

50 CFR Part 17

Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Spikedace

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: The U.S. Fish and Wildlife Service has determined that a fish, the spikedace (*Meda fulgida*), is a threatened species under the authority contained in the Endangered Species Act of 1973, as amended (Act). This determination includes a special rule allowing take for certain purposes in accordance with New Mexico and Arizona State laws and regulations. The spikedace is endemic to the Gila River system upstream from the city of Phoenix, but is presently found only in Aravaipa Creek, Graham and Pinal Counties, Arizona; sections of the Gila River upstream from the town of Red Rock in Grant and Catron Counties, New Mexico; a small section of Eagle Creek in Greenlee County, Arizona; and a portion of the upper Verde River, Yavapai County, Arizona. This historic range of the spikedace may have included the upper San Pedro River in Sonora, Mexico, but habitat no longer exists there due to dewatering of the river. The distribution and numbers of the spikedace have been severely reduced by habitat destruction due to damming, channel alteration, riparian destruction, channel downcutting, water diversion, and groundwater pumping. Approximately 6 percent of the total historic range presently supports populations of this species. The spikedace continues to be threatened by proposed dam construction, water losses, and habitat alteration. Survival of the species is also threatened by the

introduction and spread of exotic predatory and competitive fish species. In accordance with 4(b)(6)(C) of the Act, the final designation of critical habitat included in the proposed rule is postponed until no later than June 1987. This rule implements the full protection provided by the Endangered Species Act of 1973, as amended, for the spikedace, *Meda fulgida*.

EFFECTIVE DATE: The effective date of this rule is July 31, 1986.

ADDRESSES: The complete file for this rule is available for inspection, by appointment, during normal business hours at the U.S. Fish and Wildlife Service Regional Office, 500 Gold Avenue S.W., Room 4000, P.O. Box 1306, Albuquerque, New Mexico 87103.

FOR FURTHER INFORMATION CONTACT: Mr. Gerald Burton, Endangered Species Biologist, Regional Office of Endangered Species, U.S. Fish and Wildlife Service, Albuquerque, New Mexico [see ADDRESSES above] (505/766-3972 or FTS 474-3972).

SUPPLEMENTARY INFORMATION:**Background**

The spikedace, *Meda fulgida*, 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*. It is a small (less than 75 millimeters [3 inches]), slim fish, characterized by very silvery sides, and by spines in the dorsal and pelvic fins. Breeding males develop a brassy golden color. The spikedace is found in moderate to large perennial streams, where it inhabits shallow riffles with gravel and rubble substrates and moderate to swift currents, and swift pools over sand or gravel substrates (Barber *et al.* 1970). Recurrent flooding is very important in the life history of *Meda* and helps to maintain its competitive edge over invading exotic fish species in its remaining habitat.

The spikedace was once common throughout much of the Verde, Aqua Fria, Salt, San Pedro, San Francisco, and Gila (upstream from Phoenix) River systems, occupying suitable habitat in

both the mainstreams and moderate gradient perennial tributaries, up to 1800-1900 meters (5900-6200 feet) elevation. Because of habitat destruction and competition and predation by exotic fish species, its range and abundance have been severely reduced, and it is now restricted to approximately 24 kilometers (km) (15 miles) of Aravaipa Creek, Graham and Pinal Counties, Arizona; approximately 108 km (67 miles) of the upper Gila River in the Middle Box canyon, the Cliff-Gila Valley and the lower end of the West, East, and Middle Forks, Grant and Catron Counties, New Mexico; and approximately 57 km (35 miles) of the Verde River from the lower end of the Chino Valley downstream to just below the mouth of Sycamore Canyon, Yavapai County, Arizona (Anderson 1978, Minckley 1973, Barrett *et al.* 1985, Probst in prep.). In May 1985, larval *Meda fulgida* were also found in a very short section of Eagle Creek, Greenlee County, Arizona (Bestgen 1985). This stream had been surveyed several times in the past, with no *Meda* found, and no adult *Meda* were found during the 1985 sampling, indicating the population remaining there is quite small. The historic range of the spikedace included approximately 2600 km (1600 miles) of river. The 190 km (118 miles) of presently occupied range represent only 6 percent of the historic range.

Land ownership in existing spikedace habitats is mixed and is as follows: 1) *Aravaipa Creek*—the Bureau of Land Management administers about 75 percent of the perennial length of the stream, most of which is designated as the Aravaipa Canyon Wilderness; most of the perennial stream above and below the Wilderness is owned or leased by the Defenders of Wildlife as the George Whittell Wildlife Preserve; there are a few scattered parcels of other privately owned lands along the perennial stream length; 2) *Eagle Creek*—privately owned; 3) *Gila River*—the Bureau of Land Management administers approximately 4½ km (2¾ miles) of river just downstream from the

Middle Box canyon, all of which is part of a designated Area of Critical Environmental Concern; lands along the river in most of the Cliff-Gila Valley, near Gila Hot Springs, and along the East Fork are privately owned; the Nature Conservancy owns a small portion of river upstream from the town of Gila; the New Mexico Department of Game and Fish has land along approximately 6 km (3¾ miles) of river on the West and Middle Forks and the New Mexico State Land Office has land along ½ km (¼ mile) of river in the Cliff-Gila Valley; the National Park Service's Gila Cliff Dwellings National Monument, which is currently being administered by the U.S. Forest Service lies along approximately 1 km (0.6 miles) of the West Fork; the U.S. Forest Service administers a large portion of the river in the Gila National Forest, with sections flowing through the Gila Wilderness, the Lower Gila River Bird Habitat Management Area, and the Gila River Research Natural Area; 4) *Verde River*—most of the spikedeace habitat is located on the Prescott National Forest administered by the U.S. Forest Service; privately owned lands are located along the river below Sullivan Lake and private inholdings are interspersed within Forest Service lands; the State of Arizona has approximately 4 km (2½ miles) of scattered State lands located along the Verde River below Sullivan Lake.

The native fish fauna of the Gila River system, including the spikedeace, has been drastically affected by man's alteration of that system, with 35 percent of the native fish presently federally listed as endangered, and another 35 percent considered to be threatened or endangered by the States of Arizona and New Mexico and/or the American Fisheries Society. The spikedeace has been extirpated from much of the system and was last found in the Salt River drainage in 1972, in the San Pedro River drainage (except Aravaipa Creek) in 1967, in the Agua Fria drainage in 1943, and in the San Francisco River drainage in 1950. In the Gila River downstream from Red Rock, New Mexico, scattered individual *Meda* have been found as late as 1984, but no permanent populations of *Meda* have occupied this stretch of river since 1951. A 1978 study (Anderson 1978) documented the distribution of *Meda* in New Mexico and noted its absence from the San Francisco River System, the Gila River downstream from Red Rock, and the major tributaries of the Gila River upstream from Red Rock. The study noted that the range of spikedeace has receded 25 km (16 miles) upstream in the

Gila River in the last 26 years. Those findings were confirmed by a study conducted in 1983 and 1984 by the New Mexico Department of Game and Fish (Propst in prep.). In addition, that study documented an apparent loss of 40 percent in the range of *Meda* in the Gila River since 1978. This decline included loss of *Meda* from the East Fork of the Gila River, as well as an additional 10 km recession upstream from Red Rock to the mouth of the Middle Box canyon. Loss of *Meda* from the East Fork was probably due to several interacting factors. The numbers of nonnative predatory smallmouth bass and catfish had increased until few members of any native species were present. Land management practices in the area, particularly grazing, had resulted in damage to the watershed and to the riparian and aquatic habitat and had left the stream vulnerable to unnatural damage from flooding. Flooding in 1978 acted upon the damaged stream and resulted in severe channel erosion near the mouth of the East Fork, destroying the braided channel habitat preferred by *Meda*. However, flooding in 1983 and 1984, along with changes that had occurred in grazing practices on some of the private lands along the East Fork, resulted in improved habitat conditions for *Meda* in the East Fork. Habitat improvements included removal of sediments and rebuilding of stream channel, as well as removal of nonnative species during flooding. In September 1985, spikedeace were once again found in some portions of the East Fork, although in very small numbers. The renewed presence of *Meda* in the East Fork is in keeping with the population characteristics of this fish. It is highly mobile, has a high reproductive potential, and characteristically undergoes large fluctuations in population sizes. However, *Meda* in the East Fork of the Gila River have shown a steep downward trend in the past 30 years and this small upswing in population is not likely to indicate more than a brief reversal in that trend.

The continuing decline in the numbers and distribution of spikedeace has evoked concern over its survival from many sources. *Meda fulgida* was listed in 1973, as a species of concern, by the Bureau of Sport Fisheries and Wildlife (USDI 1973), the predecessor to the Fish and Wildlife Service. It was included by the American Fisheries Society's Endangered Species Committee on their 1979 list (Deacon *et al.* 1979) as a threatened species due to habitat destruction and competition/predation from exotic species. Prior to that, it was listed as rare and possibly endangered

on a 1972 list of threatened freshwater fish of the United States, published by the American Fisheries Society and the Society of Ichthyologists and Herpetologists (Miller 1972). It has also been listed as vulnerable by the International Union for Conservation of Nature and Natural Resources in its Red Data Book (Vol. 4) in 1977. Both the States of Arizona and New Mexico include *Meda fulgida* on their lists of threatened and endangered species (New Mexico State Game Comm. 1985, Arizona Game and Fish Comm. 1982). It was included in the Service's December 30, 1982, Vertebrate Notice of Review (47 FR 58454) in category 1. Category 1 includes those taxa for which the Service currently has substantial information on hand to support the biological appropriateness of proposing to list the species as endangered or threatened. Because of concern over the survival of, and to provide protection for, native species, including *Meda fulgida*, land has been acquired on the upper Gila River by The Nature Conservancy and on Aravaipa Creek by the Defenders of Wildlife.

The Service was petitioned on March 14, 1985, by the American Fisheries Society (AFS), and on March 18, 1985, by the Desert Fishes Council (DFC) to list the spikedeace, *Meda fulgida*, as threatened. Evaluation of the AFS petition by the Service revealed that substantial information was presented indicating that the petitioned action might be warranted. Finding that the petitioned action was warranted, the Service published a proposed rule to list this species on June 18, 1985 (50 FR 25390). Because the species was already under active petition by AFS, the DFC petition was accepted only as a letter of comment.

Summary of Comments and Recommendations

In the June 18, 1985, proposed rule (50 FR 25390) and associated notifications, all interested parties were requested to submit factual reports or information that might contribute to the development of a final rule. The original comment period closed on August 19, 1985, but was reopened on October 7, 1985 (50 FR 37703), to accommodate the public hearings and remained open until November 8, 1985. Appropriate State agencies, county governments, Federal agencies, scientific organizations, and other interested parties were contacted and requested to comment. Newspaper notices inviting general public comment were published in the *Courier* in Prescott, Arizona, on July 5, 1985; in the *Daily Press* in Silver City, New Mexico,

on July 13, 1985; and in the *Eastern Arizona Courier* in Safford, Arizona, on July 10, 1985. Ninety-five letters of comment were received from 89 separate parties, and are discussed below. Six requests for a public hearing were received. Public hearings were held in Silver City, New Mexico; Safford, Arizona; and Phoenix, Arizona, on October 7, 8, and 9, 1985, respectively. Interested parties were contacted and notified of those hearings, and notices of the hearings were published in the *Federal Register* on September 17, 1985 (50 FR 37703); in the *Daily Press* in Silver City, New Mexico, on September 24, 1985; in the *Eastern Arizona Courier* in Safford, Arizona, on October 2, 1985; in the *Courier* in Prescott, Arizona, on September 27, 1985; and in the *Arizona Republic* in Phoenix, Arizona, on September 26, 1985. Comments received in the hearings are summarized below.

Because of the complexity of the economic analysis that must accompany the final rule designating critical habitats and the large number of comments and data received on these habitats, the Service has decided to make final only the listing portion of this rule at this time as provided under 4(b)(6)(C) of the Act, so that immediate protection of the spikedace would be possible. In addition, Section 4(b)(6)(C) of the Act allows the Service to postpone the final designation of critical habitat for one year (June 18, 1987, in this case). Hence, the comments pertaining to final designation of critical habitat or the potential economic impacts of such designation will not be discussed here but will be addressed when a final decision is made regarding critical habitat. Only comments addressing the issue of listing this species are responded to here.

Sixty-nine letters were received in support of the proposal, from 67 separate parties. Eleven letters were received in opposition to the proposal, from 9 separate parties. An additional 15 letters expressed neither support nor opposition, or contained only economic information for use in economic analysis of the critical habitat designation. Four letters of comment which were received following the close of the original comment period were returned to the senders for resubmission when the comment period reopened for the hearings. Many of the letters of comment addressed concerns regarding critical habitat and its impact on water development or flood control projects. These comments will be addressed in the critical habitat rule which will be prepared at a later date. All comments

received are available for public inspection (see ADDRESSES).

Summaries of all comments addressing the issue of listing the spikedace and the Service's response to those comments and questions follow:

1. Support for the proposal was received from the Bureau of Land Management, the Desert Fishes Council, the American Society of Ichthyologists and Herpetologists, the International Union for Conservation of Nature and Natural Resources, three Commissioners of the New Mexico Interstate Stream Commission, the Defenders of Wildlife, the Prescott Audubon Society, the Rio Grande Chapter of the Sierra Club, the Maricopa Audubon Society, the Tuscon Audubon Society, the Huachuca Audubon Chapter, the Apache County Chapter of the Arizona Wildlife Federation, the Southern New Mexico Sierra Club, the Yuma Audubon Society, the Arizona State University Chapter of the Wildlife Society, the George Whittell Wildlife Trust, the Northern Arizona Paddlers Club, and 39 biologists and private citizens.

2. Dr. W.L. Minckley, of the Arizona State University Department of Zoology, and Dr. Paul Marsh, of the Arizona State University Center for Environmental Studies, both support the proposal to list the spikedace, but recommend listing as endangered to more appropriately represent the status of the species. The Service's reasons for listing as threatened, rather than endangered, are set forth in the "Summary of Factors Affecting the Species" section of this rule.

3. The Rocky Mountain Heritage Task Force of The Nature Conservancy, the Arizona Nature Conservancy, and the New Mexico Nature Conservancy support the proposal, but also recommend listing as endangered rather than as threatened. The Service's reasons for listing as threatened, rather than endangered, are set forth in the "Summary of Factors Affecting the Species" section of this rule.

4. Dr. John Rinne, of the U.S. Forest Service Rocky Mountain Forest and Range Experiment Station, supports the proposal. Dr. Rinne also suggests that further survey work be done on the upper Salt River system to confirm the absence of *Meda* from that area. The Service replies that such work was conducted in May 1985 (Propst *et al.* 1985), and *Meda fulgida* was not found in any of the surveyed areas of the upper Salt River system. During that survey, however, a previously unknown population of *Meda fulgida* was found in Eagle Creek, a tributary of the upper Gila River in Arizona (Bestgen 1985).

5. Dr. Dean Hendrickson, of the Arizona State University Department of Zoology, supports the proposal. At Dr. Hendrickson's suggestion, information regarding the possibility of adverse effects of predation by adult *Notropis lutrensis* on larval *Meda fulgida* has been added to the final rule.

6. Dr. Robert R. Miller, of the University of Michigan Museum of Zoology, supports the proposal. Dr. Miller points out that there are no specific records of *Meda fulgida* occurrence in Mexico; however, it is probable that it did once live in the upper San Pedro River in Sonora, Mexico. The final rule has been changed to reflect this uncertainty.

7. The New Mexico Department of Game and Fish supports the proposal and provided biological and distributional data in support of the proposal. The Department also suggested the following changes to the proposal (C=suggested change, R=Service response): C. The statement in the proposal, that *Meda* populations in the vicinity of lakes that are heavily stocked with gamefish are depleted by the impacts of those stocked fish, actually applies only to Wall Lake on the East Fork of the Gila River. R. The cited reference referred to three lakes in the area and the effects of their stocking on populations of all native species. The Department is correct that only one of those lakes, Wall Lake, would affect *Meda fulgida* specifically. C. The cause of the extirpation of *Meda* from the East Fork of the Gila River was probably a combination of factors, including habitat degradation by livestock grazing, and predation and competition by introduced species. The proposed rule had cited the Department's study as attributing the loss strictly to predation and competition. R. This has been altered in the final rule. C. The Department does not feel that allowance of red shiner use as live bait in the Gila River has contributed significantly to the spread of that fish in the Gila River. It is much more likely that the red shiner, now present in the Virden, Red Rock, and Cliff/Gila areas, moved upstream from Arizona. R. While the Service agrees that the primary source of the red shiner now in the Gila River in New Mexico is most likely upstream migration, the use of red shiner and other nonnative minnows as live bait in the Gila River is a practice that is detrimental to the native fishes on a long-term basis.

8. The Arizona Game and Fish Department supports the proposal, and offers the following comments (C=comment, R=Service response): C.

The Department thinks that federally permitted water diversions and cattle grazing in riparian areas have had, and will continue to have, serious effects on *Meda*, and should be included in the affected Federal activities considered under "Available Conservation Measures." *R.* Livestock grazing on U.S. Forest Service lands is included in the "Available Conservation Measures" section of the rule, as a Federal activity which might be affected by the proposal. It was not included for Bureau of Land Management lands, since grazing is not allowed in the Aravaipa Canyon Wilderness, and because the primary management objective of the Area of Critical Environmental Concern at the mouth of the Middle Box is to "maintain the proper aquatic habitat" for *Meda fulgida* and *Tiaroga cobitis* (loach minnow). Other than the Bureau of Reclamation's Upper Gila Water Supply Study, water diversions involving Federal funding, permits, or actions are generally located on private lands and are included in the paragraph addressing potentially affected activities on private lands. *C.* The Department points out that upstream pesticide use is an additional potential threat to the Aravaipa Creek population. *R.* This has been added to the final rule. *C.* The Department questioned the absence of red shiner in the Gila River in New Mexico prior to 1978. *R.* The red shiner was first collected in the Gila River in New Mexico by Buddy Jensen in 1978.

9. Dr. Paul Turner, of the New Mexico State University, Department of Fishery and Wildlife Sciences, supports the proposal. Dr. Turner feels that the severe reduction of *Meda* in the East Fork of the Gila River is a result of habitat changes caused by winter flooding in 1978-79. This information has been added to the final rule.

10. Opposition to the proposal was received from the Southwest New Mexico Industrial Development Corporation, and 2 private citizens. Their opposition has been considered, but, as long as a species meets the Act's requirements for listing, the Service is required to list that species. No biological information was presented that would indicate the species is not threatened.

11. Kirby Kline, of Silver City, New Mexico, opposes the proposal, and recommends that habitat improvement practices, particularly on Federal lands, be initiated in lieu of listing. The Service responds that too little is known about the specific habitat needs of *Meda fulgida* to ensure that habitat improvement practices and reintroduction alone would secure the

survival and recovery of this fish, particularly in the face of the many threats, such as habitat alterations and exotic fishes, to this species which cannot be alleviated by habitat improvements and reintroduction from a hatchery population.

12. The Hooker Dam Association, of Silver City, New Mexico, opposes the proposal and submitted 2 letters with the following comments (*C*=comment, *R*=Service response): *C.* The Association feels that the purpose of this proposal is to stop the construction of Conner Dam. *R.* *Meda fulgida* has been under consideration by the Service for nearly a decade as part of the continuing program to identify and list endangered and threatened species, and the specific proposal has been in progress since 1982. The Conner Dam alternative of the Upper Gila Water Supply Study is only one of many considerations in the proposal and is not the reason for the proposal. *C.* The 154 km (95 miles) of remaining range (as in the proposal) for *Meda fulgida* provides sufficiently dispersed habitat that the species does not merit listing as threatened. *R.* The remaining range of *Meda* may seem large; however, the species is not uniformly spread over that range. Some of the area contains interspersed stretches of unsuitable habitat and sparse populations of *Meda*. In addition, virtually all of the 190 km (118 miles) (as in the final rule) of remaining range are threatened by various human activities or by predation and competition by introduced fish. *C.* The Association thinks that there may be other unsurveyed areas where *Meda* still exists and which are not included in the proposal. These include the White River and many tributaries of the upper Gila River and East Fork of the Gila River. In addition, the Association contends that *Meda* probably exists in the Gila River between the mouth of the East Fork and Mogollon Creek. These assumptions are based, in part, on distributional information on the species given in the Proposal Gila National Forest Plan. *R.* Most of the distributional information on *Meda fulgida* in New Mexico, as used in the proposal for listing, is based on studies done by the New Mexico Department of Game and Fish from 1982 to 1984 (Propst in prep.). That intensive survey and habitat study of the fishes of the upper Gila and San Francisco River drainages in New Mexico included all of the tributaries of those drainages that had a potential for supporting *Meda*. However, no *Meda* were found outside of the mainstream Gila River and its 3 major forks, and no *Meda* were found in the Gila River

between the East Fork and Mogollon Creek. Information on the upper Salt River drainage, including the White River, is sketchy, due to the remoteness, rugged terrain, and the need for collecting permission from the White Mountain Apache and San Carlos Indian Tribes. However, many of these areas were surveyed in May 1985, and no *Meda* were found in the upper Salt River drainage. During that survey, a small population of larval *Meda fulgida* was found in Eagle Creek, in the upper Gila River basin in Arizona. This new location is included in the final rule. The differences in distributional information between the listing proposal and the Proposed Gila National Forest Plan reflect the fact that the Forest Plan was compiled prior to the availability of the New Mexico Department of Game and Fish study data, and therefore contains some outdated information. *C.* The Association cites a statement by a Service representative that the loss of *Meda* in the East Fork of the Gila River was due to recent overgrazing. It asks for a reconciliation of that statement with the statement in the proposal that the loss was due to predation by introduced fish. *R.* The cause of the loss of *Meda* in the East Fork has been questioned by several other letters of comment, and is addressed in detail in the "Background" section of this final rule. *C.* The Association believes that the 94 percent loss of historic range for *Meda fulgida* is an unintentional exaggeration, due to the scarcity of early collections, poor sampling methods and equipment in early surveys, and the natural population fluctuations and elusiveness of the species. It feels that large gaps probably existed in the historic range, as represented by the Service, and that the loss of range may be more in the "50 to 60 percent range (or less)." The Association concludes that this smaller range reduction combined with the present numbers of the species is sufficient to show that the species does not meet the criteria for threatened status. *R.* The Service agrees that the historic data are spotty, and that some unoccupied areas probably occurred in the historic range. However, the very elusiveness, fluctuations, and meager sampling that the Association cites as evidence of historically fewer *Meda* and smaller historic range could also be interpreted as indicating a high probability that there were actually more *Meda* historically and that they had a larger historic range than is presently assumed. If the few surveys, using poor equipment, could easily locate an elusive species that fluctuates highly in numbers, then the assumption

must be that the species was indeed quite common, and that it most probably extended quite a distance upstream and downstream from range limits as shown by collection records. As for gaps within the historic range, there were undoubtedly areas within that range in which the habitat was not suitable for *Meda*. Canyon areas and areas with slow moving or pooled water were and are scattered along all of the Gila basin rivers, and such areas exist within the limits of what the Service defines as presently occupied *Meda* range. However, to calculate specific lengths of noncontinuous habitat would require intensive mapping of streams and would fail to recognize the importance of the intervening nonhabitat areas for migration and gene flow, for food production and transport, and for maintenance of water and channel characteristics such as sediment, temperature, flow moderation, chemistry, and others. C. The Association recommends that "positive action" to improve the habitat and numbers of this species be taken for this species rather than listing as threatened. R. The Service's response is the same as that for a similar recommendation under item 11 above.

13. The Arizona Cattle Growers Association and the Arizona Mining Association both question the appropriateness of the proposal and submitted similar comments: C. *Meda fulgida* occurred historically in northern Sonora, Mexico. Listing as threatened is not appropriate if the species still occurs in Mexico and the status in Mexico should be determined before final listing. R. *Meda fulgida* was probably historically found in Mexico only in the upper San Pedro River. However, habitat is no longer found there due to habitat destruction and dewatering. C. The Mining Association points out that many of the identified nonnative or exotic predators that threaten *Meda fulgida*, such as catfish and trout, provide recreation for residents of these areas, as well as create revenue from sport fishing recreation. It recommends that critical habitat designation be limited to areas which would not prevent the stocking of such sport fish. R. The State of Arizona does not stock warmwater fish in the San Francisco or Blue Rivers, and the State of New Mexico has only occasionally stocked channel catfish into the Gila River in the past. The warmwater fisheries which exist in those rivers are self-sustaining, and do not need stocking in order to continue. The stocking of trout into the higher elevation headwater streams does not appear to have a significant

impact on *Meda fulgida*. The areas of such stocking overlap only slightly with that of *Meda* and the stocked fish are primarily rainbow trout which feed more heavily on insects and other invertebrates than on fish. In addition, many of the stocked trout often do not feed at all in the short time they remain in the streams before being caught or dying. C. The Mining Association contends that the Service should analyze the cumulative economic and other impacts of all past species listings and all other such actions that are under consideration in the area to be affected by the proposal. R. Possible future or pending listing actions for other species are specifically excluded from consideration of economic impacts, because of the prohibition in Section 4 of the Endangered Species Act against consideration of economic factors in listing decisions. At present, no other federally listed species is present in any of the streams in which *Meda fulgida* is found. The only listed nonaquatic species near the area is the bald eagle. In addition, experimental nonessential populations of Colorado squawfish (*Ptychocheilus lucius*) have been reintroduced into the upper Verde River in the area occupied by *Meda fulgida*. However, experimental nonessential designation allows a population to be treated as a proposed species, which removes virtually all protection from the population so designated, and consequently removes virtually all economic or other impacts of those populations.

14. The Soil Conservation Service, New Mexico State Office, opposes the proposal and feels that designation of threatened status, without a management and statutory effort to control undesirable introduced fish species, is not justified. It also suggests that the final rule clarify the impacts of agricultural water diversions and include documentation on the effects of water pumping on stream flows. The Service is presently working with the State Game and Fish Departments on the problem of controlling predation by introduced fish species. As was explained under item 13, little or no warmwater stocking is now occurring. The existing populations of predatory warmwater species are self-sustaining. Presently available management techniques are not sufficient to allow complete removal of the existing warmwater nonnative populations. Habitat alteration remains the primary threat to the spikedeace and complete removal of exotics would not preclude the need to list the species. Regarding the impacts of agricultural water

diversions and the effect of water pumping on stream flow, the statements on such impacts and effects refer to large areas of the historic range and existing range where the problem exists. In addition, inclusion of extensive data into a published rule would be prohibitively expensive and would not be in keeping with the purpose of a rule, which is to summarize the necessary information. This information, or references to it are available from the Service (see ADDRESSES).

15. J.E. Allensworth, of Silver City, New Mexico, opposes the proposal and submitted the following comments: C. The fact that *Meda fulgida* is still found in several streams in two States, and "the sheer numbers of these fish now on record" precludes the need for listing. R. See item 12 above. C. There has been no attempt by any agency to reintroduce *Meda* into its original range; therefore it should not be listed. R. The first step in the process for protecting species under the Endangered Species Act is to place them on the Federal List of Threatened Fish and Wildlife as either threatened or endangered. Attempts by the Service to reintroduce listed species back into their historic range are part of the recovery process which is initiated following listing. C. Continued introduction of nonnative species by the New Mexico Department of Game and Fish has caused the decline of this species. If this practice were corrected, no further danger would exist for *Meda fulgida*. R. As was pointed out in the proposal, much of the habitat in the historic range of *Meda* has been destroyed by stream alterations, and potential water development threatens to cause further habitat losses. The habitat alteration threat alone is sufficient to necessitate the listing of *Meda fulgida* as a threatened species. Predatory and competitive interactions with nonnative fish are secondary problems and as has been explained under item 13 and 14 above, very little stocking of nonnative fish now occurs in the area occupied by *Meda*. The previously introduced nonnative fish have become self-sustaining and will continue to be a problem to *Meda*. C. Mr. Allensworth feels that the proposal is an attempt by the Service and the New Mexico Department of Game and Fish to slow or stop construction of Conner Dam. R. See item 12 above.

16. Agencies and organizations with land or project involvement in the area affected by this proposal who did not comment on the proposed listing, but submitted economic information for use in the Economic Analysis of critical habitat, include: the U.S. Forest Service;

City of Prescott, Arizona; Salt River Project; Arizona State Office of the Soil Conservation Service; Federal Emergency Management Agency; U.S. Army Corps of Engineers; Federal Highway Administration; Bureau of Reclamation; Environmental Protection Agency; and New Mexico State Engineer Office.

The three public hearings held were attended by 107 people, with 33 oral or written statements given, 16 in support of the proposal, 12 in opposition, and 5 neither in support nor opposition. These public hearings accepted formal oral and written statements, and included an informal question and answer session. Transcripts of the hearings are available for inspection (see ADDRESSES).

The public hearing held in Silver City, New Mexico, was attended by 68 people, including representatives of the Silver City Town Council, New Mexico Department of Game and Fish (NMGF), U.S. Forest Service (USFS), New Mexico Interstate Stream Commission, New Mexico State Engineer Office, Bureau of Reclamation (BR), Southwest New Mexico Council of Governments, Southwest New Mexico Industrial Development Corporation, Gila Fish and Gun Club, Hooker Dam Association, *Silver City Daily Press*, *El Paso Times*, Prospectors Organization of the Grant County-Silver City Chamber of Commerce, Old West Country, Mimbres Archeological Foundation, and Southern New Mexico Conservation Coalition. Sixteen oral statements were made, 5 of which were accompanied by written statements. Two additional written statements were submitted. Much of the comments and discussion concerned the Bureau of Reclamation's Upper Gila Water Supply Study proposed project, and those comments will not be summarized here. Of the Statements given or submitted, 7 were in support of the proposal, 8 were in opposition to the proposal, and 3 neither opposed nor supported the proposal. Summaries of the substantive statements follow:

1a. Steve May, Mayor of the Town of Silver City, New Mexico, speaking on behalf of the Town Council, opposed the proposal. Mr. May was concerned regarding his and the Council's understanding that the "management decision" to be made at the hearings was an "approximately 50-year plan," which they felt would unnecessarily lock up Silver City's options for water development on a long-term basis. Service representatives explained that the meetings from which he had gathered that understanding were not in relation to the proposed listing of this fish species, but were meetings

specifically regarding the Bureau of Reclamation's Upper Gila Water Supply Study. If *Meda fulgida* is listed, the listing would remain in force until such time as the species was delisted due to recovery or extinction. No specific management actions are required by this proposed listing. Any such actions would be a result of the Section 7 consultation process or the recovery planning and implementation process, and would be subject to varying time frames.

2a. Richard Johnson, President of the Hooker Dam Association, presented both oral and written statements in opposition to the proposal. Some of his comments repeated earlier comments made by the Association and these have already been addressed under item 12 above. Other specific comments were: C. Mr. Johnson asked for clarification of the Service's and the NMGF information on the effects of flooding on the survival of *Meda fulgida*. He quoted what he felt were contradictory statements from those agencies that this fish is not affected by flooding, but that flooding was part of the reason for the elimination of *Meda* from the East Fork of the Gila River. R. This apparent contradiction results from several factors. *Meda fulgida* has evolved with flooding, as a natural part of the Gila River ecosystem, and in general escapes being washed out by flooding by moving outward with the spreading water, thus keeping out of the heaviest flows. Nonnative fish do not generally have such an adaptive mechanism to protect them from damage by the typically severe Gila basin floods. However, under certain conditions flooding can also be detrimental to *Meda*. Much of the Gila River watershed has been damaged by land use practices and is very susceptible to further damage during flooding, primarily from erosion. A healthy aquatic/riparian system can normally withstand severe flooding with only minor and localized damage. An already damaged system is often severely eroded by such flooding and habitat for native fish is lost, as was the case with the lower end of the East Fork of the Gila River in 1978. C. Mr. Johnson questioned the statement in the proposal that *Meda fulgida* is no longer found in the East Fork of the Gila River. R. *Meda* abundance in the East Fork has been decreasing since about 1961, and in 1983 NMGF biologists found no *Meda fulgida* and greatly reduced numbers of other native fish, despite intensive sampling. Although in 1985 *Meda* were once again found in the East Fork, neither Service nor NMGF biologists feel that the small number of *Meda* remaining in the East

Fork is likely to represent a healthy, stable population on a long-term basis. C. Reports by the Service's Albuquerque Ecological Services Field Office have stated that the area of the Middle Box (proposed site of Conner Dam and Reservoir) has the lowest habitat value for aquatic species and general ecology in that portion of the Gila River from Mogollon Creek downstream through the Red Rock area. That office also stated that the greatest habitat value to the native fishes is found in the Cliff/Gila/Riverside Valley, where the greatest concentration of existing manmade structures is also found. On this basis, Mr. Johnson asks for clarification of the contradiction between the high habitat rating of the Cliff/Gila/Riverside area and the statements in the proposed rule regarding the destruction of *Meda fulgida* habitat by man's activities. R. The Service's analysis of the aquatic system habitat values found that the Middle Box itself does indeed provide less overall general habitat quality than other stretches. However, there is a healthy population of *Meda fulgida* in the upper end of the Middle Box and at the mouth. The short unoccupied stretch between those two populations is small but provides an essential element to the habitat by providing a channel for water, fish, and gene flow between the two population segments. Without that connection, it is probable that the lower population would be extirpated. The high habitat value of the Gila/Cliff/Riverside Valley is not inconsistent. All manmade structures are not equally destructive of habitat values. Most of the structures in the Cliff/Gila/Riverside area are small and have only minor, localized impacts on the aquatic habitat. In the localized areas of those impacts *Meda* generally do not exist.

3a. Clyde Birkla, President of the Gila Fish and Gun Club, spoke in opposition to the proposal, and stated that his organization felt that the proposed listing was intended to stop construction of Hooker Dam or suitable alternative (Upper Gila Water Supply Study). The Service has addressed this concern under item 12 above.

4a. Fred Trauger, of Geohydrology Associates, Inc. of Albuquerque, New Mexico, made a statement in opposition to the proposal. Mr. Trauger addressed issues of water supply availability and use. He also stated that evolution and extinction are natural processes, and that the decline of *Meda fulgida* is more likely a natural event, due to climatological changes, than it is a man-caused event. The Service feels that the loss of large portions of *Meda* habitat

within the past 100 years by conversion to reservoirs or by the complete drying up of the river by diversion or damming removes the rapid decline of the species from the realm of natural extinctions. Natural extinction, except in rare instances of major, widespread catastrophic events, is a slow process involving hundreds or thousands of years.

5a. Steve E. Reynolds, Secretary of the New Mexico Interstate Stream Commission, submitted oral and written statements in opposition to the proposal. Mr. Reynolds gave extensive information on water rights, uses, and needs in southwestern New Mexico, and submitted the following suggestion and comment: C. Mr. Reynolds suggested that habitat could be enhanced through predator control and reintroduction of *Meda fulgida* from Dexter National Fish Hatchery. R. Habitat enhancement, through predator control, would improve the status of the spikedace but would not alleviate the need to list the species. Enhancement and reintroduction are measures which will be considered in the recovery of this species, once it becomes listed. Extensive study will be needed to ensure the success of such work. The Dexter National Fish Hatchery does not presently maintain stocks of *Meda fulgida*. Space at that facility is limited, and priority is given to species whose survival depends heavily upon artificial propagation. *Meda* is not yet at that point. Placement of stocks of *Meda* into that facility may be considered in the future; however, several years are often needed to develop the techniques required to successfully propagate a given species in captivity. C. Mr. Reynolds stated that the spikedace (*Meda fulgida*) also occurs in streams in Arizona, Nevada, and Utah. R. This distributional misunderstanding is a result of confusion of the spikedace with a group of fish known as the spinedace (genus *Lepidomeda*) which live in streams in the Colorado River basin in Arizona, Nevada, and Utah. The spikedace, which is the only member of the genus *Meda*, is found only in the Gila basin, and only in Arizona and New Mexico.

6a. Keith LeMay, President of the Prospectors Organization of the Silver City-Grant County, New Mexico, Chamber of Commerce, made oral and written statements in opposition to the proposal. Mr. LeMay commented on the already addressed topics of the Service's habitat evaluations of the Gila River area (item 2a above) and the use of habitat enhancement in lieu of listing (item 11 above).

7a. J.C. Grimes, President of Old West County, a tourist promotion organization in Silver City, New Mexico, and Allen K. Kaufman, of the Mimbres Archeological Foundation, addressed water development and availability in the area.

8a. George Jackson, Silver City, New Mexico, questioned the ability of *Meda fulgida* to survive in the river during periods of drought when portions of the river become dry. The Service has extensive data documenting the historic occupation of most of the Gila River Basin in New Mexico and Arizona by *Meda fulgida*. There are also data available on water flows in the upper Gila River since the 1930's and written accounts of droughts since the early 1800's. *Meda fulgida* was able to survive and thrive historically despite those droughts and periodic drying of portions of some of the occupied streams. Survival during drought periods depended upon movement into pools where water remained, until flow recommenced. Areas where pools were not available, or where dry periods continued for long periods, were probably repopulated from large upstream and downstream populations. The widespread abundance of the species buffered it against localized population losses. That abundance no longer exists, and the consequences of drought are increasingly severe on the species.

9a. The Southwest New Mexico Industrial Development Corporation, of Silver City, New Mexico, submitted a written statement opposing the proposal, and giving information on water uses and economics in the Silver City area. See item 10 above.

10a. Seven biologists and private citizens gave oral and written statements in support of the proposal and other wildlife values of the Gila River area, and opposing the need for and construction of a dam on the Gila River in New Mexico.

The public hearing held in Thatcher, Arizona, was attended by 20 people including representatives of the Arizona State Division of Emergency Services, Upper Gila River Association, City of Safford, Graham County Board of Supervisors, George Whittell Wildlife Preserve, Graham County Republican Party, Arizona Nature Conservancy, Arizona Game and Fish Department, Greenlee County Board of Supervisors, Arizona Department of Commerce Advisory Board, Bureau of Reclamation, Soil Conservation Service, and Bureau of Land Management. Five oral statements were made, 4 of which were accompanied by written statements. Of

the statements given or submitted, 1 was in support of the proposal, 2 were in opposition to the proposal, and 2 neither opposed nor supported the proposal. Summaries of the statements addressing the listing of the spikedace follow:

1b. Richard A. Colson, Director of the Arizona State Division of Emergency Services, and Carol MacDonald, Mayor of the City of Safford, Arizona, gave an oral and written statement in opposition to the proposal, and discussed flood control needs and damages in the Duncan and Safford Valleys. See item 10 above.

2b. Kenyon Udall, Chairman of the Upper Gila River Association, submitted oral and written statements discussing flood costs in the Safford Valley and adjacent areas, and challenging the proposal's conclusion that human alterations to the habitat are the primary cause of the decline of *Meda fulgida*. Mr. Udall contends that all dams and diversions in the area were in place and were more numerous, and grazing was heavier in the area, before 1960 which was about when *Meda* began to decline. He also questions the reasons for the decline of the species in Eagle Creek, where he states there are no dams and only one small diversion, no mining or timbering, and only very reduced grazing. It is Mr. Udall's premise that the primary cause of the decline of this species is increased flooding since 1967, and secondarily predation by nonnative fish. He proposes that floods be controlled to stay within a range determined to cause the least channel damage, for the benefit of both man and *Meda fulgida*. The Service's response is that the decline of *Meda* began well before 1960, although it was only widely recognized later. The species has been gone from the Aqua Fria River drainage since about 1943. There is often a lag time between the adverse modifications to the species' habitat and the decline of the species itself, particularly when there are numerous individual modifications involved. Present use of the habitat is often only one of many factors in the decline of the species. Cumulative effects of numerous adverse habitat modifications over time play a significant part in the decline of many species. In addition, somewhat modified conditions that might have been acceptable to a healthy population of a species may not be sufficient, although improved, for a damaged population to recover. Once this species is listed, planning should be undertaken not only for the recovery of the species but also to provide plans compatible with flood control and recovery of the species.

3b. Joe Carter, County Manager of the Graham County Board of Supervisors, made oral and written statements in opposition to the proposal. Mr. Carter also discussed flood damages, occurrence, and control, and suggested that reintroduction of *Meda fulgida* be carried out in lieu of listing. In addition, speaking for both Graham County and its local governments, he suggested that action on the proposal be postponed until final work and feasibility studies have been completed with respect to the proposed dam sites on the Gila and San Francisco Rivers. The Service's response to the first comment has been addressed under item 11 above. Regarding the second comment, such a postponement is not allowed under the Endangered Species Act. A proposed listing is required to be finalized, either as listing or as withdrawal, within one year from the date of publication of the proposal. Extension of that deadline is allowed only if there is substantial disagreement regarding the biological data.

4b. John C. Luepke, Manager of the George Whittell Wildlife Preserve on Aravaipa Creek, Arizona, spoke in support of the proposal and associated wildlife values.

Three substantive questions regarding listing were asked (Q=question, R=response): Q. If *Meda fulgida* has been declining since the 1960's, why was nothing done to help it earlier? R. *Meda* has been declining since well before 1960, however little work was being done on this species and the extent of decline was not generally recognized. Prior to the Endangered Species Act, which was passed in 1973, little or no funding or authorization was available for work on nongame fish. With the passage of the Act, work began on rare native fishes, but with limited funds and manpower it was necessary to concentrate on those fish closest to extinction. Now that the most needy fish have been protected we are beginning to turn our attention to those, like *Meda*, which are not so close to extinction. Q. If *Meda fulgida* does not survive downstream from dams, then why does it exist downstream from Sullivan Dam on the upper Verde River? R. Sullivan Dam is a very small diversion structure, hardly deserving the epithet of "dam." In addition, most of the flow of the upper Verde River derives from springs below Sullivan Dam, and therefore is not subject to the changes in water temperature, chemistry, and flow regime imposed by a mainstream dam. The discussion of the survivability of *Meda* downstream from mainstream dams was intended to refer to large structures which permanently impound water and

have a major effect upon the flow and water characteristics downstream. Q. Since there are no diversion dams on Eagle Creek, why has *Meda fulgida* been eliminated there. R. As of May 1985, we know that *Meda* still exists in Eagle Creek, although apparently in very low numbers. We have no historic records from Eagle Creek, so we do not know how extensive the *Meda* population there was, and whether it has declined or not. However, dams are not the only factor in the decline of this species. Many diverse watershed uses in the past and present may have contributed to declining habitat conditions in Eagle Creek. In addition, there is a fairly large number of introduced predatory fish in Eagle Creek which may have had severe impacts on *Meda*.

The public hearing held in Phoenix, Arizona, was attended by 19 people including representatives of the City of Prescott, The Nature Conservancy, Arizona Cattle Growers Association, Maricopa Audubon Society, Arizona Game and Fish Department, Salt River Project, the Bureau of Reclamation, and *Phoenix Gazette*. Nine oral statements were made, 4 of which were accompanied by written statements. One additional written statement was submitted. Of the statements given or submitted, 8 were in support of the proposal and 2 were in opposition to the proposal. Summaries of the statements addressing listing the spikedace follow:

1c. Allen Gookin read a statement, in opposition to the proposal, from William S. Gookin, a consulting engineer representing the City of Prescott, Arizona, and the Yavapai-Prescott Indian Community. Mr. Gookin presented information on the water needs, resources, and development plans of the City and the Indian Community. He believes the threats to *Meda fulgida* come from other than the joint City/Indian proposed water diversion from the Verde River. He believes such threats come from the presence of the nonnative red shiner and make it "highly likely if not probable" that *Meda fulgida* faces extinction with or without the diversion. The Service's response is that while red shiner and other introduced fish are a considerable threat to *Meda fulgida*, their presence alone does not account for the major habitat losses in the past nor the potential habitat losses in the future. Mr. Gookin also pointed out several errors in the proposal with respect to stream flow in the Verde River and the planned diversion. He stated that the maximum diversion rate of 13 cubic feet per second cited in the

proposal for the City/Indian diversion was incorrect. In addition, he pointed out that the estimated 10 cubic feet per second average median monthly discharge for the diversion site was also incorrect. The Service agrees that both figures were in error. The correct figures of 10.5 cubic feet per second diversion rate and 16.8 cubic feet per second average median monthly discharge for the diversion site have been placed into the final rule.

2c. The Nature Conservancy, the Arizona Game and Fish Department and 5 private citizens submitted oral and written statements in support of the proposal and addressed economic and water development issues.

3c. Lynn Anderson read a statement by John M. Olson, Executive Vice President of the Arizona Cattle Grower's Association in opposition to the proposal. This statement was identical to that submitted by the Association as a letter of comment and is addressed under item 13 above.

4c. Herbert Fibel, President of the Maricopa Audubon Society, spoke in support of the proposal. Mr. Fibel commented that he understood that the Service's recent Section 7 biological opinion, on the proposed construction of Cliff Dam on the Verde River, decreed that unless the Bureau of Reclamation guarantees minimum instream flows in connection with water exchanges on the Verde River it cannot build Cliff Dam. The Service's response is that the Cliff Dam consultation concerned bald eagles. Although the biological opinion rendered by the Service set forth as a reasonable and prudent alternative a cessation of additional water withdrawals above the proposed Cliff Dam until such time that flow rates necessary to assure an adequate forage fish base for the eagles are determined and protected, that determination may or may not provide adequate protection for *Meda fulgida*. The needs of a small minnow such as *Meda* are not necessarily protected by protecting the needs of the bald eagle. Mr. Fibel also read into the record the letter of comment submitted by his organization.

Summary of Factors Affecting The Species

After a thorough review and consideration of all information available, the Service has determined that *Meda fulgida* should be classified as a threatened species. Procedures found at Section 4(a)(1) of the Endangered Species Act (16 U.S.C. 1531 *et seq.*) and regulations (50 CFR Part 424) promulgated to implement the listing provisions of the Act were

followed. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in Section 4 (a)(1). These factors and their application to *Meda fulgida* (spikedace) are as follows:

A. *The present or threatened destruction, modification, or curtailment of its habitat or range.* The majority of the historic native habitat of *Meda fulgida* has been drastically altered or destroyed by human uses of the rivers, streams, and watersheds. These alterations include: conversion of flowing waters into still waters by impoundment; alteration of flow regimes (including conversion of perennial waters to intermittent or no flow, and the reduction, elimination, or modification of natural flooding patterns); alteration of water temperatures (either up or down); alteration of silt and bed loads; loss of marshes and backwaters; and alteration of stream channel characteristics from well-defined, surface level, heavily vegetated channels with a diversity of substrate and habitats, into deeply cut, unstable arroyos with little riparian vegetation, uniform substrate, and little habitat diversity. Causes of such alterations include: damming, water diversion, channel downcutting, excessive groundwater pumping, lowering water tables, channelization, riparian vegetation destruction, erosion, mining, grazing, and other watershed disturbances.

The biology of *Meda fulgida* is not well enough understood to determine what specific effects each of these habitat changes or losses has had on the survival of the species. However, the conversion of a large portion of the habitat into intermittent or lacustrine waters or totally dewatered channels has had an obvious effect on *Meda* populations by totally eliminating usable habitat in the impacted areas. These habitat changes, together with the introduction of exotic fish species (see factors C and E) have resulted in the extirpation of *Meda fulgida* throughout most of its historic range.

Some of the major reasons for specific *Meda* habitat losses are easily identifiable. The San Pedro River, once a perennial stream, is now severely dewatered and has only intermittent flow. The lower Salt and Verde Rivers now have a very limited or no flow during portions of the year due to agricultural diversion and upstream impoundments, and both rivers have several impoundments in their middle reaches. The Gila River, after leaving the Mogollon Mountains in New Mexico, is affected by agricultural and industrial

water diversion, impoundment, and channelization, and has been subjected to use of chemicals for fish management from the Arizona border downstream to San Carlos Reservoir. The San Francisco River has suffered from erosion and extensive water diversion and at present has an undependable water supply throughout much of its length.

Remaining *Meda fulgida* habitat is still threatened with further habitat destruction. Aravaipa Creek is relatively protected from further habitat loss because of its status as a Bureau of Land Management Wilderness and as a Defenders of Wildlife Preserve. Access and land uses are limited in the canyon, and it is managed primarily for natural values and recreation. However, it is affected by upstream uses in the watershed, primarily groundwater pumping resulting in continued lowering of the water table, which could eventually reduce perennial flow in Aravaipa Creek. Channelization and mesquite clearing that is occurring upstream, and heavy recreational use within the canyon create excessive sediment which is detrimental to *Meda* habitat. In addition, pesticide use on the agricultural lands upstream from Aravaipa Canyon could have serious adverse effects on *Meda fulgida*, particularly if flows become depleted.

In the upper Gila River, *Meda fulgida* habitat is somewhat protected along the portions of the river that flow through the U.S. Forest Service Gila Wilderness and the Gila River Research Natural Area which have use and access restrictions. However, both wilderness and non-wilderness portions of the river in the National Forest are still affected by past and present uses of the watershed and riparian zone, such as grazing, timber harvest, road building, recreation, and mining; and by water diversion for public and private uses. Substantial increases in timber harvest on steep slopes, as called for in the Proposed Gila National Forest Plan (USDA 1985), may have significant impacts on *Meda fulgida* through increased sedimentation. On privately owned lands along the river there is no statutory control of habitat alteration or destruction. Agricultural use, water diversion, and flood control measures in these areas have a heavy impact on the habitat. The U.S. Army Corps of Engineers (Corps) has recently completed work in the Cliff-Gila area under its Emergency Authority, which allows it to replace or restore damaged flood control structures. Other flood control alternatives considered for this area in the past by the Corps, have been set aside. The only current plans for

flood control in the New Mexico portion of the Gila River are in cooperation with the Bureau of Reclamation's Conner Dam study (U.S. Army Corps of Engineers 1984).

Of particular importance to *Meda fulgida* survival in the Gila River is the proposed construction of a dam on the Gila River mainstream, as part of the Central Arizona Project Upper Gila Water Supply Study by the Bureau of Reclamation (USDI 1972). Currently the Bureau of Reclamation is studying six alternatives (USDI 1985): a high dam and reservoir at the Conner site on the mainstream Gila River near the lower end of the Middle Box canyon; a slightly smaller dam and reservoir at the Conner site; a small dam at the Hooker site on the mainstream Gila River just downstream from Turkey Creek, with an off mainstream storage reservoir on Mangas Creek; two levels of direct pumping from the river in the Cliff-Gila Valley to an offstream storage reservoir on Mangas Creek; and a no Federal action alternative. A high dam at the Conner site on the Gila River could have major negative impacts on *Meda fulgida*. Up to 29 km (18 miles) of river, 27 percent of the existing range in the Gila River, would be inundated and thus would no longer support *Meda fulgida*, which lives only in flowing waters. The presence of a dam on the river could also adversely alter habitat downstream from the dam by changing the temperature, bedload, and flow regimes, including the elimination of natural flooding which is an important factor in riparian and channel maintenance and in the maintenance of the competitive edge of native over exotic fish species. Major dam and reservoir construction in the past, on the Salt, Verde, and Gila Rivers, has resulted in the complete extirpation of all *Meda fulgida* downstream of the dam and for up to 65 km (40 miles) above the reservoir. Even with extensive planning for natural flow and temperature maintenance downstream, the construction of a dam on the upper Gila would have a strong impact on *Meda fulgida*, affecting 46 percent of the existing range in the Gila River. A small dam at the Conner site would inundate an estimated 14 km (8½ miles) of river, and would also affect populations upstream and downstream from the reservoir. A small dam at the Hooker site would not affect *Meda fulgida* directly through inundation; however, populations downstream, occupying 46 percent of the range in the Gila River, would be affected. The effects of direct pumping from the river to offstream storage are not completely known, but may include entrapment of

fish in pipelines, impingement of fish on intake screens, and depletion of stream flow below the diversion point.

Future threats to *Meda fulgida* on the Verde River are found in watershed disturbances, increasing silt in the river bed, deteriorating water quality due to upstream communities, and future water developments. The Bureau of Reclamation, as part of the Central Arizona Project (CAP), is currently working on plans for water rights exchanges between upstream and downstream water rights holders, and subsequent diversions of water from the upper Verde River. There are ten potential CAP water exchangers on the upper Verde River, but of these, only two, the city of Prescott and the Yavapai-Prescott Indian Reservation, are within or upstream from the portion of the Verde River where *Meda* is still known to exist.

The Bureau of Reclamation is planning to address the cumulative impacts of eight of these exchanges together. The remaining two exchanges are located in the lower Verde, separated from the upper river exchanges by two major reservoirs. The City of Prescott and the Yavapai-Prescott Indian Reservation have jointly proposed removal of water from the Verde River about 4 km (2.5 mi) below Sullivan Lake by means of an infiltration gallery buried in the riverbed. The joint allocation for these two entities is 7627 acre-feet per year, and the final plans call for a diversion rate of 10.5 cubic feet per second. The effects of this diversion have not yet been studied, but the loss of the maximum planned diversion rate from the river during low flows would be significant. Average median monthly discharge near the diversion point is estimated to be 16.8 cubic feet per second and the minimum daily flow at the diversion point is estimated to be 10.1 cubic feet per second (M. Jakle, USBR, pers. comm., February 3, 1986). These figures are based on measured flows at the USGS Verde River near Paulden gauge (5037), with a period of record from 1963 to present. The City of Prescott estimate for flow at the diversion point is 67.5 percent of that at the gauge. Such a reduction in flows could result in crowding, increased predation and competition, increased water temperatures, and other negative impacts to *Meda* and other aquatic fauna.

B. Overutilization for commercial, recreational, scientific, or educational purposes. No threat from overutilization of this species is known to exist at this time.

C. Disease or predation. Historically, predation was not a significant factor

affecting *Meda fulgida* populations; however, in the past 100 years, introduction of exotic predatory fish species has increased the role that predation plays in *Meda* biology. In Aravaipa Creek, there are two potential predators, the native roundtail chub and the exotic green sunfish, the latter being primarily restricted to side channel pools, and kept at low numbers by frequent flooding. Neither are known to have a significant effect on *Meda fulgida*. In the Gila and Verde Rivers, the native roundtail chub and several exotic fish (black and yellow bullhead, channel catfish, green sunfish, flathead catfish, small and large mouth bass, and brown trout) are probable predators on *Meda fulgida*. Although predation may not be a major threat to *Meda* in good habitat conditions, it is undoubtedly a negative factor to populations under the altered conditions present in much of the existing habitat. It has been noted that the present downstream limit of *Meda fulgida* in the Gila River closely corresponds to an increasing abundance of red shiner, flathead and channel catfish (Anderson 1978); that in the vicinity of lakes in the upper Gila drainage where game fish are heavily stocked, the populations of native species are depleted; and that the recent severe decline of the *Meda* population in the East Fork of the Gila River is probably due, in part, to the increased numbers of smallmouth bass and catfish in that portion of the river (Propst in prep.). In 1983 and 1984, Propst found abundant smallmouth bass and catfish in the East Fork, but few native species. In 1985, after two years with heavy fall/winter flooding, Propst found fewer exotic species, and higher levels of native species. Under unfavorable habitat conditions, caused by changes in flow, temperature, substrate, etc., it is likely that predation becomes an important factor in *Meda* survival. Construction of dams and reservoirs exacerbates the predation problem by increasing the habitat desirable to exotic predators, decreasing the habitat suitable for *Meda fulgida*, and supplying a ready source of exotic predators from the reservoir. The effect of predation on *Meda* in the Gila River could increase significantly if a mainstream dam is constructed.

D. The inadequacy of existing regulatory mechanisms. *Meda fulgida* is protected by the States of New Mexico and Arizona. It is listed by New Mexico as an endangered species, Group 2 (New Mexico State Game Comm. 1985), which are those species "... whose prospects of survival or recruitment within the State are likely to be in jeopardy within the foreseeable future." This provides

the protection of the New Mexico Wildlife Conservation Act (Section 17-2-37 through 17-2-46 NMSA 1978) and prohibits taking of such species except under the issuance of a scientific collecting permit. *Meda fulgida* is listed by the State of Arizona as a threatened species, Group 3 (Arizona Game and Fish Comm. 1982), which are those species "... whose continued presence in Arizona could be in jeopardy in the foreseeable future." This listing does not provide any special protection to the species listed. Protection provided in the Arizona Game and Fish Regulations prohibits taking of *Meda fulgida* except by angling, an unlikely method for their capture. Neither State provides any protection of the habitat upon which the species depends.

New Mexico water law does not include provisions for the acquisition of instream water rights for protection of fish and wildlife and their habitat, and Arizona water law has only recently recognized such rights. This deficiency has been a major factor in the survival of those species dependent upon the presence of instream water.

State Game and Fish regulations in New Mexico allow the use of the red shiner and other live minnows as bait fish in the Gila River, in areas containing *Meda fulgida*. This encourages the spread of detrimental exotic species, specifically the red shiner, which appears to replace *Meda fulgida* under certain conditions (see factors C and E).

E. Other natural or manmade factors affecting its continued existence. Existing populations of *Meda fulgida* are threatened by the continued introduction and dispersal of exotic species, particularly *Notropis lutrensis* (red shiner), throughout the Gila River system. Although it is not known by what mechanisms these exotic species affect *Meda*, it is known that the spread of exotic species throughout the Gila system correlates closely to the declining numbers and distribution of *Meda fulgida* and other native species, and that *Notropis lutrensis* now occupies much of what was once *Meda* habitat. It has been demonstrated with other native fish that competitive and/or predatory interactions with exotic species have been a major factor in the declining numbers and distribution of native fishes. Apparently *Notropis lutrensis* is a competitor with *Meda fulgida* for some habitat factors (Minckley and Deacon 1968) and may be a significant predator on larval *Meda* (D. Hendrickson, Arizona State Univ., letter, July 8, 1985). In suitable unaltered habitat, it is possible that *Meda* is able

to hold its own against invasion of *Notropis lutrensis* or other exotic species; however, in extensively altered habitats where *Meda* populations are already under stress, it appears that *Notropis lutrensis* has a competitive advantage and thereby replaces *Meda fulgida*. A major factor in the displacement seems to be the disturbance of natural flooding patterns, since native species such as *Meda fulgida* are adapted to and thrive under a regime of frequent moderate to severe flooding, and *Notropis lutrensis* and other exotic species do not. The controlled flow of flood waters, resulting from impoundment, interrupts this natural pattern in downstream reaches and encourages the spread of *Notropis lutrensis* at the expense of *Meda fulgida*. The presence of reservoirs also increases the likelihood and rapidity of the spread of *Notropis lutrensis* and other exotics by supplying a ready source of exotic species from the reservoir and its fishery. At present, *Notropis lutrensis* is not found in Aravaipa Creek, but is found in the Verde River along with *Meda fulgida*, and is found in the upper Gila River as far upstream as Cliff, New Mexico. In 1978, *Notropis lutrensis* had not yet been found in the Gila River in New Mexico.

The Service has carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by this species in determining to make this rule final. Based on this evaluation, the preferred action is to list *Meda fulgida* as threatened. Because this fish is still locally abundant throughout approximately 190 km (118 miles) of stream it does not appear to be in danger of extinction and therefore does not fit the definition of endangered. However, because of the drastic loss of range which this species has undergone, and the imminent threats to all major portions of its presently occupied range, threatened status is appropriate for the species. The reasons for postponing the designation of critical habitat are given in the following section. The designation of critical habitat will be through a subsequent rule.

Critical Habitat

Section 4(a)(3) of the Act, as amended, requires that to the maximum extent prudent and determinable, the Secretary designate critical habitat at the time a species is determined to be endangered or threatened. Section 4(b)(6)(C) further indicates that a concurrent critical habitat determination is not required if the Service finds that a prompt determination of endangered or

threatened status is essential to the conservation of the involved species. The Service believes that a prompt determination of threatened status for the spikedace is essential. If the spikedace were only proposed, but not listed, it would be eligible only for the consideration given under the conference requirement of section 7(a)(4) of the Act, as amended. This does not require a limitation on the commitment of resources on the part of the concerned Federal agencies. Therefore, in order to ensure that the full benefits of section 7 and other conservation measures under the Act will apply to the spikedace, prompt determination of threatened status is essential.

Section 4(b)(2) of the Act requires the Service to consider economic and other impacts of designating a particular area as critical habitat. The Service is in the process of evaluating the information on economic impacts of designating critical habitat that was submitted during the comment period. However, because of the complexities and extent of the activities being assessed, the Service has not completed the evaluation. The Service is, however, currently performing the economic and other impact analyses required for designation of critical habitat for the species, and plans to make such a determination prior to issuing the final rule designating critical habitat. The designation of critical habitat for the spikedace must be made by June 18, 1987, pursuant to section 4(b)(6)(C)(ii) of the Act, as amended.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Endangered Species Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing encourages and results in conservation actions by Federal, State, and private agencies, groups, and individuals. The Endangered Species Act provides for possible land acquisition and cooperation with the States and requires that recovery actions be carried out for all listed species. Such actions are initiated by the Service following listing. The protection required of Federal agencies, and the prohibitions against taking and harm are discussed, in part, below.

Section 7(a) of the Act, as amended, requires Federal agencies 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 being

designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR Part 402, (see revision at 51 FR 19926; June 3, 1986). Section 7(a)(2) requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of a listed 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 must enter into formal consultation with the Service.

No Federal activities are expected to be affected on Bureau of Land Management lands on Aravaipa Creek, because the Aravaipa Canyon Wilderness is presently being managed to protect and enhance natural values. However, if existing or increased recreational use within the canyon results in streambank degradation and increased sediment or pollution load in the stream, Section 7 consultation may be necessary.

On U.S. Forest Service lands on the Gila and Verde Rivers, little effect is expected on Federal activities from this rule; however, Section 7 consultation may be needed if changes occur in current grazing, mining, timbering, recreational, or other activities affecting *Meda fulgida* and its habitat.

On Bureau of Land Management lands on the upper Gila River, little effect is expected on present Federal activities because the area involved is designated an Area of Critical Environmental Concern, which requires management to protect natural values.

Proposed dam construction or alternative water projects on the upper Gila River, which have been authorized for study as part of the Bureau of Reclamation's Upper Gila Water Supply Study, could be affected by this rule, as could the Bureau's tentative plans for water development on the upper Verde River as part of the Central Arizona Project. Any such project would become subject to Section 7 consultation requirements.

Known Federal activities on private lands that might be affected by this action would be future flood control work funded by the Federal Emergency Management Agency or carried out by the U.S. Army Corps of Engineers in the Cliff-Gila Valley, or future federally funded irrigation projects. Federal funding has been used in the past and is expected to be used in the future for pipeline, water diversion, and land leveling projects on private agricultural lands in the Cliff-Gila Valley.

The Act and its implementing regulations found at 50 CFR 17.21 and 17.31 set forth a series of general prohibitions and exceptions that apply to all threatened wildlife. These prohibitions, in part, make it illegal for any person subject to the jurisdiction of the United States to take, import or export, ship in interstate commerce in the course of commercial activity, or sell or offer for sale in interstate or foreign commerce any listed species. It also is illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken illegally. Certain exceptions apply to agents of the Service and State conservation agencies.

The above discussion generally applies to threatened species of fish or wildlife. However, the Secretary has the discretion under Section 4(d) of the Act to issue special regulations for a threatened species that are necessary and advisable for the conservation of the species. *Meda fulgida* is threatened primarily by habitat disturbance or alteration, not by intentional direct taking or by commercialization. Given this fact and the fact that the States currently regulate direct taking of the species through the requirement of State collecting permits, the Service has concluded that the States' collection permit systems are more than adequate to protect the species from excessive taking, so long as such takes are limited to: educational purposes, scientific purposes, the enhancement of propagation or survival of the species, zoological exhibition, and other conservation purposes consistent with the Endangered Species Act. A separate Federal permit system is not required to address the current threats to the species. Therefore, a special rule is designated which allows take to occur for the above stated purposes without the need for a Federal permit, if a State collection permit is obtained and all other State wildlife conservation laws and regulations are satisfied. This special rule also acknowledges the fact that incidental take of the species by State-licensed recreational fishermen is not a significant threat to this species, and that such incidental take is not a violation of the Act, if the fisherman immediately returns the individual fish taken to its habitat. It should be recognized that any activities involving the taking of this species not otherwise enumerated in the special rule are prohibited. This special rule will allow for more efficient management of the species, and thus will enhance its conservation. For these reasons, the Service concludes that this regulation is

necessary and advisable for the conservation of *Meda fulgida*.

General regulations governing the issuance of permits to carry out otherwise prohibited activities involving threatened animal species, under certain circumstances, are set out at 50 CFR 17.22, 17.23, and 17.32.

National Environmental Policy Act

The Fish and Wildlife Service has determined that an Environmental Assessment, as defined under the authority of the National Environmental Policy Act of 1969, need not be prepared in connection with regulations adopted pursuant to Section 4(a) of the Endangered Species Act of 1973, as amended. A notice outlining the Service's reasons for this determination was published in the Federal Register on October 25, 1983 (48 FR 49244).

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List of Subjects in 50 CFR Part 17

Endangered and threatened wildlife, Fish, Marine mammals, Plants (agriculture).

Regulations Promulgation

PART 17—[AMENDED]

Accordingly, Part 17, Subchapter B of Chapter I, Title 50 of the Code of Federal Regulations, is amended as set forth below:

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

Authority: Pub. L. 93-205, 87 Stat. 884; Pub. L. 94-359, 90 Stat. 911; Pub. L. 95-632, 92 Stat. 3751; Pub. L. 96-159, 93 Stat. 1225; Pub. L. 97-304, 96 Stat. 1411 (16 U.S.C. 1531 *et seq.*).

2. Amend § 17.11(h) by adding the following, in alphabetical order under "Fishes," to the List of Endangered and Threatened Wildlife:

§ 17.11 Endangered and threatened wildlife.

* * * * *
(h) * * *

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
Fishes							
Spikedace	<i>Meda fulgida</i>	U.S.A. (AZ, NM), Mexico.	Entire	T	236	NA	17.44(p)

3. Section 17.44 is amended by adding a new paragraph (p), as follows.

§ 17.44 Special rules—fishes.

(p) Spikedace, *Meda fulgida*. (1) No person shall take the species, except in accordance with applicable State fish and wildlife conservation laws and regulations in the following instances:

(i) For educational purposes, scientific purposes, the enhancement of propagation or survival of the species, zoological exhibition, and other conservation purposes consistent with the Act; or,

(ii) Incidental to State permitted recreational fishing activities, provided that the individual fish taken is immediately returned to its habitat.

(2) Any violation of applicable State fish and wildlife conservation laws or regulations with respect to taking of this species is also a violation of the Endangered Species Act.

(3) No person shall possess, sell, deliver, carry, transport, ship, import, or export, by any means whatsoever any such species taken in violation of these regulations or in violation of applicable State fish and wildlife conservation laws or regulations.

(4) It is unlawful for any person to attempt to commit, solicit another to commit, or cause to be committed, any offense defined in paragraphs (p) (1) through (3) of this section.

Dated: June 18, 1986.

P. Daniel Smith,

Deputy Assistant Secretary for Fish and Wildlife and Parks.

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