

## United States Department of the Interior

U.S. Fish and Wildlife Service  
2321 West Royal Palm Road, Suite 103  
Phoenix, Arizona 85021-4951  
Telephone: (602) 242-0210 FAX: (602) 242-2513

AESO/SE  
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May 25, 2001

### Memorandum

To: Chief, Division of Federal Aid, Fish and Wildlife Service, Albuquerque, New Mexico

From: Field Supervisor

Subject: Intra service Section 7 Consultation for Rainbow Trout stocking into Nelson, Knoll, and Blue Ridge Reservoirs

This document transmits the Fish and Wildlife Service's (Service) Arizona Ecological Service Field Office (AESO) biological opinion based on our review of the proposed stocking of rainbow trout (*Oncorhynchus mykiss*) into the three subject reservoirs in (Apache and Coconino counties in Arizona, and the effects on the Little Colorado spinedace (*Lepidomeda vittata*) in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). Your April 30, 2001, request for formal consultation was received by fax on May 9, 2001. This action, proposed by the Service's Division of Federal Aid, is being coordinated by the Arizona Game and Fish Department (AGFD). Your biological evaluation form concluded that the proposed project would have no effect to the endangered southwestern willow flycatcher (*Empidonax traillii extimus*) or the proposed threatened Chiricahua leopard frog (*Rana chiricaheunsis*). These species will not be addressed further in this consultation.

This biological opinion is based on information provided in the biological evaluation form, support documents provided by AGFD, telephone conversations between our staffs, and other sources of information. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, and its effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file in this office.

## CONSULTATION HISTORY

This biological opinion is a reinitiation of formal consultation which concluded with a biological opinion issued in November 1995. That biological opinion addressed stocking of rainbow trout from January 1996 to December 2000 into the same three reservoirs: Nelson, Knoll, and Blue Ridge. The Service's Division of Federal Aid, through the Sport Fish Restoration Program (Dingell-Johnson & Wallop-Breaux), provides financial support to Arizona's sport fish stocking program. Informal discussions led by the AGFD on the continuation of rainbow trout stocking into the three reservoirs has been underway for several months. We received the initiation package from AGFD on April 26, 2001, with a follow up for formal consultation from Federal Aid on May 4, 2001. Federal Aid requested an expedited issuance of the biological opinion, so that rainbow trout could be stocked in the subject reservoirs by the Memorial Day weekend. The draft biological opinion was sent to Federal Aid on May 22, 2001. On May 24, after coordination with AGFD, Federal Aid notified us that they did not have any comments on the draft document.

## BIOLOGICAL OPINION

### DESCRIPTION OF THE PROPOSED ACTION

The proposed action is the continuation of a program to stock rainbow trout for sport fishing into three locations in the Little Colorado River basin. This action is funded, in part, by the Service's Sport Fish Restoration Program. All three stocking sites have the following precautions built into the project: (1) the State will stock catchable rainbow trout only; (2) all stocked fish will be marked; (3) stocking will be delayed until flow over the affected dam ceases; and (4) monitoring will be conducted to determine whether movement of tagged trout from the three impoundments occurs. The number of trout stocked in each impoundment varies depending on impoundment size, fish availability, and fishing pressure exerted. Stocking occurs roughly between Memorial Day and Labor Day. Although fishing occurs year-round, winter fishing is generally limited due to ice cover that precludes open water fishing but is not sufficient to support ice fishing.

Project specifics are discussed below. Changes to the 1995 stocking program are printed in **bold**.

#### **Nelson Reservoir**

Stocking at Nelson Reservoir includes the following provisions.

1. Stock to maintain put-and-take rainbow trout fishery providing 20,000 angler days annually.
2. All stocked fish to be tagged with coded wire tags **or tetracycline**.
3. Stocking to begin each year as soon as practical following spring runoff and outflow from reservoir ceases.

4. Cease stocking if/when habitat conditions (temperature, pH) deteriorate, but no later than Labor Day.

5. Initial stocking rate to be 20,000 catchable rainbow trout per year, but adjusted to accommodate angler use, fish survival, and water conditions.

6. Monitoring

a. Creel census to be stratified random, 2 weekdays, 2 weekend/holiday per month during the period April-September **at least once every 5 years**.

b. **Following significant stocking season runoff events resulting in spills (sufficient to move fish)**, population surveys, upstream and downstream from the reservoir, conducted during low flow periods (May-June, September-October) to detect movement of tagged fish should they migrate from the reservoir.

### **Knoll Lake**

Stocking at Knoll Lake includes the following provisions:

1. Stock to maintain put-and-take rainbow trout fishery.

2. All stocked fish to be tagged with coded wire tags **or tetracycline**.

3. Stocking to begin each year as soon as practical following spring runoff and outflow from the reservoir ceases.

4. Cease stocking if/when habitat conditions (temperature, pH) deteriorate but prior to Labor Day.

5. Initial stocking rate to be 15,000 catchable rainbow trout per year, but adjusted to accommodate angler use, fish survival, and water conditions.

6. Monitoring:

a. Creel census to be stratified random, 2 weekdays, 2 weekend/holiday per month during the period April-September **at least once every 5 years**.

b. **Following significant stocking season runoff events resulting in spills (sufficient to move fish)**, population surveys, upstream and downstream from the reservoir, conducted during low flow periods (May-June, September-October) to detect movement of tagged fish should they migrate from the reservoir.

### **Blue Ridge Reservoir**

Stocking at Blue Ridge Reservoir includes the following provisions:

1. Stock to maintain put-and-take rainbow trout fishery.
2. All stocked fish to be tagged with coded wire tags **or tetracycline**.
3. Stocking to begin each year as soon as practical following spring runoff and outflow from the reservoir ceases.
4. Cease stocking if/when habitat conditions (temperature, pH) deteriorate but prior to Labor Day.
5. Initial stocking rate to be 15,000 catchable rainbow trout per year, but adjusted to accommodate angler use, fish survival, and water conditions.
6. Monitoring:
  - a. Creel census to be stratified random, 2 weekdays, 2 weekend/holiday per month during the period April-September **at least once every 5 years**.
  - b. **Following significant stocking season runoff events resulting in spills (sufficient to move fish)**, population surveys, upstream and downstream from the reservoir, conducted during low flow periods (May-June, September-October) to detect movement of tagged fish should they migrate from the reservoir.

#### STATUS OF THE SPECIES (rangewide and/or recovery unit)

The spinedace is a cyprinid native to the Little Colorado River (LCR) drainage. This fish occurs in disjunct populations throughout much of the LCR drainage including Apache, Coconino, and Navajo counties. The species was listed as threatened with critical habitat designated on October 16, 1987. Forty-four stream miles (70.8 km) of critical habitat were designated: eighteen miles of East Clear Creek immediately upstream and 13 miles (20.9 km) downstream from Blue Ridge Reservoir in Coconino County, 8 miles (12.8 km) of Chevelon Creek in Navajo County, and 5 (8.0 km) miles of Nutrioso Creek in Apache County.

The species was described in 1874 by E.D. Cope (Miller and Hubbs 1960). Extensive collections summarized by Miller (1963) indicated the spinedace had been extirpated from much of this historic range during the period 1939 to 1960. Although few collections were made of the species prior to 1939, the species is believed to have inhabited the northward flowing tributaries off the Mogollon Rim, including the northern slopes of the White Mountains.

The spinedace is a small [about 4 inches; 100 millimeter (mm)] minnow with olivaceous, bluish or lead grey coloration. Habitat requirements include a wide range of stream habitats ranging from stagnant pools to permanent flowing water, and with stream substrates ranging from fine sediments to bedrock. Water temperatures in habitats occupied ranged from 58 to 78 degrees Fahrenheit (14 to 25 degrees Celsius) (Miller 1963). Miller (1963) called the spinedace "trout like" in behavior and habitat requirements. It is likely, that prior to 1900 the spinedace used habitats now dominated by nonnative salmonids. Food habits of spinedace include chironomid

larvae, dipterians, filamentous green algae and crustaceans (cladocerans) (Runck and Blinn 1993).

Rainbow trout predation on spinedace was demonstrated by Blinn and Runck (1990) in aquaria experiments. Trout obtained from Nutrioso Creek consumed spinedace in aquaria with and without rocks provided for cover. Spinedace did not appear capable of avoiding trout predation when placed in aquaria. The largest spinedace consumed by a rainbow trout was 71 mm (2.8 inches); the trout was 240 mm (9.5 inches) (Blinn and Runck 1990). However "domesticated" trout obtained from the Page Springs hatchery did not consume spinedace. Robinson et al. (2000) examined stomach contents of 54 rainbow trout captured from Nutrioso Creek and the Little Colorado River and detected no predation on spinedace.

Although the spinedace exhibits a wide tolerance of habitat types, their overall numbers appear to be declining. The primary reasons believed responsible for decline are changes in water quality and quantity, modification of watersheds (dams, road construction), and interactions with nonnative fishes. Spinedace population estimates fluctuate drastically from year to year. Between 1963 and 1966, spinedace were readily found throughout much of the habitat where they had been collected in the recent past, indicating the species ability to persist through severe drought conditions and severe winter temperatures yet repopulate when physical conditions improved. Spinedace are late spring early summer spawners. Five spinedace populations are known to occur within the LCR: Chevelon, Silver, Nutrioso, East Clear Creek, and the LCR proper. Spinedace are currently considered rare in East Clear Creek. However, recent conservation actions in 2000 by AGFD and Coconino National Forest have led to the reintroduction of spinedace into three tributaries (Yeager, Houston Draw, and General Springs) of this drainage. Also, spinedace were collected from Silver Creek in 1997. Spinedace were last taken from this drainage in the mid-1970s and were thought by many to have been extirpated. Several of these locations are irregularly surveyed, the last collection of spinedace from various populations are summarized below (Table 1). This table does not, however, quantify the number of spinedace, or provide information on population trends, stability, or the quality of the habitat.

Native fishes associated with spinedace include speckled dace, bluehead sucker, Little Colorado sucker, roundtail chub, and Apache trout (USFWS 1998). The list of non-native fishes is much greater and with varying degrees of incompatibility to the spinedace's long-term survival. The presence of nonnatives may contribute to the disjunct distribution patterns observed and the species retreat to what may be suboptimal habitats for spinedace. Nonnative fish may compete with, prey upon, harass, and alter habitat utilized by native fish fauna. Although spinedace numbers fluctuate greatly, overall, their numbers appear to be declining.

Table 1. Known Populations of Little Colorado Spinedace and last known collection date.

<u>SPINEDACE POPULATIONS</u>	<u>Last Year Species documented as of 1994</u>	<u>Last Year Species documented as of 2000</u>
CHEVELON CREEK		
Above The Steps	1994	1998 <sup>1</sup>
Hugo Meadow	1994	1998 <sup>1</sup>
The Steps	1994	1998 <sup>1</sup>
SILVER CREEK		
Silver Creek	1965	1997 <sup>1</sup>
Cottonwood Wash	1974	1974
NUTRIOSO CREEK		
Above Forest Service Boundary*	1994	2000 <sup>1</sup>
Upstream of Nelson*	1990	2000 <sup>1</sup>
Correjo Crossing*	1994	2000 <sup>1</sup>
Rudd Creek	1994	1999 <sup>1</sup>
EAST CLEAR CREEK		
Above Blue Ridge*	1994	1995 <sup>1</sup>
Below Blue Ridge*	1988	1998 <sup>1</sup>
Leonard Canyon – Dines Tank*	1994	1999 <sup>1</sup>
West Leonard Canyon*	1994	2000 <sup>1</sup>
Mid-Leonard Canyon*	1994	1994 <sup>1</sup>
Yeager Canyon	-	2000(stocked)
Houston Draw	-	2000(stocked)
General Springs	-	2000(stocked)
LITTLE COLORADO RIVER		
Downstream of Salado	1939	-
Clear Creek	1960	-
Willow Creek	1965	-
Upstream of Lyman	-	-
Winema	1994	2000 <sup>1</sup>
Downstream of Lyman	1994	1995 <sup>1</sup>

\*Populations possibly affected by proposed action.

<sup>1</sup>Date of last survey.

## ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation. There have not been many section 7 consultations on the Little Colorado spinedace, although this is the second formal consultation on the potential effects of stocked nonnative trout moving into occupied spinedace

habitat. Miller (1963) and Blinn et al. (1993) hypothesized that spinedace have not historically been associated with fish predators. However, headwaters of the LCR originate along the northern slopes of Mount Baldy. Most streams originating from Mount Baldy still support Apache trout. It is likely that Apache trout co-existed historically with spinedace at some elevations in the Little Colorado River. Much of the lands where spinedace are found are private and have been developed for agriculture, livestock pasturage and urban development, especially around Eagar and Springerville. Additional consultations on Little Colorado spinedace include repairs to the Greer Lakes, effects of livestock grazing on the Apache Sitgreaves National Forest, and bank protection done by Natural Resources Conservation Service.

The AGFD coldwater strategic plans call for a return to the creel of at least 50 percent on put-and-take trout fisheries (J. Janish, AGFD, personal communication). Most put-and-take fish are caught by anglers, preyed upon by various other predators, or succumb to other causes. The number of stocked fish which overwinter in the stocked areas is considered insignificant. However, the few fish which do overwinter are harvested at a much larger size and are prized by anglers. At one time Nelson Reservoir held the inland state record for rainbow trout (5.02 kg) (Novy and Jones 1988). Blinn and Runck (1990) and Blinn et al. (1993) documented rainbow trout predation on spinedace in aquaria and stream enclosures and suggested that rainbow trout might limit the distribution of Little Colorado spinedace. However, in 1996 the two species were often caught within the same pools, lending little evidence to suggest that spinedace distributions were limited by rainbow trout (Robinson et al. 1998). Under the put-and-take program of stocking catchable size rainbow trout, it is anticipated that the trout will either be caught by anglers or die before leaving the lake.

Naturally reproducing trout populations occur in some stream segments of the Little Colorado River. The ancestors of these fish were probably stocked as fingerlings into the stream or reservoirs prior to 1993, by Service and AGFD in support of a recreational fishery. This management technique requires that fingerling trout adapt to the stream or reservoir environment to which they have been introduced. Put-grow-and-take provides anglers opportunity to take fish that exhibit wild fish characteristics and behavior, but harvest opportunity is delayed until fish grow to harvest size. The stocking of catchable size fish make them immediately available to anglers negating the need for extended survival in the wild thus minimizing carryover beyond the fishing season and lessens the probability of these larger fish contributing to a self-sustaining population. Salmonids fingerlings (brook, brown, and rainbow), which have not been stocked since 1993, still survive in waters of the Little Colorado basin (AGFD files).

Critical habitat affected by this action include the following 36 miles (58 km) of stream. Nelson stocking affects critical habitat of Nutrioso Creek - 5 miles (8.0 km) of stream below Nelson Reservoir dam to the Apache-Sitgreaves National Forest. Knoll and Blue Ridge stocking affects East Clear Creek - 13 miles (20.9 km) above Blue Ridge from the upper end of the reservoir to Potato Lake area; the 18 miles (29 km) below Blue Ridge Dam to the East Clear Creek - Leonard Canyon confluence.

## Action Area

### Nelson Reservoir

Created in 1892, Nelson Reservoir is a 60-acre (24.3 ha) reservoir located near the Arizona/New Mexico border in the Apache-Sitgreaves National Forest on Nutrioso Creek in Apache Country, to provide irrigation water for the Round Valley area. The reservoir is a 90 surface acre (36.3 hectare) impoundment of Nutrioso Creek, and has an average depth of 8.3 feet (ft) [2.5 meters (m)] with a maximum depth of 24.6 ft (7.5 m) (Novy and Jones 1998). Nelson Reservoir will be managed as a put-and-take rainbow trout fishery. The elevation at the spillway is approximately 7,412 feet (2260 m). Nelson Reservoir was formally operated for irrigation, but has not been operated that way since 1959, as is now managed to retain as much water as possible to sustain the recreational uses. As a result, Nutrioso Creek, Rudd Creek and the reach below Nelson Reservoir were reduced to a series of isolated pools as recently as 1996 (A. Robinson, AGFD, pers. comm.), limiting the availability of spinedace habitat below Nelson.

The AGFD first introduced trout into the reservoir in 1958. During the years that followed, rainbow, brown, brook, and cutthroat fingerlings have been stocked. In the past, AGFD managed Nelson Reservoir as a Basic Yield System (Novy and Jones 1988), meaning fingerling or sub-catchable trout were stocked, and allowed to grow to catchable size before being harvested by anglers. Because of concern that wild trout were surviving year round, moving to areas where spinedace occur and preying upon or competing with spinedace, the AGFD has converted to a put-and-take program to maximize sport fish harvest while limiting possible adverse impacts to spinedace or their critical habitat. Today, only catchable rainbow trout are stocked. Nelson still has large numbers of green sunfish (*Lepomis cyanellus*), black crappie (*Pomoxis nigromaculatus*), largemouth bass (*Micropterus salmoides*), channel catfish (*Ictalurus punctatus*), and the native bluehead sucker (*Pantosteus clarki*) (Novy et al. 2000).

From 1996 to 1999, approximately 73,067 marked catchable size rainbow trout were stocked into Nelson Reservoir (Novy et al. 2000). Stocking took place in May and June each year, following the cessation of spring runoff and spill, except for 1996 when low water levels and drought conditions allowed stocking to take place in April. Seasonal elevation in pH levels associated with growth of aquatic vegetation generally precluded stocking past mid-June to allow trout enough time to acclimate and avoid associated mortality. Fish were marked at the hatchery of origin (Page Springs) with coded wire tags in 1996, 1997 and 1998. These same fish were exposed to therapeutic levels of tetracycline at the hatchery, which resulted in another marker (deposition in bony structures) that could be detected with ultra violet light to identify hatchery fish. A comparison of the two tagging methods used at Nelson in 1997 showed that 93.3% of 583 harvested rainbow trout that were checked and examined for both marks were coded wire tagged, and 97.6% of the same fish were marked with tetracycline. This indicated that tag retention was good and that tetracycline was a better marker for identification purposes. Tetracycline was the only marker used on trout stocked into Nelson after 1998 when permission was secured from the Service to eliminate the coded wire tag requirement.

The reservoir capacity has been reduced by siltation (Novy and Jones 1988). In 1983, the water



rights for the reservoir were transferred from irrigation to recreation, thus eliminating downstream water rights, and limiting downstream habitat for spinedace. As a result, the water level of the reservoir remains near spillway elevation most of the year (Novy and Jones 1988). Nelson normally spills into Nutrioso Creek during the late winter and early spring months, before rainbow trout stocking. Days of spill per year were 42 days in 1997, 57 days in 1998, 132 days in 1999, and at least 106 days in 2000. The only exception to the late winter, early spring spill occurred in 1999 when heavy summer precipitation resulted in Nelson spilling into Nutrioso Creek from August 21, through April 15, 2000. Creel census for Nelson in 1999 concluded that 88% of the stocked fish were harvested during this high water year.

Throughout all of the monitoring conducted downstream of Nelson Reservoir in Nutrioso Creek by AGFD between the fall of 1996 and the spring of 2000, a total of 25,074 fish were collected including only one rainbow trout with a coded wire tag, indicating a low incidence of stocked trout moving out of the reservoir into spinedace habitat. Surveys were made prior to stocking (May) and then post-stocking during low flow periods (early fall) following the summer rainy season. Monitoring prior to 1999 was restricted to fixed 164-656 ft (50 or 200 m) sampling stations that had been established during a survey of Nutrioso Creek in 1994. Blocking seines were set up at both ends of sample stations prior to sampling with a backpack electroshocker using 3 pass fish removal methodology. In 1999-2000, the entire length ( 6.7 miles; 10,819 m) of Nutrioso Creek located on Forest Service lands below Nelson Reservoir and nearly 5.6 miles (9,000 m) immediately upstream of Nelson were sampled by single pass electrofishing. Fish captured in Nutrioso Creek in descending order of abundance include fathead minnow (75.7%), speckled dace (11.2%), bluehead sucker (9.2%), Little Colorado spinedace (3.7%), green sunfish (0.17%), rainbow trout (0.02), and Little Colorado sucker (0.01%). The interactions between spinedace and the other fish are not known. In addition, five small trout were collected in Nutrioso Creek above the Reservoir. All five were smaller than the fish stocked into Nelson, and had tags indicating that they had been stocked elsewhere in the system, and were not naturally reproduced. There are a number of private ponds in upper Nutrioso Creek, near the town of Nutrioso, that are stocked by private landowners. High flows in late summer and early fall the preceding year (1999) were conducive to fish movement. None of the rainbow trout sampled from Nutrioso Creek were found to contain spinedace in stomach analyses (Novy et al. 2000, Robinson et al. 2000). The nearly 93,000 catchable size rainbow trout stocked into Nelson Reservoir the past five years had the opportunity to escape but apparently few did so, primarily because most were harvested by anglers or succumbed to predators, or natural mortality in the reservoir. Novy et al. (2000) found that return rates of stocked trout ranged from a low of 49 percent in 1996 to 88 percent in 1999, averaging 68 percent over the four (1996-1999) year survey period. Total catch and harvest rates were similar each year indicating that most trout caught were also harvested by anglers.

Catch rates peaked shortly after the initiation of stocking most years, declined through summer, with a secondary peak observed in the fall coincident with declining water temperatures and improved water quality. Seasonal lows were observed in the winter and early spring each year prior to restocking which occurred in May and June most years except for 1996 when stocking took place in April (Novy et al. 2000). Gill net surveys were carried out each spring in late April or early May, just prior to stocking, to assess survival and carryover of rainbow trout stocked the

previous year. Catch per unit effort recorded for rainbow trout over the past four years indicated a very low carryover from the previous years stocking, averaging less than 2 trout/net night of effort, with a range of 0.4 to 4.5 trout/net night of effort (Novy et al. 2000). This is significantly lower than the 46 trout/net night of effort recorded between 1988 and 1993 when the lake was under put-grow-and-take management (Novy and Jones 1988). In an attempt to further minimize trout from spinedace habitat, AGFD has also implemented the voluntary removal of bag and possession limits for rainbow and brown trout from September 1 through May 1 on East Clear Creek including Blue Ridge and Knoll Reservoirs, Nutrioso Creek including Nelson Reservoir and Chevelon Creek downstream of Chevelon Crossing.

### Knoll Reservoir

Knoll Reservoir is located in upper Leonard Canyon, a tributary of East Clear Creek, on the Coconino National Forest in Coconino County. A concrete dam was completed in 1963 to form this 77-acre (31 ha) lake at an elevation of 7,340 feet (2,237 m). Critical habitat for the Little Colorado spinedace includes the area approximately 18 miles of stream (29 km) of East Clear Creek from the confluence of Leonard Canyon upstream to the dam at Blue Ridge Reservoir.

Stocking first occurred in Knoll Lake in 1964. In previous years, Knoll Lake was stocked with catchable rainbow trout and fingerling brown trout; approximately 20,000 angler days of sport fishing were provided annually. Knoll Lake also has unquantified, high numbers of fathead minnow which were not targeted during sampling. Brown trout are also still common in Knoll Lake (Benedict 2000) and are likely breeding. Between 1996 and 2000, this area was managed as a put-and-take rainbow trout fishery, with approximately 46,638 marked catchable rainbow trout stocked into Knoll Lake (Benedict 2000). Stocking took place from May through August following cessation of spring runoff and spill. Knoll was sampled annually during the fall from 1994 through 1999. Rainbow trout catch from Knoll Lake ranged from 0 (1994 & 1995) to 0.23 fish/minute (1997) with a mean of 0.07 fish/minute. Stratified random creel census estimated that all (103 percent) (48,277) of the rainbow trout stocked into Knoll reservoirs from 1996 to 1998, were harvested by anglers (Benedict 2000). Estimates showing greater than 100 percent return to creel at Knoll Lake represent a statistical and/or survey anomaly, and does not represent natural reproduction and recruitment in Knoll, since there was no variation in size classes (K. Young, AGFD, pers. comm.). In 1999 anglers were less effective at removing stocked rainbow trout than in previous years, perhaps because of the low water levels in the reservoir.

Leonard Canyon below Knoll Lake has been sampled annually since 1996, prior to trout stocking. Leonard Canyon is usually dry 1/4 mile below Knoll Lake (Keller, AGFD, pers. comm.). Since sampling began in 1996 no trout have been collected during the pre-stocking sampling trips below the reservoir. This indicates few, if any stocked rainbow trout are escaping from the lakes. In addition stomach samples taken from "wild" rainbow trout sampled from Leonard Canyon suggests that they are not eating fish as a major part of their diet.

### Blue Ridge

Blue Ridge Dam was completed and the reservoir began filling in December 1964. Located on

the Coconino National Forest in the upper reach of East Clear Creek at an elevation of 6,720 feet, in Coconino County. East Clear Creek above Blue Ridge Reservoir is designated critical habitat for the Little Colorado spinedace. There are no barriers to prevent upstream movement of trout out of the reservoir into East Clear Creek. Similarly, spinedace can move into the upper portions of Blue Ridge Reservoir from East Clear Creek. Critical habitat also exists immediately downstream from Blue Ridge Reservoir in East Clear Creek.

This 70-acre (28 ha) reservoir has a total capacity of 19,500 acre-feet and is managed as a put-and-take trout fishery. The reservoir spills at 15,000 acre-feet (Smith et al. 1994). Stocking has occurred into Blue Ridge Reservoir since 1965. Prior to 1995, the stocking program for Blue Ridge Reservoir included catchable rainbow trout and rainbow, brown, brook, and cutthroat trout. Trout are maintained in the reservoir throughout the year. Sampling efforts by AGFD from May 1990 to November 1991 reported eight species of nonnative fishes in East Clear Creek drainage (fathead minnow, rainbow, brook, brown trout's, golden shiner, plains killifish, green sunfish, and channel catfish) (Denova and Abarca 1992). Common carp, bluegill, largemouth bass, and red shiner have also been found to co-exist with spinedace. Blue Ridge currently has large, unquantified numbers of fathead minnow (*Pimephales promales*) and speckled dace (*Rhinichthys osculus*) (K. Young, AGFD, pers. comm.). Brown trout and Little Colorado sucker are also common in the reservoir. With only rainbow trout stocking since 1995, creel surveys by AGFD estimate between 36% and 62% of the trout are harvested from Blue Ridge (Benedict 2000). Many fish are removed from Blue Ridge Reservoir in September when take and possession limits are removed (September 1-May 1) and creel surveys are suspended (C. Benedict, AGFD, pers.comm.)

Gage data for Blue Ridge are available for the period 1984 to 1999. The spillway crest for the dam is at 15,000 acre-feet. Between 1984 and 1994, the water level rarely exceeded this level in early May. However, in 1992, the reservoir was above 15,000 acre-feet throughout most of May, into early June, and then again in late August and early September (USGS Water Data Report AZ 94-1). Between 1996 and 2000, East Clear Creek below Blue Ridge has been mostly dry from about 1/4 mile (0.4 km) below Jones Crossing up to the reservoir. Surveyors dip netted in the few pools available; no fish of any species were found between 1996 and 2000. Attempts to survey above Blue Ridge during the 1996-2000 period occurred each year prior to stocking, but there was no flowing water. No sampling occurred in the creek above the reservoir. Blue Ridge Reservoir spilled twice during the survey period between 1996 and 2000 (March 31-May 16, 1998; and April 9-April 28, 1997). Although 47 rainbow trout were collected below Blue Ridge Reservoir, during the summer and fall between 1995 and 1999, none of the fish possessed the coded wire tag or tetracycline tag which marks all the fish stocked by AGFD (Benedict 2000).

From 1996 to 2000, approximately 31,007 marked catchable rainbow trout were stocked into Blue Ridge Reservoir (Benedict 2000). Stocking took place from May through August following cessation of spring runoff and spill. Stratified random creel census estimated that about 53 percent (16,445) of the rainbow trout stocked into Blue Ridge from 1996 to 1999 respectively, were harvested by anglers (Benedict 2000). In 1999, anglers were less effective at removing stocked rainbow trout than in previous years, only 36%, perhaps because of the

drought induced low water levels. Blue Ridge was sampled annually during the fall from 1994 through 1999. In Blue Ridge Reservoir, catch rates for rainbow trout ranged from 0 (1994) to 0.41 fish/minute (1996) with a mean of 0.21 fish/minute. In addition, East Clear Creek below Blue Ridge Reservoir has been sampled annually since 1996, prior to trout stocking. East Clear Creek was sampled for ½ mile below Blue Ridge (Keller, AGFD, pers. comm.). Since sampling began in 1996 no trout have been collected during the pre-stocking sampling trips. In addition to sampling below the reservoir a complete walkthrough sampling was also conducted above Blue Ridge Reservoir in 1995 with no trout being caught. In general, when pre-stocking sampling is conducted, East Clear Creek is dry from 1/4 mile (0.4 km) below Jones Crossing to Blue Ridge Reservoir. No trout have been caught between Jones Crossing and Blue Ridge Reservoir. Five 200 meter annual monitoring stations were established on East Clear Creek below Blue Ridge Reservoir in 1995. A total of 46 rainbow trout have been collected from the 5 stations since 1996. None of the trout collected have been marked hatchery fish. Of the 46 trout stomachs examined, none contained fish or fish remains (R. Keller, AGFD, pers. comm.).

### **Status of the Species in Project Area**

Stream and watershed alterations have greatly reduced the diversity and complexity of spinedace habitat. Human impacts on the upper LCR watershed include an increase in stream sedimentation; and apparent impact from logging, or road construction, modification of stream channels; dam construction for diversion or impoundment, and introduction of nonnative fish; all have modified historical habitat and influenced spinedace distribution and abundance. The use of piscicides as a fish management tool and subsequent introduction of nonnative fish have impacted the spinedace (Minckley 1984). East Clear, Chevelon, and Nutrioso creeks are vulnerable to the effects of channelization, impoundments, groundwater pumping, and water diversion. The presence of the artificial dams limits flows below the structures where critical habitat exists. In addition to fish, a variety of animals including belostomatid insects and snakes are known to prey on spinedace (Blinn et al. 1993; Blinn and Runck 1990).

It is understood that spinedace numbers within a given population vary from year to year and that a combination of factors are believed to influence such fluctuations. Historically, spinedace have occurred downstream of Knoll Lake. Spinedace occurrence above Knoll has not been documented. Spinedace are consistently found in Dines Tank, approximately 4 ½ miles (7.2 km) downstream (i.e. north) of Knoll Lake (Blinn and Runck 1993) but not downstream from Dines Tank (Minckley 1984). Spinedace habitat below the reservoir is limited. Leonard Canyon was usually dry during the sampling before the annual stocking of rainbow trout between 1996 and 2000 providing no habitat for spinedace. Stream flow is discontinuous between Knoll Lake and Dines Tank in Leonard Canyon. Spinedace have not been recorded in the area immediately downstream of Knoll Lake. The Dines Tank population may serve as an important refugium for the species. Spinedace were also collected in Middle and West Leonard Canyon in 1994 (J. White, Northern Arizona University, AESO Files). Spinedace were also collected in West Leonard Creek in 1999 and 2000. Chuck Benedict (AGFD) states that over 100 spinedace were collected in West Leonard Creek and was the source for spinedace stocking at Yeager.

Surveys conducted in 1961 found a large population of spinedace in East Clear Creek (Miller 1963); however their distribution and abundance has since been greatly reduced (Denova and Abarca 1992). Spinedace have not been collected downstream of Blue Ridge Reservoir (96 crossing) since 1988. However, rainbow and brown trout were collected in the area at Horse Crossing in 1994 (K. Young, AGFD, pers. comm.).

Spinedace in Nutrioso may be coping better, with additional populations found in Nutrioso and Rudd Creek (tributary to Nutrioso Creek). These findings are significant because Rudd Creek and associated water rights have been acquired recently by AGFD providing additional protection for the species. Spinedace were last collected upstream of Nelson Reservoir in 2000 (Lopez et al. 2001).

## EFFECTS OF THE ACTION

### Direct and Indirect Effects

The proposed project may result in rainbow trout entering spinedace habitat. The results and subsequent effects, their magnitude, and degree of risk will vary from year to year depending on weather conditions, snowpack runoff, and local conditions. All three stocking sites have the precaution built into the proposed action that trout will not be stocked sites until after the snowpack runoff to minimize movement of trout from the reservoir into spinedace habitat. Strict adherence to this requirement could delay stocking until some time following Memorial Day weekend. Even with this provision in place, unavoidable spills are possible, as seen from recent spill events at Nelson Reservoir. Variations in hydrology which may result in the reservoirs unanticipated spilling, or other long-term impacts associated with continuing annual stocking of catchable trout and maintaining a sport fishery in this watershed will continue.

Precautions to limit upstream movement of trout are still absent. Stream barriers do not exist to prevent fish movement upstream from Nelson, Knoll, or Blue Ridge reservoirs. Knoll and Blue Ridge incoming streams are typically dry during the majority of the stocking season in a year of average precipitation, and do not provide habitat for either spinedace or trout. Spinedace have not been collected above Nelson since 1990. Spinedace were last collected above Blue Ridge (Jones Crossing) in 1995 (Young et al. 2000). AGFD had proposed fish barriers in Leonard Canyon and above Nelson Reservoir (Project FW-20-D-19) (J. Burton, AGFD, pers. comm.). However, these projects have not been designed or funded, and are not part of this proposed action. During wet years or during periods of high runoff, stocked trout may move out of the stocked areas and move upstream into spinedace habitat. Similarly, spinedace could move into the reservoir habitats supporting trout.

Stocked rainbow trout in the Blue Ridge, Knoll, and Nelson impoundments will continue to be subject to heavy fishing pressure by anglers. Under the planned management regime of put-and-take stocking, and seasonally liberalized bag limits, few if any, trout are expected to overwinter. However, some carry over of trout is possible and these fish are not restricted from moving into spinedace habitat.

Blinn et al. (1993) conducted experiments in Nutrioso creek enclosures. Wild rainbow trout and spinedace (all from Nutrioso Creek) were placed in 6.6 to 9.8 ft (2 by 3 meter) enclosures and fish interactions monitored. Although spinedace disappeared from enclosures with and without trout, significantly more spinedace were lost from enclosures that contained wild rainbow trout (Blinn et al. 1993). Even though macroinvertebrates were abundant in the enclosed areas, trout consumed spinedace. However, Robinson et al. (2000) examined stomach contents of 54 rainbow trout captured from Nutrioso Creek and the Little Colorado River and detected no predation on spinedace. Blinn et al. (1993) also noted trout presence modified spinedace behavior. In the presence of trout, spinedace moved into open water possibly making them more vulnerable to a wide variety of predators (Blinn and Runck 1990; Blinn et al. 1993). Robinson et al. (2000) also documented changes in spinedace habitat use when in the presence of rainbow trout and the shifts appeared to be dependent on the density of rainbow trout present.

Blinn et al. (1993) documented an inverse relationship between trout and spinedace abundance and distribution throughout Nutrioso Creek. This pattern is also noted with the consistent presence of spinedace in Dines Tank and the absence of rainbow trout. The uppermost area of Nutrioso Creek contained a healthy population of trout, the area downstream had a few trout and spinedace, while the area still farther downstream had only spinedace (Blinn and Runck 1990). In addition to predation, competition between spinedace and rainbow trout may occur. Robinson et al. (2000) documented both species selecting for the same habitats (pools with undercut banks) in both field and lab observations. With downstream flow being limited during the summer months, competition for space could occur.

Spills from the reservoirs are more likely to transport large numbers of fathead minnows, as evidence by the previous sampling reports (Lopez et al. 2001, Benedict 2000, Robinson et al. 1998). While native fishes are adapted to flood events, small bodied fish like the fathead minnow are readily transported downstream into spinedace habitat (Minckley and Meffe 1987). Fatheads mainly feed on detritus and algae on soft bottoms (Minckley 1973). High numbers of fathead minnow will continue to have a negative effect on Little Colorado spinedace through competition for food and habitat and by predation on larval fishes. While it is recognized that other variables such as water temperatures, stream gradient, etc. may affect abundance and distribution of all fish species, it is possible that spinedace population may not be able to maintain or increase their numbers in the presence of non-native fishes. In addition, introduced crayfish (*Orconectes virilis*) likely pose yet another threat to spinedace, since they both prey on and cause spinedace to modify their habitat use (Robinson et al. 2000). Providing habitat free of non-native fish may be crucial to spinedace recovery.

### Critical Habitat

Critical habitat designation for spinedace occurred before the requirement to identify constituent elements or habitat qualities necessary to allow a species to survive and recover from extinction was added. Therefore, the best scientific and commercial data available were used to determine those characteristics of the designated critical habitat that support the species' survival and recovery (USFWS 1998).

Currently no barriers exist to prevent upstream movement of trout into designated critical habitat upstream of Blue Ridge reservoir. Likewise there are no barriers to prevent downstream movement of trout from Blue Ridge or Nelson Reservoirs other than the dams that impound the stream. When critical habitat areas for spinedace were designated, these areas were reported as "...presently support(ing) healthy self-perpetuating populations of the Little Colorado spinedace" (USFWS 1987). Since that time, habitat degradation, introduction of non-native fishes, and scarcity of water have resulted in low numbers of spinedace in East Clear Creek and Leonard Canyon. In years of high precipitation or during periods of high runoff, trout have the opportunity to move out of stocked area into spinedace habitat. Similarly, spinedace may move into trout areas. In either case, some spinedace could be consumed by rainbow trout or other non-native species. Movement of predaceous fish into designated critical habitat may contribute to the disjunct distribution patterns and retreat of spinedace to suboptimal habitats. Results may include competition, predation, harassment or further loss of spinedace. The act of stocking catchable rainbow trout upstream and downstream of critical habitat is reversible and does not diminish or preclude the role of that habitat for the survival and recovery of the spinedace. The proposed action does not appreciably diminish the value of the constituent elements essential to the conservation of the spinedace. Therefore, the adverse modification threshold is not exceeded.

#### CUMULATIVE EFFECTS

Cumulative effects are those effects of future State or private activities that have no Federal connection, but are reasonably certain to occur within the action area of this consultation. Projects without a Federal nexus may require section 10 (a) permits (Habitat Conservation Plans) to comply with section 9 of the Act.

The cumulative effects of rainbow trout in spinedace habitat may be an important factor. In addition to the stocking program established by AGFD or the Service's Fisheries Program, there are private water bodies which are stocked in the area. Spinedace may also be affected by other accidental or intentional transfer of fishes into or within the LCR drainage. Although State law prohibits the use of bait fish in the LCR watershed, the opportunity for transfers from bait buckets to spinedace habitat may occur illegally. However, fishing for trout with live bait is not a recognized practice (K. Young, AGFD, pers. comm.). The dumping of nonnative fish no longer wanted by individuals, culturists, and distributors is a threat that must be recognized.

Private introductions of nonnative fishes will likely have an adverse effect on the spinedace. The delay in the trout stocking program has frustrated some members of the private sector, including anglers; some have threatened to stock fish in the absence of State or Federal programs. Given the nature of the area, actions from the private sector could affect spinedace survival. The operation of Nelson Reservoir as a recreational facility limits downstream flows in Nutrioso Creek which is critical habitat for the Little Colorado spinedace.

#### CONCLUSION

After reviewing the current status of the Little Colorado spinedace, the environmental baseline for the action area, the effects of the proposed stocking, and the cumulative effects, it is the

Service's biological opinion that the rainbow trout stocking in Nelson, Knoll, and Blue Ridge reservoirs as proposed, is not likely to jeopardize the continued existence of the Little Colorado spinedace and is not likely to destroy or adversely modify its designated critical habitat. This conclusion is based on full implementation of the project as described in the Description of the Proposed Action section of this biological opinion, including the conservation measures as precautions incorporated into the project design.

We present these conclusions for the following reasons:

#1. Escapement of rainbow trout from Nelson Reservoir into Nutrioso Creek was extremely limited during the 1996-2000 period that surveys were conducted. Just one tagged trout originating from Nelson was recaptured in Nutrioso Creek downstream of the reservoir. Angler harvest of trout stocked into Nelson is expected to remain high with most trout being removed over the course of the summer and fall following stocking. Seasonal trends in catch rates and surveys of the reservoir's fish population both indicated that most trout had been caught prior to spring overflows in previous years, and is expected to continue in the future.

#2. Surveys conducted annually between 1996 and 2000 indicate that changes in fish - management at Blue Ridge/Knoll have achieved objectives. According to the data collected as part of the section 7 requirements trout stocked into Blue Ridge and Knoll lakes have had minimal if any impact on the threatened Little Colorado spinedace, and we anticipate similar effects in the future. Stream sampling conducted prior to stocking and during routine monitoring have not found marked rainbow trout above or below the reservoirs. This indicates few, if any stocked rainbow trout are escaping from the lakes. In addition stomach samples taken from "wild" rainbow trout sampled from the creeks suggests that they are not eating fish as a major part of their diet.

#3. Spinedace critical habitat continues to support variable populations of spinedace.

### **INCIDENTAL TAKE STATEMENT**

Sections 4(d) and 9 of Act, as amended, prohibit taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the applicant. Under the terms of section 7(b)(4) and section 7 (o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided such taking is in compliance with the terms and conditions of this incidental take statement.

The purpose of stocking rainbow trout is to provide recreational fishing opportunity for anglers. If stocked rainbow trout consume spinedace, it would be incidental to the proposed action. The



stocking of hatchery-reared, catchable rainbow trout, anticipated high angling pressure, and management provisions listed for each reservoir are designed to prevent rainbow trout from migrating from the three reservoirs into the three reservoirs will assist in determining if stocked rainbow trout move from the reservoirs into spinedace habitat. But, regardless of these precautions, it is possible that incidental take of some unknown number of spinedace may occur. In addition to the direct take some 36 of the 44 miles of critical habitat are likely to be affected by this action.

The measures described below are non-discretionary, and must be implemented by the agency so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply.

#### AMOUNT OR EXTENT OF TAKE

The Service anticipates incidental take of spinedace will occur but it is difficult to quantify for the following reason(s): finding a spinedace that has been eaten by a rainbow trout is unlikely; and opportunity to evaluate effects of rainbow trout on spinedace behavior that results in harassment or mortality will be infrequent.

#### EFFECT OF THE TAKE

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

#### REASONABLE AND PRUDENT MEASURES (as appropriate)

The Service believes the following reasonable and prudent measure(s) are necessary and appropriate to minimize take of (species):

1. Federal Aid shall monitor incidental take resulting from the proposed action and report to the Service the findings of that monitoring.
2. Federal Aid shall minimize opportunity for interaction between spinedace and rainbow trout and other nonnative species associated with sport fishing, including crayfish, fathead minnows, brown, and brook trout, in order to minimize negative interactions for spinedace.

#### TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, Federal Aid must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

To implement reasonable and prudent measure #1:

1.a. Conduct stream surveys, upstream and downstream of each of the three reservoirs, to determine whether tagged rainbow trout are moving to connecting streams (recognizing the frequency and timing as stated in the Project Description). Surveys shall be conducted within 60 days of spill cessation. Triggers for conducting surveys above the reservoir may not be the same for conducting surveys below the reservoir. Surveys shall be conducted at flows that optimize human safety and capture of fish. If tagged trout are collected from areas occupied by spinedace, stomachs are to be taken and attempts made to determine if spinedace are being consumed by the marked trout.

1.b. Provide AESO results of monitoring activities every two years.

2. Protect Little Colorado spinedace populations and from negative interactions with the species listed in Reasonable and Prudent Measure #2, and other species of fish and invertebrates as appropriate. Techniques for spinedace protection may be evaluated under lab and field conditions.

**Review requirement:** The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. If, during the course of the action, the level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures provided. The Division of Federal Aid must immediately provide an explanation of the causes of the taking and review with the AESO the need for possible modification of the reasonable and prudent measures.

The level of incidental take will be considered to be exceeded if it is determined that tagged rainbow trout migrate to spinedace habitat and consume spinedace in numbers that prevent maintenance of existing populations. Parameters used to make this determination, and require reinitiation of consultation will be either the collection of spinedace taken from tagged trout stomachs or collection of tagged trout from occupied spinedace habitat. Consultation will be initiated on the three reservoirs individually if more than 1 spinedace is taken from the stomachs of tagged trout or collection of more than 10 tagged trout occur below a reservoir during any one year.

## CONSERVATION RECOMMENDATIONS

Section 7 (a)(1) of Act directs Federal Agencies to utilize their authorities to further the purposes of Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. Consider the development of a watershed management program which will provide for long-term survival and recovery of the spinedace. This should meet the Service's Ecosystem Approach to resource management.

2. Remove non-native fishes above Nelson, Knoll, and Blue Ridge reservoirs to provide for the long term survival of Little Colorado spinedace.
3. Construct fish barriers in Nutrioso Creek above Nelson Reservoir, and in East Clear Creek above Blue Ridge Lake to provide for secure populations of spinedace.
4. Study the effects to the spinedace of maintaining Nelson Reservoir water levels for recreational fishing.

### **REINITIATION NOTICE**

This concludes formal section 7 consultation on the stocking of rainbow trout into Nelson, Knoll, and Blue Ridge Reservoirs, as described in your request for consultation. As required by CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; or (3) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

In future communications on this project, please refer to consultation number 2-21-92-F-403. If there are any questions about this biological opinion, please contact Debra Bills (x239) or Tom Gatz (x240).

/s/ David L. Harlow  
Field Supervisor

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES)  
Project Leader, Fisheries Resources Office, Pinetop, AZ

Fisheries, Arizona Game and Fish Department, Phoenix, AZ (Attn: K. Young)  
John Kennedy, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ

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