DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

RIN 1018–AC62

Endangered and Threatened Wildlife and Plants; Final Rule to List the Arkansas River Basin Population of the Arkansas River Shiner (*Notropis girardi*) as Threatened

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: We, the U.S. Fish and Wildlife Service, determine the Arkansas River basin population of the Arkansas River shiner (ARS) (*Notropis girardi*) to be a threatened species under the authority of the Endangered Species Act of 1973, as amended (Act).

The ARS is a small fish found in the Canadian River in New Mexico, Oklahoma, and Texas and the Cimarron River in Kansas and Oklahoma, both rivers in the Arkansas River basin. A non-native, introduced population occurs in the Pecos River in New Mexico; however, we did not propose listing of this population and are not including it in this final rule. The Arkansas River basin population is threatened by habitat destruction and modification from stream dewatering or depletion due to diversion of surface water and groundwater pumping, construction of impoundments, and water quality degradation. Competition with the non-indigenous Red River shiner (*Notropis bairdi*) contributed to diminished distribution and abundance in the Cimarron River. Incidental capture of the ARS during pursuit of commercial bait fish species may also contribute to reduced population sizes. Drought and other natural factors also threaten the existence of the ARS.

We originally proposed to list the ARS as endangered. However, since publication of the proposed rule for this species, we decided to list this species as threatened due to lesser immediacy and magnitude of threats to its existence. New information received during the public comment period revealed that modifications to the Lake Meredith Salinity Control Project resulted in streamflow reductions that were less severe than originally projected in 1994. In addition, new information shows that the influence of the High Plains Aquifer on streamflows in the Canadian River upstream of Lake Meredith are less than originally believed and that the aggregations of Arkansas River shiners in the reach between Ute Reservoir and Lake Meredith are stable and not declining, as presented in the proposed rule. This action will implement Federal protection provided by the Act for the ARS. We have determined that designation of critical habitat for the ARS is not prudent.

EFFECTIVE DATE: December 23, 1998.

ADDRESSES: The complete file for this rule is available for inspection, by appointment, during normal business hours at the Oklahoma Ecological Services Field Office, 222 South Houston, Suite A, Tulsa, Oklahoma 74127–8909.

FOR FURTHER INFORMATION CONTACT: Ken Collins at the above address, telephone 918/581–7458, or facsimile 918/581–7467).

SUPPLEMENTARY INFORMATION:

Background

A. I. Ortenburger discovered the Arkansas River shiner (ARS) in 1926 in the Cimarron River northwest of Kenton, Cimarron County, Oklahoma (Hubbs and Ortenburger 1929). The ARS is a small, robust shiner with a small, dorsally flattened head, rounded snout, and small subterminal mouth (Miller and Robison 1973, Robison and Buchanan 1988). Adults attain a maximum length of 51 millimeters (mm) (2 inches (in)). Dorsal, anal, and pelvic fins all have eight rays, and there is usually a small, black chevron present at the base of the caudal fin. Dorsal coloration tends to be light tan, with silvery sides gradually grading to white on the belly.

The ARS historically inhabited the main channels of wide, shallow, sandy-bottomed rivers and larger streams of the Arkansas River basin (Gilbert 1980). Adults are uncommon in quiet pools or backwaters, and almost never occur in tributaries having deep water and bottoms of mud or stone (Cross 1967). Specifically, Polivka and Matthews (1997) found that the ARS in the South Canadian River of central Oklahoma, like most fishes occurring in the highly variable environments of plains streams, used a broad range of microhabitat features. They also found only a weak relationship between selected environmental variables and occurrence of the species within the stream channel. Water depth, sand ridge and midchannel habitats, dissolved oxygen, and current were the environmental variables most strongly associated with the distribution of ARS within the channel. Juvenile ARS associated most strongly with current, conductivity (total dissolved solids), and backwater and island habitat types (Polivka and Matthews 1997).

Cross (1967) believed that adults preferred to orient into the current on the ''lee'' sides of transverse sand ridges and feed upon organisms washed downstream. Researchers have only recently described the feeding preferences and diets of the ARS. In studies on the South Canadian River near Norman, Oklahoma, Polivka and Matthews (1997) found that gut contents were dominated by sand/sediment and detritus (organic matter). Invertebrate prey were only an incidental component of the diet. Polivka and Matthews (1997) concluded that the ARS is a generalist feeder in which no particular invertebrate dominated the diet. In the Canadian River of Texas, the diet of ARS was dominated by detritus, aquatic invertebrates, and sand and silt (Bonner *et al.* 1997). With the exception of the winter season when larval flies were consumed much more frequently than other aquatic invertebrates, no particular invertebrate taxa dominated the diet. This led Bonner *et al.* (1997) to similarly conclude that the ARS is a generalized forager, feeding on both items suspended in the water column and items lying on the substrate. In the Pecos River, fly larvae, copepods, immature mayflies, insect eggs, and seeds were the dominant items in the diet of ARS (Keith Gido, University of Oklahoma, *in litt.* 1997).

The ARS spawns in July, usually coinciding with flood flows following heavy rains (Moore 1944). However, recent studies by Polivka and Matthews (1997) and Texas Tech University (Gene Wilde, Assistant Professor, pers. comm. 1998) neither confirmed nor rejected the hypothesis that ARS spawn during rises in the river stage. The ARS appears to be in peak reproductive condition throughout the months of May, June and July (Polivka and Matthews 1997) and may actually spawn several times during this period (Gene Wilde, pers. comm. 1998). Arkansas River shiner eggs are non-adhesive and drift with the swift current during high flows.

The mean number of mature ova for ARS in Texas varied between 120.8 and 274.4, with some large females containing over 400 (Bonner *et al.* 1997). Hatching occurs within 24–48 hours after spawning. The larvae are capable of swimming within 3–4 days; they then seek out backwater pools and quiet water at the mouth of tributaries where food is more abundant (Moore 1944). Both Moore (1944) and Cross (1967) inferred that this species will not spawn unless conditions are favorable to the survival of the larvae.

Maximum longevity is unknown, but Moore (1944) speculated that the species' life span is likely less than 3 years in the wild. The age structure of ARS collected from the Pecos River in New Mexico included three, and possibly four, age classes (Bestgen *et al.* 1989). The majority of the fish captured were juveniles (Age-0) and first-time spawners (Age-I). Most of the fish in spawning condition were Age-I. Bestgen *et al.* (1989) thought mortality of post-spawning fish was extremely high based on the absence of Age-I and older fish from collections made after the spawning period (late July and August).

Historically, the ARS was widespread and abundant throughout the western portion of the Arkansas River basin in Kansas, New Mexico, Oklahoma, and Texas. In New Mexico, surveys and collection records establish that the ARS historically inhabited the Canadian River from the Texas-New Mexico State line as far upstream as the Sabinoso area in central San Miguel County, New Mexico (Sublette *et al.* 1990), a distance of over 193 river-kilometers (river-km) (120 river-miles (river-mi)). The ARS also occurred in Ute and Revuelto creeks and the Conchas River.

In Texas, the Arkansas River shiner occurred throughout the Canadian River from State line to State line, a distance of about 370 river-km (230 river-mi). The first reported captures of ARS from Texas were in 1954 (Cross *et al.* 1955, Lewis and Dalquest 1955). The species was captured at several sites extending from near the Texas-New Mexico State line at the Matador Ranch in Oldham County downstream to the Texas-Oklahoma State line (Lewis and Dalquest 1955).

Arkansas River shiners (9 specimens) were first reported from Kansas in 1926 from near Kinsley (Hubbs and Ortenburger 1929), although fish collection records from as early as 1884 exist. More extensive collections from the mainstem Arkansas River first occurred in 1952 at Holcomb in Finney County, Great Bend in Barton County, and Wichita in Sedgwick County (Cross *et al.* 1985). Arkansas River shiners were present but scarce at all 3 sites—41 specimens at Holcomb, 11 specimens at Great Bend, and 4 specimens at Wichita. Cross *et al.* (1985) believed ARS inhabited the full length of the Arkansas River mainstem in Kansas at that time, a distance of over 640 river-km (400 river-mi); although the species was already suspected to be in decline. In the Cimarron River basin of Kansas, ARS were first reported from Crooked Creek, Meade County in 1941. Earliest records from the mainstem Cimarron were from 1955 near Ulysses, Grant County, and in 1956 from near Kismet, Seward County (William H. Busby, Kansas Biological Survey, University of Kansas, *in litt.* 1990). In all, ARS specimens exist from 17 counties and eight rivers or streams, including several tributaries of the Arkansas and Cimarron rivers (Larson *et al.* 1991, Cross *et al.* 1985, William H. Busby, *in litt.* 1990).

Records of occurrence for the ARS are most extensive from Oklahoma where the majority of the historical range occurs. Collections from as early as 1926 exist for 43 counties (Luttrell *et al.* 1993, Larson *et al.* 1991, Pigg 1991, Hubbs and Ortenburger 1929). Records exist for the major rivers in the Arkansas River basin and many of the smaller tributaries. A record (one individual) also exists for the Red River basin in Oklahoma (Cross 1970), possibly originating from a release of bait fish by anglers. Historically, the ARS inhabited over 2,700 km (1,700 mi) of habitat in the larger rivers (e.g., Arkansas, Cimarron, North Canadian, and Canadian rivers) plus an unknown amount in the smaller tributaries.

Records from Arkansas are scarce. There is one record of several specimens from the Arkansas River at the mouth of Piney Creek in Logan County, Arkansas (Black 1940, as cited in Robison and Buchanan 1988). The ARS is presumed to have been extirpated from (become extinct in) Arkansas.

Researchers conducted comprehensive surveys for the ARS at 155 localities within the Arkansas River basin from 1989 to 1991 (Larson *et al.* 1991). They collected fish at 128 of 155 localities; the remaining 27 sites were dry. The researchers captured 1,455 ARS from 23 localities—14 in Oklahoma, 5 in Texas, and 4 in New Mexico. No ARS were captured in Kansas. These data, plus related surveys from 1976 to 1997 (Kevin R. Bestgen, Larval Fish Laboratory, Colorado State University, *in litt.* 1998; Polivka and Matthews 1997; Bonner *et al.* 1997; Eric Berg, Wildlife Biologist, L.W. Reed Consultants, Inc., *in litt.* 1995; Luttrell *et al.* 1993; Eric Altena, Fisheries Biologist, Texas Parks and Wildlife Department (TPWD), *in litt.* 1993; Pigg 1991; and Eugene Hinds, Regional Director, Bureau of Reclamation (Bureau), *in litt.* 1984), confirm that the ARS has disappeared from over 80 percent of its historical range within the last 35 years.

The ARS is now almost entirely restricted to about 820 km (508 mi) of the Canadian River in Oklahoma, Texas, and New Mexico. An extremely small population may still persist in the Cimarron River in Oklahoma and Kansas, based on the collection of only nine individuals since 1985. A non-native population of the ARS has become established in the Pecos River of New Mexico within the last 20 years (Bestgen *et al.* 1989). The decline of this species throughout its historical range may primarily be attributed to inundation and modification of stream discharge by impoundments, channel desiccation (drying out) by water diversion and excessive groundwater pumping, stream channelization, and introduction of non-native species.

The ARS began to decline in the Arkansas River in western Kansas prior to 1950 due to increasing water diversions for irrigation and completion of John Martin Reservoir in 1942 (Cross *et al.* 1985). The Arkansas River between Coolidge to near Great Bend, Kansas, is frequently dewatered (Cross *et al.* 1985). Habitat alteration following construction of Kaw and Keystone reservoirs on the Arkansas River in Oklahoma, in conjunction with completion of the McClellan-Kerr Navigation System in 1970, greatly reduced ARS habitat in Oklahoma and Arkansas. The ARS is no longer believed to occur in the Arkansas River in Arkansas, Kansas, and Oklahoma, a loss of over 1,240 km (770 mi) of previously occupied habitat.

The ARS was once common throughout the Cimarron River and its tributaries (Pigg 1991). The abundance of the ARS in the Cimarron River declined markedly after 1964 (Felley and Cothran 1981). The Red River shiner, a small minnow endemic to the Red River, was first recorded from the Cimarron River in Kansas in 1972 (Cross *et al.* 1985) and from the Cimarron in Oklahoma in 1976 (Marshall 1978). Cross *et al.* (1985) believed the Red River shiner was first introduced into the Cimarron River sometime between 1964 and 1972. Since that time, the Red River shiner has essentially replaced the ARS. Habitat alteration and resulting flow modification also have contributed to the decline of the species from the Cimarron River. A small, remnant population may still persist in the Cimarron River.

The ARS was first reported from the North Canadian River drainage in 1926 (Hubbs and Ortenburger 1929). Collections between 1947 and 1976 indicated that the ARS occurred in large numbers in the river and some larger tributaries despite the construction of Optima and Canton reservoirs (Pigg 1991). This fish was still sporadically collected from the North Canadian River until 1987. Several collection attempts at 15 localities over the next 2 years failed to result in the capture of any

ARS (Pigg 1991). In 1990, four specimens were collected from the river south of Turpin, Beaver County, Oklahoma (Larson *et al.* 1991; Jimmie Pigg, Oklahoma Department of Environmental Quality, pers. comm., 1993). Commercial bait dealers were observed flushing their holding tanks in the vicinity of the site where the ARS specimens were captured and may have been responsible for the unintentional release of this species back into the North Canadian River. The species has not been captured from the North Canadian River since 1990 (J. Pigg, pers. comm., 1997), indicating a probable loss of over 1,046 km (650 mi) of previously occupied habitat.

Historically, the species occurred in the Canadian River from its confluence with the Arkansas River near Sallisaw, Sequoyah County, Oklahoma as far upstream as the Sabinoso area in central San Miguel County, New Mexico (Pigg 1991, Sublette *et al.* 1990). Construction and operation of Ute and Conchas reservoirs in New Mexico, Lake Meredith in Texas, and Eufaula Reservoir in Oklahoma altered or eliminated sections of riverine habitat and diminished the range of ARS within the Canadian River. Eufaula Reservoir isolated Canadian River populations from the Arkansas River and, in combination with Lake Meredith and Ute Reservoir, confined ARS to two restricted segments of the Canadian River—a 218-km (135-mi) section from Ute Dam to the upper reaches of Lake Meredith; and 601 river-km (373 river-mi) downstream of Lake Meredith (near Canadian, Texas) to the upper reaches of Eufaula Reservoir in Oklahoma. The reservoirs function as barriers, significantly inhibiting dispersal and interchange between the two segments.

Consideration as a ''Species'' Under the Act

Section 3(15) of the Act defines ''species'' to include ''any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife . . .'' On February 7, 1996, the Fish and Wildlife Service and the National Marine Fisheries Service published a joint policy (DPS policy) (61 FR 4722) to clarify our interpretation of the phrase ''distinct population segment of any species of vertebrate fish or wildlife'' for the purposes of listing, delisting, and reclassifying species under the Act. The policy identifies the following three elements to be considered in deciding whether to list a possible DPS as endangered or threatened under the Act: The discreteness of the population segment in relation to the remainder of the species or subspecies to which it belongs; the significance of the population segment to the species or subspecies to which it belongs; and the conservation status of the population segment in relation to the Act's standards for listing.

Discreteness of the Population Segment: According to our DPS policy, a population segment may be considered discrete if it satisfies either one of the following conditions: it is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors; or it is delimited by international governmental boundaries across which there is a significant difference in control of exploitation, management of habitat, or conservation status. The Arkansas River basin population is discrete based on natural, geographic isolation from the non-native, introduced population in the Pecos River.

Significance of the Population Segment: Our DPS policy states that the consideration of the significance of the population segment to the taxon to which it belongs may include, but is not limited to, the following: persistence of the discrete population in an ecological setting unusual or unique for the taxon; evidence that the loss of the discrete population segment would result in a significant gap in the range of a taxon; evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere; or evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics. The Arkansas River basin population is significant because it represents the only surviving natural occurrence of the taxon.

Because it is both discrete and significant, the Arkansas River basin population of the ARS qualifies as a distinct population segment under the Act. Although it is discrete, the Pecos River population of the ARS is not significant because it is an introduced population located outside of the species' historic range and, at this time, is not essential for recovery of the species within its historic range. Therefore, the Arkansas River basin population of the ARS is a listable entity under the Act, and the non-native, introduced Pecos River population is not a listable entity under the Act.

Furthermore, protection of the non-native Pecos River population of the ARS would conflict with the preservation of the Pecos bluntnose shiner (*Notropis simus pecosensis*) and possibly the Rio Grande silvery minnow (*Hybognathus amarus*). Management of native Pecos River fishes will focus on the preservation and restoration of habitat conditions favored by these species. Restoration of historic flow conditions in the Pecos River and control of competitive, non-indigenous fishes, including the ARS, may be necessary in recovery efforts for the Pecos bluntnose shiner. While the non-native, introduced Pecos River population of the ARS could be important in efforts to supplement native populations of the ARS within the species' historical range, protection of the Pecos River population would not improve the status of the ARS within the species' historical range.

Previous Federal Action

We included the ARS in our September 18, 1985, Review of Vertebrate Wildlife (50 FR 37958) as a category 2 candidate for listing. At that time, category 2 comprised those taxa for which information indicated that a proposal to list as endangered or threatened was possibly appropriate, but for which conclusive data on biological vulnerability and threats were not currently available to support proposed rules. Our January 6, 1989, revised Animal Notice of Review (54 FR 554) retained this status for the ARS.

We first received detailed information on the status of the species in 1989 (Pigg 1989). A partial status survey by Larson *et al.* (1990) was a source of additional information. We subsequently prepared a status report on this species (U.S. Fish and Wildlife Service 1990). Following this report, Larson *et al.* (1991) and Pigg (1991) provided comprehensive status survey information. In our November 21, 1991, Animal Candidate Review for Listing as Endangered or Threatened Species (56 FR 58804), we reclassified the ARS as a category 1 candidate. At that time, category 1 comprised taxa for which we had substantial information on biological vulnerability and threats to support proposals to list the taxa as endangered or threatened.

In the August 3, 1994, **Federal Register**, we published a proposed rule to list the Arkansas River basin population of the ARS as endangered and invited public comment (59 FR 39532). We based the proposal primarily on status information from reports to the Oklahoma Department of Wildlife Conservation (ODWC). We also used collections and observations made by Dr. Frank Cross, Mr. Jimmie Pigg, the TPWD, and the Bureau and our own collections and observations in preparing the proposed rule.

The enactment of Public Law 104–6 in April, 1995, and subsequent series of continuing resolutions from October 1, 1995, through April 26, 1996, established a moratorium on issuing final listings or critical habitat designations. During that time, we were prohibited from making final determinations on listing proposals. Following this delay, we reopened the comment period on the proposal to list the ARS on December 5, 1997 (62 FR 64337), to solicit any new relevant data and to allow the public to review and comment on data we had obtained since publication of the proposed rule.

Since publication of the proposed rule for the ARS, we have determined that the Arkansas River basin population of the Arkansas River shiner, which we proposed to list as endangered, should be listed as threatened due to a lesser immediacy and magnitude of threats to its existence. New information received during the comment period revealed that modifications to the Lake Meredith Salinity Control Project resulted in streamflow reductions that were less severe than originally projected in 1994. Also, the influence of the High Plains Aquifer on streamflows in the Canadian River upstream of Lake Meredith is less than originally believed. In addition, we discovered that the aggregations of ARS in the reach between Ute Reservoir and Lake Meredith are stable and not declining, as presented in the proposed rule. The most recent information on the status of the ARS is discussed in the ''Summary of Factors Affecting the Species'' section.

The processing of this final rule conforms with our listing priority guidance published in the **Federal Register** on May 8, 1998 (63 FR 25503). This guidance further clarifies the order in which we will process the remaining backlog of rulemakings resulting from the 1995–1996 moratorium. The guidance calls for giving highest priority to handling emergency situations (Tier 1) and second highest priority to resolving the listing status of outstanding proposed listings, resolving the conservation status of candidate species, processing petitions, and delisting or reclassifications (Tier 2). The guidance assigns the lowest priority (Tier 3) to processing of proposed or final designations of critical habitat. Processing of this final rule is a Tier 2 action.

Summary of Comments and Recommendations

In the August 3, 1994, proposed rule (59 FR 39532), associated notifications, and in subsequent notices to extend or reopen the public comment period, we requested all interested parties to submit factual reports or information that might contribute to the development of a final rule. The original public comment period closed on October 3, 1994, but we reopened it from January 6, 1995, to February 3, 1995 (60 FR 2070) to accommodate three public hearings. We reopened the comment period a second time from December 5, 1997 to January 5, 1998 (62 FR 64337). We contacted numerous Federal and state agencies, county governments, municipalities, scientific organizations, knowledgeable individuals, and other interested parties and requested them to comment during the comment periods. We published newspaper notices during all comment periods in the *Dodge City Globe* (KS), the *Hutchinson News Herald* (KS), the *Quay County Sun* (Tucumcari, NM), the *Daily Oklahoman* (Oklahoma City, OK), the *Tulsa World* (OK), *Woodward News* (OK), and the *Amarillo Globe* (TX), inviting general public comment and attendance at public hearings. In addition, we published a notice in the *Lubbock Avalanche-Journal* (TX) announcing the reopening of the comment period on December 5, 1997.

We received 114 requests for public hearings—46 from interested parties in Kansas, 40 from Oklahoma, and 28 from Texas. We received 16 other requests for public hearings after the 45-day period for requesting hearings had expired. We held public hearings on January 23, 1995, in Meade, Kansas; January 24, 1995, in Woodward, Oklahoma; and January 25, 1995, in Amarillo, Texas.

In Meade, 154 people attended and 25 commented; in Woodward at least 45 attended and 29 commented; and in Amarillo 381 attended and 27 commented. Thirty-seven individuals at the Amarillo hearing did not have an opportunity to make oral comments because of time limitations. However, many of these individuals did submit written comments at the conclusion of the hearing. In addition, the High Plains Underground Water Conservation District Number One sponsored a public meeting in which an unknown number of individuals attended. The District provided a video tape and transcript of this meeting containing the comments of 25 individuals.

We received a total of 734 comments (letters and oral testimony) from Federal (12) and State (45) agencies/elected officials, local governments (62), and private organizations, companies, and individuals (615) during the comment periods. The total number of entities providing comments was 671, with several individuals submitting more than one comment. We also received three letters containing numerous signatures opposing listing of the ARS.

We address written and oral comments received during the comment periods in the following summary. Comments from all respondents, including the invited peer reviewers, are combined. These comments addressed a diversity of economic, social, and political issues. Because multiple respondents offered similar comments in some cases, comments of a similar nature are grouped. Most comments opposed listing or favored delaying the listing. Of those actually stating a position, 380 specifically opposed listing and 8 supported listing. The remainder, while not specifically stating a position on the rule, often expressed concerns over what impact the listing would have on various activities. Some comments were non-substantive or dealt with matters of opinion or legal history, which are not relevant to the listing decision. The substantive comments and our responses, grouped by issue category, are as follows:

Issue 1: Procedural Concerns

Comment: Thirty commenters noted that the Act expired in 1992 and has not yet been reauthorized, leaving us without authority from Congress to implement it. These commenters believed that, therefore, we should either postpone listing or take no action until the Act has been reauthorized.

Service Response: The Act remains in place unless unfunded in the annual Congressional appropriations process. With the exception of the recision of listing funds described earlier, Congress has continued to fund the Act. We prepared this final rule using funds specifically appropriated by Congress for conducting the Act's listing activities.

Comment: Seven commenters believed that we fail to use common sense in implementing the Act, relying on regulation instead of innovation, leaving landowners with no incentive to protect listed species and their habitat.

Service Response: By **Federal Register** notice on July 1, 1994 (59 FR 34272), the Secretaries of the Interior and Commerce set forth an interagency policy to minimize social and economic impacts of the Act consistent with timely recovery of listed species. Therefore, we will work closely with stakeholders throughout the Arkansas River basin to accommodate economic and recreational activities to the extent possible while ensuring the continued survival and recovery of the ARS.

Comment: One commenter stated that we do not have the authority to list the ARS in only a portion of the species'

known range. Another individual stated that if we can exclude listing of the Pecos River population, we could exclude listing of the ARS population upstream of Lake Meredith.

Service Response: As described previously, our policy published in the **Federal Register** on February 7, 1996 (61 FR 4721), established that to qualify as a distinct population segment, the population must be both discrete in relation to the remainder of the species to which it belongs, and significant to the species to which it belongs. In the case of the ARS, the Arkansas River basin population is clearly separate from the Pecos River population and represents the only surviving natural occurrence of the species. Thus the Arkansas River basin population segment is both discrete and significant.

With respect to the Canadian River segment upstream of Lake Meredith, we do not believe it would be prudent to consider these aggregations of ARS as a distinct population segment. Although Lake Meredith is a human-made barrier to dispersal, the ARS aggregations upstream of Lake Meredith are not markedly separated from those in the remainder of the Arkansas River basin.

Comment: Eighteen commenters requested a longer comment period or stated that we did not give adequate time for public comment. Five commenters thought we were unwilling to disclose pertinent information or denied access to materials which the rule was based on. One commenter requested that all data, information, and results of investigations, including information on occurrence of Red River shiners in the Canadian River, be available for review by interested parties. Another felt we provided ''Fact Sheets'' only to select individuals.

Service Response: Regulations at 50 CFR 424.16(c)(2) require us to allow a minimum of 60 days for public comment on proposed rules. The first comment period on the ARS proposed rule was open for 60 days. We also provided two additional comment periods, encompassing a total of 59 days. We believe that the comment periods provided were adequate and fulfilled the requirements of the Act.

The proposed rule contained a complete summary of the information available to us regarding the status of the ARS and sources of that information. The cited material was available to the pubic through a variety of sources. We have incorporated new information on the occurrence of the Red River shiner in the Arkansas River basin into this rule and the administrative record. All documents, records, and correspondence relating to this listing, including data, survey results, analyses, supporting information, and public comments, are included in the administrative record and are available for review by the public by appointment, during normal business hours, at the Oklahoma Field Office. Appointments can be made by contacting the Field Supervisor (see **ADDRESSES** section).

In several instances, we provided copies of referenced material, including information on Red River shiners, in response to requests from the public. Also, in accordance with the Act and its implementing regulations, the Administrative Procedure Act, and the Freedom of Information Act (5 U.S.C. § 552), we provided copies of documents to members of the public who requested such information.

We prepared Fact Sheets and distributed them to the public in conjunction with notification letters for the public hearings. We also distributed copies of the Fact Sheets to the public at the three public hearings. Any individual who was not on our mailing list at the time of the hearings or did not attend the public hearings did not receive copies of the Fact Sheets. We would have provided this material to anyone requesting it; however, we have no record of any specific requests for the Fact Sheets following conclusion of the public hearing process.

Comment: Three commenters felt that we had already reached a decision prior to receiving public comment and did not value public participation in the decision-making process. Ten commenters stated that we had not adequately notified the public regarding the hearings or the proposed rule. Commenters specifically stated that we did not contact the TPWD, Texas State elected officials, and affected municipal governments and that newspaper notices were inadequate.

Service Response: We reviewed and evaluated all written and oral comments, as recorded in the public hearing transcripts, before making a final determination on the proposed rule. We have addressed all substantive comments in this section. Based on the comments we received, we revised the status of the shiner and incorporated new information into this final rule.

We conducted an extensive notification process to make the public aware of the proposal. In addition to newspaper and **Federal Register** notices (see discussion at beginning of this section), we mailed 153 separate notifications of the proposed rule to Federal, State, county and city governments, species experts, and other individuals to solicit their input. Subsequently, we mailed 355 separate notifications of the public hearing to species experts, other interested individuals, and Federal, State, county and city government entities. We directly notified all interested parties known to us. We continually updated the mailing list to include all parties who had expressed interest in the rulemaking or had requested to be added to the mailing list. Our mailing list currently contains 1,153 separate entities. We believe our notification process fully satisfied the requirements of the Act.

We first contacted the TPWD concerning the status of the ARS by letter dated May 7, 1993. We sent copies of this letter to Andrew Sansom, the Executive Director; Larry McKinney, then Director of the Resource Protection Division, and David Diamond, Coordinator of the Natural Heritage Program. We received a response from David Bowles, Endangered Species Biologist with TPWD. We also contacted the Federal Congressional delegation and the commissioners and judges within the counties encompassing the ARS historic range during the notification process. Subsequent to this initial mailing, we received over 200 requests for additions to the mailing list. Included in these additions were Texas Senator Teel Bivins, Texas Representatives Warren Chisum and David Counts, and the cities of Brownfield, Canadian, Hereford, Plainview, and Slaton, Texas.

Comment: Some respondents were disappointed with the quality of the hearings, and thought we deliberately misled the public. Others believed the hearings were inadequate to obtain full public input on the proposal or that we had deliberately tried to limit the number of individuals who were allowed to comment.

Service Response: We are obligated to hold at least one public hearing on a listing proposal if requested to do so within 45 days of publication of the proposal (16 U.S.C. 1533(b)(5)(E)). Considering the number of requests received and the geographic distribution of the species, we decided that holding a single public hearing in each State, excluding New Mexico, would be adequate and would not cause undue inconvenience to those wishing to attend. We selected the locations and times of the public hearings to be convenient to most citizens living within the affected area. We reviewed and considered all oral comments presented at the public hearings. In one instance, we had to limit oral comments; however, all persons were allowed to submit written comments,

which receive equal consideration to oral comments.

Comment: Two respondents wanted to know if information in the proposed rule had been peer reviewed.

Service Response: The information used in determining to propose listing the ARS has been peer reviewed (see ''Peer Review'' section).

Comment: One commenter stated that we must prepare an Environmental Impact Statement (EIS), pursuant to the National Environmental Policy Act (NEPA), on this rule.

Service Response: For the reasons set out in the NEPA section of this document, we have determined that the rules issued pursuant to section 4(a) of the Act do not require the preparation of an EIS. The Federal courts have held in *Pacific Legal Foundation* v. *Andrus*, 657 F2d. 829 (6th Circuit 1981) that an EIS is not required for listing under the Act. The Sixth Circuit decision noted that preparing an EIS on listing actions does not further the goals of NEPA or the Act.

Comment: One respondent believed we were being pressured to list the ARS in response to pending litigation.

Service Response: We classified the ARS as a category 1 candidate species independent of any litigation, meaning that we had substantial information on biological vulnerability and threats to support a proposal to list the taxon as endangered or threatened. Our decision to propose the ARS for listing was based on the mandates of the Act and not any ''pressures'' from litigants.

Issue 2: Recovery Planning and Implementation

Comment: Many comments were received regarding our recovery planning process. Twenty-four commenters felt that we should not list the species because recovery of the species is too costly and recovery is not guaranteed by listing or through the recovery process or that we should provide details, costs, and recovery goals of the recovery program before proceeding with the listing. Seventeen commenters requested that we involve stakeholders in meetings and in the development of recovery actions. Sixty-six respondents suggested potential recovery actions or focus areas for recovery, or expressed concern regarding implementation of unfavorable recovery actions.

Service Response: Regulations at 50 CFR 424.11(b) require the Secretary of the Interior to make listing decisions based on ''the best available scientific and commercial information regarding a species' status, without reference to possible economic or other impacts of such determination.'' Neither the Act nor implementing regulations allows us to consider the recovery potential or recovery cost for a species in determining whether a species should be listed.

We solicit active participation by the scientific community, local, State, and Federal agencies, Tribal governments, and other interested parties in the development and implementation of recovery plans (59 FR 34270). We agree that local community support and the cooperation of private landowners is essential to fully protect and recover listed species, and we will work closely with stakeholders in the management and recovery of the ARS to ensure that the concerns of local governments, citizens, and others are considered.

Section 4(f) of the Act authorizes us to develop and implement recovery plans for listed species. A recovery plan delineates reasonable actions which are believed to be required to recover and/or protect listed species and may address measures specifically mentioned during the comment period. Recovery plans do not, of themselves, commit personnel or funds nor obligate an agency, entity, or person to implement the various tasks listed in the plan. Once we develop a recovery plan for the ARS, the plan will be available for public review and comment prior to adoption.

Issue 3: Critical Habitat

Comment: We received many comments regarding the designation of critical habitat. Numerous (110) commenters expressed concern regarding the economic implications of critical habitat designation and often stated that such designation would severely limit a number of land and water uses or affect residents' quality of life and economic growth potential. Seventeen commenters requested we involve stakeholders in any economic analysis conducted during identification of critical habitat. Eleven others urged us to designate critical habitat at the same time the species is proposed for listing. A few (3) suggested locations that should or should not be included as critical habitat.

Service Response: We have determined that designation of critical habitat is not prudent (see ''Critical Habitat'' section).

Issue 4: Pecos River Population

Comment: We received a variety of comments relating to the Pecos River population of the ARS. Fifteen commenters questioned the need to eradicate the Pecos River population stating that it is not in direct adverse competition with native fish fauna, it is valuable in restoration efforts, habitat in the Pecos River is optimal for maintaining a thriving population, and the Act requires protection of the ARS and does not authorize eradication of this population. One individual questioned whether the ARS population in the Pecos River was truly an anomaly or if it was actually a natural event. Another respondent stated that the historic range should be expanded to include the Pecos River. Conversely two commenters stated that our description of the Pecos River population was accurate. Twenty respondents believed the Arkansas River Basin population of the ARS should not be listed because the species is abundant, robust, and thriving in the Pecos River of New Mexico and its habitat is stable and optimal for spawning. Two other commenters stated that the Arkansas River basin population should not be listed if recovery of the Pecos bluntnose shiner is more important than conservation of the ARS.

Service Response: In the ''Background'' section of this rule we included a discussion of the Pecos River population of the ARS that addresses most of these comments. As we explained in that section, the Act clearly authorizes us to list distinct population segments of vertebrate species.

The occurrence of the ARS in the Pecos River is not a natural event. Researchers examined fish collections housed at Eastern New Mexico University in Portales and at the University of New Mexico for evidence of any historical occurrence of ARS in the Pecos River. Two collections from near Ft. Sumner in 1977 and 20 collections from the reach extending from near Santa Rosa to the vicinity of McMillan Reservoir between the years 1974 to 1977 did not contain ARS. A collection taken in September of 1978 downstream of Sumner Dam contained 16 specimens. This led Bestgen *et al.* (1989) to conclude that the initial release of ARS into the Pecos River occurred in 1978 and that the Pecos River population is artificial and not within the historic range of the ARS. We concur with this assessment.

The purpose of the Act is to conserve threatened and endangered species and the ecosystems on which they depend. Non-native, introduced populations, while possibly useful in recovery/restoration efforts, are not a viable substitute for species conservation in native ecosystems. We do not believe listing or active conservation of the introduced Pecos River population is appropriate nor is such conservation required by the Act.

We agree that the Pecos River population could serve as a source of individuals for transplantation into suitable, unoccupied, historic habitat. Consequently, we do not currently intend to aggressively pursue eradication of the ARS from the Pecos River. However, we do not intend to manage the Pecos River as a refugium for the ARS. The feasibility of using ARS from the Pecos River in restoration efforts in the Arkansas River basin will be fully evaluated during the recovery process.

Issue 5: Ecological and Economic Value of the ARS

Comment: Several (21) commenters questioned the economic or ecological value of the ARS, including its use as an indicator of the health of ecosystems, its benefit to society, its value for medicinal purposes, its importance in comparison with other species, and its importance in comparison to the economic benefits of agriculture. Another eight individuals believed the shiner was here to be used as humans deemed necessary.

Service Response: In section 2 of the Act (Findings, Purposes, and Policy), Congress found that numerous species of fish, wildlife, and plants had become extinct, and that other species had become so depleted in numbers that these species were in danger of, or, threatened with, extinction due to a lack of concern for their conservation. Furthermore, Congress found that these species of fish, wildlife and plants are intrinsically valuable to the Nation and its people for reasons of aesthetic, ecological, educational, historical, recreational, and scientific value (section 2(a)(3)). These findings are the basis of the Endangered Species Act, the purpose of which is to conserve threatened and endangered species and the ecosystems on which they depend. To that end, the Act requires the Department of Interior to maintain a list of endangered and threatened species.

The Act requires that listing decisions be based on the best available scientific and commercial information regarding a species' status, without reference to possible economic or other impacts of such determination. Although a variety of opinions likely exist as to a particular species' contribution to society, this issue is not among the five factors upon which a listing determination is based. While we cannot consider the intrinsic value of species when making a listing determination under the Act, we believe that protecting these species has a positive effect on society. Society, like the ARS, depends upon reliable supplies of clean water. Conserving water resources will help to provide a necessary resource for future generations of people and maintain a healthy aquatic ecosystem for fish and wildlife.

Comment: Eighteen commenters stated that extinction of the ARS is a natural, evolutionary process and we should not interfere with the process of natural selection.

Service Response: We concur that extinction and the dynamic processes of natural selection, fitness, and evolution are natural, ecological phenomena. Numerous natural, including catastrophic, events over geologic time have resulted in the extinction of many species. However, evolutionary changes rarely occur at rates comparable to those induced by human environmental alteration. Congress clearly recognized human-caused increases in the rate of species extinctions and passed the Act in an attempt to decrease the rate at which human-caused extinction occurs.

Issue 6: Threats

Comment: Forty-six commenters were concerned that corporate swine farms pose a threat to the ARS due to their high usage of surface and ground water which could reduce streamflows in the affected rivers. These same commenters were concerned that waste application from confined swine, poultry, and dairy operations has the potential to contaminate surface and groundwater, constituting a threat to the ARS. Conversely, one commenter stated that we have no information to indicate that commercial livestock operations have impacted the ARS.

Service Response: We concur that water use and waste application or a spill from waste holding facilities represents a potential threat to ARS. Since 1990, the number of swine in Oklahoma has increased from 200,000 to 1.7 million animals, making Oklahoma the eighth largest pork producer in the Nation (''State Legislators Expecting Vote on Hog Farm Bill,'' Mick Hinton, *The Daily Oklahoman*, Oklahoma City, February 11, 1998). The Oklahoma panhandle contains almost one-half of these animals. However, we have no data documenting the effects of concentrated livestock operations on water quality or quality specifically relating to the ARS.

Comment: Four respondents suggested that salt cedar (*Tamarix* sp.), Russian olive (*Eleagnus angustifolia*), mesquite (*Prosopis* sp.), and other phreatophytes (i.e., deep rooted plants that obtain water from the water table or the zone just above it) have invaded river basins and use water, causing streamflows to decline.

Service Response: We agree that various species of phreatophytes have invaded stream channels within the western regions of the Arkansas River basin and that they have the potential to use large quantities of water when growth is extensive. Stinnett *et al.* (1988) documented the effects of vegetation encroachment within the Canadian River (see factor A in ''Summary of Factors Affecting the Species'' section).

Comment: One respondent stated that when the Eastern New Mexico Water Supply Project is completed in the year 2000 (or later), diversions from Ute Reservoir would occur, reducing the frequency and amount of water released from Ute Reservoir.

Service Response: The Bureau has preliminarily evaluated the feasibility of minimum streamflow releases (2 cubic feet per second (cfs)) downstream of Ute Reservoir as a component of the Eastern New Mexico Water Supply Project. Such releases would likely preclude dewatering of the Canadian River below Ute Reservoir, provided the State of New Mexico does not appropriate all of the remaining unappropriated water in the Canadian River downstream of Ute Dam. We will work with the Bureau pursuant to section 7 to ensure that the needs of the ARS are adequately addressed by this project.

Comment: Twenty-five commenters were concerned that we considered agricultural conservation practices a threat to the ARS and would discourage practices such as planting of shelterbelts, conservation farming (e.g., no-till planting and conservation reserve program grass plantings), and construction of terraces, waterways, stockwater ponds, and watershed dams. Many included specific information relating to these practices. Another 13 specifically were concerned about the effect of listing on flood control reservoirs.

Service Response: All of the conservation practices mentioned in this comment, although very effective at reducing run-off, are specifically designed to minimize soil erosion and control sedimentation. Without these practices in place, increased siltation would likely occur in rivers and streams of the Arkansas River basin. Construction of terraces, shelterbelts, grassed waterways, and other vegetative planting for conservation are not likely to significantly impact streamflows and habitat or threaten the survival of the ARS.

The effects of construction of stock ponds and flood water retention structures and other small dams on tributary streams are likely to have a

much different effect on streamflows. The primary goal of most small watershed projects is to provide drainage and relief from flooding in rural areas. Channelization (e.g. channel modification or ''improvement'') is often used to provide drainage and flood relief, while watershed dams and levees primarily provide flood relief. The effects of these activities are discussed in the ''Summary of Factors Affecting the Species'' section.

The Natural Resource Conservation Service (NRCS) Small Watershed Project program is subject to the provisions of section 7 of the Act and any planned projects must first be examined for impacts to listed species before construction may proceed. Private actions, such as construction of a farm pond, would generally be exempt from the regulatory provisions of the Act unless the actions involve Federal funds or Federal authorization, or if the action would result in take of ARS. The term ''take'' means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. A private party could seek a section 10(a)(1)(B) incidental take permit to legally take ARS incidental to otherwise lawful activities.

Comment: Two commenters expressed concern that we considered open-range grazing a threat to the ARS due to water quality concerns. Two other commenters implied that white-tailed deer have access to streamside zones, have abundant populations, and would cause similar impacts on riparian zones as do domestic livestock.

Service Response: We believe well-managed livestock grazing is compatible with viable ARS populations and that certain types of grazing in riparian zones likely have minimal impacts on the ARS. In fact, low to moderate grazing and seasonal or rotational grazing practices are compatible with many natural resource objectives. However, negative effects of overgrazing remain a concern (see ''Summary of Factors Affecting the Species'' section).

Although white-tailed deer typically inhabit lowland and riparian areas in the Central and Southern Plains (Menzel 1984), the overall impacts of deer and other native ungulates on riparian zones are less than that of livestock. Livestock do not forage, herd, or move in the same manner as native ungulates. Deer do not tend to concentrate in large numbers and do not remain in riparian areas for long periods of time as do cattle. Deer typically do not trample vegetation and streambanks to the same extent as cattle. Where cattle have access to streamside zones, they generally reduce the suitability of the riparian zone for deer, either by consumption of forage or by trampling vegetation (Menzel 1984). Restriction of livestock grazing is one of the principal management tools used for white-tailed deer on public lands. Additionally, the dietary preferences of deer and livestock generally do not overlap to a significant extent. Deer are opportunistic feeders, consuming a wide variety of plant species (Jackson (1961) as cited in Menzel (1984)), and cattle forage almost exclusively on grasses and forbs. Consequently, we do not believe that deer exert the same influence on the riparian zone as do cattle and do not consider use of riparian zones by deer to be a threat to ARS.

Comment: Two individuals were concerned that the Federal government, through construction of reservoirs and support of soil and water conservation practices, was responsible for the decline of the ARS. Three other respondents stated that agriculture was singled out as a threat, even though Federal reservoirs were known to have an impact on ARS.

Service Response: We acknowledge that some Federal actions are, in part, responsible for the threats facing the Arkansas River basin population of the ARS. As a result of listing, those ongoing Federal actions will be subject to consultation under section 7 of the Act.

We did not intentionally single out agriculture as the primary threat to survival of the ARS. We believe a number of threats collectively imperil the ARS, and no single threat likely poses a sufficient threat to the ARS to justify listing. When making a listing determination, we assess the potential impact of all threats, including agriculture, to the species. Although agricultural activities can impact the ARS in various ways, we do not believe agriculture is the primary threat to the ARS.

Comment: Two commenters stated that overcollection for scientific purposes, particularly during spawning periods, is a threat.

Service Response: We have no information indicating that collecting for scientific or educational purposes poses a significant threat to the ARS. However, take by private and institutional collectors could pose a threat, if left unregulated. With the exception of the States of Texas and Arkansas, the ARS is listed as an endangered or threatened species by States within its historical range and take is prohibited without a valid State collecting permit. Such provisions should minimize the threat of overcollecting for scientific or educational purposes. Federal protection of the ARS also will help to reduce illegal and inappropriate take.

Arkansas River shiners are thought to spawn communally (Cross *et al.* 1985) but are not known to make basin-wide migrations to a few traditional spawning areas where large numbers of individuals would be susceptible to a single collection event. Additionally, ARS may spawn several times during the course of the spawning season and even widespread scientific collecting during this period would not likely eliminate the entire reproductive effort for the year.

Comment: Numerous (115) commenters stated that irrigation and groundwater pumping are not a threat to the ARS because water levels have stabilized, primarily due to conservation and more efficient irrigation systems, and the effect on streamflow, where it occurs, is limited. Similarly, 58 commenters stated that we have no evidence to support the assumption that irrigation and pumping from the High Plains (Ogallala) aquifer has diminished flow in the Canadian River or has affected habitat conditions for the ARS. Two commenters stated that we have new information regarding the influence of groundwater on flows in the Canadian River basin. Six others stated that springflow is not reliable or has not been affected by groundwater pumping.

Service Response: We agree that water conservation efforts have had a significant effect on reducing the amount of water used. These efforts have reduced the rate of depletion of the High Plains aquifer in Texas. However, groundwater depletion continues within the Central Regional Subdivision of the High Plains aquifer. Although certain underground water conservation districts have recently shown stabilized groundwater levels within their districts or have shown that average depletions over the past several years have been reduced to less than 10 centimeters (cm) (4 in), these statistics are not indicative of the entire western region of the Arkansas River basin. Dugan and Sharpe (1996) state that water level declines in the Central High Plains subregion from 1980 to 1994 were the largest, both in area and magnitude of decline, of any in the entire High Plains. A nearly continuous area including much of southwestern Kansas, portions of the Oklahoma Panhandle, and much of the northern Panhandle of Texas has shown a decline of more than 3 meters (m) (10 feet (ft))(see factor A in ''Summary of Factors Affecting the Species'' section).

Regarding the influence of water level declines on streamflow, specific, regionwide data are lacking. We concur

that groundwater pumping has likely had a minimal effect on streamflow in the Canadian River upstream of Lake Meredith. We evaluated new information provided during the public comment period and concluded that pumping has reduced spring flow but the overall effect on flow in the Canadian River between Ute Reservoir and Lake Meredith has been relatively minor. This new information has been incorporated into this rule (see factor A in ''Summary of Factors Affecting the Species'' section).

Information on the contribution of springs to flow in the Canadian River below Lake Meredith and the effects of groundwater pumping on this springflow is generally unavailable. However, we believe that, based on the predevelopment discharge from the aquifer within the Arkansas River basin (Luckey and Becker 1998), continuing groundwater depletion will affect streamflow in the Arkansas River basin.

Comment: Seven commenters stated that, based on the rate at which water moves through the High Plains aquifer, the aquifer would not contribute to streamflow. Similarly, one respondent stated that water level contour maps of the aquifer show that water only moves toward the river within the area described as the ''breaks.''

Service Response: The rate at which water moves through the aquifer has no bearing on the contribution of the aquifer to streamflow. The aquifer is an underground body of water that resembles a ''reservoir;'' the water bearing strata are a mixture of gravel and sands. A withdrawal from one end of the ''reservoir'' affects water levels in the entire reservoir. Water within the aquifer exists in balance with the rate of recharge, that is, natural discharge to streams equals recharge, at least under predevelopment conditions. Pumping from the aquifer essentially represents an artificial discharge from the aquifer. When this artificial discharge exceeds recharge, natural discharges must decline accordingly.

Comment: Five commenters stated that the Canadian River was below the elevation of the High Plains aquifer and thus not connected.

Service Response: We partly agree with this comment. The Canadian River has cut below the elevation of the Ogallala formation upstream of the Hutchinson-Roberts County line in Texas (Dugan and Sharpe 1996). Downstream of this point the Canadian River is confined within the sediments of the Ogallala formation (see factor A in ''Summary of factors Affecting the Species'' section).

Comment: One respondent stated that the threat analysis is incorrect because very little surface water is diverted from the Canadian River in Texas.

Service Response: We agree that very little diversion of stream surface water occurs in the Canadian River of Texas. However, surface water is diverted from Lake Meredith via the Canadian River Project. Diversion of surface water also occurs within other Arkansas River tributaries. Our threat analysis includes threats occurring in other portions of the Arkansas River basin, not just those in Texas.

Comment: Seven commenters expressed opposing views concerning the influence of predation on the ARS. Four individuals stated that predation is a threat and three commenters did not believe that existing information suggested that predation was a threat.

Service Response: Studies on the impact of disease or predation upon the ARS have not been conducted and the significance of these threats is unknown. While neither disease nor predation are thought to be a significant threat to a healthy ARS population, they could, in certain localized areas, occur more frequently or have a more significant impact and hinder recovery of the ARS. This threat is addressed in more detail under factor C in the ''Summary of Factors Affecting the Species'' section.

Comment: One commenter stated that illegal dumping of oil field brines in the 1960s caused fish kills, and fish populations never recovered. Two commenters stated that a major threat to the ARS and other aquatic species was water quality degradation. Two others stated that we have no information that any chemical has been introduced into ARS habitat. One commenter stated that changes in turbidity and salinity were not threats to the ARS.

Service Response: Dumping of oil field brines was suspected to have partially accounted for the decline of the ARS from the North Canadian River in the vicinity of Oklahoma City, Oklahoma (Pigg *et al.* 1997a). Nutrient enrichment from municipal waste water effluent, particularly in the North Canadian River, also may have contributed to degradation of water quality. Pigg *et al.* (1992) stated that 64 municipal sewage treatment plants, 34 industries, and 2 electric power plants discharge into the North Canadian River. Matthews and Gelwick (1990) examined fish communities within a highly urbanized reach of the North Canadian River in Oklahoma City that received concentrated feedlot runoff and secondary treated sewage effluent. Dumping of construction materials and a smaller secondary sewage source occurred at a site approximately 30 river-km (18 river-mi) downstream of that site. Although ARS were not collected during that study, fish communities in these reaches did not appear to be significantly depressed by urbanization (Matthews and Gelwick 1990).

Advancements in waste water treatment facilities and reductions in other sources of pollution have occurred since passage of the Clean Water Act in 1972. Species which are less tolerant of degraded conditions would generally not occur in stream reaches affected by urbanization. Where water quality degradation has dramatically altered ARS habitat, we would agree that such events have played a role in the decline of this species. However, we have very little specific information documenting the effects of poor water quality on ARS and cannot conclude that these types of pollution are a significant factor contributing to the decline of the ARS. The effects of changes in turbidity or salinity on the ARS are unknown.

Comment: Three commenters stated that drought is the main threat to the ARS and is responsible for its decline; twelve others stated that minnows inhabiting plains streams are adapted to withstand a variety of harsh conditions, such as dewatered and drought conditions, and lack of streamflow is not a threat.

Service Response: Arkansas River shiners evolved under natural cycles of flooding and drought, and are adapted to a wide variety of physical and chemical conditions. Fish populations in such systems tend to be cyclic in nature, responding to such natural factors as weather events, disease, and predation. Natural events, however, including long-term drought or extreme rainfall, have less of a negative effect overall on a species when that species is widely and continuously distributed. Where populations are small, fragmented, or isolated by various human-related factors, they are more vulnerable to extirpation by naturally occurring or random events and cumulative effects.

Construction of mainstream dams hinder natural expansion and contraction of populations, preventing fish from recolonizing dewatered reaches when flows return. This may have contributed to the extirpation of aggregations of the ARS. Drought also accentuates the effect of human-caused events (Matthews 1998), such as overallocation of streamflows and overdraft of groundwater resources. Stream dewatering combined with long-term drought could result in permanent

elimination of ARS from a large part of the Arkansas River drainage. Although the species as a whole has persisted to date, we do not believe remaining populations are secure. Considering the species' ability to withstand harsh conditions within prairie streams, the fact that this species has disappeared from over 80 percent of its historical range suggests that the effects of natural events are exacerbated by human influences.

Comment: Two commenters thought introductions of non-native species was a primary reason for the disappearance of the ARS. Five individuals stated that introductions of Red River shiner did not affect aggregations of ARS because the species had already declined and the Red River shiner simply replaced the ARS. Two others stated that reduced flows or drought, not introductions of non-native fishes, was the primary threat. Six commenters stated that introductions of Red River shiners only affected a small portion of the historical range and thus are not a primary threat to remaining populations.

Service Response: The introduction of the Red River shiner represents a potentially serious threat to the ARS; however, we do not believe introductions of the Red River shiner have had a detrimental effect on any ARS aggregations other than those in the Cimarron River. The primary threat to ARS aggregations is streamflow alterations due to reservoir construction and water withdrawals (see ''Summary of Factors Affecting the Species'' section).

Comment: Seven respondents stated that the ARS is not likely to be affected by commercial bait harvest. One commenter stated that using ARS as fish bait should be illegal.

Service Response: We agree that abundance of the ARS is not likely to be seriously impacted by commercial harvest of bait fish. The ARS is not a highly prized bait fish, and it is not selectively harvested as bait. Arkansas River shiners may occasionally be captured incidental to capture of other commercial bait fishes (see factor B in ''Summary of Factors Affecting the Species'' section). The ARS is already listed as threatened or endangered in the States of Kansas, New Mexico, and Oklahoma, and collection is prohibited without a valid permit. The greatest potential threat to the ARS from commercial bait operations is the possible accidental release of non-indigenous fishes into the Arkansas River basin.

Comment: Twenty-two commenters requested clarification or documentation that reservoirs and impoundments were a threat to the ARS. Four of these individuals stated that construction and operation of John Martin Reservoir in Colorado had affected streamflow within the Arkansas River in Kansas. Conversely, one individual stated that the threat from John Martin Reservoir is speculative and inconclusive. One individual stated that construction of Medford Dam was a threat. Another stated that construction of Forgan Reservoir on the Cimarron River was no longer a threat. Four individuals stated that reservoirs were beneficial and that we should consider these benefits in the analysis. Two others stated that our assessment of the impacts of dams was inconsistent. One individual asked if we had considered the effects of releases from Keystone Reservoir on ARS spawning requirements. Conversely, one individual stated that flood pulses still occur below dams and reproduction should still occur. Five individuals stated that damming has diminished habitat but the effects are short-term and the river will stabilize allowing populations to persist. Another individual stated that streamflows following impoundment have stabilized and are not going to decline. One individual stated that Lake Meredith was the primary threat.

Service Response: Cross *et al.* (1985) stated that irrigation diversions and flow regulation by John Martin Reservoir led to declines in several species of fish in western Kansas, including ARS. They found that the initial effect of impoundment by John Martin Reservoir was a moderation of flow extremes (e.g., reduction peak flows and increase in minimum flows) between 1943 and 1965. After 1965, streamflow generally ceased after July and did not resume until January or February. Although these declining streamflow conditions cannot be entirely attributed to John Martin Reservoir, this reservoir definitely contributed to flow alterations in the western portion of the Arkansas River.

We could not verify the existence of a Medford Dam and cannot address this comment.

In its Northwest Oklahoma Water Supply Study (Bureau 1991), the Bureau proposed the construction of Forgan Reservoir, to be located near the Kansas-Oklahoma State line on the Cimarron River. This reservoir would impound about 8 km (5 mi) of the Cimarron River. Although this reservoir has not been authorized, and planning has been deferred, we consider this reservoir a potential threat to the ARS.

We disagree that reservoirs have had a beneficial effect on the ARS. Reservoirs function as barriers, significantly inhibiting dispersal and interchange between populations. Reservoirs also have inundated, dewatered, or otherwise directly altered considerable sections of riverine habitat once inhabited by ARS (see factor A in ''Summary of Factors Affecting the Species'' section). It is possible that, under certain conditions, fragmentation of ARS habitat by reservoirs could help reduce the probability that a release of Red River shiners would impact all ARS aggregations within a river basin. However, such protection is minimal considering the popularity of recreational fishing in the basin and the lack of specific regulations prohibiting bait-bucket releases of non-native fishes. We believe that the known adverse effects of reservoirs far outweigh any such potential small benefit.

We have not evaluated the implications of releases from Keystone Dam on ARS reproduction. The specific spawning requirements of ARS are not yet known. However, we suspect that these releases are not compatible with ARS spawning requirements and that these flow modifications are largely responsible for the decline of ARS below the reservoir. We anticipate that once reproductive requirements are known, we will initiate discussions with the Tulsa District of the Army Corps of Engineers (Corps) to evaluate whether releases from the reservoir could be modified to benefit ARS.

We agree that flood pulses necessary to support reproduction by ARS still occur below some impoundments. Reproducing populations of ARS persist downstream of Lake Meredith and Ute Reservoir; however, neither of these impoundments provide regular downstream releases. Runoff and tributary inflow during precipitation events within these river segments provide stage rises sufficient to induce spawning in these populations. In the eastern regions of the Arkansas River basin, reservoir releases often cause streamflows to fluctuate on a daily basis which is not conducive to spawning by ARS.

Flow fluctuations caused by releases from reservoirs tend to attenuate or dampen with distance downstream of the dam. Thus, at some point, the effects of such releases on the aquatic community would be minor and reproduction could occur. However, in the absence of sufficient river length or without modification of existing releases, regulated flows rarely mimic those which occurred prior to impoundment. Under these conditions, reproduction will not occur, and populations will not likely persist.

We agree that Lake Meredith has exerted the greatest influence over ARS aggregations in Texas. However, Lake Meredith is not the primary threat to ARS. The decline of the ARS is due to a variety of factors, many of which act synergistically. The cumulative and synergistic effects of all of the identified threats are responsible for the present and threatened destruction of ARS habitat and its diminished range.

Comment: One respondent stated that minimal alterations of the flow regime did not directly cause the ARS to diminish in range and abundance, and thus are of little consequence.

Service Response: We agree that very minor alterations in streamflow are not likely to be a significant threat to the ARS. However, the commenter did not state what constitutes minimal streamflow alterations. As discussed under factor A of the ''Summary of Factors Affecting the Species'' section, certain alterations of the natural flow regime are detrimental to the ARS.

Comment: One commenter stated that a present threat must be demonstrated and asked to what extent reservoirs now impact or threaten the ARS.

Service Response: The Act requires us to consider ''the present or threatened destruction'' of a species' habitat or range. The lack of streamflow downstream of a reservoir would qualify as a present, ongoing threat because if streamflows were restored, downstream populations could recolonize those areas that are presently unsuitable. For example, if releases were made from Lake Meredith, these flows, under certain conditions, could be beneficial and allow shiner aggregations which exist downstream to recolonize the entire reach of the river. Withholding these releases prevents this from occurring and is a present, ongoing threat to ARS habitat downstream of the reservoir, particularly in Texas. Similarly, where reservoir releases have modified ARS habitat such that these reaches can no longer be inhabited, the present, ongoing operation of these reservoirs prevents ARS from recolonizing these stream reaches.

Comment: One individual commented that the decline of the ARS is due to channelization of the Cimarron River below Tulsa for navigation.

Service Response: We suspect this commenter mistakenly referred to the Cimarron River instead of the Arkansas River. The Cimarron River has not been modified to support navigation. We agree that modification of the Arkansas River for navigation eliminated habitat for the ARS (see ''Summary of Factors Affecting the Species'' section).

Issue 7: Sufficiency of Information

Comment: Eighty commenters questioned why we were listing the ARS, either rangewide or within the State of Texas. Few of these commenters provided substantive new information relevant to making risk assessments or assessing the status of the species. Forty-six commenters stated that the proposed rule contained inadequate, incomplete, inaccurate, or unclear information concerning the need to list the ARS. Three commenters stated that the listing is premature and that the need for listing has not been fully researched. Two others believed that the listing should be postponed until more information outlining why the species continues to survive in the Canadian River has been obtained. One individual felt that the listing should be delayed until more studies have been completed on habitat requirements. Eighteen individuals requested that we provide life history information on the species or conduct additional studies.

Service Response: Section 4(b)(1)(A) of the Act requires us to make listing determinations on the basis of the best scientific and commercial data available. Although we consider historical habitat loss and rates of decline, we also consider many other factors, including current rates of decline, potential and imminent threats, number and status of populations, and amount and quality of remaining habitat. We use historical habitat loss and rates of decline to ascertain whether a species is undergoing a precipitous or gradual decline. Reduced abundance, loss of habitat, and extirpation of ARS aggregations from a variety of causes have been documented. This information shows that the range of the ARS in the Arkansas River basin has been reduced by over 80 percent.

In preparing both the proposed and final rules on this listing, we have used information received from a variety of sources including museum collections, knowledgeable biologists, groundwater hydrologists, and studies specifically directed at gathering information on the distribution and threats to the ARS. This rule summarizes all of the available information on the status of and threats to the ARS.

We have incorporated in this rule all substantive new data, including an investigation of ARS habitat requirements, obtained since the species was first proposed for listing in 1994. This new information caused us to reassess our analysis of the nature and immediacy of threats affecting the species. Specific justification for listing the species is summarized in factors A through E in the ''Summary of Factors Affecting the Species'' section.

We have summarized all of the available life history information in this rule. We agree that many aspects of the biology of this species are unknown and need further study. This is true for most species of fishes, including common species that have been studied extensively. However, we are not required to address all of the biological and ecological requirements of the species in order to list it. In fact, delaying listing in order to complete a large, long-term biological or ecological research effort could seriously compromise the survival of the Arkansas River basin population of the ARS.

Comment: Four commenters were concerned that we had not used all of the available information in preparing the proposed rule; specifically status information from the TPWD and the Bureau, collections of commercial bait dealers, and groundwater depletion records from underground water conservation districts in Texas.

Service Response: We examined data from the TPWD (Lewis and Dalquist 1955 and Eric Altena, *in litt.* 1993) and the Bureau (Eugene Hinds, *in litt.* 1984) but did not specifically cite them in the proposed rule. We used harvest data from the commercial minnow dealers, to the extent possible. However, this information is not always reliable (see factor B in ''Summary of Factors Affecting the Species'' section). We used information available from the U.S. Geological Survey (USGS) to document groundwater depletion in the High Plains aquifer. During the comment period, we received additional information on groundwater depletion from several underground water conservation districts. We also obtained additional information from the USGS. We have incorporated all of the information from these sources into this final rule.

Comment: One individual stated that there is currently more water in the Canadian River than there was before the reservoir was constructed.

Service Response: This commenter did not specify which portion of the Canadian River, above or below Lake Meredith, now has more water. An analysis of streamflow records for the period of record up to 1963 (USGS 1963) above Lake Meredith, shows that average annual discharge was 12.4 cubic meters per second (cubic m/s) (439 cfs) as measured at the gage north of Amarillo. This measurement included some regulation by Conchas Reservoir, but was prior to construction of Ute Reservoir. Analysis of flows in the

Canadian River, as measured at Logan, New Mexico in 1961 (USGS 1961) shows that flows averaged 11.1 cubic m/s (392 cfs) prior to construction of Conchas Reservoir and 7.6 cubic m/s (270 cfs) after construction. The average annual discharge at Amarillo for the period of record up to 1996 has been reduced to 8.1 cubic m/s (286 cfs).

Streamflow records up to 1996, as measured at Canadian, Texas, approximately 121 river-km (75 river-mi) downstream of Lake Meredith, show that the average annual discharge was 15.5 cubic m/s (549 cfs) before Lake Meredith was built and 2.4 cubic m/s (83.7 cfs) after the reservoir was built. Flow in both reaches of the river may now be perennial, due to seepage from Ute and Sanford dams, but there is not more water in the river now compared to years prior to construction of Lake Meredith.

Comment: One individual stated that the proposed rule was incorrect because water quality improves rather than declines as the river flows from Ute Reservoir to Lake Meredith.

Service Response: We recognize that water quality for human consumptive purposes improves as the river flows into Lake Meredith because salinity concentrations are diluted by tributary inflows. The existing salinity levels in this section of the Canadian River do not appear to have an adverse effect on ARS populations. However, the proposed rule actually referred to water quality within the entire Canadian River in Texas, not just the segment upstream of Lake Meredith (see factor A in ''Summary of factors Affecting the Species'' section).

Comment: Five commenters stated that additional surveys should be conducted because one survey was not sufficient. Similarly, three individuals stated that a complete census of the ARS should be conducted.

Service Response: We did not rely on one survey to document the status of the ARS in the Arkansas River basin. We used data from the TPWD, Bureau, University of New Mexico, Oklahoma State University, University of Kansas, University of Oklahoma, University of Michigan, Westark Community College, and the Oklahoma Department of Environmental Quality in assessing the current status of the ARS.

Complete census data for fishes are extremely difficult, if not impossible, to obtain with non-lethal survey techniques. Use of lethal techniques are not appropriate for surveys of rare species. Additionally, even lethal techniques, such as fish toxicants, are not 100 percent accurate. We often must rely on data collected from numerous sites, often by several individuals, over several years. The protocols used in these surveys and in analyzing the data are generally accepted by the scientific community as appropriate for sampling fish populations (Nielsen and Johnson 1983, Schreck and Moyle 1990).

Comment: Seventeen commenters stated that a one-time introduction of Red River shiners would not constitute a catastrophic event sufficient to cause extirpation of the entire Arkansas River basin population of the ARS. One other individual stated that the rangewide loss of an annual reproductive cycle is remote.

Service Response: Lake Meredith is an effective artificial barrier to movement of stream fishes and potentially could provide a small degree of protection to ARS aggregations upstream of Lake Meredith from introductions of non-native fishes which might occur downstream of the reservoir. However, aggregations of ARS upstream of Lake Meredith are much less numerous than those in the remainder of the Canadian River and the risk of extinction for the entire Arkansas River basin population would increase if Red River shiners became established downstream of Lake Meredith. We have reassessed the vulnerability of the Arkansas River basin population of the ARS to a single, catastrophic event and no longer consider the entire population susceptible to extinction from a single, catastrophic event at this time. However, as the range and abundance of ARS continue to decline, the vulnerability of the ARS to catastrophic events and the likelihood that a catastrophic event would lead to extinction of the species increases.

Comment: Thirteen individuals stated that existing Federal and State laws and regulatory mechanisms are adequate to protect the ARS.

Service Response: Although certain laws and regulations provide some water quality and quantity benefits, they do not alleviate all of the identified threats to the ARS. Flow modification below Federal dams is ongoing and prevents ARS from recovering. Irrigation withdrawals have dewatered the Beaver River in the Oklahoma Panhandle, as well as considerable sections of the Arkansas River in Kansas. Existing regulations did not prevent these events from occurring. Existing regulations also were ineffective in preventing the introduction of non-native fishes into the Cimarron River. With the exception of the State of Kansas, none of the States protect ARS habitat. The State of Texas does not list the ARS as threatened or endangered and provides no special protection. We believe that existing regulatory mechanisms do not currently provide adequate protection for the ARS. Additional discussion of existing regulations can be found under factor D of the ''Summary of Factors Affecting The Species'' section.

Comment: Nineteen commenters believed we did not adequately demonstrate that the threats identified in the proposed rule were actually affecting ARS aggregations in the Arkansas River basin. One commenter stated that ongoing activities within the river basin were not likely to change in the foreseeable future.

Service Response: For the reasons explained in this rule, sufficient, ongoing threats exist for us to justify listing the Arkansas River basin population of the ARS. Although specific studies documenting the influence of a particular threat on the ARS may not have been conducted, sufficient information exists to demonstrate that ARS are vulnerable to the identified threats. We have presented ample evidence for a reasonable person to conclude that a definite cause and effect relationship exists. Under section 4 (b)(1) of the Act, we must make listing decisions based on the best scientific and commercial data available. We have met these requirements in this listing decision.

Comment: Nine respondents questioned the influence of the reproductive characteristics of the ARS during the threat assessment. One individual stated that southernmost populations of the ARS may spawn repeatedly, giving them an advantage over those populations in the northern portion of the range. Two individuals wanted to know how much water was necessary to ensure spawning by ARS. Another individual stated that the ARS should persist because the species is very fecund. One individual requested we explain how stream channelization affects spawning of the ARS. Two individuals stated that data do not demonstrate that flood pulses are needed to induce spawning. Two individuals stated that reproduction is not restricted to only Age-I fish.

Service Response: There is no information in the scientific literature which even speculates that reproductive potential varies among those ARS aggregations in the Arkansas River and those from the Canadian River.

We do not know what specific flow regimes are necessary to trigger spawning in the ARS. As previously discussed, the Act does not require us to address all of the biological and ecological requirements of the species in order to list it.

Cross *et al.* (1985) stated that female ARS develop 1,500 to 3,500 eggs of uniform size. Carlander (1969) reported the number of ova for several species of minnows in the genus *Cyprinella* and *Notropis.* The number of eggs varied from 98–2,600 per individual. Although several of these species have reproductive strategies which differ from ARS, the values presented do not indicate that the ARS is significantly more fecund than other species of minnows. Regardless of their fecundity, ARS were unable to maintain populations in several Arkansas River basin rivers and streams. Fecundity of ARS is not sufficient to maintain robust populations where adequate water to support populations no longer exists.

Stream channelization affects fish populations indirectly by altering the structural, physical, and chemical characteristics of the stream (Simpson *et al.* 1982). Direct impacts include injury or mortality during the actual construction of the channel. The specific spawning requirements of ARS are unknown, and we cannot specifically describe the influence of channelization on reproduction of ARS. Based on known impacts of channelization, we can predict, with a fairly high degree of accuracy, how ARS reproduction could be affected. The preferred habitat, including presumed microhabitat for spawning, of the ARS is found in wide, relatively shallow, sandy bottomed rivers and larger streams. Channelization would eliminate this preferred habitat. Shallow water habitat would then exist in minute quantities and would be restricted to nearshore areas. Production of microscopic plant material by photosynthesis would be limited to the shallow near shore zones. Consequently, productivity of the stream would decline. Channelization also would reduce or eliminate invertebrates and other food resources needed to ensure successful reproduction and survival of the larvae.

Channelization also alters the morphology of the channel by creating fairly uniform steep sided channels, eliminating habitat diversity. Alteration of the channel morphology also would alter water velocities, which would in turn affect hatching of the fertilized eggs, assuming any would be produced. If ARS prefer to spawn in shallow waters, channelization would reduce the amount of habitat available for spawning. All of these alterations that occur as a result of channelization would likely seriously reduce the number of young fish that would be produced, leading to overall declines in the number of adult fish in the affected stream reach.

All of the information published prior to 1997 concluded that flood pulses were the primary environmental cue that triggered the onset of spawning by ARS. None of these studies, however, documented how much of a rise in river stage was necessary to induce spawning. We still lack specific data to determine how much of a flood pulse is needed to induce spawning. Recent studies (Polivka and Matthews 1997, Bonner et al. 1997), have failed to show that reproduction in ARS is entirely dependent upon these flood pulses. Flows, however, are important to maintaining habitat conditions within the stream channel and for hatching of the eggs once a spawn occurs. We believe streamflow is a crucial component of suitable ARS habitat even though large flood pulses may not be required to induce spawning.

The proposed rule did not state that reproduction was entirely restricted to Age-I individuals. Age-I individuals, however, do provide most of the annual reproductive effort. The loss of a single year class would significantly reduce the chances of survival of the ARS because the Age-I year class is so important to the success of each year's reproductive effort (see factor E in ''Summary of Factors Affecting the Species'' section).

Issue 8: Conservation Agreement

Comment: Eight respondents urged us to consummate a conservation agreement or seek local attempts to conserve the species without the need to list. Seven commenters encouraged us to follow a voluntary approach to conservation as fostered in the draft Memorandum of Understanding submitted to us by the TPWD and the ODWC.

Service Response: Candidate conservation agreements are formal agreements between us and one or more parties (i.e., land owners, land managers, or State fish and wildlife agencies) to address the conservation needs of proposed or candidate species. The participants take on the responsibility of developing the agreement, and voluntarily commit to implementing specific actions that will remove or reduce threats. This can contribute to stabilizing or restoring the species, thereby precluding or removing the need to list.

In order to remove the need for listing the ARS, a significant number of candidate conservation agreements would have to be developed and implemented throughout the four-State range of the Arkansas River Basin population. We met with representatives of the Arkansas Game and Fish Commission, Kansas Department of Wildlife and Parks (KDWP), New Mexico Department of Game and Fish (NMDGF), ODWC, and TPWD in March of 1997 to discuss the merits and feasibility of developing a conservation agreement. Unfortunately, not all States could commit to such an agreement due to fiscal and personnel constraints. However, listing of the species does not preclude the future development of habitat conservation plans or other conservation agreements with private individuals or agencies.

Because the ARS occurs primarily on private property, we fully realize that recovery of this species will depend upon local support and the voluntary cooperation of private landowners, and we welcome them as cooperators in the recovery effort. We will work to provide technical assistance to those property owners and land managers who wish to implement conservation measures for this species.

Issue 9: Abundance and Range

Comment: Numerous (249) commenters stated that the ARS is abundant in Texas and populations are stable and that, therefore, listing is not warranted. In addition, the TPWD does not believe that the ARS should be listed in Texas and is opposed to the listing.

Service Response: A considerable amount of variation can occur in samples of fish community structure between sites, years, and sampling effort, that makes trends difficult to determine. However, data collected by various researchers (e.g., TPWD, Oklahoma State University, Bureau, and Texas Tech University) between 1953 and 1998 from identical, readily identified locations (e.g., major highway crossings) document trends in ARS abundance in Texas. In Hemphill County, the numbers of ARS collected between 1954 and 1990 declined by 67 percent. In Hutchinson County, the number of ARS collected declined by 99 percent over this same time period. Upstream of Lake Meredith, in Potter and Oldham counties, collection records document similar declines at one of two sites. At the U.S. Highway 87/287 crossing north of Amarillo, Texas, the numbers of ARS collected have declined by 46 percent. However, in Oldham County, at the U.S. Highway 385 crossing near Tascosa, Texas, the numbers of ARS collected have increased by about 38 percent.

An analysis of the amount of occupied habitat demonstrates that the range of the ARS also has been reduced

in Texas. Historically, the Arkansas River shiner occupied 370 km (230.0 mi) of the Canadian River in Texas. At present, the ARS occupies 265 river-km (164.5 river-mi). This represents a loss of 28.5 percent of the historically occupied habitat in Texas.

As discussed previously, our policy on delineating distinct vertebrate population segments requires that those segments be both discrete and significant. We do not believe that the ARS in Texas is discrete from the remainder of the Arkansas River basin population. Thus, although the ARS in Texas may have declined less precipitously than in other areas of the species' range (see factor A in ''Summary of Factors Affecting the Species'' section), we cannot consider the ARS in Texas separately from the entire Arkansas River basin population.

Comment: Three commenters stated that the historical range of the ARS did not include Morton, Stevens, or Grant counties, Kansas. Two individuals stated that, based on the journals from travelers using the Sante Fe Trail, water sufficient to support shiners was not available in the Cimarron River of western Kansas.

Service Response: Morton, Grant, and Stevens counties, Kansas are within the historical range of the species. The ARS was first collected from the Cimarron River, near Kenton, Oklahoma. This section of the Cimarron River is upstream of the section that flows through Morton, Stevens, and Grant counties. Hubbs and Ortenburger (1929) state that ''hundreds of paratypes'' were collected from several sites in Oklahoma and at Kinsley, Kansas. The species likely occurred throughout the Cimarron River in 1926. In 1955, the species was collected from the Cimarron River south of Ulysses, Grant County, Kansas (William H. Busby, *in litt.* 1990). There are also two records from the Cimarron National Grassland (Morton County), one in 1962 and one in 1987 (William H. Busby, *in litt.* 1990). Records from the Cimarron River in Kansas also exist for Clark, Meade, and Seward counties.

We suspect that the Santa Fe Trail crossed the Cimarron River where crossing was most convenient and easiest. People using the trail likely did not choose to cross at sites supporting ''abundant'' water.

Comment: Two commenters stated that we have inadequate evidence to show that any populations of the ARS occur in Kansas.

Service Response: We believe that ARS may indeed have been extirpated from Kansas (see ''Background'' section). However, habitat within the Cimarron River in Meade County, Kansas appears suitable. This segment of the Cimarron River is not separated from that portion of the Cimarron River in Oklahoma where other individuals have been collected since 1989. The extreme rarity of this species in the Cimarron River makes it highly unlikely that infrequent collection efforts from one or two sites would locate this species. Consequently, we believe the ARS could still exist in very reduced numbers in the Cimarron River near the Kansas-Oklahoma State line.

Comment: Several commenters disagreed with our assessment of the historical and current range of the ARS. Three individuals stated that the ARS had not disappeared from 80 percent of its historical range. Another individual stated that the occurrence of the ARS in Arkansas was an anomaly due either to a flood or a misidentification. Similarly, one individual thought we had exaggerated the historical range in western Kansas and eastern Oklahoma. Another three individuals stated that we reported the ARS to be historically abundant and widespread without providing sufficient data to support this position. Two other individuals stated that we provided no data to document the change in abundance alluded to in the proposed rule. Six commenters stated that the Arkansas River has been permanently modified by the navigation system and should not be included as historical range for the species. Three commenters stated that the Beaver/North Canadian River should be excluded from the current range of the shiner. One commenter stated that many small tributaries of the Arkansas River and its larger tributaries incorrectly appear to be included as historical range of the ARS.

Service Response: The distribution and abundance of ARS were determined from collections of fish throughout the Arkansas River basin since the late 1880s. The collection record establishes that this fish occurred abundantly throughout most of the Arkansas River basin with the exception of Colorado. A compilation of the museum records for the ARS is contained in Larson *et al.* (1991). These records, however, generally only contain a percentage of the number of individuals collected because ichthyologists do not always retain and catalog every individual captured. Where possible, individuals captured in excess of those needed for vouchers are released unharmed at the site of capture. Some of the larger vouchers include 533 specimens from the Canadian River below Conchas Reservoir in New Mexico; 827 specimens from the Canadian River near Norman, Oklahoma; 1,182 specimens from the Salt Fork of the Arkansas River in Oklahoma; 1,068 from the Cimarron River near Cleo Springs, Oklahoma; and 2,122 specimens from the North Canadian River near Woodward Oklahoma. At least 21 other voucher collections containing in excess of 200 individuals from over 15 different sites also exist in several museums.

It is important to note that the ARS no longer occurs in the Canadian River below Conchas Reservoir, the entire Salt Fork of the Arkansas River, and the entire North Canadian River and is almost extirpated from the Cimarron River. We believe that these data accurately document that the species was historically widespread and abundant throughout most of the Arkansas River basin and adequately document the decline in range and abundance of the ARS. Based on the amount of currently occupied habitat compared with the amount of historically occupied habitat, either in number of stream miles inhabited or percent of the drainage basin occupied, we believe the 80 percent figure is accurate.

The records from the eastern and western fringes of the species' range are both documented by voucher specimens deposited in natural history museums. We have no information indicating that the identification or capture locations of any of these fish are in doubt.

Arkansas was likely the eastern periphery of the range for the ARS. The individuals collected from the mouth of Piney Creek were deposited as voucher specimens in the University of Michigan, Museum of Zoology (catalog number 128394) and are available for inspection. In addition, Robison and Buchanan (1988) consider the ARS a valid member of the fish community of Arkansas.

The range of the ARS in western Kansas extended at least as far west as Holcomb, Finney County, Kansas based on collection of 41 individuals in 1952. At that time, Cross *et al.* (1985) believed the species inhabited the full length of the Arkansas River in Kansas. There are no records from Colorado, thus the Arkansas River west of Garden City to the Kansas State line was likely the western periphery of the range of ARS.

Although the Arkansas River in extreme eastern Oklahoma and western Arkansas was not likely optimal habitat for the ARS, this reach is established historic range of the ARS. Records for the ARS exist for this section of the Arkansas River prior to construction of the McClellan-Kerr Arkansas River Navigation System and impoundment by Keystone and Kaw reservoirs (Larson *et al.* 1991). We agree that the ARS

likely no longer occurs in the Beaver/North Canadian River.

Some smaller tributaries supported populations of the ARS, at least temporarily, based on verified collection records (Larson *et al.* 1991). These tributaries, while not likely essential habitat for the ARS, are a vital component of the entire watershed and are indirectly important to the survival of the ARS. These tributaries contribute streamflow, sediments and other important habitat constituents; influence water quality; and supply nutrients to the larger tributaries and river mainstems. These inputs are necessary to sustain the ecological integrity of the entire Arkansas River basin.

Comment: One respondent stated that journals of the early explorers reported the western region of the Arkansas River basin to be devoid of water long before the arrival of irrigation on the plains, thus irrigation could not have affected habitat for the ARS.

Service Response: Historically, the western region of the Arkansas river basin did not have an abundant supply of surface water. Average annual precipitation in this region varies from 40–61 cm (16–24 in) and pan evaporation during the growing season varies from 25–38 cm (10–15 in) (Johnson and Duchon 1995). Various periods of drought, generally lasting from 3–5 years each, also have occurred (Johnson and Duchon 1995). Despite these harsh conditions, ARS occurred at a number of sites in the western basin as early as 1926, which is prior to extensive irrigation development (see ''Background'' section). The general lack of water reported by these explorers does not disagree with information in this rule and does not indicate that ARS or their habitat were non-existent in this region prior to extensive irrigation development.

Comment: Thirteen respondents stated that the ARS is abundant in the Canadian River, Revuelto Creek, Palo Duro Creek, and throughout its range.

Service Response: Data available to us, as presented in this rule, document that the ARS has decreased in abundance and has been completely eliminated from over 80 percent of its historical range. The number of fish collected, an indication of the abundance of the species, has declined at numerous sites within the Canadian River (Larson *et al.* 1991).

In the Canadian River, habitat upstream of Ute Reservoir and downstream of Lake Meredith and Eufaula Reservoir has been eliminated or degraded to the point that this habitat no longer supports the ARS. Habitat throughout the entire length of the Arkansas River in Kansas, Oklahoma, and western Arkansas has been destroyed or degraded to the point that the ARS no longer occurs. Likewise habitat in the North Canadian River, Salt Fork of the Arkansas River, and many of the smaller tributaries, including Palo Duro Creek, no longer supports ARS. The introduction of the Red River shiner, in combination with habitat loss and degradation has severely depleted the ARS in the Cimarron River.

Comment: Two commenters stated that records on the periphery of the ARS historical range could be due to bait bucket introductions.

Service Response: These records could be due to bait bucket introduction. However, we believe this is very unlikely. Considering the size of the human population in western Oklahoma and Kansas, the wide-spread distribution of the species, and the general lack of access to the technology necessary for transporting minnows over long distances, we do not believe populations in the Arkansas River were established by bait bucket introductions.

Comment: Two individuals stated that the ARS is thriving in ponds and lakes (e.g., Optima Reservoir) in Oklahoma.

Service Response: All of the existing life history information indicates that the ARS is an obligate riverine species. Flowing water is necessary to keep the eggs suspended in the water column until hatching and the larvae become free-swimming. The few collection records from reservoirs were obtained following a flood event, immediately post-impoundment, or under similar circumstances. A persistent, self-perpetuating reservoir population has never been documented.

Issue 10: Socioeconomic Impacts

Comment: Numerous (325) commenters stated that listing and the regulations which follow will have a devastating effect on the economy of the region. Conversely, two commenters stated that society will benefit when habitat for threatened and endangered species is protected. One other commenter stated that Federal listing of the interior least tern (*Sterna antillarum*) has not affected landowners economically. Fifty commenters requested that we prepare an in-depth regional economic impact study describing how listing will affect present and future economic growth and metropolitan development. Forty-eight others believed that listing places the needs of animals over the needs of the people.

Service Response: Under section 4(b)(1)(A) of the Act, we must base listing decisions solely on the basis of biological information using the best scientific and commercial data available without considering possible economic or other impacts. Because we are specifically precluded from considering economic effects, either positive or negative, in a final decision on a proposed listing, we did not evaluate or consider the economic effects of listing this species.

While economic effects, private property rights, and related concerns cannot be considered in listing decisions, we intend to work closely with affected parties throughout the Arkansas River basin to accommodate economic and recreational activities to the extent possible while ensuring the continued survival and recovery of the ARS. By **Federal Register** notice on July 1, 1994 (59 FR 34272), the Secretaries of the Interior and Commerce set forth an interagency policy to minimize social and economic impacts consistent with timely recovery of listed species. We will strive to balance any recovery actions for the ARS with social and economic concerns.

Comment: Three commenters stated that the High Plains aquifer exists to be exploited for man's benefit. Another respondent stated that once water supplies in the Texas Panhandle are gone, they cannot be easily replaced. Similarly, one respondent stated that one of the Texas underground water conservation districts is involved in developing and implementing an aquifer management plan.

Service Response: Listing will not preclude a landowner's ability to utilize water which exists on or under his property, unless such use would result in take of ARS pursuant to section 9 of the Act. A description of activities we believe would and would not likely violate section 9 is presented in the ''Available Conservation Measures'' section.

If a landowner proposes to withdraw groundwater to an extent that taking of ARS would likely occur, the landowner could seek a section 10(a)(1)(B) incidental take permit to legally take ARS incidental to otherwise lawful activities. We recognize the importance of the aquifer to the citizens of the region but also realize the importance of the aquifer to streamflow within the basin. We believe that a region-wide focus on conservation will ensure that the aquifer can meet the needs of people and the ARS simultaneously. Even at reduced pumping rates, the supply of water within the aquifer is not unlimited. Many citizens realize this

and are diligently striving to conserve this resource. We support such efforts.

Comment: Eleven commenters wanted to know how listing and section 7 of the Act would affect Federal agencies. One commenter was concerned that the section 7 process would increase the costs of and delay affected projects. Seventeen commenters stated that listing the shiner would impact several existing or proposed water development projects in the Arkansas River Basin either by requiring downstream releases or eliminating the ability to control floodwaters. Similarly, seven commenters stated that any change in operation of the upstream Federal reservoirs, which are operated to maximize benefits to the McClellan-Kerr Arkansas River Navigation System, would have a negative impact on navigation either by altering the uses, benefits, and reliability of the navigation system or impacting operation and maintenance of the system. Three commenters stated that listing will extend the regulations of the Act to private land and impact all Federal funds spent in the region.

Service Response: Any action funded, carried out, or authorized by a Federal agency that may affect a listed species would be subject to the section 7 consultation process. The implications of the consultation process on the various agencies would vary according to the nature of the project. If a project was determined to adversely affect a listed species, the action agency would initiate formal consultation with us. We would then prepare a biological opinion, pursuant to 50 CFR 402.14 (h) and (i). If incidental take of a listed species was involved, we would provide mandatory terms and conditions and recommended reasonable and prudent measures in an incidental take statement to minimize take and its effects. Under sections 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered taking within the bounds of the Act, provided that such taking is in compliance with an incidental take statement in a biological opinion.

If we determined that a project would jeopardize the continued existence of a listed species, we would seek to develop reasonable and prudent alternatives to avoid jeopardy. Such reasonable and prudent alternatives might require project modifications. Implementation of reasonable and prudent alternatives and terms and conditions are not discretionary. Discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat would be provided as conservation recommendations in the biological opinion.

We are required to deliver a biological opinion, which concludes consultation, to the action agency within 135 days of receipt of a request for formal consultation (50 CFR 402.14(e)). If the action agency incorporates consultation into their planning process and consultation is initiated early, project delays are unlikely. Meetings with us, preparation of documents, and implementation of any reasonable and prudent alternatives or measures identified in the biological opinion may result in some additional project costs.

Large water development projects virtually always involve a Federal agency through funding, permitting, or other action. Therefore, future construction and ongoing operation of reservoirs will be evaluated for impacts to the ARS, and, where impacts occur, these actions would undergo consultation under section 7 of the Act. If feasible, modifications to these projects will be sought to ensure that the ecosystems upon which this species depends are conserved. However, if no adverse impacts would occur, or if the affected habitat is unoccupied and unsuitable, such as in the McClellan-Kerr Navigation System, further consultation under section 7 would be unlikely.

Private actions, such as construction of a private residence, would be exempt from the regulatory provisions of section 7, unless Federal funds were expended or Federal authorization was required. However, private actions that would result in the taking of an ARS are not exempt. In the latter case, a private party could seek a section 10(a)(1)(B) incidental take permit to legally take ARS incidental to an otherwise lawful activity.

Comment: Seven commenters stated that listing would affect recreational activities (fishing and trail rides) on the Canadian River, at the Lake Meredith National Recreation Area, and at Conchas and Ute reservoirs.

Service Response: We believe that normal, lawfully authorized recreational activities such as hiking, trail rides, camping, boating, hunting, and fishing, do not result in take of the ARS and would not be prohibited under section 9 of the Act (see ''Available Conservation Measures'' section). These activities do not generally impact or destroy the physical habitat for the ARS. However, recreational vehicle use within the river bed to the extent that habitat for the ARS is adversely impacted could be a violation of section 9.

The Lake Meredith National Recreation Area is managed by the National Park Service. Consequently, the National Park Service has an obligation under section 7 of the Act to evaluate its activities for possible effects on listed species. Similarly, if a Federal agency funds, authorizes, or carries out a recreation program at Ute or Conchas Reservoir, that agency has an obligation to evaluate its activities for possible effects on listed species. We do not anticipate that recreational activities at the Lake Meredith National Recreation Area, Ute Reservoir, or Conchas Reservoir will be altered as a result of these evaluations.

Comment: Eighty-four commenters contended that the listing of the ARS will result in control of, or ''taking'' of private property (e.g., grazing and water rights), in clear violation of their rights within the Fifth, Tenth, and Fourteenth Amendments to the U.S. Constitution. Similarly, 25 others concluded that property would be taken without compensation or that listing would impact ability to generate income. Conversely, one individual stated that Federal listing of a fish, the leopard darter (*Percina pantherina*), in southeastern Oklahoma did not result in the loss of private land rights.

Service Response: Listing under the Act does not imply that private land would be confiscated or taken without just compensation, and the Act itself does not authorize ''takings'' of private lands. Many of the provisions of the Act apply only to Federal agencies and Federal lands. However, section 9 of the Act prohibits taking of a listed species, including the ARS, regardless of land ownership. Recovery planning for the species may include recommendations for land acquisition or easements involving private landowners. These efforts would only be undertaken with the cooperation of the landowner. In the vast majority of cases, listing of a species does not preclude private landowners from using their land as they always have.

We do not anticipate significant land use restrictions, impacts to local economies, or to the well-being of citizens. The listing of the Arkansas River Basin population of the ARS does not, in itself, restrict groundwater pumping or water diversions, does not in any way limit or usurp water rights, and does not violate State or Federal water law. Through section 7 consultations, extraction or use of water that is funded, carried out, or authorized by Federal agencies that might adversely affect the ARS could be modified through reasonable and prudent measures or alternatives in a biological

opinion, as discussed previously. However, compliance with section 7 or other provisions of the Act has never resulted in the wrongful taking of property.

Comment: Numerous (105) respondents expressed concern that listing would either reduce land and property values or diminish or eliminate a property owner's equity. Two other commenters specifically stated that listing will depress property values as shown in the Texas A&M University Real Estate Center's study on the Edwards Aquifer.

Service Response: The Act and regulations at 50 CFR 424.11(b) require the Secretary of the Interior to make listing decisions based on the best available scientific and commercial information regarding a species' status, without reference to possible economic or other impacts of such determinations. However, we do not anticipate that listing would result in reduced land and property values or other significant impacts to the economy. The results of one study, conducted by the Massachusetts Institute of Technology (Meyer 1995), show that endangered species listings have not depressed State economic development activity as measured by growth in construction employment and gross State product. Continuing depletion of the High Plains Aquifer and related reduction in the region's water supply is likely to be an equally important factor determining future land and property values in the Region.

Comment: Twelve individuals expressed concern regarding the implications of section 9 of the Act and either urged us to follow the interpretation of the ''Sweet Home'' decision or expressed concern that actions causing habitat alterations would constitute take under section 9.

Service Response: The Sweet Home decision (*Sweet Home Chapter of Communities for a Great Oregon* v. *Babbitt*, 17 F.3d 1463) found the harm regulation at 50 CFR 17.3 invalid because our definition of harm exceeded our statutory authority and was not a reasonable interpretation of the statute. The definition of harm at 50 CFR 17.3 includes ''. . . significant habitat modification or degradation. . . .'' In this decision, the court found that harm does not include habitat modification. However, on June 29, 1995, the Supreme Court upheld our definition of harm to include habitat modification. The prohibition against take of listed species applies to Federal and non-Federal lands without respect to whether critical habitat has been designated. In accordance with our policy published in the **Federal Register** on July 1, 1994 (59 FR 34272), we have identified those activities that would or would not constitute a violation of section 9 of the Act (see ''Available Conservation Measures'' section).

Comment: Twenty-two commenters believed we intend to restrict grazing in riparian zones to reduce damage by livestock.

Service Response: We consider livestock grazing to be one of many contributing factors affecting water quality within the Arkansas River basin. However, we do not envision recommending widespread fencing of riparian zones as a means of reducing water quality degradation within the basin. Excluding livestock from riparian zones is just one means of preserving water quality. Best grazing management practices, such as low to moderate grazing and seasonal or rotational grazing, are compatible with many natural resource objectives and likely do not adversely modify the riparian zone.

Comment: Two respondents stated that we would hamper activities of the commercial minnow industry in order to protect the ARS.

Service Response: We anticipate that listing of the ARS would only have minimal effects on the activities of the commercial minnow industry. At present, take of ARS in Kansas, New Mexico, and Oklahoma without a valid permit is already prohibited by State law. Federal listing will only increase the penalties for unauthorized take. Considering the ARS is not sought by the commercial minnow industry, any take that occurs is incidental to capture of other bait species and will likely be minor. Collectors could minimize take of ARS by using nets having a larger mesh size. We will work with the States and the commercial minnow industry to reduce the threat to ARS from recreational use of bait fish. We expect that any required changes in bait fish collection practices would be minor.

Comment: Eight commenters were concerned that, in order to increase streamflows, we would mandate which soil and water conservation practices could be applied on local farms and ranches.

Service Response: The U.S. Department of Agriculture (USDA) has already developed a list of approved soil and water conservation practices. Under section 7 of the Act, we would consult with the USDA to determine which practices are likely to result in impacts to the ARS. Considering the number of practices that are available, we do not believe that listing of the ARS would significantly affect the soil and water conservation options for local farms and ranches. We have already determined that certain conservation practices, such as terracing, would not likely result in take of ARS (see ''Available Conservation Measures'' section).

Comment: Ten commenters believed that listing would impact the Bureau's Lake Meredith Salinity Control Project. Seven commenters stated that this project is not a threat and would not impact the ARS.

Service Response: We expect the effects of the Lake Meredith Salinity Control Project on the ARS will be minimal. Consequently, conservation of the ARS will have little influence over the anticipated construction and operation of this project (see factor a in ''Summary of Factors Affecting the Species'' section).

Comment: Five commenters were concerned about the effect of the listing on operation of Lake Meredith.

Service Response: In 1968, the Bureau turned operation and maintenance of the reservoir over to the Canadian River Municipal Water Authority (CRMWA). However, until the cost of the reservoir has been repayed to the Federal government, operation of the reservoir is still considered a Federal action. Arkansas River shiners are not known to inhabit Lake Meredith. Arkansas River shiners prefer riverine environments; if they occur in the reservoir, they would only occur in the upper reaches of the reservoir on a temporary basis. Existing literature on spawning requirements of the ARS do not indicate that the species could complete its entire life cycle within the confines of the reservoir. Consequently, we do not anticipate any impacts to reservoir operation.

Scheduled, downstream releases from Lake Meredith have not occurred since the reservoir was constructed. Water releases could occur at three points, the spillway, control gates, and river outlet works. Water levels in the reservoir have never reached the elevation of the spillway. Releases could still occur from one of the other two points as long as the water surface elevation was above 868.6 m (2850 ft). Although lack of releases from Lake Meredith has had a significant effect on ARS habitat below the reservoir, we do not believe releases from Lake Meredith would provide any significant, long-term benefit to the ARS. The Canadian River floodplain below Lake Meredith has been invaded by salt cedar, mesquite, and other perennial woody vegetation such that a single, one-time release would not likely result in significant improvements in habitat for the ARS. This vegetation would likely consume a considerable portion of the released water and prevent restoration to a wider,

unvegetated floodplain unless the density of the vegetation was reduced or vegetation was removed prior to release. Likewise, we do not believe sufficient precipitation occurs in this area to support sufficient releases, either in duration or frequency, to improve downstream aquatic habitat permanently.

During the recovery process, we intend to investigate the potential for improving habitat below Lake Meredith with the Bureau, CRMWA, and TPWD. If releases from Lake Meredith ever occur, we will work with responsible entities to ensure that ARS benefit to the extent possible.

Comment: Thirty-seven commenters stated that listing would affect municipal water systems. Two others were concerned about the consequences of listing on municipal storm water drainage systems and waste water treatment facilities.

Service Response: Unless a city's water supply system, storm water drainage system, or waste water treatment facility is funded, carried out, or authorized by a Federal agency, these projects would not be subject to the requirements of section 7 (see other comment response under this issue for further discussion of the section 7 consultation process). If these projects result in take of ARS, the provisions of section 9 would apply. As stated in the ''Available Conservation Measures'' section, existing discharges into waters supporting the species that are carried out in accordance with existing regulations and permit requirements generally would not constitute a taking of ARS.

The States, with assistance from and oversight by the U.S. Environmental Protection Agency (EPA), set water quality standards that are presumably protective of aquatic life, including the ARS. If new information indicates that current water quality criteria are insufficient to prevent the likelihood of jeopardy to the ARS, new standards may be needed. In this instance, the EPA would consult with us under section 7 of the Act to determine appropriate standards. However, we believe that no significant increase in regulatory burden regarding waste water discharge permits would result from listing of the ARS.

Comment: Nineteen respondents wanted to know what impact this listing would have on the use of agricultural chemicals. Another was concerned that listing would hinder ability to obtain section 18 exemptions under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA).

Service Response: The EPA, during its pesticide registration process, consults with us to determine if a pesticide will likely jeopardize the continued existence of any federally listed species. If we determine that the application of the chemical is likely to jeopardize a species, we provide reasonable and prudent chemical application alternatives, if any, that would avoid the likelihood of jeopardy. These alternatives generally consist of some type of application restriction to protect the species (e.g., prohibit pesticide application within a prescribed distance from an inhabited stream reach). Thus, it is possible that we could require restrictions on the use of a pesticide to avoid jeopardizing the ARS.

Although there may be some added restrictions to pesticide use as a result of this listing, we believe that the resulting impacts to pesticide users will be minimal. We have already assessed the stream reaches inhabited by the ARS that are populated with previously listed species (interior least tern and bald eagle (*Haliaeetus leucocephalus*)). Additionally, some pesticides reviewed for registration are not believed to be harmful to fishes and no restrictions are applied. If we find a pesticide to be harmful to a species, pesticide users can sometimes use other unrestricted, alternative chemicals to control the same pest.

Comment: Fifteen commenters stated that listing the ARS would have the same implications for the High Plains aquifer as listing did for the Edwards Aquifer.

Service Response: We do not expect the implications to be the same because the two situations differ. The High Plains aquifer is not a porous limestone, karst aquifer, as is the Edwards Aquifer. Recharge in the southern portions of the High Plains Aquifer is no more than 2.5 cm (1 in) annually (Opie 1993). Although discharge from the High Plains Aquifer is important to streamflow in the western portions of the Arkansas River basin (Luckey and Becker 1998), the ARS is not an obligate spring inhabitant. Several of the listed species occurring in the Edwards Aquifer Region are entirely dependent on spring discharge for habitat maintenance or actually reside underground within the aquifer.

Comment: Numerous (280) commenters stated that listing or designation of critical habitat would result in the Federal government regulating or restricting the use of surface/stream water and groundwater within the Arkansas River basin. Similarly, one respondent stated that although pumping from the aquifer may one day cease to be economically feasible, the free enterprise system must determine when this occurs, not a fish or the Federal government.

Service Response: The listing of the ARS does not, in itself, restrict groundwater pumping or stream water diversions, does not in any way limit or usurp water rights, and does not violate State or Federal water law. Likewise, we have no authority to regulate surface water or groundwater. However, groundwater pumping or a surface water withdrawal that would dewater a stream or reduce base flows to the point that a take of ARS occurred would be a violation of section 9 of the Act.

We believe that groundwater pumping at existing rates does not pose an immediate threat to remaining ARS aggregations in the Canadian River in Texas and Oklahoma, but that withdrawals at existing rates will eventually deplete the aquifer to the point that streamflows will be reduced and ARS will be affected. Because withdrawals of groundwater and surface water at current rates have already reduced streamflows in other areas of the ARS historic range in western Oklahoma and Kansas, northern Texas, and eastern New Mexico, continued withdrawals at current rates will further diminish streamflow and make habitat more unsuitable for ARS. In the currently occupied range of the ARS, withdrawals will likely cause adverse effects in the foreseeable future unless mitigating actions are implemented. In the long term, groundwater withdrawals must be reduced to the point that they do not exceed recharge, or ARS habitat in the western reaches of the Arkansas River basin will ultimately be lost. A recent report by the USGS (Luckey and Becker 1998) demonstrates the predevelopment influence of the High Plains aquifer on streamflows in the western reaches of the Arkansas River basin. However, we recognize that groundwater pumping is not entirely responsible for reduced streamflows and the demise of the ARS in the Arkansas River basin.

We intend to fully address the implications of groundwater withdrawals and diversions of surface water during the recovery process. Generally, we will support and encourage the States in their efforts to increase irrigation efficiency and improve conservation of groundwater sources in the High Plains. Groundwater management districts in the Texas High Plains have aggressively encouraged implementation of water-saving technologies that have minimized annual depletion. For example, low head, low pressure sprinkler (LEPA) systems have largely replaced high

pressure sprinkler systems in the Texas High Plains.

Some other States do not have underground water conservation districts or similar groups that encourage water conservation to the same extent. Unfortunately, conversion to LEPA systems in other States has not been as widespread. Flood irrigation and high pressure center pivot and side roll systems are still often used in western Oklahoma and Kansas. Conservation of the High Plains aquifer, and the resulting benefits to streamflow within the Arkansas River basin, will not occur without the participation of other States. We believe voluntary conservation of the groundwater resource will be more effective in recovery efforts for the ARS than restricting or otherwise regulating withdrawals.

Comment: Two commenters stated that groundwater withdrawals in the extreme southern portion of the High Plains aquifer do not influence groundwater levels or streamflows in the Canadian River basin and that we mislead the public with these statements.

Service Response: We agree that this portion of the High Plains aquifer appears to have little influence, if any, over groundwater levels or streamflows within the Canadian River basin in Texas.

Comment: Four commenters stated that listing might impose additional cuts on oil and gas development, causing imports of foreign oil to rise.

Service Response: The listing of the ARS will not, in itself, restrict oil and gas development. However, if such development is funded, authorized, or carried out by a Federal agency, that agency has an obligation to evaluate it's activities for possible effects on listed species. If such activities may adversely affect the ARS, then some conservation actions may be necessary. Use of water from the High Plains aquifer for secondary oil recovery is not likely to be restricted as a result of this listing. We believe voluntary conservation of the groundwater resource will be more effective in recovery efforts for the ARS than restricting or otherwise regulating withdrawals.

Peer Review

We routinely solicit comments from parties interested in, and knowledgeable of, taxa which have been proposed for listing as threatened or endangered species. On May 7, 1993, we mailed a summary of the available status information on the ARS to 72 Federal and State agencies, organizations, and knowledgeable individuals, including 10 university scientists familiar with the status of fishes in the Arkansas River basin. We solicited their comments on life history, threats, and the need to propose this species under the Act. We received 13 responses.

Of the 13 respondents, the National Park Service, the Corps' Tulsa District, Kansas Water Office, and a fishery scientist from Texas Tech University provided no new information. The Bureau submitted information on the Lake Meredith Salinity Control Project. The TPWD submitted known collection records and stated that the last recorded observation in Texas was from 1954. Two acknowledged scientific authorities and one research assistant from Oklahoma State University responded that the status and threats we presented were accurate and supported listing. A highly respected fisheries ecologist from the University of Oklahoma commented that periodic scientific collecting would not harm the species and stated that modification of streamflow was the primary threat. A biologist employed by the State of Oklahoma, who has annually surveyed fish communities throughout the State since 1976, submitted information relative to the status of the species. Two of our offices, one in Kansas and one in New Mexico, also provided status information. Our New Mexico Ecological Services Field Office concurred that listing of the Pecos River population of the ARS was not appropriate. The most extensive comments were submitted by the New Mexico Interstate Stream Commission. They did not express an opinion on the need to list but did provide considerable information on threats to the species. We considered all of the information provided in preparing this rule.

A July 1, 1994, policy on peer review (59 FR 34270) requires us to solicit peer review on our listing proposals from a minimum of three independent peer reviewers. We sent copies of the proposed rule to 20 appropriate and independent specialists who have extensive knowledge or expertise in the life history, taxonomy, and ecology of the ARS. All of these specialists were employed at universities within the States affected by the proposed rule. We received one response which expressed support for the proposed listing and provided additional insight into threats affecting the species. The remaining reviewers did not respond to our request. We also met with USGS staff in Oklahoma to discuss threats affecting this species.

We also requested and/or received comments on the proposed rule from a variety of Federal, State, county, and private individuals, including all parties known to us having expertise regarding the ARS. Additionally, the State fish and game agencies as well as the State water management agencies were requested to comment. The game and fish agencies in the States of Kansas, New Mexico, and Oklahoma supported listing. The TPWD opposed listing the species in Texas. Various State water management agencies and the USGS provided information on threats to the species. We considered all of these comments in preparing this final rule.

Summary of Factors Affecting the Species

After a thorough review and consideration of all information available, we have determined that the Arkansas River basin population of the ARS is not in imminent danger of extinction. However, we have determined that this population is likely to become in danger of extinction within the foreseeable future and, therefore, should be listed as a threatened species.

Section 4(a)(1) of the Act (16 U.S.C. 1531 *et seq.*) and regulations (50 CFR Part 424) promulgated to implement the listing provisions of the Act set forth the procedures for adding species to the Federal lists. 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). These factors and their application to the Arkansas River basin population of the ARS (*Notropis girardi*) are as follows:

A. *The present or threatened destruction, modification, or curtailment of its habitat or range.* The primary threat facing the ARS and its associated habitat is the destruction and modification of habitat by one or more of the following: stream channelization, reservoir construction, streamflow alteration and depletion, and, to a lesser extent, water quality degradation.

Navigation improvements on the Arkansas River by the Corps began in Arkansas in 1832, 4 years before Arkansas adopted statehood (Corps 1989). Initially, constructed projects generally consisted of small improvements, such as clearing and snagging operations, until passage of the River and Harbor Act in 1946 authorized construction of the McClellan-Kerr Arkansas River Navigation System from the Mississippi River upstream to Catoosa, Oklahoma. Project construction began in the 1950s and intensified during the 1960s. Project segments from the Mississippi confluence upstream to Fort Smith, Arkansas were completed by 1969. By 1970, the channel had been extended up

the Arkansas River as far as Muskogee, Oklahoma and was essentially complete. The project included numerous bank stabilization and channel rectification projects, 17 locks and dams (12 in Arkansas), annual channel maintenance, and port facilities. Several of the locks and dams are multipurpose facilities, providing hydropower generation. The Corps maintains a minimum channel depth of 3 m (9 ft) and minimum width of 76 m (250 ft).

Channelization causes a variety of changes in natural stream channels, including altering the channel shape, form, and width, water depth, substrate type, stream gradient, streamflow, water velocity, and the hydroperiod (Simpson *et al.* 1982). Channelization of the Arkansas River has permanently altered and eliminated suitable habitat for the ARS and is largely responsible for the extirpation of the ARS within the State of Arkansas. This channelization has also contributed to the decline of the species in Oklahoma. In the Arkansas River downstream of Muskogee, Oklahoma, ARS were last observed in 1985 (Pigg 1991). Buchanan (1976) failed to collect any ARS specimens from the Arkansas River Navigation System in Arkansas, and fish collections between 1972 and 1988 from the Arkansas River near Fort Smith, Arkansas also failed to produce any ARS specimens (Robison and Buchanan 1988).

Reservoir construction is the most widespread cause of habitat loss for the ARS. Numerous multipurpose impoundments, including three mainstem reservoirs on the Arkansas River (John Martin, Kaw, and Keystone) and four mainstem reservoirs on the Canadian River (Conchas, Ute, Meredith, and Eufaula) have been constructed within the Arkansas River basin. Other large mainstem impoundments also have been constructed within the historical range of the ARS—Optima and Canton reservoirs on the North Canadian River, and Great Salt Plains Reservoir on the Salt Fork of the Arkansas River. All of these impoundments have inundated, dewatered, fragmented, or otherwise directly altered considerable sections of riverine habitat once inhabited by ARS. Arkansas River shiner populations persist only below Ute Reservoir in New Mexico and Lake Meredith in Texas (Bonner *et al.* 1997; Eric Altena, *in litt.* 1993; Larson *et al.* 1991; Pigg 1991).

Inundation following impoundment eliminated ARS spawning habitat, isolated populations, and favored increased abundance of predators both upstream and downstream of these reservoirs. Water releases from impoundments may be infrequent or non-existent in the western portions of the Arkansas River basin causing streams to be dewatered for considerable distances downstream of the reservoir.

In the eastern region of the basin, sufficient water is released to maintain downstream flows. However, these releases generally alter the natural flow regime for considerable distances downstream of the impoundment, establishing a stream environment unlike that which existed under pre-impoundment conditions. Regulation of streamflows has severely modified or eliminated natural cycles of flooding, drought, and sediment transport. Physical changes from these altered flows may include modifications to water velocity, wetted perimeter (amount of streambed exposed to water at any given flow), water depth, streambed and bank erosion, and suspension and re-distribution of bed and bank sediments.

Impoundments also function as barriers, fragmenting populations and habitat into smaller, more isolated units. These fragmented sections are then more likely to be affected by influences from external factors (e.g., localized drought, water withdrawals, permitted and unpermitted wastewater discharges). Once the habitats are isolated, other aggregations of ARS can no longer disperse into them and help maintain or restore populations of ARS there.

In 1952, the ARS was believed to inhabit the entire Arkansas River mainstem in Kansas, but was already suspected to be declining due to the construction of John Martin Reservoir 10 years earlier on the Arkansas River in Bent County, Colorado (Cross *et al.* 1985). By 1960, the species had disappeared from the Arkansas River mainstem west of Wichita, Kansas and was absent from the entire Kansas portion of the Arkansas mainstem by 1983 (Cross *et al.* 1985).

Arkansas River shiners were apparently abundant in the Arkansas River near Tulsa, Oklahoma prior to construction of Keystone Reservoir in 1964 (Pigg 1991). Following addition of hydropower at Keystone Dam in 1968, the resultant flow alterations severely depleted ARS populations. The ARS was last observed from the section of the Arkansas River between Keystone Reservoir and Muskogee, Oklahoma, in 1982. Kaw Reservoir, another Arkansas River mainstem impoundment, located upstream of Keystone Reservoir, became operational in 1976. Arkansas River shiners were last observed downstream of Kaw Reservoir in 1986 (Larson *et al.* 1991, Pigg 1991).

On the Canadian River, Eufaula Reservoir, Lake Meredith, Conchas Reservoir, and Ute Reservoir have impacted the ARS. Construction of Conchas Reservoir in 1938 ultimately led to the extirpation of upstream populations. Flows in the Canadian River prior to construction of Conchas Reservoir, as measured at Logan, New Mexico (before Ute Reservoir was completed in 1963), averaged 11.1 cubic m/s (392 cfs). Flows declined to 7.6 cubic m/s (270 cfs) after Conchas Reservoir was built. Flows at Logan declined to 1.1 cubic m/s (38 cfs) after construction of Ute Reservoir.

Prior to completion of Eufaula Reservoir, ARS were abundant in the Canadian River between the proposed dam site and the Arkansas River (Pigg 1991). Arkansas River shiners have not been collected from this reach of the Canadian River since the reservoir became operational in 1964. The disappearance of ARS from the 43-km (27-mi) section of the Canadian River below Eufaula Reservoir has been attributed to rapid water level fluctuations occurring during hydropower generation and altered conditions favoring an abundant predatory fish population (Pigg 1991).

Lake Meredith was constructed by the Bureau in 1965 and conservation storage is presently managed by the CRMWA. Prior to construction of the reservoir, historical streamflow measured at Canadian, Texas, 121 river-km (75 river-mi) below Lake Meredith, averaged 15.5 cubic m/s (549 cfs). Releases from Lake Meredith are now infrequent to non-existent (Williams and Wolman l984) and have considerably altered flows in the Canadian River downstream of the reservoir. Annual discharge at Canadian, Texas now averages only 2.4 cubic m/s (83.7 cfs). Principal sources of water to the Canadian River below Lake Meredith are wastewater discharges, tributary inflows, and groundwater discharges (Buckner *et al.* 1985). Although ARS persist in the Texas portion of the Canadian River some 121 river-km (75 river-mi) downstream of Lake Meredith, remaining populations are small.

Reduced flows downstream of Lake Meredith, and to a lesser extent below Ute Reservoir, have considerably altered the morphology of the Canadian River and have reduced the extent of suitable habitat for ARS. Stinnett *et al.* (1988) examined a 370-km stretch of the Canadian River and associated 72,843 hectares (ha) (179,495 acres (ac)) of floodplain between the western Oklahoma border and the western

Pottawatomie County line near Norman, Oklahoma. Between 1955 and l984, the amount of riverine wetlands (shoreline and open water) had decreased by about 50 percent. Sandbar acreage alone had been reduced by 54 percent. Wetland and associated floodplain changes were principally the result of hydrological modifications due to the influence of Lake Meredith (Stinnett *et al.* 1988). The lack of significant scouring flows permitted the encroachment of vegetation into the channel, reducing channel width by almost 50 percent since 1955. Although ARS persist in the Canadian River downstream of Ute Reservoir and Lake Meredith, the reduction in available habitat has likely suppressed shiner populations in affected reaches. Habitat alterations associated with reduced flows downstream of Lake Meredith are considered to be a significant, ongoing threat to the continued existence of the ARS within the Canadian River.

Surface water withdrawals constitute a small percentage of the total water used within the western sections of the historical range of the ARS, primarily because of the limited number of impoundments and elevated levels of chlorides. However, surface flows in the Cimarron River upstream of Waynoka, Oklahoma are affected by several diversions for irrigation. Within the western portion of the Arkansas River basin, groundwater is an extremely important water source due to limited surface supplies and lack of precipitation during the summer months (Oklahoma Water Resources Board 1997, 1990, 1980; Kansas Water Office and Kansas Division of Water Resources 1992; Texas Water Resources Board 1990; Stoner 1985; Texas Department of Water Resources 1984). For example, withdrawals from western Oklahoma aquifers account for about 80 percent of the State's total groundwater usage (Oklahoma Water Resources Board 1990). Irrigation of croplands in the basin is the dominant use of this water. Withdrawal from the High Plains aquifer and from alluvial and terrace deposits associated with the major river systems in conjunction with diversion of surface water has affected streamflow in several of the major tributaries. Kromm and White (1992) state that streamflow has been dramatically reduced by groundwater withdrawals in western Kansas and has eliminated aquatic ecosystems in many areas of the High Plains.

During the period from 1950 to 1975, water tables receded from 3 m (10 ft) to more than 30 m (100 ft) over much of southwestern Kansas (Cross *et al.* 1985). Between 1955 and 1980, declines in water levels by as much as 31 m (102 ft) have been recorded from the High Plains Aquifer in Oklahoma (Oklahoma Water Resources Board 1980). In 1960, there were about 400 groundwater wells in the Oklahoma panhandle; by 1974, the number of wells had risen to 2,067 (Oklahoma Water Resources Board 1980). By 1988, there were an estimated 3,200 high capacity wells overlying the Ogallala Aquifer in western Oklahoma alone (Oklahoma Water Resources Board 1990).

In Texas, withdrawals of groundwater in the Canadian River Basin were as much as 33 times higher than the annual natural recharge in 1980 and irrigation return flows in the Basin are negligible (Texas Department of Water Resources 1984). From 1980 to 1994, Dugan and Sharpe (1996) documented a nearly continuous area of decline exceeding 3 m (10 ft) in the Central High Plains subregion of the aquifer, including much of southwestern Kansas, portions of the Oklahoma Panhandle, and much of the northern Panhandle of Texas. The water level declines in the Central High Plains subregion were the largest, both in area and magnitude of decline, of any in the entire High Plains aquifer. Even precipitation that averaged about 5 cm (2 in) above normal from 1981–93 in the Central High Plains appeared to have a minimal effect on the large rate of water level decline (Dugan and Sharpe 1996). Portions of this subregion also showed evidence of a long-term decline in the amount of irrigated cropland acreage during this same period.

Streamflow is the largest natural discharge from the aquifer and pumping from the aquifer has caused water level declines and streamflow reductions (Luckey and Becker 1998). The relationships between groundwater pumping and river flow are complicated. Generally, when groundwater is pumped faster than it is restored, water tables drop, channel seepage ceases, and streams dry up. Under these conditions, suitable habitat to support ARS populations is non-existent.

The Canadian River appears to have been affected the least by water withdrawals from the High Plains aquifer primarily because much of the Canadian River in Texas and New Mexico has cut below the water bearing strata and the alluvium has not been significantly tapped as a source of water. Much of the land immediately adjacent to the Canadian River in Texas is rangeland and relatively little groundwater use occurs. Upstream of the Hutchinson-Roberts county line, including Lake Meredith, the Canadian River stream bed is below the elevation of the High Plains aquifer. Induced recharge of the High Plains aquifer by the Canadian River within this segment, caused by a lowering of the water table, is not likely to occur. The primary influence of the High Plains aquifer on streamflow within this reach would be predominantly through spring flow and similar emissions (e.g., natural discharge) where the water table intersects the land surface.

Springs and seeps in the Canadian River basin of Texas issue largely from Ogallala sand, gravel, and caliche, and from Triassic sandstone (e.g. Dockum and Santa Rosa formations), with a few flowing from Permian dolomite (Brune 1981, Peckham and Ashworth 1993). Upstream of Lake Meredith, Brune (1981) identified 57 springs or seeps from Oldham and Potter counties and another 25 from Hutchinson County. In his discussion of the importance of these water bearing formations and the effects of groundwater withdrawal on spring flow, Brune (1981) stated that the water tables in the Ogallala and Dockum aquifers were rapidly being depleted and flow within the associated springs had declined or ceased to flow. However, the contribution of these springs and seeps to flow in the Canadian River upstream of Lake Meredith is relatively minor.

In 1937–38, prior to large scale development of the High Plains aquifer for irrigation, flow contributions from 56 known springs in Oldham and Potter counties were measured (Texas State Board of Water Engineers 1938a, 1938b). Measured flows from these springs totaled between 2 and 4 cfs. Prior to construction of Conchas Reservoir, New Mexico in 1938, 2–4 cfs represented only about 0.5–1 percent of the average annual discharge in the Canadian River, as measured at Logan, New Mexico, and less than one percent at Amarillo (USGS 1961, 1963). Based on this information, the influence of irrigation withdrawals from the High Plains aquifer on streamflows upstream of Lake Meredith appears to be insignificant, particularly compared to flow reductions caused by impoundment of the Canadian River in New Mexico.

Downstream of Lake Meredith, the Canadian River is below the elevation of the High Plains aquifer in Hutchinson County, but is confined within the sediments of the aquifer in Roberts and Hemphill counties (John Ashworth, Texas Water Development Board, *in litt.* 1995). Within Hutchinson County, as within the segment above Lake Meredith, contributions from springflow are the primary influence of the aquifer on streamflow. Unfortunately, we have

been unable to locate comparable historic spring flow information for the reach downstream of Lake Meredith. Brune (1981) provides information on flow from some 62 springs in Hutchinson, Hemphill, and Roberts counties. These springs generally have relatively low flows, with only Spring Lake Springs in Hutchinson County, Texas having a measured flow exceeding 1 cfs (Brune 1981). However, these measurements were taken in 1977 and 1978 after widespread irrigation development had already had its greatest effect on water levels in the High Plain aquifer. Consequently, we cannot determine the influence of groundwater pumping on the observed springflows with the available information. Considering the small contribution of springflow within this segment, we believe a reduction in spring flow is not likely to have had a profound impact on streamflows or habitat for the ARS. Certainly, any impact from a reduction or cessation of flows from these springs and seeps is considerably less significant than the influence of Lake Meredith on existing streamflows.

Downstream of the Hutchinson County segment, however, groundwater moves toward the river where it eventually either discharges as spring flow into the river or seeps into the alluvial deposits (John Ashworth, *in litt.* 1995). The potential for groundwater depletion to affect streamflows is much greater in this segment of the Canadian River. For example, a proposed project adjacent to the Canadian River in Roberts and Hutchinson counties, Texas has the potential to reduce median streamflows over the 50-year life of the project by as much as 25 percent, as measured at Canadian, Texas (Kathy Peters, USGS, *in litt.* 1998). The proposed project would also dewater White Deer Creek, a Canadian River tributary, over much of its length. This project ultimately would involve the pumping of some 1,200 cubic meters (40,000 acre-feet) of groundwater annually (Bureau 1997). Currently, no reliable means of augmenting streamflows in White Deer Creek or the Canadian River have been identified. Occurrences of the ARS in the Canadian River within the project are extremely rare. No ARS were reported from fish collections made by Texas Tech University, Bureau, and us from White Deer Creek or the Canadian River in 1998 (Shirley Shadix, Bureau, *in litt.* 1998). Only three ARS were reported captured by Texas Tech University at Canadian, Texas in 1995 (Gene Wilde, in *lit.* 1997). However, we are currently working with the Bureau and the CRMWA to identify feasible measures which would reduce the impacts of the proposed project.

Continued unmitigated groundwater withdrawal threatens to further reduce or eliminate baseflows in western sections of the Arkansas River basin. Fortunately, improved conservation, more efficient irrigation practices, and improved technology have resulted in less water demand over the last 5 years. However, precipitation and runoff contribute little recharge to the underlying aquifers. In the Canadian River basin in Texas, water demand is projected to decrease only slightly over the next 50 years primarily due to improvements in irrigation efficiency (Texas Water Development Board 1990). In Oklahoma, water use is projected to increase statewide over the next 50 years (Oklahoma Water Resources Board 1997). Municipal and industrial demands are expected to increase by about 30 percent and agricultural demands by 29 percent. Streamflows will continue to diminish despite declining agricultural demand in Texas and basinwide decreases in the amount of water used per irrigated acre.

Depletion of the High Plains aquifer is expected to continue to occur in Kansas, New Mexico, Oklahoma and Texas. When two below-average flow years occur consecutively, a short lived species such as the ARS can be severely affected, if not completely eliminated from portions of the river. Dewatering and reduced base flows, due to groundwater and surface water withdrawals, is considered a significant, ongoing threat to the ARS in southwestern Kansas, northwestern Oklahoma and the Texas panhandle (Larson *et al.* 1991, Cross *et al.* 1985).

The Bureau's Lake Meredith Salinity Control Project is designed to control brine water seeping into the Canadian River downstream of Ute Reservoir from a brine aquifer in New Mexico. The Bureau completed a Final Supplemental Environmental Assessment (EA) for the salinity control project in September 1995 (Bureau 1995). At that time, we were concerned with projected streamflow reductions as a result of the project. However, the Bureau has changed the scope of the salinity control project since they completed the EA and expects these changes to reduce the impacts of the project.

As originally proposed, the salinity control project would have reduced streamflow by 1.4 cfs, with a maximum project potential streamflow reduction of 3.2 cfs. A reduction of 1.4 cfs represents about a 35 percent reduction in the average baseflow of the Canadian River as measured at the downstream end of the project and a 12–14 percent reduction in average base flow as measured at the confluence of Revuelto Creek in New Mexico. The reduced project is now anticipated to reduce flows by only 0.7 cfs, with a maximum potential of 1.4 cfs. This represents an estimated flow reduction of 8–15 percent, with only minimal expectations of ever operating the project above the anticipated pumping rate of 0.7 cfs. Downstream of Revuelto Creek, the effects on streamflow from revised project operation are expected to be no more than 5 percent of average base flow.

In addition, the CRMWA anticipates no additional surface water withdrawals upstream of Lake Meredith, at least in Texas, once the project is operational (J.C. Williams, CRMWA, *in lit.* 1997). The State of New Mexico has expressed an intent to use Canadian River water below Ute Reservoir in conjunction with the Eastern New Mexico Water Supply Project (Bureau 1995). These withdrawals would affect Canadian River streamflows, particularly between Ute Dam and the confluence of Revuelto Creek. However, the future of this project is unclear. A Special Environmental Report prepared by the Bureau (1993) on this project recommends that base flows of the Canadian River below Ute Reservoir be maintained at a minimum of 2 cfs. Such mitigation would preclude dewatering of the Canadian River below Ute Reservoir but would still result in streamflow reductions. Arkansas River shiner populations in this 219-km (136-mi) reach of the Canadian River are isolated from other populations by Ute and Meredith reservoirs. Any additional flow reductions in this reach could severely deplete these populations.

We believe that water quality degradation within the Arkansas River basin can cause localized impacts to ARS populations, particularly in areas with rapidly expanding urban populations. Water quality in the Canadian River in Texas generally declines as the river flows eastward. The Canadian River traverses oil and gas producing areas and receives municipal sewage effluent and manufacturing return flows, all of which degrade existing water quality (Texas Department of Water Resources 1984). Water quality within the Canadian River begins to improve as the river flows through the sparsely populated counties in western Oklahoma. However, several discharges influence water quality in the remainder of the Canadian River. The wastewater treatment facility for the City of Norman is the largest single

discharge into the Canadian River in Oklahoma.

Poor water quality in the North Canadian River near Oklahoma City and in the Arkansas River at Tulsa are also believed to have contributed to localized declines in ARS populations. The North Canadian River from western Oklahoma City downstream to Eufaula Reservoir is considered to be the most nutrient enriched stream in Oklahoma (Pigg *et al.* 1992). The ARS has not been found in this section of the North Canadian River since 1975 (Jimmie Pigg, pers. comm. 1997). In 1997, there were 623 active National Pollution Discharge Elimination System (NPDES) permits in Oklahoma. The majority of these are in the Arkansas River basin.

Some agricultural practices have contributed to water quality degradation in the Arkansas River basin, likely resulting in impacts to ARS aggregations. Agriculture can be a key contributer of nutrients, sediments, chemicals, and other types of non-point source pollutants, primarily due to runoff from range and pastureland and tilled fields. The EPA (1994, 1998) found that agricultural practices were the primary source of water quality impairment in both rivers and lakes and were responsible for the impairment of 72 percent of the stream miles assessed nationwide in 1992 and 25 percent in 1996. The decline in 1996 was largely due to an expansion of the national estimate of total river miles to include nonperennial streams, canals, and ditches, which essentially doubled the total river miles surveyed since 1992 (EPA 1998). Siltation and nutrient pollution were the leading causes of water quality impairment in both studies. Increased nutrients promote eutrophication of aquatic ecosystems, including the growth of bacteria, algae, and nuisance aquatic plants, and lower oxygen levels.

Overgrazing of riparian areas also can affect ARS habitat. Overgrazing in riparian zones is likely to be locally detrimental and is one of the most common causes of riparian and water quality degradation (Kauffman and Krueger 1984). High livestock densities may result in excessive physical disturbances, such as trampling, and changes in water quality. Trampling of pool margins and thinning of vegetation from overgrazing induce changes in the plant community structure, species composition, relative species abundance, and plant density which are often linked to more widespread changes in watershed hydrology. For example, soil compaction may increase pasture runoff, leading to erosion and increased siltation in streams.

B. *Overutilization for commercial, recreational, scientific, or educational purposes.* We have no evidence that the ARS is being overutilized for commercial, recreational, scientific, or educational purposes. We speculate that the ARS may occasionally be collected for personal use as bait by individual anglers. The States of Kansas, New Mexico, Oklahoma, and Texas allow the harvest of fish for personal use as bait. The introduction of the ARS into the Pecos River, presumably by anglers, provides some evidence that ARS are at least occasionally collected and used as bait. A record also exists for the Red River system in Oklahoma that was presumed to have been a bait bucket release (Cross 1970). However, the rarity of the ARS outside of the Canadian River would indicate that this fish is not likely to occur in the retail trade or to be collected for personal use very frequently.

Larson *et al.* (1991) reported that there is no evidence that the species has been adversely affected by the commercial harvest of bait fish. The reported capture of predominantly large species (plains minnows (*Hybognathus placidus*)) and the continued existence of the ARS in portions of the South Canadian River was the primary evidence used in arriving at this conclusion. Larson *et al.* (1991) suggested that slender-bodied fishes such as ARS would constitute only a small percentage of the commercial harvest, assuming the commercial bait industry used large-mesh seines as the major mode of capture. However, other evidence described below indicates that ARS, while perhaps not a highly sought commercial species, is being affected by the commercial bait industry or is being harvested for personal use as bait.

The greatest potential threat to ARS from incidental collection occurs in the State of Oklahoma. In 1985, the Cimarron and South Canadian rivers produced over 55 percent of the bait fish harvested in Oklahoma, providing over 20,846 kilograms (kg) (45,958 pounds (lbs)) of fish (Peterson 1986). Plains minnow, which may reach total lengths of 127 cm (5 in), was the primary species reported harvested by the commercial minnow dealers. In 1996, the Cimarron and South Canadian rivers produced slightly less than 34 percent of the bait fish harvested in Oklahoma, providing over 17,663 kg (38,941 lbs) of fish (Wallace 1997). River shiners (species unreported) and plains minnows were reported to be the primary species harvested. From 1980–81 to 1996, the percent of the total harvest taken from the South Canadian and Cimarron rivers varied from 67 percent in 1982 (Peterson and Weeks 1983) to 34 percent in 1996 (Wallace 1997). The amount of fish taken varied from over 37,762 kg (83,252 lbs) in 1982 to 17,663 kg (38,941 lbs) in 1996. The lists of species harvested did not include ARS.

The rapid establishment of the ARS in the Pecos River, presumably from the release of bait fish, indicates that a sufficient number of fish were released in a single event to establish a reproducing population. If ARS occur only occasionally in the commercial harvest or are rarely used as bait, several releases over a short period of time would be required to ensure that a large enough population existed to facilitate natural reproduction. In either instance, the evidence indicates that ARS may occasionally occur in commercial catches in fairly large numbers or are occasionally being harvested for bait. The capture of four individuals from the North Canadian River in 1990 also suggests that ARS are occasionally being used as bait fish.

Lists of fish species reported captured by commercial bait dealers are not always accurate and likely fail to report the capture of ARS. Based on the large percentage of golden shiners (*Notemigonus crysoleucas*) reported captured by commercial bait dealers in 1989, Larson *et al.* (1991) believed the lists to be suspect. River shiners are often one of the primary ''species'' reported harvested by commercial bait dealers. However, the river shiner (*Notropis blennius*) has not been recorded from several of the rivers where commercial minnows are harvested (Miller and Robison 1973). Larson *et al.* (1991), in their survey for ARS, also did not report capturing a single river shiner from 128 sampling localities within the Arkansas River basin. We suspect that the term ''river shiner'' is used to represent all minnows captured, except for the plains minnow.

The large numbers of fish collected from the South Canadian River would imply that ARS could constitute a measurable percentage of the by-catch taken during commercial harvest. While there is no conclusive evidence to suggest that commercial harvest has contributed to the decline of the ARS, take of this species during commercial bait harvest may be significant which suggests that the effect of this factor warrants further investigation.

The most significant threat to the ARS from the commercial bait industry or bait collection for personal use is the potential for introduction of non-indigenous fishes into occupied ARS habitat (see factor E of this section).

C. *Disease or predation.* No studies have been conducted on the impact of disease or predation upon the ARS; therefore, the significance of these threats upon existing populations is unknown. There is no direct evidence to suggest that disease threatens the continued existence of the species. Disease is not likely to be a significant threat except in isolated instances or under certain habitat conditions, such as crowding during periods of reduced flows, or episodes of poor water quality (e.g., low dissolved oxygen or elevated nutrient levels). During these events, stress reduces resistance to pathogens and disease outbreaks may occur. Parasites and bacterial and viral agents are generally the most common causes of mortality. Lesions caused by injuries, bacterial infections, and parasites often become the sites of secondary fungal infections.

Some predation of ARS by largemouth bass (*Micropterus salmoides*), green sunfish (*Lepomis cyanellus*), channel catfish (*Ictalurus punctatus*), and other fish species undoubtedly occurs, but the extent is unknown. Predation by aquatic birds (e.g., terns, herons, and egrets) and aquatic reptiles (e.g., snakes and turtles) also may occur. Plains fishes have evolved under adverse conditions of widely fluctuating, often intermittent flows, high summer temperatures, high rates of evaporation, and high concentrations of dissolved solids. These conditions are not favored by most large predaceous fish and tend to preclude existence of significant populations of these species. However, alteration of historic flow regimes and construction of reservoirs have created favorable conditions for some predatory species such as white bass (*Morone chrysops*) and striped bass (*M. saxatilis*). State and Federal fish and wildlife management agencies, through cooperative efforts to develop sport fisheries in these reservoirs, have facilitated expansion of the distributions of some predatory species. The impact of predation to the species is likely to be localized and insignificant, particularly where habitat conditions upstream of mainstem reservoirs are not favorable to the long-term establishment of abundant predatory fish populations.

D. *The inadequacy of existing regulatory mechanisms.* Federal and state laws and regulations can protect the ARS and its habitat to some extent. The State of Kansas lists the ARS as a State endangered species. The KDWP has designated portions of the mainstem Cimarron, Arkansas, South Fork Ninnescah, and Ninnescah rivers as critical habitat for the shiner (Kansas Administrative Regulation 23–17–2). A permit is also required by the State of Kansas for public actions that have the potential to destroy listed individuals or their critical habitat. Subject activities include any publicly funded or State or federally assisted action, or any action requiring a permit from any other State or Federal agency. Violation of the permit constitutes an unlawful taking, a Class A misdemeanor, and is punishable by a maximum fine of $2,500 and confinement for a period not to exceed 1 year. Kansas does not permit the commercial harvest of bait fish from rivers and streams.

The State of New Mexico lists the ARS as a State endangered species. This listing prohibits the taking of the ARS without a valid scientific collecting permit but does not provide habitat protection. The State of Oklahoma lists the ARS as a State threatened species, but like New Mexico, this listing does not provide habitat protection. The States of Arkansas and Texas provide no special protection for the species or its habitat.

While Kansas, New Mexico, and Oklahoma protect the ARS from take and/or possession, only Kansas addresses the problem of habitat destruction or modification. Only New Mexico provides significant protection from the potential introduction of non-native, competitive species. Licensed commercial bait dealers in New Mexico may sell bait minnows only within the drainage where they have been collected and cannot sell any State-listed fish species.

The Kansas legislature can identify a minimum desirable streamflow for a stream as part of the Kansas Water Plan. The Chief Engineer is then required to withhold from appropriation the amount of water necessary to establish and maintain the minimum streamflow. New Mexico and Oklahoma water law does not include provisions for acquisition of instream water rights for protection of fish and wildlife and their habitats. However, Oklahoma indirectly provides some protection of instream uses, primarily by withholding appropriations for flows available less than 35 percent of the time.

Section 404 of the Clean Water Act (33 U.S.C. 1251–1376) is the primary Federal law that could provide some protection for aquatic habitats of the ARS, if the habitats are determined by the Corps to be Federal jurisdictional areas (i.e., waters of the United States). Listing of the ARS will require the Corps to consult and obtain our concurrence prior to issuing any section 404 permit affecting ARS habitat.

The NEPA requires Federal agencies to consider the environmental impacts of their actions. The NEPA requires Federal agencies to describe a proposed action, consider alternatives, identify and disclose potential environmental impacts of each alternative, and involve the public in the decision making process. It does not require Federal agencies to select the alternative having the least significant environmental impacts. A Federal action agency may decide to choose an action that will adversely affect listed or candidate species provided these effects were known and identified in a NEPA document.

The status and threats to the ARS reflect, in part, the inability of these laws and regulations to adequately protect and provide for the conservation of the ARS. Even listing as threatened or endangered by the States of Kansas, New Mexico, and Oklahoma has not reversed the decline of this species.

E. *Other natural or manmade factors affecting its continued existence.* The overall trend in the status of this species is characterized by dramatic declines in numbers and distribution despite the fact that this species evolved in rapidly fluctuating, harsh environments. The occurrence of a single, catastrophic event, such as the introduction of competitive species, or a prolonged period of low or no flow, would increase the likelihood of extinction. Arkansas River shiners are undoubtedly capable of recovering from drought, provided other factors have not irreparably degraded their habitat. The fragmentation and apparent isolation of self-sustaining populations of ARS renders the remaining populations vulnerable to any natural or manmade factors that might further reduce population size. Recolonization of some reaches following a significant drought or period of no flow will be considerably reduced by habitat fragmentation, and may require human intervention.

The introduction and establishment of the Red River shiner, a species endemic to the Red River drainage, into the Cimarron River in Oklahoma and Kansas has had a detrimental effect on the ARS (Cross *et al.* 1983, Felley and Cothran 1981). The Red River shiner was first recorded from the Cimarron River in Kansas in 1972 (Cross *et al.* 1983) and Oklahoma in 1976 (Marshall 1978). The Red River shiner has since colonized the Cimarron River and frequently may be a dominant component of the fish community (Cross *et al.* 1983, Felley and Cothran 1981). The morphological characteristics, population size, and ecological preferences exhibited by the Red River shiner suggest that it

competes with the ARS for food and other essential life requisites (Cross *et al.* 1983, Felley and Cothran 1981). The unintentional release of Red River shiners, or other potential competitors, into the Canadian River by anglers or the commercial bait industry is a potentially serious threat and could lead to decimation or extirpation of the remaining ARS populations.

Accidental or intentional releases of the Red River shiner within stream segments occupied by the Arkansas River shiner have occurred on several instances but no populations have become established outside of that in the Cimarron River (Luttrell *et al.* 1995). A recent record of another Red River endemic, the Red River pupfish (*Cyprinodon rubrofluviatilis*), from the Salt Fork of the Arkansas River (Pigg *et al.* 1997b) indicates that releases of fish from the Red River continue.

The Red River, native habitat for the Red River shiner and Red River pupfish, exhibits high concentrations of chlorides due to contributions from brine seeps and springs. Concentrations in some tributaries often exceed that of sea water. Within the Arkansas River basin, the Cimarron River and the Salt Fork of the Arkansas River also exhibit elevated levels of chlorides due to the influence of brine seeps and springs. Although studies have not been conducted, we suspect that the elevated chloride loads in the Cimarron River may be at least partially responsible for the success of the Red River shiner in this stream system. The ability of the Red River shiner to cope with elevated chloride concentrations may have provided a competitive advantage over the native ARS aggregations. Lower chloride concentrations in other stream systems may partially explain why Red River shiners have not yet become established in other Arkansas River tributaries after accidental introductions.

While the introduction of non-indigenous fishes do not fully account for the disappearance of ARS within the Arkansas River basin, particularly outside of the Cimarron River, competition with introduced species can have a significant adverse impact on ARS populations under certain conditions. The consequences of non-indigenous species on native organisms have been widely documented and are summarized by U. S. Congress, Office of Technology Assessment (1993).

The reproductive characteristics and specialized spawning and early life history requirements of this species makes it especially vulnerable to certain natural or manmade factors, such as drought. Successful reproduction of the ARS appears to require precise flow conditions conducive to breeding and embryonic development. Spawning is triggered, in part, by abrupt increases in streamflow during the late spring or summer (Cross *et al.* 1983, Moore 1944). Streamflows favorable to spawning must be sustained over at least a 24-hour period to ensure complete embryonic and larval development. As discussed under factor A of this section, suitable habitat conditions are becoming scarce and where conditions are not favorable, populations have rapidly declined.

Declining populations of the ARS may also be due to poor survival of juveniles. Bestgen *et al.* (1989) observed that spawning in ARS appeared to be primarily limited to Age-I individuals, based on an absence of Age-I and older fish from collections made after the spawning period. The apparent extremely high post-spawning mortality observed in Pecos River ARS populations suggests that the reproductive contribution of Age-II or older individuals is very limited. Thus, the continued existence of ARS populations may be almost entirely dependent upon successful annual reproduction and subsequent recruitment of juvenile individuals into the population. The loss of a single reproductive event or cycle would seriously reduce recruitment, and possibly lead to localized extirpations. The fragmentation of ARS habitat by impoundments intensifies the effects of failed reproduction by hindering repopulation following rapid declines or localized extirpations.

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by this species in determining to issue this final rule. Based on this evaluation, the preferred action is to list the Arkansas River basin population of the Arkansas River shiner (*Notropis girardi*) as threatened due to its significantly reduced range, including the apparent extirpation of the shiner in Arkansas and throughout much of its historical range in Kansas and Oklahoma. Threatened status, which means that the species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range, more accurately reflects the threats facing this species than does endangered status, the designation we proposed on August 3, 1994 (59 FR 39532). New information recieved during the comment period revealed that modifications to the Lake Meredith Salinity Control Project resulted in streamflow reductions that were less severe than originally projected in 1994. Also, the influence of the High Plains Aquifer on streamflows in the Canadian River upstream of Lake Meredith is less than originally believed, and the threat from groundwater withdrawals on the Texas High Plains does not appear to be as severe or as imminent as first suspected. In addition, new information shows that the aggregations of Arkansas River shiners in the reach between Ute Reservoir and Lake Meredith are stable and not declining, as presented in the proposed rule.

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'' means the use of all methods and procedures needed to bring the species to the point at which listing under the Act is no longer necessary.

Section 4(a)(3) of the Act and implementing regulations (50 CFR 424.12) require that, to the maximum extent prudent and determinable, the Secretary designate critical habitat at the time the species is determined to be endangered or threatened. Our regulations (50 CFR 424.12(a)) state that designation of critical habitat is not prudent when one or both of the following situations exist: (1) The species is threatened by taking or other human activity, and identification of critical habitat can be expected to increase the degree of such threat to the species; or (2) such designation of critical habitat would not be beneficial to the species.

We find that the designation of critical habitat for the Arkansas River basin population of the ARS is not prudent due to lack of benefit. The prohibition of destruction or adverse modification of critical habitat is provided under section 7 of the Act and only applies to Federal agency actions (see ''Available Conservation Measures'' section). Under section 7, actions funded, authorized, and carried out by Federal agencies may not jeopardize the continued existence of a species or result in the destruction or adverse modification of critical habitat. To ''jeopardize the continued existence'' of a species is defined as an action that

appreciably reduces the likelihood of its survival and recovery. ''Destruction or adverse modification of critical habitat'' is defined as an appreciable reduction in the value of critical habitat for the survival and recovery of a species.

Future conservation and recovery of the ARS will emphasize remaining aggregations and habitats in the Canadian River. All suitable ARS habitat in the Canadian River is believed to be occupied by the species. Therefore, Federal actions involving the Canadian River that would cause habitat alteration of a severity that would result in destruction or adverse modification of critical habitat would also jeopardize the continued existence of the Arkansas River shiner. Furthermore, reasonable and prudent alternatives that would remove the likelihood of jeopardy would also remove the likelihood of destruction or adverse modification of critical habitat. Due to the considerable overlap in the jeopardy and adverse modification standards associated with the ARS in the Canadian River, designation of critical habitat would provide no additional benefit to the species when dealing with the Federal actions under section 7 of the Act.

The major threat to the ARS is the depletion of surface and ground waters by non-Federal entities (e.g., State water agencies, ground water and irrigation districts, private individuals). In most cases, the management of water is under the jurisdiction of the States and is not under the purview of section 7 of the Act. Therefore, the designation of critical habitat would provide no benefit in addressing this important threat to the ARS.

The benefits of listing, specifically the jeopardy standard under section 7 and the provisions of sections 9 and 10 of the Act, will provide the principal mechanisms to protect ARS populations and habitats. For these reasons, the designation of critical habitat for the ARS would provide no benefit to the species beyond that conferred by listing alone and is, therefore, not prudent.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Act include recognition, recovery actions, requirements for Federal protection and consultation under section 7, and prohibitions against certain practices. Recognition through listing encourages and results in conservation actions by Federal, State, and private agencies, groups, and individuals. The Act provides for possible land acquisition and cooperation with the States and authorizes recovery plans for all listed species. The protection required of Federal agencies and the prohibitions against taking and harm are discussed, in part, below.

Section 7(a) of the Act requires Federal agencies to evaluate their actions with respect to any species that is proposed to be listed 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. 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 consultation with us.

A number of Federal agencies have jurisdiction and responsibilities potentially affecting the ARS, and section 7 consultation may be required in a number of instances. Federal involvement is expected to include the Bureau's Canadian River Project and operation of the Corps' multi-purpose reservoirs throughout the Arkansas River Basin. The Corps will also consider the ARS in administration of Section 404 of the Clean Water Act. The EPA will consider the ARS in the registration of pesticides, adoption of water quality criteria, and other pollution control programs. The U.S. Department of Transportation, Federal Highway Administration will consider the effects of bridge and road construction at locations where known habitat may be impacted. The USDA NRCS will consider the effects of structures installed under the Watershed Protection and Floodwater Prevention program (Public Law 566). Also, the U.S. Forest Service will consider the effects of their management actions on the Cimarron and Kiowa National Grasslands.

The intent of the section 7 consultation process is to ensure that agency actions are implemented in a manner that will not jeopardize the continued existence of a listed species. We have conducted numerous section 7 consultations, and very rarely has the consultation process stopped a Federal action. In fact, in the vast majority of consultations the actions are implemented with little or no modification.

The USGS has recently initiated a water quality assessment of the High Plains aquifer under the National Water Quality Assessment program (NAWQA). Through this project the USGS will evaluate existing water quality problems in the aquifer and provide information that will help protect water quality in the aquifer.

The CRMWA, the non-Federal sponsor of the Lake Meredith Salinity Control Project, has agreed to implement certain conservation actions for the ARS. The CRMWA has agreed to—(1) conduct routine evaluations of flow conditions within the immediate project area, (2) adjust operation of the salinity control project to minimize any potential effect upon the ARS, and (3) monitor water quality within the affected stream segment (J.C. Williams, *in litt.* 1997). In response to provisions under the Supreme Court ruling in Oklahoma and Texas v. New Mexico, No. 109, the CRMWA also has agreed to cooperate with us and the State of New Mexico in scheduling releases from Ute Reservoir to benefit the ARS. The CRMWA has already sought our input in scheduling releases of excess waters from Ute Reservoir. Most recently, the CRMWA initiated releases on June 9, 1997, and concluded them in July 1997. Researchers at Texas Tech University are currently evaluating the effect of these releases on reproductive ecology of the ARS and will provide us and CRMWA with recommendations for scheduling any future releases. We anticipate that such releases will result in conservation benefits for the ARS.

The CRMWA also speculates that the reduction in salinity anticipated from operation of the salinity control project may hinder the establishment of Red River shiners within the affected reach of the Canadian River, should this non-native species be introduced upstream of Lake Meredith (J.C. Williams, *in litt.* 1997). While we have no conclusive evidence to support this premise, reduced salinities could indeed influence establishment of Red River shiners. The ARS exhibit preferences for certain water quality conditions (Polivka and Matthews 1997) which may differ from those preferred by the Red River shiner.

Reducing or eliminating incidental take of ARS during personal collections or commercial bait operations can be achieved through gear restrictions. State regulations requiring the use of seines with mesh sizes of 1.3 cm (0.5 in) or greater could minimize the capture of ARS during collections for bait. We intend to work with the States to ensure that collection of bait fish for personal or commercial uses does not reduce the abundance or distribution of the ARS.

Eliminating opportunities for introductions of non-indigenous fishes is more difficult. Commercial bait

operators should take steps to ensure that holding tanks have been thoroughly emptied and flushed before moving from one river basin to another. This is particularly important if collections are obtained from the Red River basin or the Cimarron River. Informing anglers of the potential harm from releases of unused live bait is also important.

Other general conservation measures that could be implemented to help conserve the species are listed below. This list does not constitute our interpretation of the entire scope of a recovery plan as discussed in the provisions of section 4(f) of the Act.

(1) Ensure that water extractions, diversions, and groundwater use for agriculture and municipal purposes do not adversely affect habitat of the ARS. Increase efforts to improve irrigation efficiency and implement appropriate water conservation measures.

(2) Closely monitor introductions of non-indigenous species. Develop and implement measures to minimize the accidental or intentional release of non-indigenous species. Initiate studies to determine the feasibility of and techniques for eradicating or controlling Red River shiners in the Cimarron River. If feasible, implement a control program.

(3) Monitor and maintain existing aggregations of ARS throughout the Arkansas River basin.

(4) Conduct studies to further define biological and life history requirements of the ARS.

The Act and 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 (includes harass, harm, pursue, hunt, shoot, wound, kill, trap, or collect, or to attempt any of these), 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 our agents and agents of State conservation agencies.

We may issue permits to carry out otherwise prohibited activities involving threatened wildlife species under certain circumstances. Regulations governing permits are at 50 CFR 17.22, 17.23, and 17.32. Such permits are available for scientific purposes, to enhance the propagation or survival of the species, and/or for incidental take in connection with otherwise lawful activities. For threatened species, there are also permits available for zoological exhibition, educational purposes, or special purposes consistent with the purposes of the Act. You should send requests for copies of the regulations regarding listed wildlife and inquiries about prohibitions and permits to the U.S. Fish and Wildlife Service, P.O. Box 1306, Albuquerque, New Mexico, 87103 (telephone 505/248–2914; facsimile 505/248–8063).

It is our policy (59 FR 34272) to identify to the maximum extent practicable at the time a species is listed those activities that would or would not likely constitute a violation of section 9 of the Act. The intent of this policy is to increase public awareness of the effect of this listing on proposed and ongoing activities within the species' range.

The Service believes that, based on the best available information, the following actions will not likely result in a violation of section 9:

(1) Authorized taking of ARS in accordance with a permit issued by us pursuant to section 10 of the Act or with the terms of an incidental take statement pursuant to section 7 of the Act, or possessing specimens of this species that were collected prior to the date of publication in the **Federal Register** of this final regulation adding this species to the list of endangered and threatened species;

(2) Normal, lawful recreational activities such as hiking, trail rides, camping, boating, hunting, and fishing, provided unused bait fish are not released back into the water;

(3) Normal livestock grazing and other standard ranching activities within riparian zones that do not destroy or significantly degrade ARS habitat;

(4) Routine implementation and maintenance of agricultural conservation practices specifically designed to minimize erosion of cropland (e.g., terraces, dikes, grassed waterways, and conservation tillage);

(5) Existing discharges into waters supporting the ARS, provided these activities are carried out in accordance with existing regulations and permit requirements (e.g., activities subject to sections 402, 404, and 405 of the Clean Water Act); and

(6) Improvements to existing irrigation, livestock, and domestic well structures, such as renovations, repairs, or replacement.

Activities we believe could potentially harm the ARS and result in a violation of section 9 include, but are not limited to:

(1) Take, which includes harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting, or attempting any of these actions, of ARS without a valid permit;

(2) Possess, sell, deliver, carry, transport, or ship illegally taken ARS;

(3) Introduction of non-native fish species that compete or hybridize with, displace, or prey upon ARS;

(4) Unauthorized destruction or alteration of ARS habitat by dredging, channelization, impoundment, diversion, recreational vehicle operation within the stream channel, sand removal, or other activities that result in the destruction or significant degradation of channel stability, streamflow/water quantity, substrate composition, and water quality used by the species for foraging, cover, and spawning;

(5) Unauthorized discharges (including violation of discharge permits), spills, or dumping of toxic chemicals, silt, household waste, or other pollutants (e.g., sewage, oil and gasoline, heavy metals) into surface or ground waters or their adjoining riparian areas that support/sustain ARS;

(6) Applications of pesticides, herbicides, fungicides and other chemicals, including fertilizers, in violation of label restrictions;

(7) Withdrawal of surface or ground waters to the point at which baseflows in water courses (e.g., creeks, streams, rivers) occupied by the ARS diminish and habitat becomes unsuitable for the species.

Not all of the activities mentioned above will result in a violation of section 9; only those activities that result in ''take'' of ARS would constitute a violation of section 9.

The above lists only provide some examples of the types of activities that we would consider as likely or not likely to take ARS. You should direct questions regarding whether specific activities may constitute a violation of section 9 of the Act to the Field Supervisor, Oklahoma Ecological Services Office (see **ADDRESSES** section). You should mail requests for copies of the regulations concerning listed animals and inquiries regarding prohibitions and permits to the U.S. Fish and Wildlife Service, Endangered Species Permits, P.O. Box 1306, Albuquerque, New Mexico 87103–1306 (telephone 505/248–6649; facsimile 505/248–6922).

National Environmental Policy Act

We have determined that Environmental Assessments and Environmental Impact Statements, 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 Act. We published a notice outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244).

References Cited

A complete list of references cited in this final rule, as well as others, is available upon request from the Oklahoma Ecological Services Field Office (see **ADDRESSES** section).

Author

The primary author of this proposed rule is Ken Collins, U.S. Fish and Wildlife Service (see **ADDRESSES** section).

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Regulation Promulgation

For the reasons given in the preamble, part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, is amended 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. In § 17.11(h) the following is added to the List of Endangered and Threatened Wildlife in alphabetical order under ''FISHES'':

§ 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:							
*	*	*	*	*	*		*
Shiner, Arkansas River.	*Notropis girardi*	U.S.A. (AR, KS, NM, OK, TX).	Arkansas River basin (AR, KS, NM, OK, TX).	T	653	NA	NA
*	*	*	*	*	*		*

Dated: November 13, 1998.

John G. Rogers,

Acting Director, Fish and Wildlife Service.

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