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March 9, 2001

Mr. Mark Durham
Acting Chief, Regulatory Branch
Department of the Army, Corps of Engineers
Los Angeles, California 90053-2325

Dear Mr. Durham:

This document responds to your request for formal consultation pursuant to section 7 of the Endangered Species Act of 1973, as amended, on the effects of the Mingus Avenue Extension Project. The Corps of Engineers (Corps) requested formal consultation with determinations of "may effect, likely to adversely effect" for the Arizona cliffrose (*Purshia subintegra*), and the southwestern willow flycatcher (*Empidonax traillii extimus*) and its critical habitat. The Corps determined that the project as proposed would not affect the bald eagle (*Haliaeetus leucocephalus*), Colorado pikeminnow (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), spikedace (*Meda fulgida*), and loach minnow (*Tiaroga cobitis*). The Corps' February 22, 2000, letter indicated that it had determined that the project would not affect proposed critical habitat for the spikedace and loach minnow. Critical habitat for these two species has since been finalized.

This biological opinion is based on the following information: EcoPlan Associates Inc. July 27, 1999, biological assessment (BA) for the proposed roadway extension; additional information provided to the Service in the February 22, 2000, and August 17, 2000, letters from the Corps; mitigation measures negotiated and agreed upon at meetings held in 1998, 1999, and 2000; site visits by Service biologists Michele James and Mima Falk on February 4, 2000, and March 31, 2000; telephone conversations with Service staff and Phil Bourdon, Yavapai County; conversations with species experts and researchers from the Arboretum at Flagstaff; data in our files; 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, major roadway and bridge construction and its environmental effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file in this office.

CONSULTATION HISTORY

Informal consultation on the proposed Mingus Avenue Extension began on July 19, 1988, when the Service responded to a July 6, 1988, letter from Donohue and Associates, Inc.-Royden requesting comment on the location study for the Mingus Avenue Extension. In the Service's letter, concerns regarding impacts to the Arizona cliffrose were identified, as well as the identification of habitat for the federally listed bald eagle and spikedace. On December 29, 1988, the Service provided comments to Donohue and Associates, Inc.-Royden regarding the report entitled "Evaluation of the Occurrence of *Pushia subintegra* (Kearney) J. Hendrickson, for the Mingus Avenue Extension Location Study." The Service's review included comments recommending using recent new information refining the definition of the species.

On September 14, 1998, a meeting was held in Cottonwood, Arizona among the Service, Yavapai County, the City of Cottonwood, and EcoPlan Associates. EcoPlan is the consulting firm hired by Yavapai County to conduct a biological analysis for the proposed project. The meeting was convened to discuss the issues and concerns of the Service with respect to the proposed Mingus Avenue Extension. At this meeting, the need for formal consultation was discussed. A meeting was held on September 28, 1998, between the Service and EcoPlan Associates personnel in Phoenix. This meeting was held to discuss mitigation measures to be included in the project description for the project.

On October 15, 1998, the Service received a draft BA for the Mingus Avenue Extension project (dated October 13, 1998). This draft did not include a project description or proposed mitigation. The draft BA determined that the proposed project "is likely to adversely affect" Arizona cliffrose, "may affect" southwestern willow flycatcher and designated critical habitat, and "may affect, is not likely to adversely affect" razorback sucker and designated critical habitat, spikedace, and loach minnow.

A meeting was held in Phoenix on December 15, 1998, between the Service, Yavapai County, and EcoPlan Associates personnel. On January 26, 1999, the Service met with personnel from the Arboretum at Flagstaff, the Coconino National Forest, and The Nature Conservancy to discuss potential effects of the proposed project to Arizona cliffrose. Arboretum personnel have conducted surveys and research on the cliffrose in the project vicinity and provided preliminary results and details of on-going work.

Yavapai County held a meeting on March 8, 1999, to discuss the Mingus Avenue Extension project and how to accomplish preservation of the Arizona cliffrose. This meeting was attended by multiple interested and involved parties including the Service, Arizona State Land Department (ASLD), the City of Cottonwood, Coconino and Prescott National Forests, the Arboretum at Flagstaff, and the Corps.

On September 27, 1999, the Service received a request for formal consultation from the Corps. The Corps made determinations of "may affect, likely to adversely affect" for the Arizona

cliffrose, and the southwestern willow flycatcher and its critical habitat. On December 21, 1999, the Service sent a letter to the Corps requesting additional information regarding the proposed action and effects to listed species. The Service indicated that formal consultation on the project could not proceed until the information was provided. In this letter, the Service also informed the Corps that a proposed rule to designate critical habitat for the spikedace and loach minnow had been published on December 10, 1999. The Service recommended amending the BA to analyze and consult upon effects to these species and their proposed critical habitat. The Service also requested information regarding possible alternative routes across section 36 which would assist in minimizing direct impacts to the Arizona cliffrose.

A site visit was conducted by Service and Arboretum personnel on February 4, 2000. As of February 16, 2000, the Service had not received a response from the Corps to the request for additional information. The Service contacted Phil Bourdon, Yavapai County project manager and requested a copy of Mingus Avenue Extension road plans. These plans were received at the Flagstaff Suboffice on February 18, 2000.

The Service received the Corps' February 22, 2000, response to the Service's December 21, 1999, request for additional information on March 3, 2000. This response provided a more detailed project description and answers to the Service's questions, as well as color photos of the bridge crossing area, construction plans, and locations of Arizona cliffrose habitat in the right-of-way.

An additional site visit was conducted by Service and Yavapai County personnel on March 31, 2000. On July 21, 2000, the Service wrote a letter to the Corps requesting an extension of the consultation period until August 26, 2000. The Corps sent the Service a letter on August 17, 2000, agreeing to the consultation extension and outlining changes to the proposed action.

A draft biological opinion was provided to the Corps on September 7, 2000. A November 3, 2000, letter from Yavapai County commenting on the draft biological opinion was received by the Service on November 6, 2000. A meeting was held between the Service, Yavapai County, and EcoPlan Associates on December 4, 2000, to discuss the draft biological opinion. The Service reviewed and commented upon draft meeting notes created by EcoPlan Associates on February 6, 2001. On March 5, 2001, the Service received a letter from the Corps requesting the final biological opinion.

DESCRIPTION OF THE PROPOSED ACTION

The Corps proposes to issue a section 404 Clean Water Act permit to extend Mingus Avenue from Main Street in the City of Cottonwood to State Route (SR) 89A near the Cornville Road intersection in Yavapai County, Arizona. The Service has determined the action area to include all areas affected directly and indirectly by the issuance of this permit, including the 100-year floodplain of the Verde River 0.25 miles upstream and downstream of the proposed Mingus Avenue Bridge site as well as the proposed roadway leading to and from the bridge itself. The

action area described above includes all areas where direct and indirect effects to the Arizona cliffrose and the southwestern willow flycatcher may occur; details will be explained and discussed in the “Effects of the Proposed Action” section of this consultation.

The proposed extension of Mingus Avenue would include a two-lane bridge spanning the Verde River as well as two paved, 12-foot through lanes. Curbs, gutters and 5-foot wide sidewalks would extend from Main Street to Rocking Chair Road, beyond which paved, 8-foot shoulders would continue to SR 89A. The right-of-way (ROW) would be 300 feet wide between the city limits and SR 89A. The roadway will not include a median strip. Construction of a four-lane roadway is planned in the future, but is not included in the proposed action currently under consultation. Storm drains would extend from Main Street to the west side of the Verde River Bridge and from the east side of the Verde River Bridge to Rocking Chair Road. The drains divert water to adjacent retention basins. Road side ditches are proposed from east of the Verde River Bridge to SR 89A.

The proposed Verde River Bridge would be designed for two 12-foot wide through lanes, two 6-foot wide bike lanes, and a 5-foot wide sidewalk on the north side. This 6-span, 5 pier welded steel plate girder bridge would have an overall length of 985 feet. During bridge construction activities, Yavapai County and their agents or contractors will conduct work in accordance with Yavapai County standard specifications and erosion and pollution control guidelines. Construction equipment for the project will include, but is not limited to, excavators, graders, bulldozers, cranes, front-end loader, haul trucks, and a truck-mounted drill. Construction access roads, the bridge piers and abutments and the stormwater retention basins will be constructed outside of the waters of the U.S. Construction equipment will not enter or cross the Verde River. No draining or water diversions will be required. A protective plastic, canvas, and/or woven fiber shield, installed beneath the span of the bridge located over the water, will be temporarily installed to prevent construction material, construction equipment, or contaminants/pollutants from falling into the river.

During bridge construction, debris will be disposed of in an approved site and will not be deposited in stream channels. Equipment storage and material storage will be located away from low areas, drainage ways, stream banks and situated above the 100-year flood plain. The contractor will take sufficient precautions to prevent discharge of fuels, oils, bitumen, calcium chloride, cement or concrete, raw sewage, muddy water, chemicals, or other harmful materials into the Verde River from the work and storage areas. This excess matter will be removed or disposed of according to State and Federal regulations. All washes adjacent to the Verde River will be promptly cleared of all false work, piling, debris, or other obstructions upon conclusion of the construction.

The contractor will prepare a Storm Water Prevention Plan to satisfy the requirements of the National Pollution Discharge Elimination System (NPDES). The Plan will specify temporary and permanent measures to be taken by the contractor to prevent erosion sediment transport. No stormwater run-off will be discharged directly from the bridge into the Verde River. Instead,

permanent stormwater sediment retention basins will be constructed throughout the project length. Retention basins have been designed to accommodate the 100-year, 2-hour storm event. Variable-sized basaltic rock will be used to prevent scour at the retention basin outlet to the Verde River.

Conservation Measures

The following conservation measures represent actions that the Corps has agreed to implement to reduce impacts to the Arizona cliffrose, the southwestern willow flycatcher, and their habitat.

The acquisition of 370 acres of ASLD land at Township 16N, Range 3E, section 36 by Yavapai County is to be used for the ROW and protection of Arizona cliffrose habitat. Approximately 12 acres of the 370 acres within section 36 would be used as the ROW. This would leave approximately 358 acres that would be preserved in perpetuity for the Arizona cliffrose. The entire 358 acres within section 36 would be held by Yavapai County in its existing, natural, undeveloped condition. No land disturbing activities will occur within this parcel. On May 25, 2000, Phil Bourdon of Yavapai County communicated to the Service that 1 acre of land within the 370 acres has been sold by the State to an adjacent landowner. The exact location of this acre is not known, although it is located at the western edge of section 36.

The 369 acres within section 36 which will be acquired by Yavapai County includes 11.97 acres to be used as right-of-way. Thus, the area of section 36 that will be subsequently exchanged by Yavapai County with the U.S. Forest Service, Coconino National Forest in the future totals 357.03 acres. Exchange to the Forest Service will take at least 2 years (Judy Adams, Sedona Ranger District, pers. comm.). The Forest Service indicates that these 357 acres would be included in the Verde Valley Botanical Area and managed for the Arizona cliffrose (Barbara Phillips, Coconino National Forest, pers. comm.). Construction of Mingus Avenue in section 36 will not proceed until the County has purchased this land from ASLD.

The Yavapai County Public Works Department has agreed to fund up to \$75,000 to the Arboretum at Flagstaff for the purpose of collecting and preserving genotypes of *Purshia subintegra* lost with the extension of Mingus Avenue. The work will be conducted under a contract between Yavapia County and the Arboretum at Flagstaff. The Arboretum at Flagstaff estimates that 600 plants will be removed within the ROW and they have proposed taking five cuttings from each individual (*in litt.* June 4, 2000). Each of these 3000 cuttings will be tracked individually and maintained until they have rooted. The seeds will be collected and placed into long-term storage in the National Seed Storage Laboratory in accordance with the protocol of the Center for Plant Conservation, and plants will be transplanted back into section 36 and, if deemed appropriate, transplanted elsewhere in the Cottonwood population. The Service considers such work experimental and an extension of the research currently being conducted by

the Arboretum at Flagstaff. Even in the best climatic conditions, plants may not have adequate growth to take cuttings and some plants tend to propagate from cuttings better than others. If climatic conditions reduce plant growth and seed production, the success rate may be less than 65% (Arboretum at Flagstaff, *in litt.* June 4, 2000).

The proposed project will feature guardrails, at two locations along the proposed roadway between Cottonwood Ditch and Rocking Chair Road. Guardrails will be placed at each bridge abutment for approximately 100 feet. At the east bridge abutment there are 113 feet on the north side of the roadway and about 66 feet on the south side of the road. At the west bridge abutment there are 188 feet on the north side of the road and 212 feet on the south side of the road.

The roadway section between Cottonwood Ditch and Rocking Chair Road will include a curb and gutter. Yavapai County will place six-foot high chain link fence at appropriate locations to restrict access to retention basins and associated drainage features. The chain link fencing will be in addition to that shown on the final plans. From the east bridge abutment, chain link fencing will extend 228 feet to the east. From the west bridge abutment chain link fencing will extend 715 feet to the west. This fencing will be in addition to the right-of-way fencing shown on the final plans.

The Public Works Department will forward an ordinance with fines for approval by the Yavapai County Board of Supervisors. The ordinance will preclude stopping or parking (other than emergencies) on Mingus Avenue between Cottonwood Ditch and Rocking Chair Road.

The Yavapai County Public Works Department will make a one-time \$100,000 payment to an agency/organization/group defined by the Service for the purpose of southwestern willow flycatcher conservation. This money will be used for habitat acquisition, conservation easements, and/or habitat protection, etc. of riparian habitat adjacent to the Verde River, preferably in the Verde Valley, for the flycatcher. Land will represent river bottom habitat where flycatcher habitat exists or would likely develop (Sogge *et al.* 1997). The opportunity to create larger tracts of connected undeveloped riparian riverside habitat will be explored by attempting to connect the newly acquired land to existing protected land, or a future action where this acquisition could be a portion of a larger purchase of land. The land to be acquired or protected will be examined by the Service for approval and must occur within 24 months of the date of this biological opinion.

The Yavapai County Public Works Department will restrict vehicular access to the area under the proposed Mingus Avenue Bridge. Periodically, Public Works employees will conduct routine maintenance of bridge abutments and piers for scour impacts following major flood events, debris removal from piers and abutments (e.g. sediment, brush, tree trunks, and other flood-borne debris) from the area between the Mingus Avenue bridge abutments to a site removed from the Verde River corridor, bridge deck inspections and maintenance (e.g. prevent corrosion, repair or replacing expansion joints) and maintenance of access control facilities (e.g. fencing, berms) between Rocking Chair Road and the Cottonwood Ditch. These activities may utilize dump

trucks, front-end loaders, backhoes, chain saws, pickup trucks, and cherry pickers. Major maintenance activities would require consultation.

Should Yavapai County need to conduct bridge maintenance and move vehicles and equipment into the floodplain, they shall endeavor to minimize impacts and to re-contour soils and re-seed within the vehicle pathway such that the area is returned to as natural a state as possible (Phil Bourdon, Yavapai County, pers. comm.).

Pole plantings in the immediate vicinity of the Mingus Avenue Bridge will not be included in the project.

During Verde River Bridge construction:

- a) No concrete mixing will occur in the vicinity of the bridge;
- b) All construction work in the upland areas immediately adjacent to the Verde River will be conducted in a manner that precludes any short or long-term sediment loading of the river;
- c) Precautionary measures including progressive seeding will be included in the construction contract's special provisions in addition to standard best management practices (BMPs);
- d) Water required for construction will not be drawn directly from the Verde River. Water for this purpose will be acquired from the Forest Service or local municipalities;
- e) Bridge falsework will not be permitted in the low flow channel of the Verde River at any time;
- f) Initial clearing for the Verde Valley bridge will not occur between February 15 and May 15 (razorback sucker breeding season);
- g) The installation and removal of bridge falsework landward of the low flow channel will use BMPs to minimize silt loading in the Verde River. This will include use of silt fencing and/or straw bales at the low flow channel;
- h) The construction contractor will provide a qualified fish monitor to determine if fish kills occur when construction activities occur in or adjacent to the Verde River during the razorback suckers breeding season (February 15 - May 15). Monitoring activities will be conducted at a minimum distance of 0.25 miles upstream and 0.25 miles downstream of the construction activities in the vicinity of the Verde River Bridge crossing. If fish mortality reaches 20 specimens or more per event, the contractor will immediately contact the Service (602/242-0210) to report the incident;

- i) Trees located under the Verde River Bridge span should be “topped” when possible, rather than removed.

The Service will be given complete access to the project site to monitor potential and actual impacts resulting from the construction activities.

All employees of the applicant and other personnel working on the project site will be: (1) informed of the sensitivity of the habitat areas and the presence of endangered species and habitat accommodated therein; and (2) instructed as the content of the Corps permit and the mitigation measures included herein. The Service recommends a “partnering session” to explain these issues to all employees working in the project area.

Clearly defined and fenced work areas will be established to prevent straying of construction or maintenance equipment and personnel. The construction zones will be clearly demarcated with distinctive safety fencing or its equivalent to prevent inadvertent disturbance to sensitive habitats. An area of particular concern is at station 8+500; a small knoll is located on the edge of the southern cut and fill area which contains many Arizona cliffrose seedlings. This area will be clearly staked so that no equipment or personnel will have access beyond the cut and fill area.

The Corps will ensure that all vehicle maintenance occurs only in designated upland areas that are safeguarded against runoff into riparian areas. All equipment shall be free of any fluid leaks.

Construction equipment will be inspected daily to ensure that no leaks or discharges of lubricants, hydraulic fluids or fuels occur in the aquatic or riparian ecosystem. All petrochemical spills, including contaminated soil shall be contained and disposed of in an approved upland site.

All heavy equipment operating near the Verde River will carry an oil spill kit or spill blanket all at times, and the operator should be trained and fully knowledgeable in the use of spill containment equipment.

Fencing along the ROW will be in place immediately after initial clearing and ensure that no pull-offs become established within section 36.

Weekly inspection of the construction area will occur between the Cottonwood Ditch and State Route 89A to ensure that no disturbance occurs outside cut and fill areas or designated construction areas.

Prior to construction activities, conduct surveys along the entire construction corridor for noxious weeds 50-100 feet on either side of the construction zone. The construction zone includes parking areas for worker’s vehicles, pull-off areas for staged vehicles and equipment, and any other area in which soil or vegetation may be disturbed as a result of any activity related to the proposed project.

A Weed Risk Assessment will be completed for the proposed project prior to construction activities. This document will address the presence of any weeds, the potential for weeds within the project area to be spread to non-infested areas within the project area, the potential for introducing weeds into the project area via vehicles, equipments, fill material, and water brought in from an outside source, and mitigation to reduce the potential for spreading weeds. This document will be reviewed by the Verde Valley Weed Management Area Committee.

If noxious weeds are found, actions which will be undertaken to minimize potential spread include:

- a) Prior to construction activities, coordinate with the Verde Valley Weed Management Area Committee to determine the best method(s) to control any noxious weeds located during surveys. Monitoring of the sites should occur on a regular basis during construction activities.
- b) The locations for all Category A and B noxious plants must be mapped on a 1:24,000 scale map for entry into the Southwest Exotic Plant Mapping Program (SWEMP) database. Send copies of all survey forms and maps to the Forest Service, Sedona Ranger District.
- c) Based on survey results, reduce the spread of noxious weeds by restricting parking, pull-off areas, and staging areas to locations where Arizona cliffrose and noxious weeds are not present. Consult a qualified botanist/biologist when determining these areas.
- d) All construction vehicles and equipment will be sprayed before coming onto the project area. A high pressure hose will be used to clear the undercarriage, tire treads, grill, radiator, and beds of any mud, dirt, and plant parts that may potentially spread the seeds of noxious plants.

Should there be concentrated areas of noxious weeds within the project area, additional spraying of equipment may be required to prevent the contamination of uninfested areas. Wash sites will be mapped for future monitoring of weed infestations. All maps will be provided to the U.S. Forest Service, Sedona Ranger District.

If off-site fill material is utilized, the site where the fill source comes from will be surveyed for noxious plants. Only fill from non-contaminated sites shall be used.

Water used for dust abatement and other construction activities will be obtained from a source free of noxious plant seeds.

Material used for erosion control (straw, etc.) will be certified weed free.

Temporary or final erosion control measures will be implemented immediately upon completion of clearing and grade building to reduce erosion during rainfall events. Disturbed areas will be rehabilitated by seeding with native species collected from the project or general area. A list of seeds to be collected will be created by the County and/or its consultant and recommended seeding rates established, then reviewed and approved by the Service prior to the beginning of construction work. Seed collecting will be coordinated with the Forest Service. Seed collecting will be conducted the fall before the seed is needed so that the seed is viable when planted. Seeding needs to be done in the appropriate season to enhance germination (i.e. timed for rain).

Any future maintenance activities involving pesticide/herbicide use and/or mowing within the ROW will be coordinated with the Verde Valley Weed Management Area Committee.

STATUS OF THE SPECIES

Arizona Cliffrose

Arizona cliffrose was listed as endangered under the Endangered Species Act on May 29, 1984 (USDI 1984). Critical habitat has not been designated. The Arizona Cliffrose Recovery Plan was completed in 1994 (U.S. Fish and Wildlife Service 1994). This species has narrow habitat requirements and occurs in four widely separated areas in central Arizona: near Bylas (Graham County), the Horseshoe Lake vicinity (Maricopa County), near Burro Creek (Mohave County), and near Cottonwood in the Verde Valley (Yavapai County) (Rutman 1992a). These sites differ slightly in elevation and associated vegetation, but all sites have limestone soils (generally white but also reddish in color) derived from Tertiary lakebed deposits, and at each site Arizona cliffrose is part of a locally unique vegetative community (Anderson 1993).

Each of the four populations of Arizona cliffrose are genetically variable (Mount and Logan 1992). The prevalence of certain morphological characteristics, especially the frequency and degree of leaf lobing and the density of leaf and flower stipitate glands, differ among the populations (Reichenbacher 1992). As leaf lobing and glandularity increases, distinguishing Arizona cliffrose from the commonly occurring *Purshia stansburiana* may present some difficulty (Schaack and Morefield 1985, Phillips and Phillips 1987, Reichenbacher 1987 and 1989). Problems concerning the definition and morphological separation of Arizona cliffrose from *P. stansburiana* have been attributed to putative hybridization between these two species (Schaack and Morefield 1985). Studies have been conducted on Arizona cliffrose morphometrics by Reichenbacher (Southwestern Field Biologists, Tucson) and an analysis of Arizona cliffrose DNA using the RAPD marker method was undertaken by Mount (University of Arizona, Tucson). These studies (Reichenbacher 1992, Mount and Logan 1992) are consistent with the observations of others (Denham 1992, Reichenbacher 1987 and 1989, J. Hendrickson, California State University in Rutman 1992b) and demonstrate that species of the genus *Purshia* tend to be phenotypically plastic, and can respond to long-term and seasonal changes in climate

by producing leaves and shoots that have adapted to local or seasonal climatic conditions. This type of phenotypic plasticity does not mean that the plants are hybrids or of hybrid origin (Reichenbacher 1987, Rutman 1992b, USFWS 1994).

The largest known population of Arizona cliffrose and the type locality is the Burro Creek population which occurs on Bureau of Land Management (BLM) administered lands. The draft Kingman Resource Management Plan (U.S. Bureau of Land Management 1990) included within the preferred management alternative the establishment of the 1,113 acre Clay Hills Area of Critical Environmental Concern (ACEC). This proposed ACEC contains the largest subpopulation of Arizona cliffrose in the Burro Creek area, but not two smaller, more recently discovered, subpopulations. In 1989, BLM constructed a fence that excludes cattle and burros from approximately 700 acres of the ACEC. Approximately 310 acres of the enclosure includes occupied Arizona cliffrose habitat and encompasses the larger subpopulation.

Little is known of the Arizona cliffrose population near Bylas on the San Carlos Apache Indian Reservation. However, based on the presumed extent of appropriate habitat, this population may be rather large. The Horseshoe Lake population includes several subpopulations and is found on the Tonto National Forest. No special land management designations or other special protections are afforded either the Bylas or Horseshoe Lake populations. The Horseshoe Lake population was the subject of a biological opinion issued on March 10, 1987, for the Central Arizona Water Control Study Plan 6. This biological opinion determined that 250 plants would be affected due to construction and operation of the Cliff Dam (33 percent of the Horseshoe Dam population) (USFWS 1987). However, Cliff Dam was never constructed.

All Arizona cliffrose populations have experienced declines due to human-caused actions. Grazing by livestock, feral animals, and wildlife threatens the long-term survival of Arizona cliffrose (Phillips 1986, Phillips *et al.* 1980, Rutman 1992a, USDI 1984, U.S. Fish and Wildlife Service 1994). This relatively palatable shrub often receives moderate to heavy grazing pressure when exposed to ungulate herbivores, particularly in the vicinity of water sources and frequently used trails (Bingham 1976, Phillips *et al.* 1980, Reichenbacher 1987). Tender seedlings, new growth, and branches with flowers and developing fruit are preferentially selected (Bingham 1976, Denham 1992). Observations and preliminary data analysis of BLM enclosure studies on the Burro Creek population indicate that consistent yearly browsing pressure may have reduced the vigor and/or form-size class of the remaining plants. Reduced vigor may result in less than optimal reproductive success. The extent to which browsing has altered successful reproduction in any Arizona cliffrose population has never been quantified.

Mining and mining-related activities are a serious threat to the long-term survival of this species, particularly in the Burro Creek area. Arizona cliffrose habitat at Burro Creek has a high potential for bentonite (U.S. Bureau of Land Management 1990), a type of clay used for cosmetics and pharmaceuticals. Mining and exploration activities have reduced the number of cliffrose plants and the amount of occupied, available, and undisturbed habitat. The BLM estimates that 14% of Arizona cliffrose habitat in the Burro Creek area has been lost due to mining. Evidence from

past small-scale mining activities can be found within the Verde Valley population of Arizona cliffrose. Other than at Burro Creek, no known mining activities are presently occurring or have been proposed.

Construction of roads and utility corridors has caused losses across the range of Arizona cliffrose (Phillips *et al.* 1980). All Arizona cliffrose populations have roads and/or utility right-of-ways within or near them. The Burro Creek population is divided by a graded dirt road paralleled by the Southern Union Gas Company pipeline and Arizona Electric Power Cooperative Incorporated high voltage power line (Butterwick 1979). No estimate of the amount of habitat lost to these developments in the Burro Creek area has been made. Arizona Highway SR 70 bisects the Bylas population and has impacted Arizona cliffrose plants and habitat, as demonstrated by Arizona cliffrose occurring on both sides of the road within the highway right-of-way.

Numerous paved and dirt roads pass through the Cottonwood population. Highway 89A nearly forms the eastern border and Rocking Chair Road passes through Arizona cliffrose habitat. Other roads to access housing or for recreational purposes create a network through the habitat. Habitat loss due to urbanization is a serious threat for the Cottonwood cliffrose population. A significant amount of Arizona cliffrose habitat has already been lost due to development in the Cottonwood area, but the amount of habitat has not been estimated (USFWS 1994).

The Arizona cliffrose site near Burro Creek is a well-known destination for rock-collecting enthusiasts. Increased recreational activity may occur within the Clay Hills ACEC when the Burro Creek campground is developed (U.S. Bureau of Land Management 1990). These visitors may affect Arizona cliffrose by turning over rocks and disturbing seedling establishment microsites. They also may occasionally drive short distances across country to reach collecting sites and crush plants. The amount or proportion of Arizona cliffrose habitat lost to recreational activities throughout the range of the species has not been estimated.

Southwestern Willow Flycatcher

The southwestern willow flycatcher is a small grayish-green passerine bird (Family Tyrannidae) measuring approximately 5.75 inches. It has a grayish-green back and wings, whitish throat, light gray-olive breast, and pale yellowish belly. Two white wingbars are visible (juveniles have buffy wingbars). The eye ring is faint or absent. The upper mandible is dark, and the lower is light yellow grading to black at the tip. The song is a sneezy fitz-bew or a fit-a-bew, the call is a repeated whitt.

The southwestern willow flycatcher is one of four currently recognized willow flycatcher subspecies (Phillips 1948, Unitt 1987, Browning 1993). It is a neotropical migrant that breeds in the southwestern U.S. and migrates to Mexico, Central America, and possibly northern South America during the non-breeding season (Phillips 1948, Stiles and Skutch 1989, Peterson 1990, Ridgely and Tudor 1994, Howell and Webb 1995). The historic breeding range of the

southwestern willow flycatcher included southern California, Arizona, New Mexico, western Texas, southwestern Colorado, southern Utah, extreme southern Nevada, and extreme northwestern Mexico (Sonora and Baja) (Unitt 1987).

The southwestern willow flycatcher was listed as endangered, without critical habitat on February 27, 1995 (USFWS 1995). Critical habitat was later designated on July 22, 1997 (USFWS 1997a). A correction notice was published in the Federal Register on August 20, 1997 to clarify the lateral extent of the designation (USFWS 1997b). Eighteen critical habitat units totaling 599 river miles in Arizona, California, and New Mexico were designated. Areas in CO, NV, TX, and UT, while important, were not designated as critical habitat because of the limited range of the bird in those states. In Arizona, critical habitat was designated along portions of the San Pedro River (100 miles), Verde River (90 miles) including Tavasci Marsh and Ister Flat, Wet Beaver Creek (20 miles), West Clear Creek (9 miles), Colorado River in the Grand Canyon (32 miles), and Little Colorado River and the West, East, and South Forks of the Little Colorado River (30 miles).

Declining southwestern willow flycatcher numbers have been attributed to loss, modification, and fragmentation of riparian breeding habitat, loss of wintering habitat, and brood parasitism by the brown-headed cowbird (Sogge *et al.* 1997, McCarthy *et al.* 1998). Habitat loss and degradation are caused by a variety of factors, including urban, recreational, and agricultural development, water diversion and groundwater pumping, channelization, dams, and livestock grazing. Fire is an increasing threat to willow flycatcher habitat (Paxton *et al.* 1996), especially in monotypic saltcedar vegetation (DeLoach 1991) and where water diversions and/or groundwater pumping desiccates riparian vegetation (Sogge *et al.* 1997). The presence of livestock and range improvements such as waters and corrals; agriculture; urban areas such as golf courses, bird feeders; and trash areas, may provide feeding sites for cowbirds. These feeding areas coupled with habitat fragmentation, facilitate cowbird parasitism of flycatcher nests (Hanna 1928, Mayfield 1977a, b, Tibbitts *et al.* 1994).

Habitat

The southwestern willow flycatcher breeds in dense riparian habitats from sea level in California to just over 7000 feet in Arizona and southwestern Colorado. Historic egg/nest collections and species' descriptions throughout its range, describe the southwestern willow flycatcher's widespread use of willow (*Salix* spp.) for nesting (Phillips 1948, Phillips *et al.* 1964, Hubbard 1987, Unitt 1987, T. Huels *in litt.* 1993, San Diego Natural History Museum 1995). Currently, southwestern willow flycatchers primarily use Geyer willow, Goodding's willow, boxelder (*Acer negundo*), saltcedar (*Tamarix* sp.), Russian olive (*Elaeagnus angustifolio*) and live oak (*Quercus agrifolia*) for nesting. Other plant species less commonly used for nesting include: buttonbush (*Cephalanthus* sp.), black twinberry (*Lonicera involucrata*), cottonwood (*Populus* spp.), white alder (*Alnus rhombifolia*), blackberry (*Rubus ursinus*), and stinging nettle (*Urtica* spp.). Based

on the diversity of plant species composition and complexity of habitat structure, four basic habitat types can be described for the southwestern willow flycatcher: monotypic willow, monotypic exotic, native broadleaf dominated, and mixed native/exotic (Sogge *et al.* 1997).

Open water, cienegas, marshy seeps, or saturated soil are typically in the vicinity of flycatcher territories and nests; flycatchers sometimes nest in areas where nesting substrates were in standing water (Maynard 1995, Sferra *et al.* 1995, 1997). However, hydrological conditions at a particular site can vary remarkably in the arid Southwest within a season and between years. At some locations, particularly during drier years, water or saturated soil is only present early in the breeding season (i.e., May and part of June). However, the total absence of water or visibly saturated soil has been documented at several sites where the river channel has been modified (e.g. creation of pilot channels), where modification of subsurface flows has occurred (e.g. agricultural runoff), or as a result of changes in river channel configuration after flood events (Spencer *et al.* 1996).

Breeding Biology

Throughout its range the southwestern willow flycatcher arrives on breeding grounds in late April and May (Sogge and Tibbitts 1992, Sogge *et al.* 1993, Sogge and Tibbitts 1994, Muiznieks *et al.* 1994, Maynard 1995, Sferra *et al.* 1995, 1997). Nesting begins in late May and early June and young fledge from late June through mid-August (Willard 1912, Ligon 1961, Brown 1988a,b, Whitfield 1990, Sogge and Tibbitts 1992, Sogge *et al.* 1993, Muiznieks *et al.* 1994, Whitfield 1994, Maynard 1995). Southwestern willow flycatchers typically lay three to four eggs per clutch (range = 2 to 5). Eggs are laid at one-day intervals and are incubated by the female for approximately 12 days (Bent 1960, Walkinshaw 1966, McCabe 1991). Young fledge approximately 12 to 13 days after hatching (King 1955, Harrison 1979). Typically one brood is raised per year, but birds have been documented raising two broods during one season and renesting after a failure (Whitfield 1990, Sogge and Tibbitts 1992, Sogge *et al.* 1993, Sogge and Tibbitts 1994, Muiznieks *et al.* 1994, Whitfield 1994, Whitfield and Strong 1995). The entire breeding cycle, from egg laying to fledging, is approximately 28 days.

Southwestern willow flycatcher nests are fairly small (3.2 inches tall and 3.2 inches wide) and its placement in a shrub or tree varies throughout its range (2.0 to 59.1 feet off the ground). Nests are open cup structures, and are typically placed in the fork of a branch. Nests have been found against the trunk of a shrub or tree (in monotypic saltcedar and mixed native broadleaf/saltcedar habitats) and on limbs as far away from the trunk as 10.8 feet (Spencer *et al.* 1996). Flycatchers using predominantly native broadleaf riparian habitats nest low to the ground (5.9 to 6.9 feet on average), whereas birds using mixed native/exotic and monotypic exotic riparian habitats nest higher (14.1 to 24.3 feet on average).

The southwestern willow flycatcher is an insectivore, foraging in dense shrub and tree vegetation along rivers, streams, and other wetlands. The bird typically perches on a branch and makes short direct flights, or sallies to capture flying insects. Drost *et al.* (1998) found that the major

prey items of the southwestern willow flycatcher (in Arizona and Colorado), consisted of true flies (Diptera); ants, bees, and wasps (Hymenoptera); and true bugs (Hemiptera). Other insect prey taxa included leafhoppers (Homoptera: Cicadellidae); dragonflies and damselflies (Odonata); and caterpillars (Lepidoptera larvae). Non-insect prey included spiders (Araneae), sowbugs (Isopoda), and fragments of plant material.

Brown-headed cowbird (*Molothrus ater*) parasitism of southwestern willow flycatcher broods has been documented throughout its range (Brown 1988a,b, Whitfield 1990, Muiznieks *et al.* 1994, Whitfield 1994, Hull and Parker 1995, Maynard 1995, Sferra *et al.* 1995, Sogge 1995b). Where studied, high rates of cowbird parasitism have coincided with southwestern willow flycatcher population declines (Whitfield 1994, Sogge 1995a,c, Whitfield and Strong 1995) or, at a minimum, resulted in reduced or complete nesting failure at a site for a particular year (Muiznieks *et al.* 1994, Whitfield 1994, Maynard 1995, Sferra *et al.* 1995, Sogge 1995a,c, Whitfield and Strong 1995). Cowbird eggs hatch earlier than those of many passerine hosts, thus giving cowbird nestlings a competitive advantage (Bent 1960, McGeen 1972, Mayfield 1977a,b, Brittingham and Temple 1983). Flycatchers can attempt to renest, but it often results in reduced clutch sizes, delayed fledging, and reduced nest success (Whitfield 1994). Whitfield and Strong (1995) found that flycatcher nestlings fledged after July 20th had a significantly lower return rate and cowbird parasitism was often the cause of delayed fledging.

Territory size

Southwestern willow flycatcher territory size likely fluctuates with population density, habitat quality, and nesting stage. Estimated territory sizes are 0.59 to 3.21 acres for monogamous males and 2.72 to 5.68 acres for polygynous males at the Kern River (Whitfield and Enos 1996), 0.15 to 0.49 acres for birds in a 1.48 to 2.22 acre patch on the Colorado River (Sogge 1995c), and 0.49 to 1.24 acres in a 3.71 acre patch on the Verde River (Sogge 1995a).

Rangewide Distribution and Abundance

Unitt (1987) documented the loss of more than 70 southwestern willow flycatcher breeding locations rangewide (peripheral and core drainages within its range) estimating the rangewide population at 500 to 1000 pairs. There are currently 95 known southwestern willow flycatcher breeding sites (in CA, NV, AZ, UT, NM, and CO) holding approximately 686 territories (Table 1). Sampling errors may bias population estimates positively or negatively (e.g. incomplete survey effort, double-counting males/females, composite tabulation methodology), as will natural population fluctuations, and random events. It is likely that the total breeding population of southwestern willow flycatchers fluctuates. Personal communication of unpublished information indicates that after the 1999 breeding season, just over 900 territories are known throughout the bird's range.

The distribution of breeding groups is highly fragmented, with groups often separated by considerable distances (e.g. In Arizona, approximately 55 miles straight-line distance between

breeding flycatchers at Roosevelt Lake, Gila Co., and the next closest breeding groups known on either the San Pedro River, Pinal Co. or Verde River, Yavapai Co.). To date, survey results reveal a consistent pattern rangewide; the southwestern willow flycatcher population is comprised of extremely small, widely-separated breeding groups including unmated individuals.

Arizona Distribution and Abundance

As reported by Paradzick *et al.* (2000), the greatest concentrations of willow flycatchers in Arizona in 1999 were near the confluence of the Gila and San Pedro rivers (236 flycatchers, 134 territories); at the inflows of Roosevelt Lake (140 flycatchers, 76 territories); between Fort Thomas and Solomon on the middle Gila River (9 flycatchers, 6 territories); Topock Marsh on the Lower Colorado River (30 flycatchers, 16 territories); Verde River at Camp Verde (7 flycatchers, 5 territories); Alpine/Greer on the San Francisco River/Little Colorado River (11 flycatchers, 8 territories); Alamo Lake on the Bill Williams River (includes Santa Maria and Big Sandy river sites) (43 flycatchers, 23 territories); and Lower Grand Canyon on the Colorado River (21 flycatchers, 11 territories).

Unitt (1987) concluded that “probably the steepest decline in the population level of *E.t. extimus* has occurred in Arizona....” Historic records for Arizona indicate the former range of the southwestern willow flycatcher included portions of all major river systems (Colorado, Salt, Verde, Gila, Santa Cruz, and San Pedro) and major tributaries, such as the Little Colorado River and headwaters, and White River. As of 1999, 289 territories were known from 47 sites along 12 drainages statewide (Table 1). The lowest elevation where territorial pairs were detected was 197 feet at Adobe Lake on the Lower Colorado River; the highest elevation was at the Greer town site (8300 feet). The majority of breeding groups in Arizona are extremely small. Of the 47 sites where flycatchers have been documented, 70 percent (n=33) contain 5 or fewer territorial flycatchers.

Reproductive Success

In 1999, a total of 327 nesting attempts were documented in Arizona at 41 sites (Paradzick *et al.* 2000). The outcome from 227 nesting attempts from 12 sites was determined (not every nesting attempt was monitored). Of the 227 nests, 50 percent (n=114) of the nests were successful. Causes of nest failure (n=113) included predation (n=73), nest abandonment (n=21), brood parasitism (n=5), infertile clutches (n=9), weather (n=2), and unknown causes (n=3). Ten nests were parasitized; two parasitized nests fledged at least one willow flycatcher along with cowbird young. Eight of 10 monitoring sites had cowbird trapping in 1999. Two additional breeding sites (Bill Williams National Wildlife Refuge and Alamo Lake) had traps, but no nest monitoring occurred. The upper San Pedro River in BLM’s conservation area had cowbird trapping, but no breeding flycatchers were known to be present.

Intensive nest monitoring efforts in California, Arizona, and New Mexico have shown that cowbird parasitism and/or predation can often result in failure of the nest; reduced fecundity in

subsequent nesting attempts; delayed fledging; and reduced survivorship of late-fledged young. Cowbirds have been documented at more than 90 percent of sites surveyed (Sogge and Tibbitts 1992, Sogge *et al.* 1993, Camp Pendleton 1994, Muiznieks *et al.* 1994, Sogge and Tibbitts 1994, T. Ireland 1994 *in litt.*, Whitfield 1994, C. Tomlinson 1995 *in litt.*, Griffith and Griffith 1995, Holmgren and Collins 1995, Kus 1995, Maynard 1995, McDonald *et al.* 1995, Sferra *et al.* 1995, Sogge 1995a,b, San Diego Natural History Museum 1995, Stransky 1995, Whitfield and Strong 1995, Griffith and Griffith 1996, Skaggs 1996, Spencer *et al.* 1996, Whitfield and Enos 1996, Sferra *et al.* 1997, McCarthy *et al.* 1998). The probability of a southwestern willow flycatcher successfully fledging its own young from a cowbird parasitized nest is low (i.e. <5%). Also, nest loss due to predation appears consistent from year to year and across sites, generally in the range of 30 to 50 percent. Documented predators of southwestern willow flycatcher nests identified to date include common king snake (*Lampropeltis getulus*), gopher snake (*Pituophis melanoleucos affinis*), and Cooper's hawk (*Accipiter cooperii*) (Paxton *et al.* 1997, McCarthy *et al.* 1998, Paradzick *et al.* 2000).

Table 1. Rangewide population status for the southwestern willow fly catcher based on 1996 survey data for New Mexico and California, 1997 survey data for Colorado, Nevada and Utah, and 1999 survey data for Arizona.¹

State	Number of sites with resident WIFLs	Number of drainages with resident WIFLs	Number of territories within site			
			≤5	6-20	>20	Total number of territories
Arizona	47	12	33	11	3	289
California	11	8	7	2	2	91
Colorado	7	6	2	4	1	69
New Mexico	19	6	16	2	1	209
Nevada	5	3	4	1	0	20
Utah	5	4	5	0	0	8
Texas	?	?	?	?	?	?
Total	95	39	70	18	7	686 ²

¹Based on surveys conducted at >800 historic and new sites in AZ (Sogge and Tibbitts 1992, Sogge *et al.* 1993, Muiznieks *et al.* 1994, Sogge and Tibbitts 1994, Sferra *et al.* 1995, 1997, Sogge 1995a, Sogge *et al.* 1995, Spencer *et al.* 1996, McKernan 1997, McKernan and Braden 1998, Paradzick *et al.* 2000); CA (Camp Pendleton 1994, Whitfield 1994, Griffith and Griffith 1995, Holmgren and Collins 1995, Kus 1995, San Diego Natural History Museum 1995, Whitfield and Strong 1995, Griffith and Griffith 1996); CO (T. Ireland 1994 *in litt.*, Stransky 1995); NM (Maynard 1995, Cooper 1996, 1997, Parker 1997, Skaggs 1996, Williams 1997); NV (C. Tomlinson 1995 *in litt.*, 1997); UT (McDonald *et al.* 1995, 1997, Sogge 1995b). Systematic surveys have not been conducted in Texas.

² Personal communication from states outside of Arizona indicate that the current number of territories rangewide is just over 900 as of 1999.

Cowbird trapping has been demonstrated to be an effective management strategy for increasing reproductive success for the southwestern willow flycatcher as well as for other endangered passerines (e.g. least Bell's vireo [*Vireo bellii pusillus*], black-capped vireo [*V. atricapillus*], golden-cheeked warbler [*Dendroica chrysoparia*]). It may also benefit juvenile survivorship by increasing the probability that parents fledge birds early in the season. Expansion of cowbird management programs may have the potential to not only increase reproductive output and juvenile survivorship at source populations, but also to potentially convert small, sink populations into breeding groups that contribute to population growth and expansion.

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 on which to assess the effects of the action now under consultation.

Arizona Cliffrose

The largest population of Arizona cliffrose occurs in the Verde Valley (Anderson 1986, Denham 1992, qualifying Schaack and Morefield 1985, and Phillips and Phillips 1987). Arizona cliffrose habitat in the Verde Valley is restricted to an area of approximately three miles long by one mile wide (Denham 1992, Phillips *et al.* 1987). This population includes the largest and most robust individuals of Arizona cliffrose currently known (Denham 1992). Reproductive output has successfully produced seedlings and young plants of various age cohorts. This is the only Arizona cliffrose population where successful seedling establishment leading to population recruitment is currently known. Land ownership includes the U.S. Forest Service, Arizona State Parks, Arizona State Trust, and numerous private parcels. There are hybrid swarms of *Purshia subintegra* and *Purshia stansburiana* in the Verde Valley. The Service considers these plants to be outside the definitions of *Purshia subintegra*.

Arizona cliffrose within the Cottonwood population grows in very specific areas and many aspects of this plant's life history, including seedling ecology, and the species ecological relationship to the unique soils, are poorly understood. Arizona cliffrose in the Verde Valley grows in a narrow band at the northern end of the Verde Formation where there is a mix of red clastic and carbonate sediments (Phillips *et al.* 1995). Anderson (1993) found that the Verde Formation soils have higher phosphorus and percent organic matter, and believes that the fidelity of *Purshia subintegra* to the ecological islands of lacustrine soils is due to the lack of competition for soil moisture from the surrounding dominant vegetation. These lacustrine soils deposits also have higher amounts of soil moisture and may actually provide a more mesic edaphic situation for *subintegra* (Anderson 1993). Thus, it is apparent that Arizona cliffrose are limited to an area with very site-specific soil and moisture requirements.

Current land management practices in the Verde Valley often conflict with long-term conservation goals for Arizona cliffrose. The Coconino National Forest established the 472-acre Verde Valley Botanical Area (VVBA) in 1987 (U.S. Forest Service 1987) to emphasize management practices needed to protect and preserve the unique desert community which includes Arizona cliffrose. The VVBA includes an estimated 50% to 60% of the Arizona cliffrose plants in the Verde Valley (Denham 1992, modifying Phillips *et al.* 1987). An additional 10% to 20% of Arizona cliffrose plants in the Verde Valley are found on Forest Service lands not included in the VVBA. Seasonal livestock grazing occurred within the VVBA in 1994 and 1995 which did not follow the guidelines of the Recovery Plan (BAE April 24, 1997) and was not consistent with the Windmill biological opinion.

A draft management plan has been developed for the VVBA (Ward 1988). The draft VVBA management guidelines preclude certain land management actions within the VVBA, including road development, ORV driving, mining, and land exchanges, and established long-term monitoring plots. The Forest Service is currently evaluating Arizona cliffrose habitat that was not included in the VVBA for possible inclusion. Part of this evaluation consists of the identification and survey of potential Arizona cliffrose habitat. Forest soil scientists are studying the unique soils which support Arizona cliffrose to better understand the distribution of potential habitat in the Verde Valley. Surveys were conducted in 1994 and 1995 and located additional plants. Additional land management planning is underway by the Forest. However, the VVBA management plan has not yet been completed.

Arizona State Parks at Dead Horse Ranch State Park manages a relatively small area of Arizona cliffrose habitat contiguous with populations on the Coconino National Forest and within the VVBA. A proposed campground at Dead Horse Ranch is immediately adjacent to this population. State Parks has coordinated the planning of this campground with the Forest Service and Service so not to affect Arizona cliffrose. Dead Horse State Park also is working with the Forest Service regarding trail development and recreational use in this area (Barbara Phillips, Coconino National Forest, pers. comm).

Arizona State Land Department manages one section of land within Arizona cliffrose habitat in the Verde Valley (T. 15 N., R. 3 E., section 36). This section includes high density and robust plants and is immediately south of the designated VVBA. With private lands to the west of section 36 and no Arizona cliffrose habitat extending east of the section, the management of contiguous Arizona cliffrose habitat on Forest Service lands is precluded. The management of section 36 for the conservation of Arizona cliffrose is critically important to maintain the ecological integrity of this Arizona cliffrose population and to provide for the recovery of the species.

Section 7 consultation with the Coconino National Forest on livestock grazing in the Verde Valley for the issuance of a 2-year permit was completed in December 1992 for the Windmill Allotment, and in February 1995 for the Apache Maid Allotment. Arizona cliffrose habitat in the vicinity of Rocking Chair Road and US 89A have been fenced to exclude livestock (permitted

and trespass). Arizona cliffrose in these pastures were seriously browsed prior to fencing. Positive effects to cliffrose following fencing were evident during the November 1992 field review of the Windmill Allotment and VVBA. The Apache Maid Allotment includes potential Arizona cliffrose habitat. Formal section 7 consultation on a new proposed action for the Windmill Allotment was completed on October 28, 1997. The Forest Service requested an amendment to the October 1997, biological opinion due to changes in the proposed action for *Purshia subintegra*; the amendment was issued on May 28, 1998. The BLM Kingman Resource Area completed consultation in August 1993 for the Bagdad Allotment at the Burro Creek cliffrose population.

Formal section 7 consultation was completed with the Federal Highway Administration on July 8, 1996, for improvement of SR 89A (Segment 2) east of Cottonwood Arizona (MP 356.1 to MP 357.1) (USFWS 1996). This action resulted in the elimination of an estimated 14.7 acres of Arizona cliffrose habitat and it removed or otherwise indirectly affected 29 individuals. The biological opinion provided for funding from Federal Highways to the Arboretum at Flagstaff to conduct research on the ecology of Arizona cliffrose. This study was initiated, in part, in anticipation of the possibility that the plans for the extension of Mingus Avenue would move forward. Plants and habitat have been lost from the Verde Valley population and additional destruction of habitat may result from road construction, roadway expansions, and land exchanges which are currently under evaluation. Expanding urbanization within the Verde Valley has led to direct loss of habitat and plants. No estimates of the amount or proportion of total habitat lost to these threats is available.

Recreational activities and off-road vehicle (ORV) use has contributed to significant habitat loss and degradation in all but the Bylas population (Bingham 1976, Phillips *et al.* 1980, USFWS 1994). Within the Verde Valley population there have been unauthorized parking-lots, illegal dump sites, target shooting range, ORV activity areas, numerous "party" sites, and the development of mountain bike trails. The Coconino National Forest has initiated several protective measures for the Arizona cliffrose population in the Verde Valley. Fencing to delineate the parking area at the intersection of US 89A and Rocking Chair Road has been completed. Additional barrier fences have been constructed by the Forest along part of Rocking Chair Road to restrict off-road vehicle activities. Several two-track roads crossing Arizona cliffrose habitat have been closed and rehabilitated by the Forest, and the shooting range has been relocated out of Arizona cliffrose habitat.

Southwestern Willow Flycatcher

Since listing in 1995, at least 53 Federal agency actions have undergone (or are currently under) formal section 7 consultation throughout the bird's range (Table 2). Six actions have resulted in jeopardy decisions. Many activities continue to adversely affect the distribution and extent of occupied and potential breeding habitat throughout its range (development, grazing, recreation, dam operations, etc.). Stochastic events also continue to adversely affect the distribution and extent of occupied and potential breeding habitat. A catastrophic fire in June of 1996 destroyed

approximately .62 miles of occupied habitat on the San Pedro River in Pinal County. That fire resulted in the forced dispersal or loss of up to eight pairs of flycatchers (Paxton *et al.* 1996).

Actual or anticipated loss of flycatcher habitat due to Federal Projects (modification of Roosevelt Dam, operation of Hoover Dam) has resulted in Biological Opinions requiring acquisition of otherwise unprotected property specifically for the southwestern willow flycatcher. Portions of the lower San Pedro River have been acquired by the Bureau of Reclamation and are now

Table 2. Agency actions that have undergone formal section 7 consultation and levels of incidental take permitted for the southwestern willow flycatcher rangewide.

Action (County)	Year	Federal Agency ¹	Incidental Take Anticipated
Arizona			
Cedar Bench Allotment (Yavapai)	1995	Tonto NF	Indeterminable
Tuzigoot Bridge (Yavapai)	1995*	NPS	None
Windmill Allotment (Yavapai)	1995	Coconino NF	Loss of 1 nest annually/for 2 years
Solomon Bridge (Graham)	1995	FHWA	Loss of 2 territories
Tonto Creek Riparian Unit (Maricopa)	1995	Tonto NF	Indeterminable
Eastern Roosevelt Lake Watershed Allotment (Maricopa)	1995	Tonto NF	Indeterminable
Cienega Creek (Pima)	1996	BLM	1 nest annually by cowbird parasitism
Glen Canyon Spike Flow (Coconino)	1996	USBR	Indeterminable
Verde Valley Ranch (Yavapai)	1996*	Corps	Loss of 2 flycatcher territories
Modified Roosevelt Dam (Gila/Maricopa)	1996*	USBR	Loss of 45 territories; reduced productivity/survivorship 90 birds
Lower Colorado River Operations (Mohave/Yuma)	1997*	USBR	Indeterminable
Blue River Road (Greenlee)	1997	A/S NF	Indeterminable
Skeleton Ridge (Yavapai)	1997	Tonto NF	Indeterminable
White Canyon Fire – Emergency Consultation (Pinal)	1997	BLM	Harassment of 4 pairs
U.S. Hwy 93 Wickenburg (Mohave/Yavapai)	1997	FHWA	Harassment of 6 birds in 3 territories and 1 bird killed/decade

Table 2. Agency actions that have undergone formal section 7 consultation and levels of incidental take permitted for the southwestern willow flycatcher rangewide.

Action (County)	Year	Federal Agency ¹	Incidental Take Anticipated
Safford District Grazing Allotments (Greenlee, Graham, Pinal, Cochise & Pima)	1997	BLM	Indeterminable
Lower Gila Resource Plan Amend. (Maricopa, Yavapai, Pima, Pinal, La Paz & Yuma)	1997	BLM	Indeterminable
Storm Water Permit for Verde Valley Ranch (Yavapai)	1997	EPA	Indeterminable
Gila River Transmission Structures (Graham)	1997	AZ Electric Power Coop. Inc.	Indeterminable
Arizona Strip Resource Mgmt Plan Amendment (Mohave)	1998	BLM	Harm of 1 nest every 3 years
CAP Water Transfer Cottonwood/Camp Verde (Yavapai/Maricopa)	1998	USBR	Indeterminable
Cienega Creek Stream Restoration Project (Pima)	1998	BLM	Harassment of 1 bird
Kearny Wastewater Treatment (Pinal)	1998	FEMA	Indeterminable
Fort Huachuca Programatic (Cochise)	1999	US Army	None
SR 260 Cottonwood to Camp Verde (Yavapai)	1998	FHWA	Indeterminable
Wildlife Services (ADC)	1998	Wildlife Services	in consultation
Alamo Lake Reoperation (LaPaz, Mohave)	1998	ACOE	Loss of 1 nest w/ 2 eggs in 20 years due to projected inundation
Grazing on 25 Allotments	1999	Tonto NF	in consultation in consultation
Mingus Avenue Extension (Yavapai)	2001	ACOE	Indeterminable
The Homestead at Camp Verde Development	2000	Prescott NF/EPA	in consultation

Table 2. Agency actions that have undergone formal section 7 consultation and levels of incidental take permitted for the southwestern willow flycatcher rangewide.

Action (County)	Year	Federal Agency ¹	Incidental Take Anticipated
Duncan Hwy 75 Bridge-Gila River (Greenlee)	2000	FHWA	Indeterminable
Red Creek Grazing Allotment (Gila)	2000	Tonto NF	Indeterminable
Interim Surplus Criteria/4/4 (Mohave, La Paz, Yuma)	2001	USBR	Loss of 372 acres of occupied habitat
Peck Canyon Scour Hwy I-19 Protection (Santa Cruz)	2001	ACOE	Indeterminable
Wikieup/Big Sandy Caithness Power Plant (Mohave)	2001	WAPA/BLM	in consultation
Tonto Creek Crossing	2001	Tonto NF	in consultation
Big Sandy/Santa Maria Grazing Allotments	2001	BLM	in consultation
California			
Prado Basin (Riverside/San Bernardino)	1994	Corps	None
Orange County Water District (Orange)	1995	Corps	None
Temescal Wash Bridge (Riverside)	1995	Corps	Harm to 2 flycatchers
Camp Pendleton (San Diego)	1995	DOD	Loss of 4 flycatcher territories
Lake Isabella Operations 1996 (Kern)	1996	Corps	Inundation 700 ac critical habitat; reduced productivity 14 pairs
Lake Isabella Long-Term Operations (Kern)	1997	Corps	Indeterminable
H.G. Fenton Sand Mine and Levee near Pala on the San Luis Rey River (San Diego)	1997	Corps	None

Table 2. Agency actions that have undergone formal section 7 consultation and levels of incidental take permitted for the southwestern willow flycatcher rangewide.

Action (County)	Year	Federal Agency ¹	Incidental Take Anticipated
Colorado			
AB Lateral - Hydroelectric/Hydropower Facility, Gunnison River to Uncompahgre River (Montrose)	1996	USBR	None
TransColorado Gas Transmission Line Project, Meeker, Colorado to Bloomfield, New Mexico	1998	BLM	None
Nevada			
Gold Properties Resort (Clark)	1995	BIA	Harm to 1 flycatcher from habitat loss
Las Vegas Wash, Pabco Road Erosion Control Structure	1998	Corps	Harm to 2-3 pairs of flycatchers
New Mexico			
Corrales Unit, Rio Grande (Bernalillo)	1995	Corps	None
Rio Puerco Resource Area	1997	BLM	None
Farmington District Resource Management Plan	1997*	BLM	None
Mimbres Resource Area Management Plan	1997*	BLM	1 pair of flycatchers
Belen Unit, Rio Grande (Valencia)	1998	Corps	Consultation in progress

BIA = Bureau of Indian Affairs; BLM = Bureau of Land Management; Corps = Army Corps of Engineers; DOD = Dept. of Defense; EPA = Environmental Protection Agency; FEMA = Federal Emergency Management Agency; FHWA = Federal Highway Administration; NF = National Forest; NPS = National Park Service; USBR = U.S. Bureau of Reclamation; USFS = U.S. Forest Service.

* Jeopardy opinions.

currently under the management of The Nature Conservancy. In the future, unprotected habitat will be purchased or rehabilitated to compensate for loss of flycatcher habitat along the Lower Colorado River, Tonto Creek, and Salt River in Arizona and Lake Isabella, California.

Baseline and Status of the Southwestern Willow Flycatcher in the Action Area

Surveys for the southwestern willow flycatcher have been conducted for three years 0.25 miles upstream and downstream of the proposed Mingus Avenue bridge location according to the standard survey protocol. Results in 1998 and 1999 were negative, as were the first two surveys in 2000. During the third survey period in 2000 (June 29), a single calling southwestern willow flycatcher was observed approximately 0.25 miles downstream of the proposed bridge site. The bird was observed for one hour on June 29 and the surveyor judged the individual to be a male (Corps, *in litt.* August 17, 2000). The site was revisited on July 16 to verify the presence of southwestern willow flycatchers. No tape playback was initiated and the bird was not detected again during a two-hour site visit (Corps, *in litt.* August 17, 2000).

Approximately ninety miles of the Verde River from Sob Canyon to its inflow at Horseshoe Reservoir, including Tavasci Marsh and Ister Flat, and the project area are designated as critical habitat for the southwestern willow flycatcher. The lateral extent of designated critical habitat extends out to 328 feet from the edge of areas with surface water during the May to September breeding season and out to 328 feet of areas where such surface water no longer exists due to degraded habitat that can be rehabilitated. This includes areas with thickets, riparian trees and shrubs, and areas where such riparian vegetation does not currently exist, but may become established with natural regeneration or habitat rehabilitation.

The Verde River valley between the towns of Cottonwood and Camp Verde is characterized by a wide flood basin once dominated by Fremont cottonwoods, although cottonwood stands are now highly fragmented (Paxton *et al.* 1997). A total of 56 sites have been surveyed for flycatchers in the Verde River system since 1993 (Sferra *et al.* 1997, McCarthey *et al.* 1998). A total of four willow flycatcher breeding sites have been documented near the action area along the Verde River through the Verde Valley: Tuzigoot Bridge, Tavasci Marsh, Camp Verde, and Rancho Rio Verde. The Tuzigoot Bridge site consists primarily of Fremont cottonwoods, Goodding's willow, tamarisk, box elder and honey mesquite. This was an active breeding site from 1992 to 1995, with two to four territorial male flycatchers (Sogge 1995a). Since then, however, only a single flycatcher in 1996, has been documented.

The Tavasci Marsh site is a grove of mature Goodding's willows (about 50 feet high) in which flycatchers nested. The site is in a marshy area about 650 feet from the Verde River at an elevation of 3300 feet. In 1996, four flycatchers were detected (2 territories, 2 pairs); however, none were detected in 1997 or in 1999 (Paradzick *et al.* 2000). The mature willow trees have been heavily girdled by beavers which may have compromised the site (Paxton and Sogge 1996).

The largest flycatcher breeding site along the Verde River, and currently the only location where nesting is known to occur is at the Camp Verde site (elevation 3090 feet). This site is comprised of a mature Fremont cottonwood and Goodding's willow gallery forest with adjacent patches of dense tamarisk. With several exceptions, the flycatchers nested in the dense tamarisk patches,

although they would sing and perch in native trees (Paxton *et al.* 1997). In 1997, 20 flycatchers were detected (10 territories, 10 pairs) at the Camp Verde site. Of the 19 nesting attempts during 1997, there was 58% nest success, with 22 young fledged. Also at this site, 5% of nests were abandoned, 21% of nests were lost to predators, and 16% of nests were parasitized by brown-headed cowbirds (McCarthy *et al.* 1998). In 1997, five flycatchers (71%) returned to their 1996 breeding site, and one flycatcher banded at Tuzigoot Bridge defended a territory at Camp Verde (Paxton *et al.* 1997). In 1998, seven pairs (13 birds, including one polygynous male) nested at this site (Tracy McCarthy, AGFD, pers.comm.). In 1999, seven flycatchers were detected (five territories, two pairs, seven nests); five nesting attempts were parasitized (Paradzick *et al.* 2000). The proposed project bridge site is approximately 20 miles upstream of the occupied Camp Verde flycatcher site.

In 1998, confirmed nesting of willow flycatchers was documented at Ranch Rio Verde site. This was the first time flycatchers have been found at this site, which was last surveyed in 1996. In 1999, this site had three resident flycatchers (two pairs), but it is not known if nesting occurred on this site on private property (Greg Beatty, U.S. Fish and Wildlife Service, pers.comm).

Flycatchers have also been detected at three other sites along the Verde River near the action area: Mescal Gulch, Ister Flat, and Sheepshead; however, no nests were documented at any of these sites. Mescal Gulch had a single flycatcher detected in 1993. At the Ister Flat site, a single flycatcher was detected in 1993. Flycatchers were not detected again at Ister Flat until 1997, when three flycatchers were detected (2 territories, 1 pair) and again in 1998, when two flycatchers were detected. Sheepshead had a single flycatcher detected in 1998, and two migrants were detected in June 1999 (Paradzick *et al.* 2000).

EFFECTS OF THE ACTION

Arizona Cliffrose

The survival and recovery of Arizona cliffrose will depend upon the successful management and protection of all four known populations and the ecosystems upon which they depend. Survival and recovery of each of these populations is needed to ensure the preservation of the species' genetic diversity, the evolutionary history of each population and the species, and the unique communities and ecosystems of which Arizona cliffrose is a part. To achieve this goal, the Recovery Plan (USFWS 1994) identified Arizona cliffrose "recovery units" that are analogous to the Cottonwood, Burro Creek, Bylas, and Horseshoe Lake populations. The establishment of recovery units provide for the analysis of the effects of a proposed action on a listed species to be completed based upon the status of the species within the impacted recovery unit. The jeopardy threshold is therefore assessed for each recovery unit. The effects of the Mingus Avenue Extension as proposed to Arizona cliffrose is based on the Cottonwood Recovery Unit.

Direct Effects to Arizona Cliffrose

The proposed Mingus Avenue Extension crosses Arizona cliffrose habitat between Rocking Chair Road and U.S. 89A at Cornville Road, a distance of approximately 1.10 miles. The proposed route is located primarily on ASLD administered lands (section 36) and bisects the southern portion of the Cottonwood Arizona cliffrose population. The Corps' February 22, 2000, letter explains that the width of the right-of-way within Arizona cliffrose habitat varies; a typical section width is 100 feet from the center line north and 200 feet from the center line south, for a total width of approximately 300 feet. Arizona cliffrose habitat within the entire ROW totals 30.94 acres (*in litt.* June 12, 2000, EcoPlan Associates). Surveys by personnel of the Arboretum at Flagstaff have located areas of high density seedlings and adult plants with the proposed 300-foot wide right-of-way. A very rough estimate is that approximately 600 plants are present within the ROW (Joyce Maschinski, The Arboretum at Flagstaff, pers. com.). In a portion of this project area, Arizona cliffrose appears to intergrade with the common cliffrose (*Purshia stansburiana*) and distinguishing the two species based on morphological characteristics is often difficult.

Construction of the Mingus Avenue Extension will result in soil disturbance and vegetation removal within the right-of-way. The actual acres of individual Arizona cliffrose impacted by construction of the Extension do not include the entire 30.94 acres within the ROW. Plants located within the roadbed itself will be destroyed. Review and discussion of road construction plans with Phil Bourdon of Yavapai County indicate that cut and fill slopes outside of the road bed itself, will also remove plants and impact habitat. Cut and fill slopes are located entirely within the ROW, but often do not encompass the entire 300-foot width. A case in point is a high-density seedling area located on a small knoll on the western edge of section 36 at approximately Station 8+500. This area is currently being utilized as a demographic research plot by Arboretum personnel and is located entirely within the right-of-way. A portion of the knoll will be impacted by a cut slope, but very few seedlings will be directly removed by the construction work itself.

With implementation of mitigation measures included in the proposed action, the Service expects direct project-related impacts to Arizona cliffrose to be limited to occupied and potential habitat located within the right-of-way only.

Indirect Effects to Arizona Cliffrose

Indirect project-related impacts are often more difficult to assess but are, nonetheless, very important to the long-term survival and/or recovery of the species. Implementation of Mingus Avenue Extension, as proposed, will result in various indirect, temporary, and permanent effects to the Arizona cliffrose in the Cottonwood Recovery Unit. These impacts include aspects of the project which could compromise the ecological integrity of the Cottonwood Arizona cliffrose population or the functions and processes of the ecosystem of which this population is a part.

Indirect effects to this population include 1) fragmentation of the population and the subsequent long-term effects to population structure and dynamics; 2) facilitation of introgression with *Purshia stansburiana* which could effect the genetic viability of this plant, and; 3) long-term site changes associated with potential encroachment of noxious weeds and other non-native species.

Habitat fragmentation and isolation of plant populations are thought to affect demographic processes such as seed production and cause reductions in fitness (Morgan 1999). The Cottonwood population of Arizona cliffrose is unique in that it contains the highest plant density areas, the healthiest, most vigorous plants, and some of the best reproduction of all the populations (Denham and Fobes 1994). For instance, it is estimated that the small knoll on the western edge of section 36 contains nearly one thousand plants within one acre, including many juvenile plants (Denham and Fobes 1994). The Mingus Avenue Extension, as proposed, will bisect the Cottonwood population, resulting in possible isolation of the Arizona cliffrose to the north and south of the Extension. When natural populations become fragmented through habitat destruction, individuals in small populations may also experience reduced viability and fecundity for demographic, non-genetic reasons. In insect pollinated plants, for example, reduced population size may reduce pollinator efficacy (Morgan 1999). Reducing the number of Arizona cliffrose pollinators is cause for concern because some findings suggest that plant reproduction might already be pollinator limited (Fitts *et. al.* 1993).

Construction of a road through the center of this population of Arizona cliffrose brings with it the threat of invasive weeds. Processes that threaten population integrity (e.g. weed invasion) and the internal dynamic of the population (e.g. population size effects on fecundity) ultimately threaten the survival of the species (Morgan 1999). Thus, specific mitigation measures were incorporated into the proposed action and agreed to by the County to reduce with the risk of noxious weed invasion into this population of Arizona cliffrose. Weed invasion could also compromise seedling establishment due to competition for limited resources (e.g. water and light).

In addition, it is believed that in bisecting the population of *Purshia subintegra*, Mingus Avenue Extension may create avenues for weed invasion, reduce viable seed production, and restrict gene flow, as well as generate habitat for the introgressed forms which may impact population dynamics. These project-related impacts to the Arizona cliffrose are a serious concern as they could possibly delay or preclude successful recovery of the species.

The ecological relationship between *Purshia subintegra* and *Purshia stansburiana*, which are sympatric in the immediate project area, is not completely understood. Road construction through the population within section 36 may lead to an expansion of the introgressed form as disturbance appears to increase the population of plants of the introgressed form. Research conducted by the Arboretum at Flagstaff found that the introgressed forms are typically found along roadsides, in washes, and the edge of the Cottonwood population (*in litt.* December 21,

1998). Significant differences were found between disturbed and undisturbed habitat in the distribution of *Purshia subintegra*, *Purshia stansburiana*, and the introgressed form in the Verde Valley. Washes and roadsides contained a greater proportion of the introgressed forms than undisturbed habitat and undisturbed habitat contained a greater proportion of *P. subintegra* than disturbed habitat (*in litt.* January 31, 2000). Disturbance seems to provide habitat for the introgressed form and this could increase the population and increase gene flow into the population of *Purshia subintegra* (*in litt.* December 21, 1998).

In addition, while *Purshia subintegra* blooms only in early spring (late April to early June), *Purshia stansburiana* and the introgressed form have a longer season of flower and seed production (late May to September) to take advantage of monsoon rains (Arboretum at Flagstaff, *in litt.* October 11, 2000). This puts *Purshia subintegra* at a competitive disadvantage particularly if the amount of precipitation is low in the winter and spring. A further related factor is the timing of flower blooming. The timing of flowering overlaps for *Purshia subintegra* and the introgressed form which allows for cross-pollination when the two taxon are close enough spatially. The introgressed form and *Purshia stansburiana* can bloom at the same time as well, which would facilitate cross-pollination (Arboretum at Flagstaff, *in litt.* October 11, 2000). This allows for genes to move from *Purshia stansburiana* into the population of *Purshia subintegra*, thus potentially leading to an expansion of the introgressed form.

While negative indirect effects are possible, as described above, the Service believes that the purchase of the identified 357 acres within section 36 by the County for conservation and likely exchange with the U.S. Forest Service greatly assists with offsetting the otherwise extremely negative indirect effects associated with the Mingus Avenue Extension. The acquisition of the ASLD 357 acres within section 36 and subsequent placement of these acres into conservation status with the U.S. Forest Service is necessary to prevent substantial compromise to the survival and recovery of the species.

Southwestern Willow Flycatcher

The primary adverse effects from the proposed road extension is the bridge construction over the Verde River which will result in the destruction of riparian habitat, and potential for additional erosion and sediment production. The proposed project will result in the permanent loss or modification of approximately 3.34 acres of flycatcher critical habitat located on Arizona State Parks land (*in litt.* April 18, 2000, EcoPlan Associates). Yavapai County is in the process of buying this parcel of land (approximately 4.2 acres) from the State Parks (Yavapai County, *in litt.* November 3, 2000). The Service believes the critical habitat affected by the bridge construction, while not currently considered suitable for nesting flycatchers, has the potential to become suitable habitat in the future. This is additionally supported by the location of a southwestern willow flycatcher on June 29, 2000, within approximately 0.25 miles of the proposed bridge site (Corps, *in litt.* August 17, 2000).

Due to the imperiled status of this species, any loss of suitable or potential habitat is very serious. The loss of over three acres of potential flycatcher habitat is of concern. The proximity of the nesting flycatchers to potential habitat at the bridge sites increases the probability that this habitat may become occupied in the future. However, if the site retains or develops flycatcher nesting habitat in the presence of the bridge, the site may also become occupied at some time in the future. Yavapai County indicates that vehicle access to the banks of the Verde River will not be permitted once the bridge is constructed; however, pedestrian access will not be restricted (Phil Bourdon, Yavapai County, pers. comm.). Access to the banks of the Verde River created by construction of the Mingus Avenue bridge will likely draw recreationists to the area, resulting in trampling of riparian vegetation and bank alteration. Potential flycatcher habitat currently present will decrease in quality where this occurs. Future maintenance of the bridge may or may not require vehicle access to the riparian habitat located within the floodplain (Phil Bourdon, Yavapai County, pers. comm.). Maintenance equipment may further negatively impact riparian habitat in the vicinity of the bridge. Yavapai County will endeavor to minimize impacts after maintenance through re-contouring and re-seeding the used pathway to restore the area to its natural state (Phil Bourdon, Yavapai County). The Service believes such rehabilitation will prevent use of this access route by the public, thereby minimizing further impacts to this critical habitat.

The proposed Mingus Avenue bridge will further fragment the riparian habitat along the Verde River, thus reducing habitat quality and increasing the potential for both nest predation and nest parasitism by brown-headed cowbirds. Fragmentation reduces the chance of an individual successfully finding suitable habitat by creating isolated habitat patches. Searching for increasingly isolated patches leaves individuals vulnerable to mortality from starvation or predation and can result in loss of breeding opportunities. Habitat loss and fragmentation combine to isolate and reduce in number and size the spaces necessary for breeding, feeding, sheltering, and migration. Loss and reduction of space to carry out a species' life cycle increases the probability of extinction of local breeding groups, particularly those that consist of few individuals (Pulliam and Dunning 1994). Habitat loss and fragmentation, ultimately, reduce the viability of a metapopulation or the species as a whole.

The quality and quantity of suitable habitat for the southwestern willow flycatcher in the Verde Valley has been severely affected through numerous past actions resulting in reduction of riparian habitat, altered vegetation species composition, increased presence of cowbirds and potential predators, decreased surface water availability, changes in stream channel morphology, and other factors. A significant portion of the adverse impacts to the Verde River and its aquatic and riparian ecosystem come from the additive effect of small actions that individually may not threaten the system, but cumulatively result in a continuing deterioration of the ecosystem.

Foppen and Reijnen (1994) and Reijnen and Foppen (1994) documented reduced breeding success, lower breeding densities, and higher dispersal rates of willow warblers (*Phylloscopus trochilus*) breeding next to roads that bisect forested habitat in Europe. Sogge (1995a) noted that

the population decline and changes in the distribution of willow flycatcher territories on the Verde River in Arizona were consistent with other studies documenting adverse effects of roads that bisect habitat. In addition, a southwestern willow flycatcher was killed by an automobile on a rural road that bisects flycatcher habitat in the White Mountains (Sferra et al. 1995). The effects, documented in Arizona and elsewhere, indicate that habitat fragmentation caused by roads can have direct effects to flycatchers, including mortality, and overall changes to habitat suitability that can further reduce the carrying capacity of particular habitat patches.

Yavapai County Public Works has agreed as part of the proposed action to make a one-time payment of \$100,000 for the purpose of southwestern willow flycatcher conservation, for example, for the acquisition of habitat, conservation easements and/or habitat protection in the Verde Valley. Such habitat should already contain or have the capability of attaining habitat conditions suitable for nesting flycatchers. Much of Verde Valley is privately owned and the cumulative effects of this ownership has reduced the protection of the habitat for nesting flycatchers. The acquisition and protection of habitat within the Valley for purposes of riparian restoration is important to improve and stabilize the Verde Valley metapopulation of nesting flycatchers (the only known population of birds nesting on this 195 mile long river).

The removal of riparian vegetation within the project area may alter the quality of the habitat in areas adjacent to the project site. The Service anticipates that the Mingus Avenue bridge will have the long-term effect of reducing the overall habitat suitability for the southwestern willow flycatcher in the project area. The vehicle use on the bridge may reduce adjacent habitat suitability and create hazards to flycatchers if they occupy the site.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions are subject to the consultation requirements established under section 7 and, therefore, are not considered cumulative in the proposed action.

The human population within Cottonwood is expected to more than double in the next 40 years (Phillips *et al.* 1995). Future actions within or adjacent to the project area that are reasonably certain to occur include urban development and associated activities (e.g., illegal dumping, parking areas), road building and widening, land clearing, outdoor recreational activities including trail construction, off-road vehicle driving and “party sites,” water pumping, and control of insect pests. Livestock grazing on the ASLD lands within Arizona cliffrose habitat in the Verde Valley within section 36 is managed as part of the Windmill Allotment (U.S. Forest Service, Coconino National Forest) but is not specifically addressed in the Windmill Allotment Management Plan environmental documentation. Livestock grazing also occurs on private lands on the Verde River.

Increasing development along the Verde River may have significant effects on the southwestern willow flycatcher. Effects may be direct on individuals or on habitat. Habitat fragmentation can have direct effects including mortality and overall changes in habitat suitability that can further reduce the carrying capacity of a particular habitat patch. Increased development also has the secondary effect of increasing predatory pets. Increases or changes in the types of potential cowbirds foraging sites (e.g. bird feeders, golf courses, corrals, stockyards) may increase the potential for cowbird parasitism of local flycatchers. Increased human disturbance including recreational use of the river floodplains, particularly by off-highway vehicles or river floaters, may also adversely affect habitat. In addition, the pumping of surface and ground water may result in reduced river flows, which in turn would result in decreased habitat quality and quantity.

CONCLUSION

The Verde Valley population of Arizona cliffrose is the largest and most robust of the four populations known. However, despite the designation of the Verde Valley Botanical Area by the Coconino National Forest, the long-term conservation status of this population is very insecure. Due to land ownership patterns and the expanding communities of Cottonwood, Clarkdale, and Bridgeport, the ecological integrity of the Arizona cliffrose Verde Valley population is threatened by urban encroachment, dispersed recreation, and public and private developments. Many such developments are often associated with new road construction or up-grading or existing roadways. The acquisition of the ASLD 357 acres is crucial for the survival and recovery of the species.

Habitat loss, modification, and fragmentation are the primary factors involved in the decline of the southwestern willow flycatcher (USFWS 1995) and are the primary threats to the survival and recovery of this species. Habitat fragmentation caused by roads can have direct effects to flycatchers, including mortality, and overall changes to habitat suitability that can further reduce the carrying capacity of particular habitat patches. The vehicle use on the bridge may reduce adjacent habitat suitability and create hazards to flycatchers if they occupy the site. Over 3 acres of critical habitat will be adversely affected by the Mingus Avenue Bridge.

After reviewing the current status of the Arizona cliffrose and the southwestern willow flycatcher, the environmental baseline for the action area, the effects of the proposed Mingus Avenue Extension, and the cumulative effects, it is the Service's biological opinion that the construction, as proposed, is not likely to jeopardize the continued existence of the Arizona cliffrose or the southwestern willow flycatcher or result in the destruction or adverse modification of designated southwestern willow flycatcher critical habitat.

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.

Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to plant species. However, limited protection of Arizona cliffrose and other listed plants from take is provided to the extent that the Act prohibits the removal and reduction to possession of federally listed endangered plants or the malicious damage of such plants on areas under Federal jurisdiction, or the destruction of endangered plants on non-Federal areas in violation of state law or regulation or in the course of any violation of a state criminal trespass law.

The measures described below are non-discretionary, and must be undertaken by the Corps so that they become binding conditions of any grant or permit issued to the applicant, 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 applicant 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 applicant) 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)].

Amount or extent of take

The Service anticipates that incidental take of the southwestern willow flycatcher will occur as a result of the proposed Mingus Avenue bridge construction over the Verde River. A southwestern willow flycatcher was observed within 0.25 miles of the proposed bridge site in 2000, and the considerable vegetation in the area contains all the river components needed to develop suitable habitat in the vicinity of the project site. These factors as well as the proximity of this site to

other occupied nesting habitat makes it likely that flycatchers will likely occupy the area during the construction phase or after project completion. Potential sources of take in the form of harm, harassment, or death include the loss of a nesting site, loss or disturbance of a nest, nest parasitism by cowbirds anticipated in the long-term, and collision with vehicles. The proposed action will result in some riparian degradation and loss, and potentially reduce nesting productivity if/when the site is occupied by nesting flycatchers. Habitat loss and degradation is anticipated to result in displacement of adults, reduced productivity, and reduced survivorship of adults and young in the long-term.

The extent of take for this proposed action is difficult to measure due to a high level of uncertainty about project effects and difficulties in detectability of taken flycatchers. The Service concludes that incidental take from the proposed action will be considered to be exceeded if the proposed action results in the loss or modification of more than 3.34 acres of southwestern willow flycatcher critical habitat.

EFFECT OF INCIDENTAL TAKE

In the accompanying biological opinion, the Service has determined this level of anticipated take is not likely to result in jeopardy to the southwestern willow flycatcher, nor the destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of southwestern willow flycatcher. The reasonable and prudent measures described below are non-discretionary and must be implemented by the Corps 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.

Some of the reasonable and prudent measures and their implementing terms and conditions are already an implicit or explicit part of the proposed project and their inclusion in this incidental take statement is only an affirmation of their importance in minimizing take. Where the proposed project already adequately fulfills the following reasonable and prudent measures and terms and conditions, this incidental take statement does not imply any requirement for additional measures.

- 1) All proposed actions will be conducted in a manner that will minimize disturbance as well as loss and alteration of suitable or potential southwestern willow flycatcher habitat.

- 2) A complete and accurate record shall be maintained of all actions which may result in take of the southwestern willow flycatcher.
- 3) Southwestern willow flycatcher suitable and potential habitat on the Verde River shall be protected and enhanced.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, 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. The following terms and conditions are necessary to implement the reasonable and prudent measures.

The following terms and conditions are necessary to implement reasonable and prudent measure 1.

- 1a) The Corps shall ensure that the conservation measures included in the project description are fully implemented.
- 1b) Southwestern willow flycatcher surveys, following accepted protocol (note that the protocol was revised in 2000 to include more visits for project-related surveys than Sogge *et. al* 1997), shall be conducted along the Verde River 0.25 miles upstream and 0.25 miles downstream of the proposed bridge during each breeding season immediately prior to construction. If southwestern willow flycatchers are present, there will be no construction activities within 0.25 mile radius of where birds were detected. If southwestern willow flycatchers are found during the last survey period, it will be considered resident and nesting birds, and no construction activities will occur within 0.25 mile radius of that site. Activities such as blasting and pile driving will also be precluded. These restrictions would be in place for the May 1 to September 1 breeding season. Construction activities on the bridge and within 0.25 miles of the Verde River will not occur from May 1 until surveys determine flycatcher absence. Absence is determined based upon the results of a minimum of five visits (three visits conducted in the last survey period, June 22-July 17) as described in the revised survey protocol prepared by the Service in 2000. If flycatchers are not located during yearly surveys, construction work can begin after July 3 each year (given that the last three visits have been conducted), except as noted in 1c below.
- 1c) Initial clearing related to the construction activities on the Mingus Avenue Bridge shall be restricted to the period of September 2 to April 30, outside the flycatcher breeding season.

- 1d) No construction equipment shall enter the live stream.
- 1e) Water required for construction shall not be drawn from the Verde River.
- 1f) All construction work shall use best management practices and use technical advise and biological information on ways to minimize adverse effects to southwestern willow flycatcher habitat (e.g. protection against toxic spills, reduction in sedimentation, minimizing loss of riparian vegetation). Construction workers will be briefed on the boundaries of the project area to minimize habitat degradation, and markers such as temporary fencing, poles and/or flagging etc. will mark the project area to clearly delineate construction area boundaries.

The following terms and conditions are necessary to implement reasonable and prudent measure 2.

- 2a) The Corps (or Yavapai County) shall submit an annual report to the Service each year through completion of activities related to construction within and immediately adjacent to the river corridor. This report shall include survey results for the southwestern willow flycatcher, a description and explanation of project mitigation measures which were not implemented or which had a result not otherwise expected, and complete and accurate records of any incidental take that occurred during the course of the project.
- 2b) The Service shall be notified immediately if any construction actions contribute to the introduction of toxic materials into the Verde River or the floodplain. All construction activity must halt until further notice.

The following terms and condition is necessary to implement reasonable and prudent measure 3:

- 3a) The Corps/Yavapai County will ensure that construction of the bridge will not generate use of the river/floodplain that causes loss of riparian habitat, bank erosion, retard growth of riparian habitat, etc. Construction of bridges increases human proximity to the river, and possibly increased access. As a result of the potential for increased river access and habitat degradation, there shall be no vehicle access (ATV, motorcycle, truck, etc.) into the floodplain. Use of the area (0.25 miles upstream and downstream of the bridge) will be evaluated/monitored quarterly for two years following construction (photos taken, etc.) and reported to the Service annually on types of use and/or changes to the habitat which occur as a result of building the bridge. The results from this monitoring will determine whether human activity, unauthorized livestock use, etc. is damaging or threatening natural resources in the bridge area or whether access to the river as a result of construction of the bridge is having effects to the habitat elsewhere outside of the immediate bridge area. The Corps/County will ensure that adequate barriers, fences, signs, etc. are created and

maintained in order to minimize and reduce negative effects to habitat as a result of increased human proximity to the river and floodplain.

DISPOSITION OF DEAD OR INJURED ANIMALS

Upon locating a dead, injured, or sick southwestern willow flycatcher, initial notification must be made to the Service's Law Enforcement Office, Federal Building, Room 8, 26 North McDonald, Mesa, Arizona (telephone: 480/835-8289) within three working days of its finding. The Service can advise as to handling of dead or injured listed species. Written notification must be made within five calendar days and should include the date, time, and location of the animal, a photograph, if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling specimens to preserve the biological material in the set possible state. If possible, the remains of intact birds shall be provided to this office. If the remains of the bird(s) are not intact or are not collected, the information noted above shall be obtained and the carcass left in place. Injured animals should be transported to a qualified veterinarian by an authorized biologist. Should the treated animal(s) survive, the Service should be contacted regarding the final disposition of the animal.

To the extent this statement concludes take of any threatened or endangered species of migratory bird that will result from the agency action for which consultation is being made, the Service will not refer the incidental take of any such migratory bird for prosecution under the Migratory Bird Treaty Act (MBTA) or 1918, as amended (16 U.S.C. 703-712), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of ESA directs Federal agencies to utilize their authorities to further the purposes of ESA 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. Yavapai County should consider closing Rocking Chair Road after the completion of the Mingus Avenue Extension to assist in the protection of Arizona cliffrose habitat. The Service recommends that some of the seedlings grown from the cuttings of Arizona cliffrose within the Mingus Avenue right-of-way be transplanted into the old road bed, thereby assisting in the restoration of that habitat.

2. The Corps (or Yavapai County) should consider submitting an annual report to the Service each year through completion of activities related to construction within Arizona cliffrose habitat and management of section 36 . This report would include a description and explanation of project mitigation measures which were not implemented or which had a result not otherwise expected, and complete and accurate records of habitat affected during the course of the project.
3. Yavapai County should consider assisting in reducing impacts to nesting bald eagles through implementation of the conservation strategy outlined in the Draft Conservation Assessment for the Bald Eagle in Arizona (Arizona Game and Fish Department 1999): All construction and related work would halt during the bald eagle breeding season restriction (December 1 to June 30) within a 2500 foot radius around the nest site.
4. Yavapai County should consider implementing an alternative route through section 36 to minimize to the maximum extent possible the direct impacts to Arizona cliffrose plants.
5. Yavapai County should consider fully avoiding the established high density seedling site located within the current right-of-way at Station 8+500.

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.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the action outlined in the this biological opinion. As provided in 50 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; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) 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.

The Service appreciates the assistance provided by Yavapai County in minimizing adverse effects to the Cottonwood population of Arizona cliffrose and to the southwestern willow flycatcher. For further information, please contact Michele James (520) 527-3042 or Debra Bills

(602) 242-0524. Please refer to the consultation number 2-21-00-F-069 in future correspondence concerning this project.

Sincerely,

/s/ David L. Harlow
Field Supervisor

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (AES; Attn: Cindy Schulz)
Field Supervisor, Fish and Wildlife Service, New Mexico Field Office, Albuquerque, NM

Yavapai County, Cottonwood, AZ (Attn: Phil Bourdon)
EcoPlan Associates, Inc., Mesa, AZ (Attn: George Ruffner)
Director, Arboretum at Flagstaff, Flagstaff, AZ
Forest Supervisor, Coconino National Forest, Flagstaff, AZ (Attn: Barb Phillips)
District Ranger, Sedona Ranger District, Sedona, AZ (Attn: Janie Agyagos)
Jean Calhoun, The Nature Conservancy, Phoenix, AZ

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BIOLOGICAL OPINION SUMMARY
Mingus Avenue Extension

Date of Opinion: March 9, 2001

Action Agency: Department of the Army, Corps of Engineers

Project: Mingus Avenue Extension

Location: Yavapai County

Listed species affected: Arizona cliffrose (*Purshia subintegra*), southwestern willow flycatcher (*Empidonax traillii extimus*) and its critical habitat.

Biological Opinion: Non-jeopardy for the Arizona cliffrose and southwestern willow flycatcher; critical habitat for the southwestern willow flycatcher will not be destroyed or adversely modified.

Incidental Take Statement:

Level of take anticipated: The Service anticipates a surrogate measure of incidental take as the loss or modification of 3.34 acres of southwestern willow flycatcher critical habitat.

Reasonable and prudent measures: Three reasonable and prudent measures are provided which reduce impacts to the southwestern willow flycatcher and its habitat. Nine implementing terms and conditions are provided.

Conservation recommendations: Five conservation recommendations are provided. Implementation of conservation recommendations is discretionary.