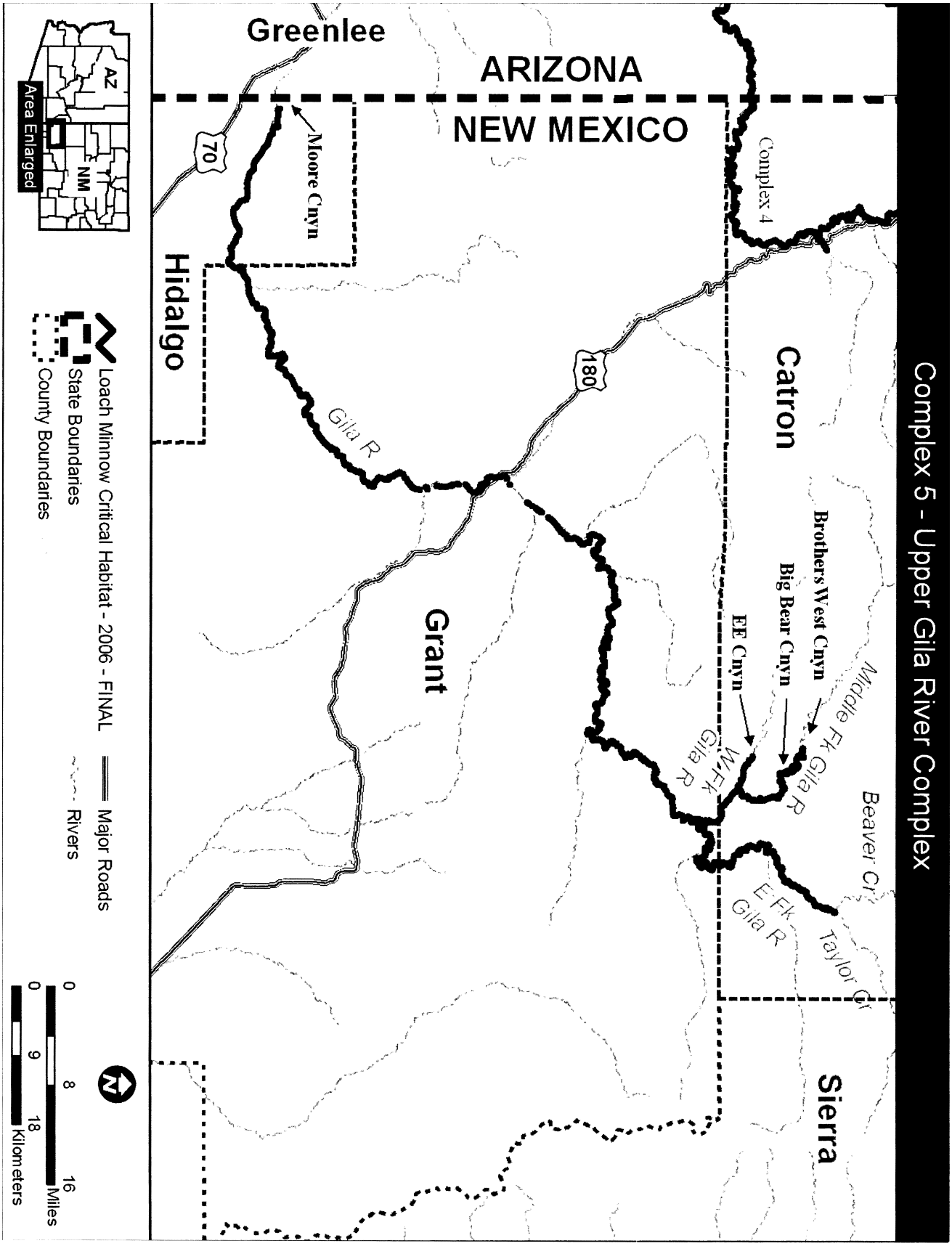
(i) Upper Gila River—94.9 mi (152.7 km) of river extending from the confluence with Moore Canyon (near the Arizona/New Mexico border) at Township 18 South, Range 21 West, section 32 upstream to the confluence of the East and West Forks of the Gila River at Township 13 South, Range 13 West, section 8. Land ownership: Bureau of Land Management, U.S. Forest Service (Gila National Forest), State, and private lands.

(ii) East Fork Gila River—26.1 mi (42.0 km) of river extending from the confluence with the West Fork Gila River at Township 11 South, Range 12 West, section 17 upstream to the confluence of Beaver and Taylor creeks at Township 13 South, Range 13 West, section 8. Land ownership: U.S. Forest Service (Gila National Forest) and private lands.

(iii) Middle Fork Gila River—11.9 mi (19.1 km) of river extending from the confluence with the West Fork Gila River at Township 12 South, Range 14 West, section 25 upstream to the confluence with Brothers West Canyon at Township 11 South, Range 14 West, section 33. Land ownership: U.S. Forest Service (Gila National Forest) and private lands.

(iv) West Fork Gila River—7.7 mi (12.4 km) of river extending from the confluence with the East Fork Gila River at Township 13 South, Range 13 West, section 8 upstream to the confluence with EE Canyon at Township 12 South, Range 14 West, section 22. Land ownership: U.S. Forest Service (Gila National Forest), National Park Service, and private lands.

(v) **Note:** Map of Complex 5 (Upper Gila River Complex) of loach minnow critical habitat (Map 5) follows:


Complex 5 - Upper Gila River Complex
Greenlee
ARIZONA
NEW MEXICO
Moore Cnyn
70
Hidalgo
Complex 4
Catron
180
Gila R
Grant
Brothers West Cnyn
Big Bear Cnyn
EE Cnyn
Middle Fk Gila R
W. Fk Gila R
Beaver Cr
E Fk Gila R
Taylor Cr
Sierra
AZ
NM
Area Enlarged
Loach Minnow Critical Habitat - 2006 - FINAL
State Boundaries
County Boundaries
Major Roads
Rivers
0 8 16 Miles
0 9 18 Kilometers

* * * * *

Spikedace (Meda fulgida)

(1) Critical habitat units are depicted for Graham, Greenlee, Pinal, and Yavapai Counties, Arizona; and Catron, Grant, and Hidalgo Counties, New Mexico, on the maps and as described below.

(2) Within these areas, the primary constituent elements of critical habitat for spikedace are the following:

(i) Permanent, flowing water with no or minimal pollutant levels, including:

(A) Living areas for adult spikedace with slow to swift flow velocities between 20 and 60 cm/second (8 and 24 in/second) in shallow water between approximately 10 cm (4 in) and 1 meter (40 in) in depth, with shear zones where rapid flow borders slower flow, areas of sheet flow (or smoother, less turbulent flow) at the upper ends of mid-channel sand/gravel bars, and eddies at downstream riffle edges;

(B) Living areas for juvenile spikedace with slow to moderate water velocities of approximately 18 cm/second (8 in/second) or higher in shallow water between approximately 3 cm (1.2 in) and 1 meter (40 in) in depth;

(C) Living areas for larval spikedace with slow to moderate flow velocities of approximately 10 cm/second (4 in/second) or higher in shallow water approximately 3 cm (1.2 in) to 1 meter (40 in) in depth; and

(D) Water with dissolved oxygen levels greater than 3.5 cc/l and no or minimal pollutant levels for pollutants such as copper, arsenic, mercury, and cadmium; human and animal waste products; pesticides; suspended sediments; and gasoline or diesel fuels.

(ii) Sand, gravel, and cobble substrates with low or moderate amounts of fine sediment and substrate embeddedness. Suitable levels of embeddedness are generally maintained by a natural, unregulated hydrograph that allows for periodic flooding or, if flows are modified or regulated, a hydrograph that allows for adequate river functions, such as flows capable of transporting sediments.

(iii) Streams that have:

(A) Low gradients of less than approximately 1.0 percent;

(B) Water temperatures in the approximate range of 35 to 82 °F (1.7 to 27.8 °C) (with additional natural daily and seasonal variation);

(C) Pool, riffle, run, and backwater components; and

(D) An abundant aquatic insect food base consisting of mayflies, true flies, caddisflies, stoneflies, and dragonflies.

(iv) Habitat devoid of nonnative aquatic species or habitat in which nonnative aquatic species are at levels that allow persistence of spikedace.

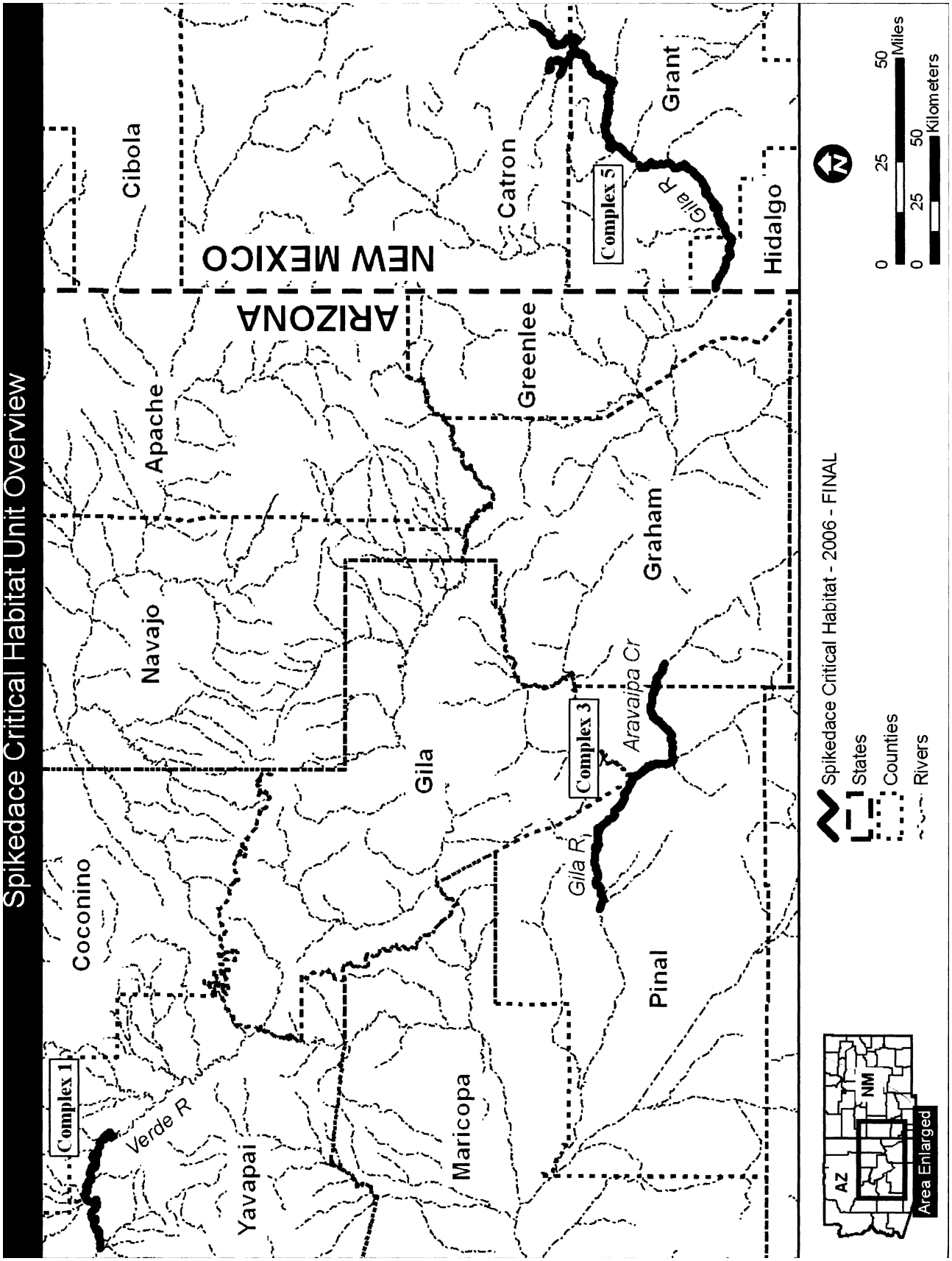
(v) Areas within perennial, interrupted stream courses that are periodically dewatered but that serve as connective corridors between occupied or seasonally occupied habitat and through which the species may move when the habitat is wetted.

(3) Each stream segment includes a lateral component that consists of 300 feet (91.4 meters) on either side of the stream channel measured from the stream edge at bank full discharge. This lateral component of critical habitat contains and contributes to the physical and biological features essential to the spikedace and is intended as a surrogate for the 100-year floodplain.

(4) Critical habitat map areas. Data layers defining map areas, and mapping of critical habitat areas, was done using Arc GIS and verifying with USGS 7.5′ quadrangles. Legal descriptions for New Mexico and Arizona are based on the Public Lands Survey System (PLSS). Within this system, all coordinates reported for New Mexico are in the New Mexico Principal Meridian (NMPM), while those in Arizona are in the Gila and Salt River Meridian (GSRM). All mileage calculations were performed using GIS.

(5) **Note:** Index map of critical habitat units for spikedace (Map 1), follows:

BILLING CODE 4310–55–P

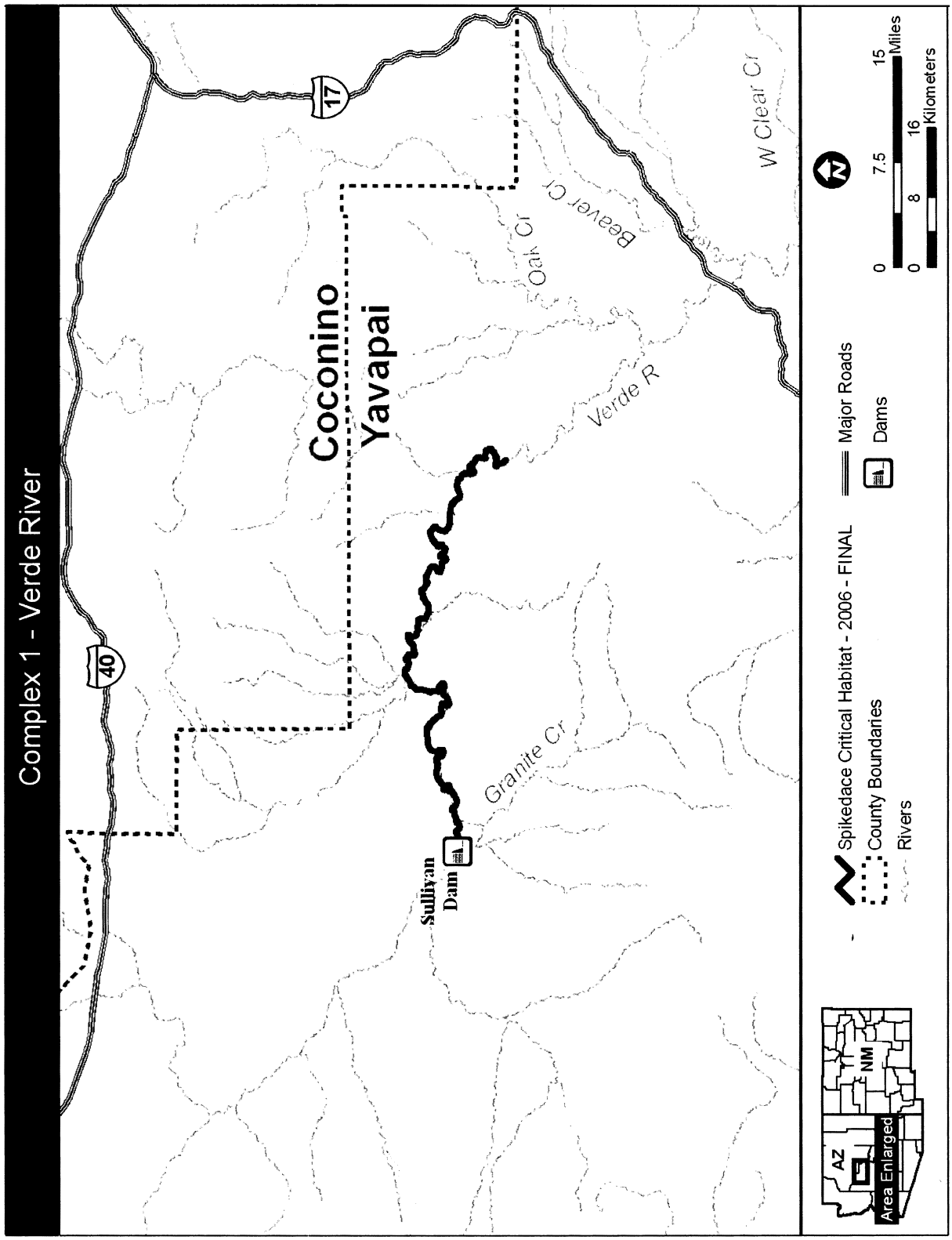


(6) Complex 1—Verde River, Yavapai County, Arizona.

(i) Verde River—43.0 mi (69.2 km) of river extending from the Prescott and Coconino National Forest boundary with private lands at Township 17

North, Range 3 East, section 7, upstream to Sullivan Dam at Township 17 North, Range 2 West, section 15. Land ownership: U.S. Forest Service (Coconino and Prescott National Forests), State, and private lands.

(ii) **Note:** Map of Complex 1 (Verde River) of spikedace critical habitat (Map 2) follows:



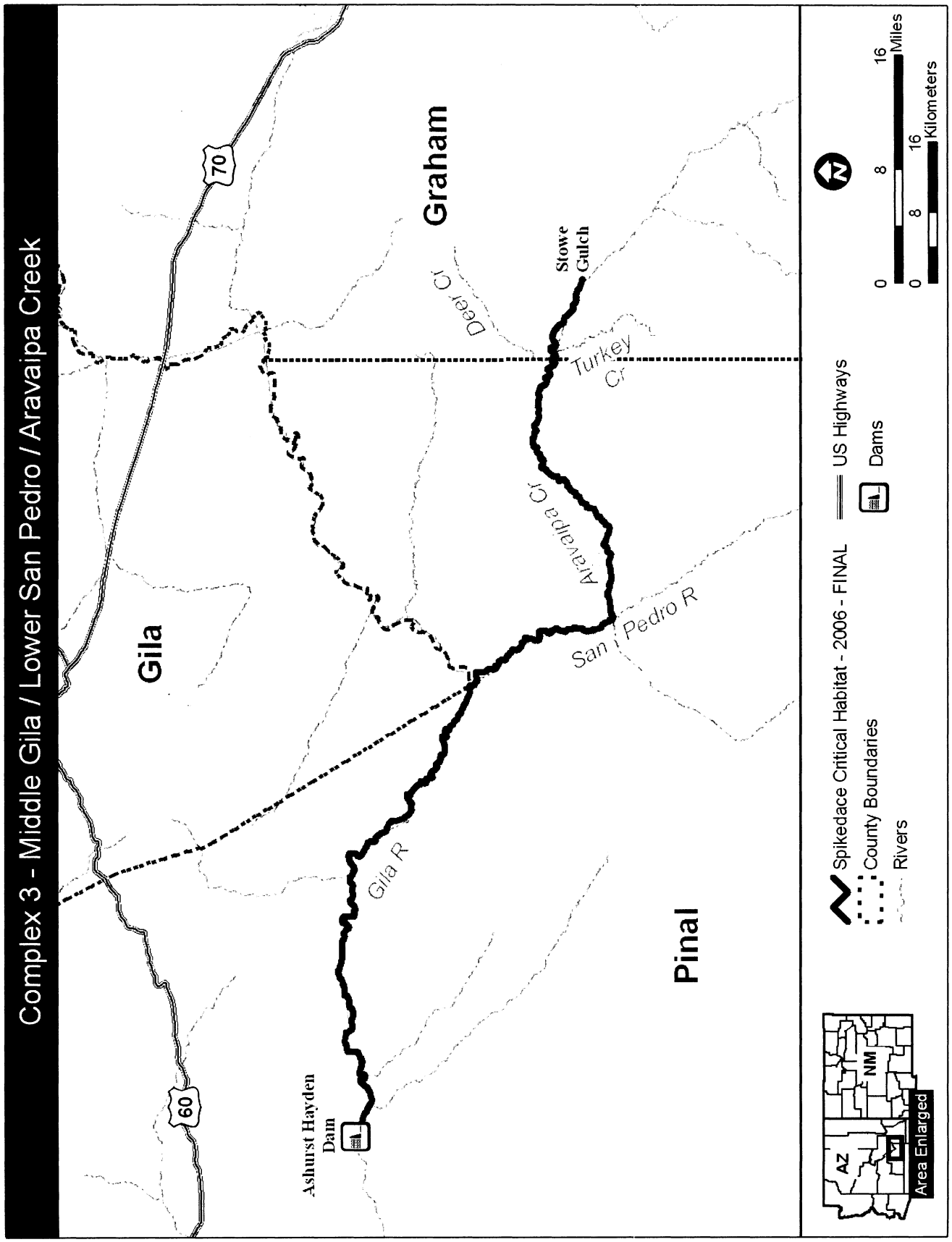
(7) Complex 3—Middle Gila/Lower San Pedro/Aravaipa Creek, Pinal and Graham Counties, Arizona.

(i) Gila River—39.0 mi (62.8 km) of river extending from the Ashurst-Hayden Dam at Township 4 South, Range 11 East, section 8 upstream to the confluence with the San Pedro River at Township 5 South, Range 15 East, section 23. Land ownership: Bureau of Reclamation, Bureau of Land Management, State, and private lands.

(ii) Lower San Pedro River—13.4 mi (21.5 km) of river extending from the confluence with the Gila River at Township 5 South, Range 15 East, section 23 upstream to the confluence with Aravaipa Creek at Township 7 South, Range 16 East, section 9. Land ownership: Bureau of Land Management, Tribal, State, and private lands.

(iii) Aravaipa Creek—28.1 mi (45.3 km) of creek extending from the confluence with the San Pedro River at Township 7 South, Range 16 East, section 9 upstream to the confluence with Stowe Gulch at Township 6 South, Range 19 East, section 35. Land ownership: Bureau of Land Management, Tribal, State, and private lands.

(iv) **Note:** Map of Complex 3 (Middle Gila/Lower San Pedro/Aravaipa Creek) of spikedace critical habitat (Map 3) follows:


Complex 3 - Middle Gila / Lower San Pedro / Aravaipa Creek
Gila
Graham
Pinal
70
60
Stowe Gulch
Deer Cr
Turkey Cr
Aravaipa Cr
San Pedro R
Gila R
Ashurst Hayden Dam
Spikedace Critical Habitat - 2006 - FINAL
County Boundaries
Rivers
US Highways
Dams
0 8 16 Miles
0 8 16 Kilometers
AZ
NM
Area Enlarged

(8) Complex 5—Upper Gila River Complex, Catron, Grant, and Hidalgo Counties, New Mexico.

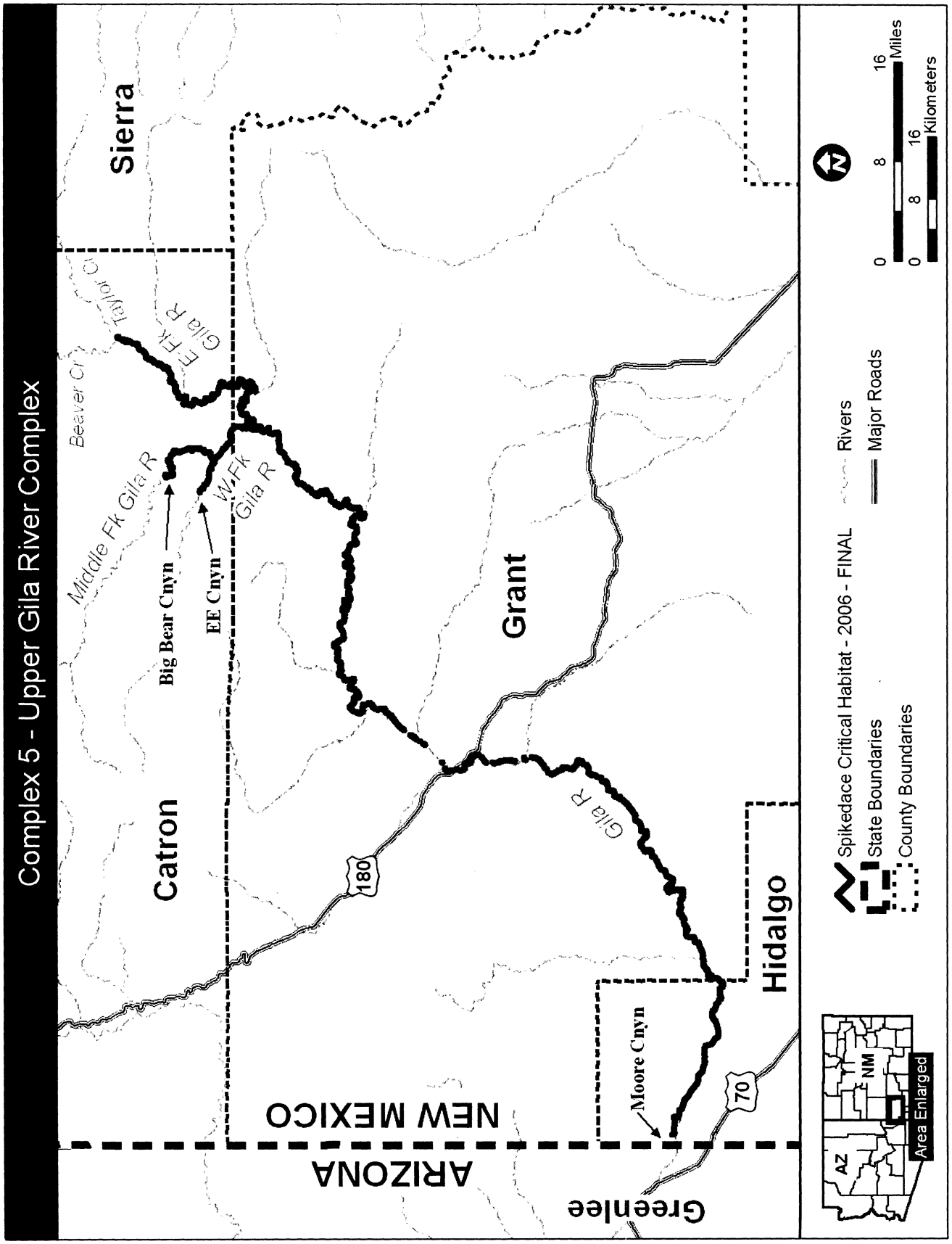
(i) Upper Gila River—94.9 mi (152.7 km) of river extending from the confluence with Moore Canyon (near the Arizona/New Mexico border) at Township 18 South, Range 21 West, section 32 upstream to the confluence of the East and West Forks of the Gila River at Township 13 South, Range 13 West, section 8, excluding lands owned by the Phelps Dodge Corporation. Land ownership: Bureau of Land Management, U.S. Forest Service (Gila National Forest), State, and private lands.

(ii) East Fork Gila River—26.1 mi (42.0 km) of river extending from the confluence with the West Fork Gila River at Township 13 South, Range 13 West, section 8 upstream to the confluence of Beaver and Taylor creeks at Township 11 South, Range 12 West, section 17. Land ownership: U.S. Forest Service (Gila National Forest) and private lands.

(iii) Middle Fork Gila River—7.7 mi (12.3 km) of river extending from the confluence with the West Fork Gila River at Township 12 South, Range 14 West, section 25 upstream to the confluence with Big Bear Canyon at Township 12 South, Range 14 West, section 2. Land ownership: U.S. Forest Service (Gila National Forest) and private lands.

(iv) West Fork Gila River—7.7 mi (12.4 km) of river extending from the confluence with the East Fork Gila River at Township 13 South, Range 13 West, section 8 upstream to the confluence with EE Canyon at Township 12 South, Range 14 West, section 22. Land ownership: U.S. Forest Service (Gila National Forest), National Park Service, and private lands.

(v) **Note:** Map of Complex 5 (Upper Gila River Complex) of spikedace critical habitat (Map 4) follows:


Complex 5 - Upper Gila River Complex
Sierra
Catron
Grant
Hidalgo
Greenlee
ARIZONA
NEW MEXICO
Beaver Cr
Taylor Cr
Gila R
EF Gila R
Middle Fk Gila R
Big Bear Cnyn
EE Cnyn
W Fk Gila R
Gila R
Moore Cnyn
180
70
Spikedace Critical Habitat - 2006 - FINAL
State Boundaries
County Boundaries
Rivers
Major Roads
0 8 16 Miles
0 8 16 Kilometers
AZ
NM
Area Enlarged

* * * * *

Dated: March 6, 2007.

David M. Verhey,

Acting Assistant Secretary for Fish and Wildlife and Parks.

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