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
2-21-01-F-218 August 21, 2001

Ms. Cindy Lester
Chief, Regulatory Branch
U.S. Army Corps of Engineers
3636 North Central Avenue, Suite 760
Phoenix, Arizona 85012-1936

Dear Ms. Lester:

This biological opinion responds to the Corp's May 22, 2001, letter requesting initiation of formal section 7 consultation under the Endangered Species Act (Act; 16 U.S.C. 1531 et seq.), as amended. The consultation concerns effects of the Upper Little Colorado River Riparian Enhancement Demonstration Project on the threatened Little Colorado spinedace (*Lepidomeda vittata*). The Corp has determined that the above project will have no effect on the bald eagle (*Haliaeetus leucocephalus*) and the southwestern willow flycatcher (*Empidonax traillii extimus*). These species will not be addressed further.

Consultation History

The proposed action was designed by Natural Channel Design, Inc. (Tom Moody), for Gary and Cheryl Enders. Acting as an agent for Mr. and Mrs. Enders, Mr. Moody submitted an application to the Army Corps of Engineers (Corps) for authorization to implement a channel restoration and enhancement project.

Informal consultation began on February 12, 2001, when we met with Mr. Moody to discuss the possible effects his project might have on Little Colorado spinedace. Subsequent to this meeting, Mr. Moody emailed us a draft copy of the biological evaluation (BE) for the above project. We mailed comments on this draft BE on March 30, 2001. On May 2, 2001, we received the final BE, accompanied by a request from the Corps for concurrence with a "may affect, not likely to adversely affect" determination for the Little Colorado spinedace. We responded on May 17, 2001, with a letter stating we were unable to concur with this determination of effects.

On May 23, 2001, we received the Corp's request for formal consultation on the above project, and responded with an affirmative 30-day letter on May 31, 2001. A draft biological opinion was sent to the Corps on July 16, 2001. On August 3, 2001, we received a letter from the Corps asking us to finalize the draft document.

Ms. Cindy Lester

BIOLOGICAL OPINION

Description of Proposed Action

PROJECT SUMMARY (as described in the biological evaluation)

The primary objective of the Upper Little Colorado River Riparian Enhancement Project is to restore the natural stability and function to the stream channel and enhance the riparian vegetation community. A secondary objective is to provide a demonstration of bioengineering and other low-impact, non-structural stream restoration practices for local landowners. The project is funded by the Arizona Water Protection Fund as a stream restoration project. The project reach is located in Round Valley within the town limits of Springerville, Arizona in Apache County.

Using reference conditions gathered from nearby stream reaches, the project design attempts to restore natural dimension, pattern, and profile to the channel and floodplain and encourage the revegetation of banks and floodplains with a variety of bioengineering practices. Changes in management will include the removal of all livestock for a minimum period of 5 years. Under the grant contract with the Arizona Water Protection Fund, the integrity of the project components will be maintained for an additional 15 years. Native species from local sources will be used whenever possible in the revegetation. Stable channel dimension and pattern will be restored where existing features have created unstable conditions. The floodplain will be widened at three sites to allow greater spreading and natural dissipation of energy from high flood flows. Construction is scheduled to begin during October or November of 2001, and will last for approximately 6 weeks.

PROJECT LOCATION

The project is located along the Little Colorado River just upstream of the Highway 60 bridge near Springerville (T9N, R29E, Sec. 29, SE 1/4), Apache County, Arizona. Approximately 3600 feet of the Little Colorado River flows through the property. The watershed area is approximately 120 square miles.

MANAGEMENT CHANGES

Current management includes intensive livestock grazing throughout the riparian areas. This management has severely impacted the riparian vegetation. The landowners have decided to change management to exclude livestock from the riparian zone for a minimum of 5 years and will construct a fence surrounding the riparian area as part of the project. The 5-year period is designed to allow the new vegetation to become firmly established. The land owner's primary objective is to enhance and protect the riparian corridor. As part of the contract with Arizona Water Protection, the grantee is required to "operate and maintain grant-assisted structures, human access or educational facilities, and revegetation sites(s) for 20 years". The grantee retains the responsibilities for maintaining the project even if a change in ownership takes place. As a result, formal agreements are in place to protect the riparian community through 2019.

BIOENGINEERING BANK PROTECTION:

Primary restoration activities include the reestablishment of native riparian vegetation along 2200 feet of eroding banks. These bioengineering practices are standard practices developed for the Natural Resource Conservation Service and will be installed according to such specifications (see BE for details). A short description of each practice is included here.

- Preparation for these activities generally involves dressing banks with hand tools with minimal impacts to the stream channel. "Dressing" describes smoothing of existing banks to allow adequate stem-to-soil contact for successful revegetation and to allow the effective installation of erosion matting where prescribed. Dressing does not involve the movement of appreciable amounts of soil or result in significant resloping of banks unless specifically called for in the construction specifications.

- Erosion cloth or other cover will be installed on all disturbed banks and floodplains exposed to fluvial flow. Native willow cuttings, sedge plugs, and grass seed will be planted in and under these mats. The mat is designed to minimize erosion from disturbed areas until vegetation becomes established.

- Initial revegetation is planned to immediately follow fall construction. There will be a second opportunity the following spring to repair areas damaged by winter flows and/or revegetate areas where efforts appear inadequate.

- All species used in revegetation will be collected from local stock or purchased from reliable seed suppliers as close to the project site as possible. Willow shoots will be harvested from local stocks at Wenima Wildlife Area and other sites in Round Valley. Sedge plugs will be harvested from the project site or other areas along the Little Colorado River upstream or downstream of the project site. Local species of grass seed will be purchased from reliable suppliers.

- All Coyote (Salix exigua) and Strapleaf willow (S. liqulifolia) cuttings will be planted to the depth of permanent ground water.

DESCRIPTION OF BIOENGINEERING PRACTICES

Fiberschines (biologs) are small diameter cocoanut-fiber rolls installed along the elevation of perennial base flow to provide temporary stabilization of bank toes and trap sediment from the sloughing streambank. The fiberschine decomposes as native vegetation is being established. Both willows and sedge plugs will be planted in these biologs, depending on the location.

Erosion Control Fabric commonly consists of a woven mat constructed of biodegradable natural materials. The purpose of these mats is to provide temporary protection to disturbed soils until native vegetation can become established to stabilize the slope.

Live sedge mats are live mats consisting of sedge plugs inserted in erosion control fabric. These mats will be constructed in the spring in temporary ponds near the project for planting in the fall. The extra growing season increases the survival rate.

Brush Layering uses bundles of willow cuttings (*Salix exigua*) in buried trenches along the slope of an eroding streambank. This willow "terrace" is used to reduce the length of slope of the streambank.

Brush Trenches use bundles of willow cuttings in a buried trench along the tip of an eroding stream bank. This willow "fence" filters runoff before it enters the stream and is a method for alleviation of piping problems.

Vertical Bundles use bundles of willow cuttings placed in vertical trenches along an eroding streambank. Erosion control fabric will be used to protect bundles until they become established.

Willow wattles or fascines are cigar or sausage-shaped bundles of live cuttings tied together and inserted into a shallow trench dug into the streambank. The willow bundles will sprout and take root, thus stabilizing the streambank with a dense matrix of roots.

Brush mattress uses a mat of willow cuttings along the slope of an eroding stream bank. The cut ends of the willows are placed in a trench at the toe of the slope

Pole Plantings are cuttings from willow and cottonwood (*Populus angustifolia*) used to revegetate eroding streambanks. These cuttings will sprout and take root, stabilizing the streambank with a dense matrix of roots. Holes for pole plantings will be drilled using a hydraulic jet. All cuttings will be planted to the depth of permanent ground water.

STRUCTURAL PRACTICES

Toe Rock: To provide a demonstration of low impact structural approaches to bank protection, toe rock will be installed along 100 feet of a 6-foot high eroding bank. The toe rock will be installed below bed scour and extend to floodplain elevation. At that point, the terrace will be stepped back approximately 5 – 10 feet to provide a small floodplain and 2 or 3 willow brush layers at 24 inch intervals will be installed. Willow bundles will be buried to the depth of permanent ground water and survival rates are expected to be very high.

Rock Vanes: Three rock vanes will be installed to protect the newly constructed bank at Site #2 (see BE for details). These structures are constructed of individual large rocks (3 ft dia.) that angle upstream at a sharp angle (~20 – 30 degrees). They are tied to the bank at floodplain elevation and dip to channel bed elevation at the upstream tip. The structures are completely inundated by moderate, frequent flow events and do not restrict high flows across the floodplain. They do not extend more than 1/3 of the width of the bankfull channel. The function of the structures is to create a surface that slows flow velocities against the vulnerable bank and redirects flow to the channel center. While near bank velocities are reduced, local flow velocities near the tip are increased. According to the biological evaluation, these structures do not tend to

degrade the elevation of the channel bed but create small local scour holes near their tips. A trench will be excavated in the channel to install footer rocks below bed scour. The excavation can be conducted quickly, with installation generally taking only a few hours. Since the trenches must be excavated directly in the channel, some short-term increase in turbidity can be expected.

Rock Weir: A low rock weir will be installed to demonstrate an alternative to traditional diversion structures. The design of the weir is similar to the rock vane using large native rock to create a chevron shaped structure with the tip pointed upstream. The wings are anchored to the bank at floodplain elevation with the upstream center tip dipping to near bed elevation. The structure is inundated by moderate, frequent flow events and does not restrict flows across the floodplain. Local velocities are lowered against the bank but increased in the channel center to maintain sediment transport. A footer trench will be temporarily excavated to scour depth for this structure and filled with rock. Since the weir must be sited in channel center, some short-term disturbance and increase in turbidity can be expected. This structure will be installed in a newly constructed dry channel, into which water will then be diverted.

RESTORING CHANNEL DIMENSION AND PATTERN

The project reach generally maintains the historic channel meander pattern. However, in two short sections, channel adjustments have led to unstable channel geometries. At Site #1 (see BE for details) a floodplain constriction has initiated excessive deposition and created a broad mid-channel bar. The resulting channel no longer has the reference channel width and depth. The project proposes to restore appropriate bankfull width, depth, and cross-sectional area to 130 feet of channel through this section. No fill will be necessary and appropriate excavated channel material will be used as fill at Site #2 (see BE for details). Stream flow at this site can easily be diverted into a secondary channel so that much of the excavation could take place in the outside the existing channel. Only the final excavation necessary to open the upper end of the new channel would directly add sediments to the stream or impact channel bed material. No fill will be added to channel. Some short-term disturbance and increase in turbidity can be expected.

At Site #2, bank erosion has created a bend out of sequence with the existing meander pattern. The project proposes to restore stable pattern by excavating a short cut-off channel (constructed to match bankfull width, depth, and cross-sectional area) to connect the stream above and below the present bend creating an abandoned meander. Excavated native channel material from Site #1 and Site #2 would be used to fill the abandoned meander to floodplain elevation. A kidney-shaped low area would be maintained to create an area with higher soil moisture.

Similar to Site #1, the majority of stream channel excavation will take place along the alignment before the stream flow is allowed to enter the channel. Diverting the stream into the new channel and damming the abandoned channel at the top and bottom points would then allow placement of fill in the abandoned meander with minimal sediment inputs to the stream. The abandoned channel will be seined a minimum of 3 times to remove all aquatic species prior to filling. Some short-term disturbance and increase in turbidity can be expected. Adequate floodplain width is

essential to the stream's successful dissipation of energy during high flow events. In general, floodplain widths range from 100 to 150 feet. However, in 4 areas the floodplain is less than 75 feet wide. At these sites (STA 15+00, STA 17+50, STA 19+00, STA 29+50), terrace features will be lowered to the floodplain elevation and resloped in order to increase floodplain width and stabilize terrace features. No excavation will take place within the active channel or floodplain. Excavated material will be removed from the riparian zone and deposited in an appropriate area on the property.

MITIGATION MEASURES AND POLLUTION CONTROL

Construction will take place in late fall to: 1) coincide with low base flows, 2) minimize the chance of flood events, 3) minimize impacts during the spinedace spawning and egg hatching period, and 4) allow harvesting and planting of local vegetation during or approaching a dormant state.

The stream channel will never be dewatered during construction. Channel sections abandoned will be dammed and seined several times to remove fish prior to placement of fill.

Refueling of excavation equipment will be restricted to the area adjacent to the existing propane tanks near Highway 60, a distance of 200+ feet from the stream channel.

Status of the Species (range-wide)

The Little Colorado spinedace was included in the Service's 1982 "Review of Vertebrate Wildlife for Listing as Endangered or Threatened Species" (USFWS 1982) as a category 1 candidate species. Category 1 species were those for which sufficient information to support listing as threatened or endangered existed. On April 12, 1983, the Service was petitioned under the Act by the Desert Fishes Council to list the spinedace as endangered or threatened. The petition was found by the Service to contain substantial scientific and commercial information and a notice of finding was published on June 14, 1983 (USFWS 1983). A warranted finding was issued by the Service on July 13, 1984 (USFWS 1984) and a proposed rule to list the spinedace as a threatened species with critical habitat was published in May 22, 1985. The final rule was published on September 16, 1987 (USFWS 1987). Three areas of critical habitat were designated for the spinedace that included portions of East Clear Creek, Chevelon Creek, and Nutrioso Creek.

Taxonomic, distributional and life history information on the spinedace has been compiled in the recent Little Colorado Spinedace Recovery Plan (USFWS 1998). This biological opinion incorporates the recovery plan by reference for that information, which will not be repeated here.

The spinedace is still found in the streams it was known from historically. Populations are generally small; however, the true population size for any occupied stream is unknown due to the yearly fluctuations and difficulty in locating the fish. Spinedace have a tendency to appear and disappear from sampling sites from one year to the next and may not be found for several years.

The Silver Creek population provides an example of this, as it was thought extirpated until individuals were found again in the late 1990's. This makes management for the species difficult since assessing the responses of the population to changes on the watershed cannot be measured with certainty.

III. 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 to provide a platform to assess the effects of the action now under consultation.

The Little Colorado River in the proposed action area is affected by control of flows upstream, water diversions for agriculture and other purposes, road crossings, livestock use of streambanks, urbanization and runoff, and efforts to protect human developments from floods by channelization or other forms of channel alteration.

The stream reach is perennial and has been heavily utilized for livestock grazing for many years. Riparian vegetation has been severely impacted and the woody element is entirely absent. Without vegetation, bank stability was compromised and active cutbanks ranging from 3-6 feet in height exist along the outside of all meanders. It is estimated that these banks supply several hundred tons of fine sediments to the stream annually. As a result, the channel bed gravels appear to be cemented by fines and are not mobile during low flows. Pool reaches are filled with a thick deposition of clay fines several inches to several feet in thickness. There is little evidence of macro-invertebrate species on channel gravels. The channel has widened and shallowed relative to upstream reaches with good vegetation. The shallow nature and lack of woody vegetation likely increases water temperatures. The lack of streamside willows limits terrestrial vertebrate communities.

Upstream of the proposed action area, the Little Colorado River is dominated by run habitats with riffles accounting for less than 25 percent (Dorum and Young 1995). In 1995 surveys, substrates were often cobble with some boulders, pebbles and sand, and the streambanks were stable (Dorum and Young 1995). Raw banks are common within the proposed action area. Spinedace in the Little Colorado River up and downstream have been captured in run and riffle habitats similar to that at the proposed action area.

The stream within the project area has a meandering channel with a low gradient, riffle-pool morphology and a gravel bed. According to the biological evaluation, the channel has a sinuous meander pattern and from analyses of historic aerial photos (1954, 1971, 1983, 1993, 1998, 2000) does not appear to have been significantly straightened or channelized. The channel and associated floodplain lie approximately 3-4 feet below the elevation of the valley floor suggesting

historical channel incision. However, the channel has widened since that period and reestablished a meander pattern and an associated floodplain. These well-developed features suggests that the channel is currently vertically stable and has access to a broad, well-vegetated floodplain during moderate, frequent flow events. The surrounding valley floor has historically been utilized as unirrigated pasture and supports a moist vegetation community including *Juncus balticus*, *Equisitum (spp),* and *Iris missouiensis.* Since these species require moist soil conditions and the terrace elevation is 3-4 feet above the river's floodplain, this upland water source may represent subsurface flow through the valley, supplemented by leaky irrigation ditches.

The biological evaluation rated the riparian habitat of this reach as poor. Past management practices have severely impaired the riparian community. Little to no native riparian woody species are found along the stream reach and the herbaceous communities have been invaded by annuals and weedy species. Relative to well-vegetated areas upstream, the bankfull channel has widened and shallowed. The resulting wide, shallow channel decreases the stream's ability to transport sediment and, if not corrected, will lead to adjustments in channel alignment and additional bank erosion. While this is a natural process, if left alone, the channel adjustments could reduce the effectiveness of the surrounding restoration efforts and lengthen the time necessary to reach a stable dynamic equilibrium. The loss of vegetation appears to have decreased bank stability resulting in vertical cutbanks along the outside of meanders throughout the project. Active cutbanks ranging from 3 to 6 feet in height occur along 2400 feet in the outside of meanders within the project area. Accelerated bank erosion increases the local supply of sediment into the channel. Due to the composition of the banks this sediment is largely comprised of fines and appears to be cementing the channel alluvium. As part of the evaluation prior to design, a set of scour chains were installed in the channel bed. The channel gravels were so well cemented that a pilot hole had to be driven with rebar prior to installing the chains.

The project portion of the Little Colorado River is currently listed as impaired by the Arizona Department of Environmental Quality due to high turbidity and sediment loads. The source of these pollutants has not been determined. However, high sediment loads in nearby Nutrioso Creek have been linked to actively eroding banks (biological evaluation cites: Nutrioso Creek TMDL for Turbidity, Arizona Dept. of Environmental Quality, 2000). The biological evaluation provided the following analysis on the project site to evaluate sediment loads contributed by the existing condition.

Active bank erosion occurs on the outside of each meander throughout the project reach. While this is often a natural process in meandering stream channels, the unstable banks of the existing unstable stream likely contributed to the current condition. The existing pattern forces the stream to make a sharp turn as it exits the bend and, if left unaltered, will likely result in continued erosion and ultimately the abandonment of the downstream meander. That abandonment would force additional adjustments in the form of bank erosion to the channel both upstream and downstream over time. The consequence would be loss of additional property for the landowner and an increase in sediment loads to the stream. The immediate erosion could add as much as 3,000 cubic yards of material to the channel downstream and subsequent adjustments would add

more.
Erosion from these banks is currently contributing an estimated 380 cubic yards of fine material annually to the stream channel. These additional fines lower water quality and collect in the streambed gravels. Bank condition appears to be the result of a lack of streamside vegetation. The initial cause for the reduction in vegetation is assumed to be over-utilization by livestock and management will be altered to reduce or eliminate this stress. Revegetation of these banks will accelerate the natural healing processes.

It seems evident that the primary impact to the project site has been extended over-utilization of riparian vegetation by livestock. The natural healing of the system has been impeded by continued grazing, by the lack of seed/plant sources in the degraded community, and by the dense sod mats along terrace features which tend to maintain vertical bank faces.

The riparian vegetation community is severely below reference conditions. The native sedge/rush community has been impacted by heavy livestock grazing and subsequently invaded by weedy and noxious species. The native willow community is nearly absent. As a result, no shading or cover currently exists to maintain cooler water temperatures or benefit fish species. The lack of streamside vegetation has allowed abnormally high bank erosion and subsequent sediment loading. The absence of willows across the floodplain removes an important mechanism to slow flow velocities during flood events.

Status of the Species Within the Action Area

In the Little Colorado River mainstem, spinedace are found sporadically from the area around St. Johns upstream to near the town of Greer. There are records from the 1990's from the area upstream of the State Route 260 (SR260) bridge crossing (upstream of the proposed action area) and near the rest area on United State route 180/666 (US180/666) north of Springerville (Dorum and Young 1995).

Surveys at the SR260 bridge between 1991-1995 found spinedace in 1991 when they represented 9.1 percent of the catch (Dorum and Young 1995). The appearance of brook trout (*Salvelinus fontinalis*) in this portion of the Little Colorado River in 1993 may have had an effect on the spinedace population, although other factors were likely involved in their disappearance from this site. Spinedace were located at the rest area site in 1995, where they made up 1 percent of the catch (Dorum and Young 1995). Larger and more stable spinedace populations are found downstream of the rest area site.

Arizona Game and Fish Department (AGFD) personnel conducted fish surveys in the project reach in fall 2000. This sample included three stations, and did not come close to sampling the entire project reach. A total of 1210 fish; 73.8% speckled dace, 26.0% fathead minnow, 0.2% LC sucker (*Catostomus spp*.), and 0.1% brown trout were collected. Crayfish were very abundant. Old Anadontid shells were found on sandy beaches.

No Little Colorado River spinedace were caught. However, spinedace have been collected approximately 1.55 stream miles downstream of Hwy 191/60 on State Trust land in 1995, 1996 and as recent as June 9, 1999 (every sampling trip made to that location found spinedace). A diversion dam exists just upstream of those collection sites and is a fish barrier. AGFD has surveyed not far upstream of Hwy 260 recently and did not find spinedace. Forest Service surveys on USFS land just upstream of Springerville have also failed to document spinedace.

There have not been many section 7 consultations that have involved this portion of the Little Colorado River population of spinedace. The nearest and most recent (1999) project that underwent formal consultation involved a bank protection project along the Little Colorado River, approximately 3.5 river miles upstream of the proposed project, and about 1.3 miles west of Eager, Arizona, along Highway 260 (2-21-99-F-167). In addition, a biological opinion was issued in 1996 for repairs to River Reservoir dam near Greer, in Apache County (2-21-96-F-339). Lands in the immediate area of the proposed action area are private and have been developed for agriculture, livestock pasturage and urban development in Eagar and Springerville. Upstream of the proposed action area is the Apache-Sitgreaves National Forest (ASNF). In 1999, a biological opinion was issued to the ASNF on the effects of livestock grazing on spinedace in the Colter and Riggs Creek watersheds. Effects to spinedace habitats from direct access of livestock to streamside habitats, from road placement and maintenance, and from recreation were considered. Owing to the location of the proposed action area downstream of the former consultations, there is a small likelihood that the baseline condition of the action area was affected. The extent to which the condition of the river in the action area was affected is unknown and would be very difficult to estimate.

IV. EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action, that will be added to the environmental baseline. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

The action area of this project for effects to spinedace and its habitat is the 3600 feet of stream corridor included in the project area, adjacent floodplains, and approximately 40 feet of terraces on either side of the channel and floodplain. Direct effects will take place in the stream channel, and terrestrial vegetation will likely be improved in the floodplains and terrace features. Direct effects of the project will be limited to the disturbance of a 6-week construction period.

Since no critical habitat exists within the action area, effects of the action only encompass effects to the Little Colorado spinedace itself. Direct adverse effects to spinedace are likely to occur in two primary ways. The first is through the sediment that will temporarily be generated as water

leaves its former channel and enters the newly constructed channel, and as the channel adjusts to the flow of water. Sediment will also be generated in areas where bioengineering will take place on established river banks. The second is the possibility of direct mortality through the dewatering of two stream segments as water is diverted into the new channels, and from the placement of toe rock in a portion of wet channel. The two effects are discussed below.

Sedimentation Effects:

Direct effects to the spinedace from the Upper Little Colorado River Riparian Enhancement Demonstration Project will occur from sediment producing activities during installation of bioengineering practices, toe rock, rock vanes, the rock weir, and during channel and floodplain restoration. Sediments derived from bioengineering practices will be limited to soils displaced by hand tools as the banks are smoothed. Sedimentation caused by all construction activities will generally be limited to fine particles and gravels found in bank sections. Once the toe rock is installed, the erosion mat and brush layers will reduce sediment supplied by existing banks. Large flood events that occur immediately after construction could result in accelerated bank erosion. The rock vanes extend 1/3 across the channel and are designed to maintain natural sediment transport. This will cause some local scour around the vane tip. Furthermore, the center of the rock weir dips to channel bed elevation to maintain natural sediment transport. Some local scour is expected to occur around the weir. Although some scour is expected from both the rock vanes and the rock weir, the biological evaluation suggests that such installations in other gravel streams have not contributed to excessive scour or channel bed degradation or aggradation.

Sediment generated by this project may settle directly onto spinedace occupied areas. Adverse effects of stream sedimentation to fish and fish habitat have been extensively documented (Murphy et al. 1981, Wood et al. 1990, Newcombe and MacDonald 1991, Barrett 1992, Waters 1995), and although spinedace can cope with some amount of sediment being carried in the water column, they prefer clear water. Sediment control measures are built into the project that will, if correctly implemented, prevent some of the fine sediment from entering the stream.

Machinery may contribute some sediment to the stream during construction. During installation of the bioengineering materials, machinery will only be used to construct trenches for the brush layering and brush trenches. These effects will be minimized as these practices are not immediately adjacent to the stream channel. For installation of the toe rock, the excavator can do the work from the terrace or nearby floodplain areas to limit impact to the channel itself. Rock will be placed as the trench is excavated to minimize disturbance and siltation. For installation of the rock vanes and weir, installation will take place in a newly excavated channel, and will thus minimize sediment contributions to the stream. Generally, an excavator can work from the bank while constructing the trench.

Instream Construction and Dewatering Effects:

Since most activities will be taking place in newly constructed, dry channels, we do not expect direct mortality of fish from most construction activities. However, toe rock will be placed along 100 feet of a 6-foot high eroding bank in a wetted portion of channel. Spinedace using the shallow shoreline waters may not be able to avoid the substrate disturbances caused by excavation and placement of rocks, and incidental mortality is possible.

Excavation equipment can remain outside the channel for most operations. However, operations from the floodplain or terrace create disturbance to the existing vegetation on these features. Although these areas will be reseeded, they may contribute some additional sediment to the stream in the short-term. Thus, some heavy equipment work within the channel will be necessary. Heavy equipment tracks create disturbance to the channel substrate and may directly impact aquatic macro-invertebrates and fishes including spinedace. Tests of the channel substrate indicate that the gravels are not loose and the bed is extremely firm. Individual gravels appear to be cemented together by excessive fines, presumably originating from the eroding local banks. Spinedace are not found in high velocity situations and are more likely to be found in moderately shallow areas with low velocities and cover in the form of rocks and undercut banks. If these types of areas would be affected by the construction, there is a potential for spinedace to be present.

With respect to dewatering of the former river channel, although the river would be seined prior to construction, it is difficult to prevent fish from re-entering the undesirable portion of river; this increases the risk of mortality. Also, it is extremely difficult to remove every fish, especially small ones, from even small backwaters, thus there is the potential for some fish to remain after the seining.

Indirect effects:

Indirect effects are those effects caused or related to the proposed action that happen later in time. These effects largely involve changes to instream habitats that result from the placement of the rock vanes, and possible changes in habitat resulting from the creation of new stream channels that may not be the correct channel geometry. Rock vanes are designed to slow the flow of water, causing a drop in velocity and the ability to transport bedload. Such changes can be expected from the river as it alters its behavior to accommodate the new restrictions on movement.

Rivers in alluvial valleys have a natural tendency to meander. In meandering rivers, the location of the channel is changing while the basic geometry of the channel remains the same (Leopold 1994). Bank erosion on the concave banks of bends provides the materials for point bar construction downstream and increases the radius of the bend, thus increasing the sinuosity. The greater the sinuosity, the greater the actual stream length versus a straight line distance, and thus the greater dissipation of energy from the passage of water (Hunter 1991). There is a balance point between the flows (high and low), the sediment load, and the geometry of the stream

channel that provides for the most efficient passage of energy down the river (Simons et al. 1976) that is at the heart of the dynamic equilibrium. Changes to flows or sediment loads will require changes in velocity, water depth and slope to the river channel to restore the stability.

The Little Colorado River is not a pristine river. Watershed changes, creation of dams and diversions, gravel mining from the channel, past and present cattle grazing practices, and land use changes in the floodplain have all affected the flow and physical behavior of the river. These alterations, and how the river channel is dealing with them are at the root of the need for the proposed action. Significant changes to a river's geology, hydrology, geometry or hydraulics result in a loss of the dynamic equilibrium that characterizes a healthy river. The river processes adjust in an attempt to move from the unstable condition to a restored equilibrium that may be different from the pre-disturbance equilibrium.

From the information provided in the biological evaluation, we believe that the intent of the proposed action is to restore equilibrium conditions in the project area. The total disturbance area will be approximately 21,000 sq. ft. (0.49 acres), separated into two areas: one measuring 4,000 sq. ft., and the other measuring 17,000 sq. ft. Although we do not anticipate effects that are characteristic of typical channelization projects, if the proposed action has mistakenly identified the stable geometry of the river, then preventing the development of meanders by creating new channels armored with toe rock will not contribute to improvements for long-term stability of the reach. Human disturbances of the watershed, floodplain, and stream channel change many of the factors determining channel configuration. Increased sediment off the watershed is a common result of human actions and sediment is a major determinant of channel shape (Leopold 1997). When the dynamic equilibrium has been disrupted, the channel begins a process of adjustment as it attempts to restore a dimension, pattern, and profile that are consistent with controlling hydraulic variables (Rosgen 1996). These adjustments may lead to dramatic changes in the stream channel width, depth, and geometry that encroach on human activities, such as has occurred in the Little Colorado River. Again, we only expect such adjustment of the stream channel if the proposed action has mistakenly identified the stable geometry of the river. Since it is very difficult to predict river geometry and pattern, there are inherent risks (as described above) with a project which creates a new channel. If the project is successful, restoring natural dimension, pattern, and profile to the channel/floodplain could provide benefits to habitat. Inadvertent benefits to habitats for predacious, exotic fish species could increase direct and indirect competition and decrease (or limit potential increases to) spinedace populations.

The American Fisheries Society has adopted a position statement regarding the cumulative effects of small modifications to fish habitat (Burns 1991). That statement concludes that accrual of localized impacts, often from unrelated human actions, can pose a threat to fisheries. It also points out that some improvement efforts to fish habitat may not result in cumulative increases in status of the species, but instead may simply mitigate cumulative habitat alterations from other activities. This is particularly true on the Little Colorado River, where the accumulating effects of a large number of small and localized impacts over the past century have resulted in a

damaged stream channel with depleted flows and degraded aquatic habitat. As a result, each small and localized project that will affect the stream and its listed fish must be viewed in the context of the current degraded situation.

Summary

Effects to the Little Colorado spinedace from the proposed action primarily occur in three ways. The first is through the sediment that will temporarily be generated as water leaves its former channel and enters the newly constructed channel, and as the channel adjusts to the flow of water. Sediment will also be generated in areas where bioengineering will take place on established river banks. The second is the possibility of direct mortality through the dewatering of two stream segments as water is diverted into the new channels, and from instream work (the placement of toe rock) in a portion of wet channel. Indirect effects may also occur through continued and exacerbated unraveling of the stream channel in the future if a stable channel geometry is not achieved.

V. CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

A majority of the lands in the action area and adjacent areas are owned and managed by private entities. Thus, the effects of many activities likely to occur in the project area could be considered cumulative effects. Among these activities is cattle grazing. In the biological evaluation, grazing has been implicated as the major cause for degraded riparian conditions, sloughing stream banks, and the near absence of riparian vegetation. However, this project proposal includes an action to fence cattle out of the riparian area for five years. Because Arizona Water Protection Fund monies are funding this proposed action, the grantee is required to "operate and maintain grant-assisted structures, human access or educational facilities, and revegetation sites(s) for 20 years". The grantee retains the responsibilities for maintaining the project even if a change in ownership takes place. As a result, formal agreements are in place to protect the riparian community through 2019. We do not have information as to the nature of this protection, and its effectiveness is dubious if cattle are allowed back in the riparian area after five years' time. Thus, we must assume that there is some possibility of future riparian degradation if cattle are allowed to graze in the riparian zone. This habitat degradation would adversely affect the spinedace (through increases in sedimentation, reduction in aquatic vegetation through cattle consumption and soil compaction, and through headcutting initiated by trampling and vegetation loss). However, we do not anticipate future conditions to be any worse than current conditions by virtue of the contract between the grantee and the Arizona Water Protection Fund to maintain the integrity of the restored area.

Any currently unforeseen effects of activities in the project area that do not have a Federal nexus could be addressed by a section 10(a)(1)(B) incidental take permit, if the action may result in take of spinedace.

VI. CONCLUSION

After reviewing the current status of the Little Colorado spinedace, the environmental baseline for the action area, the anticipated effects of the proposed stream work, and the cumulative effects, it is the Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of the Little Colorado spinedace. No critical habitat exists within the action area, thus none would be affected. We make these findings for the following reasons:

1. Although the range of the Little Colorado spinedace includes the portion of river contained in the action area, seining of affected stream segments will occur prior to dewatering to minimize direct effects to spinedace that may occupy the action area.

2. The Little Colorado spinedace is found in East Clear Creek and its tributaries (Coconino County), Chevelon and Silver creeks (Navajo County), and Nutrioso Creek and the Little Colorado River (Apache County) in Arizona. The proposed action affects a very small portion of the species' range within the Little Colorado River drainage.

3. Provided that the project is successful, the effects will be transitory and are expected to be of short duration. Aspects of the project (revegetation and bank stabilization) are expected to benefit the spinedace.

INCIDENTAL TAKE STATEMENT

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

The measures described below, with their implementing terms and conditions, are nondiscretionary, and must be undertaken by the Corps so that they become binding conditions of

any grant or permit issued to the permittee, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require the permittee to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps or permittee must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. [50 CFR §402.14(i)(3)]

I. AMOUNT OR EXTENT OF TAKE

The Service anticipates incidental take of the spinedace will be difficult to detect. Actual numbers of spinedace taken will be difficult to see in the water due to turbidity resulting from the construction process, the small size of the individual fish, any injured or dead individuals being washed downstream out of the construction area, and the small size of the population in the area. However, the following level of take of this species can be anticipated by the loss of other small fish in the construction area. The spinedace shares its habitat with a number of small fish species that are at equal risk of injury or death from the construction activities. If large numbers of dead fish of any species appear in the area, then it is reasonable to assume that any spinedace present may be equally affected.

Using the data from surveys in the 1990's (Dorum and Young 1995), upstream of the proposed action area, an estimate of an average fish population can be made in terms of fish density. The data provide an average of 30 fish per 10.76 square feet. The project is most likely to take fish during the dewatering of the two stream sections, and the redirecting of water to newly constructed channels. According to the biological evaluation, the total disturbance area is approximately 21,000 square feet. This gives a potential population of approximately 47,397 fish in the affected area. This figure is for fish of all species (including exotic fish), not just spinedace. If the seining, barriers and machinery handling is 99 percent effective at avoiding fish mortality, approximately 585 fish may still be in the project area at the time the channels are dry and construction takes place. Therefore, the Service anticipates a total mortality of up to 585 fish of all species as a result of the project.

In addition to the direct loss of fish due to construction activities, the implementation of the proposed action will have some effect on the aquatic habitats in the project area and reaches below. The extent of this effect is not known. The Corps believes that this action will benefit fish by improving habitat. If the project is successful, we agree that the project could benefit spinedace. Since this type of action is likely to be proposed again for streams with similar instability problems, it would be prudent to evaluate the changes to the streams so that effects can be gauged more accurately. Since these changes, beneficial or not, have an effect on occupied spinedace habitats, there is a potential for taking due to harm or harassment. This take can be estimated by evaluating the changes to the river in and immediately below the proposed action area.

In cases where the extent of anticipated take cannot be quantified accurately in terms of number of individuals, the Service may anticipate take in terms of loss of a surrogate species, food, cover, or other essential habitat elements, such as water quality or quantity. Thus, incidental take will be exceeded if any of the following conditions occur:

1 If more than 585 fish of any species are found dead in the project area during the 6 weeks of proposed construction.

2. If channel width at bankfull stage and bank erodibilty increase in more than 20% of the project area, as determined by monitoring data.

3. If channel bed elevations in riffle sections do not remain at current elevations, or if structural design components fail in more than 20% of the project area, as determined by monitoring data.

II. EFFECT OF 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.

III. REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures (RPMs) are necessary and appropriate to minimize take of spinedace.

1. Measures shall be taken to reduce the number of fish that may be taken in the proposed action area.

2. Measures shall be taken to assess the long-term effects to fish habitats from the implementation of the proposed action.

IV. TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Corps 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. All seining activities shall be performed by trained fishery biologists or others with demonstrated expertise in this capture technique.

2. The Corps proposes to seine the two stream reaches (that will be diverted) three times. Seining shall only occur after the stream reaches are dammed from the stream.

3. Immediately after the diverted stream reaches are dry, the stream beds shall be searched for dead fish. All dead fish shall be collected and identified to species. Any specimens of Little Colorado spinedace shall be frozen whole and sent to the Service for dispersal to a qualified museum or research program. A count of all dead fish collected shall also be provided to the Service on completion of the proposed action.

4. Any exotic fish removed from the project area via seining shall not be returned to the Little Colorado River.

To implement reasonable and prudent measure 2:

1. The Corps proposes a thorough stream channel monitoring plan for the proposed action. However, it is essential that such monitoring continue further into the future to determine the success of the project. Therefore, the Corps shall continue to collect all channel monitoring measurements and photo points during the month of October for years 2003, 2004, and 2005.

2. The Corps shall provide to the Service an annual report containing the photographs and any analysis done of noticeable changes to erosion and deposition patterns for each year the photographs are taken. This report shall be due annually on December 31, until year 2005.

3. The Corps shall evaluate the changes to the river channel in terms of creating new fish habitat that result from the implementation of the proposed action. This evaluation shall accompany the annual report with the photographs.

The Service believes that an unknown number of Little Colorado spinedace will be incidentally taken as a result of the proposed action. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, the surrogate measures of take indicate that incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation for the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

Disposition of Dead or Injured Listed Animals

Upon finding a dead or injured threatened or endangered animal, initial notification must be made to the Service's Division of Law Enforcement, Federal Building, Room 8, 26 North McDonald, Mesa, Arizona (480/835-8289) within three working days of its finding. Written

notification must be made within five calendar days and include the date, time, and location of the animal, a photograph, and any other pertinent information. Care must be taken in handling injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible condition. If feasible, the remains of intact specimens of listed animal species shall be submitted as soon as possible to this office or the nearest AGFD office, educational, or research institutions (e.g., Arizona State University in Tempe) holding appropriate State and Federal permits.

Arrangements regarding proper disposition of potential museum specimens shall be made with the institution before implementation of the action. A qualified biologist should transport injured animals to a qualified veterinarian. Should any treated listed animal survive, the Service should be contacted regarding the final disposition of the animal.

CONSERVATION RECOMMENDATIONS

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

1. We recommend that livestock not be allowed to graze in the project area for the duration of the agreement with the Arizona Water Protection Fund (20 years).

2. We recommend the Corps work with the Service and Arizona Game and Fish Department to begin an aggressive program to control nonnative aquatic organisms on the Little Colorado River, particularly fish and crayfish.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

We appreciate your interest in furthering the conservation of this species. If we can be of further assistance, please contact Darrin Thome (x250) or Debra Bills (x239) at the Arizona Ecological Services Field Office. Please refer to number 2-21-01-F-218 in future correspondence concerning this consultation.

Sincerely,

/s/ David L. Harlow
Field Supervisor

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES)
Project Leader, Arizona Fishery Resources Office, Pinetop, AZ
John Kennedy, Arizona Game and Fish Department, Phoenix, AZ

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