



United States Department of the Interior  
Fish and Wildlife Service

Arizona Ecological Services Field Office  
2321 W. Royal Palm Road, Suite 103  
Phoenix, Arizona 85021-4951  
(602) 640-2720 Fax (602) 640-2730



In Reply Refer To:

AESO/SE  
2-21-92-I-360

December 1, 1995

Mr. Charles W. Cartwright, Jr.  
Regional Forester  
USDA Forest Service  
517 Gold Avenue SW  
Albuquerque, New Mexico 87102-3292

Dear Mr. Cartwright:

This responds to your request of April 25, 1995 for section 7 consultation with the U.S. Fish and Wildlife Service (Service) pursuant to the Endangered Species Act (ESA) of 1973, as amended, the endangered southwestern willow flycatcher (*Empidonax traillii extimus*) on the Tonto Basin Allotment Grazing Strategy and the Tonto Creek Riparian Unit (TCRU). The Tonto National Forest (Forest) made the determination that the proposed action may affect the continued existence of the southwestern willow flycatcher (SWWF).

The project area is on the Tonto National Forest in Gila County, Arizona. This biological opinion was prepared using information contained in the Biological Assessment and Evaluation (BAE) dated April 25, 1995, a BAE dated January 12, 1994 completed for the Tonto Basin Allotment, an Environmental Assessment dated December 1994, an undated Resource Development Plan (RDP) for the TCRU, data in our files or in the published or grey literature, and other sources of information.

#### Consultation History

On February 11, 1994, the Forest entered into formal consultation with the Service on the Tonto Basin Allotment Management Plan. The Service provided a Biological Opinion on the proposed project on July 19, 1994 which concurred with the Forest's determination of effects for all listed species. At that time, the SWWF was proposed for listing as endangered and the Biological Opinion stated that a separate conference opinion would be provided for the SWWF. No conference report was completed prior to the listing of the SWWF as endangered, effective March 29, 1995.

Similarly, the Forest informally consulted with the Service on the TCRU. The Service concurred with a no affect determination for all listed species included in the Biological Evaluation submitted by the Forest in 1991. At that time, the SWWF was neither listed nor proposed for listing.

Nesting SWWFs were discovered at the Tonto Creek inflow into Roosevelt Lake in 1993, and seven nests were observed there in 1994. The SWWF breeding area is within the TCRU, and the TCRU is adjacent to the Tonto Basin Allotment. In a meeting with the Service on April 5, 1995, the Service requested that the Forest include TCRU in the Tonto Basin consultation as TCRU bisects the allotment and is used by the same grazing permittees. In response, the Forest submitted a BAE for both Tonto Basin and the TCRU on April 25, 1995.

Initially, the Service determined that the proposed project would jeopardize the continued existence of the species. Draft reasonable and prudent alternatives were developed and reviewed by the Forest Service. The draft opinion was provided to the Service's Regional Office in Albuquerque. On September 28, 1995, following review of the draft jeopardy opinion and reasonable alternatives, the Regional Office of the Forest Service decided to modify the proposed project description to address adverse effects to the flycatcher by incorporating the draft reasonable and prudent alternatives in the proposed project description. Following receipt of the revised project description from the Forest on November 6, 1996, the Service revised the draft jeopardy opinion to a non-jeopardy opinion.

### BIOLOGICAL OPINION

It is the Service's Biological Opinion that implementation of the proposed Tonto Basin Allotment Grazing Strategy and the TCRU is not likely to jeopardize the continued existence of the SWWF. The Service is responding to the Forest's April 25, 1995 may affect determination and request for formal consultation.

#### Description of the Proposed Action

It is important to note that the project description is legally binding. Failure to conduct the action as described could constitute a project modification if it would adversely affect a listed species in a manner not considered in this opinion. As provided in 50 CFR §402.16, such a project modification would require reinitiation of formal consultation.

#### 1. Tonto Basin Allotment

The proposed action is to implement a grazing management system, including structural and non-structural range improvements. The proposed action would be implemented on the Tonto Basin Allotment and would involve two proposed rest-deferred rotation grazing management systems, one per permittee. The George T. Cline Trust is the permittee for the eastern section of the allotment. For the eastern section, implementation of the proposed action would result in a three unit system with ten pastures. The Lake and Middle Units are of greatest concern for this consultation due to their proximity to the SWWF breeding area. The Lake Unit consists of the Cactus, Methodist, Lake, and Goose Holding Pastures. The Lake Pasture of the Lake Unit does not border Tonto Creek, but is adjacent

and to the east of the TCRU and occupied habitat, while the Methodist, Cactus, and Goose Holding pastures are further east of the Lake Pasture. In the Lake Pasture, grazing would occur February through May the first year, March through June the second year, and April through July the third year.

Since the original BAE was submitted for the Tonto Basin Allotment, one pasture layout change has been made. The Lake Pasture originally included the lake bottom at the Tonto Creek inflow. The southern boundary of the TCRU was a fence line that was directly adjacent and to the south of the occupied flycatcher breeding area. Under this layout, the cattle would have had full access to the lake bottom whenever they were grazing in the Lake Pasture. The difficulty in maintaining fencing across Tonto Creek made it possible that cattle grazing in the Lake Pasture would at some point be able to enter the TCRU. In order to prevent this, a new fence was constructed that ties into the TCRU perimeter fencing and enters the lake about one mile east of Indian Point. This fencing will prevent livestock from entering the Tonto Arm of the lake bottom when in the Lake Pasture. It also moves the southern boundary of the TCRU to wherever the water level of the lake is.

The Middle Unit consists of the Bouquet, Bathtub, Greenback, and Cline Mesa pastures. Of these pastures, the Bouquet and Cline Mesa pastures are adjacent to the TCRU and nearest the occupied habitat. The Bouquet pasture would be grazed June through July the first year, May through July the second year, and February through April the third year. The Cline Mesa pasture would be grazed March through May the first year, February through April the second year, and May through June the third year.

The Dorothy Cline Wells Trust is the permittee for the western section of the Tonto Basin allotment. For the western section, the proposed action would result in a four unit system with thirteen pastures and four herds of cattle. Within the western section, the Bar X Unit is the unit of greatest concern for this consultation due to its proximity to the breeding area. The Bar X Unit is composed of the Mesquite Flat, Sycamore, Long Mesa, and Mt. Ord pastures. Of these pastures, only Mesquite Flat is within five miles of occupied SWWF habitat at the Tonto Creek inflow. As described in the proposed action, the Mesquite Flat pasture would be grazed February through May in the first year, rested the second year, and grazed February through May in the third year. Additional details on proposed grazing schedules for all units and pastures is located in Appendix 4 of the original BAE for the Tonto Basin Allotment.

Implementation of the proposed grazing system would require completion of 27 structural projects including 47 miles of fencing, two miles of new pipeline, five water troughs, two cattleguards, two spring developments, two ten-acre holding traps, and two corrals. Maintenance projects would include seven miles of fence, two stock tanks, and five non-structural projects. Within five miles of the SWWF breeding area, two fences, a corral, a pipeline extension, and a cattle guard would be constructed. The Lower Division Fence would create the Greenback, Bathtub, Bouquet, and Cline Mesa Pastures. It would begin at the Greenback and Tonto Basin allotments boundary fence on Horse Range Mesa.

Bluffs of Horse Range Mesa form a natural boundary, and the fence would continue from the bluffs southwest to cross an existing fence near Forest Road 425B, finally tying into the TCRU boundary fence. The fence would either be electric or barbed wire.

The Salt Fence would split the Methodist and Lake Pastures. This fence would start at the lake at the mouth of Salt Gulch and run north along the western edge of Salt Gulch, across the A Cross Road, and tie into an existing fence corner near Forest Road 1424. It would be either electric or barbed-wire, and approximately two miles in length.

The Corner Corral with a drinker from a pipeline extension would be built at the junction of the four pastures of the Middle Unit, approximately five miles from the flycatcher nesting area. The Corner Corral would be used to facilitate movement of cattle between the four pastures. It will not be used for shipping. The corral would be constructed of pipe and sucker rod, and would be approximately 100 feet by 150 feet in size. An adjacent holding pen would be standard barbed wire and would be approximately two acres in size.

The Bouquet Pipeline Extension in the Bathtub Pasture would be an extension of an existing pipeline from Bouquet that was previously installed as part of the TCRU. It would start near Forest Service Road 425 and continue for approximately one-half mile, terminating with a trough at the proposed Corner Corral.

The Salt Cattleguard project would consist of installing a two grid cattleguard on the A Cross Road near the Salt Gulch crossing. The cattleguard is needed due to the proposed construction of the new Salt Fence. The grid would be placed on a concrete base in a hole dug by tractor.

In addition, several burns were proposed in the original BAE. Burns would take place in the Greenback, Mt. Ord, Gun Creek, Red Rock, Bear Head, and Clover pastures. None of these pastures are adjacent to the TCRU, Tonto Creek, or the occupied SWWF habitat. The Forest indicated that these burns would result in short-term sedimentation of drainage systems directly below the burns, but are not expected to have negative cumulative effects.

It is anticipated by the Forest that the change in the management system for this allotment, including structural and non-structural improvements, would result in changes in livestock use patterns, seasons of use, and concentration areas. The Forest anticipates that grazing pressure would be reduced in the central, desert portion of the allotment, accompanied by an increase in use in the chaparral vegetative portions of the allotment. Increased livestock concentrations would be expected in close proximity to any new watering troughs, and new trailing may occur adjacent to new fences. The Forest believes that the new management system would promote riparian recovery by allowing increased periods of rest in areas capable of supporting riparian plant species.

## 2. TCRU

The TCRU is one of the wildlife mitigation measures proposed by an interagency team composed of representatives of the Forest, Bureau of Reclamation (Reclamation), Service, and the Arizona Game and Fish Department (AGFD) to implement the Fish and Wildlife Coordination Act requirements associated with Plan 6 of the Central Arizona Project which will result in the raising of lake levels at Roosevelt Lake. The management goal of the TCRU was to develop a management plan that would allow the degraded Tonto Creek riparian community to recover to its potential. The TCRU also served as mitigation for losses of 460 acres of riparian habitat at Roosevelt Lake and Lake Pleasant.

The TCRU is a special riparian management unit in which livestock grazing is closely managed in order to allow for recovery of riparian communities. Specific goals included 1) the establishment of new cottonwood/willow communities on at least 20 percent of the riparian area, 2) an increase in the density, frequency, acreage, and number of stands of sapling, pole, and sub-mature cottonwood/willow, and 3) an increase in the density and frequency of seedling cottonwood and willow plants within the sites demonstrating potential for those communities.

The original plan involved splitting the TCRU into three separate pastures. Grazing would have occurred for a maximum of seven weeks of early spring in one pasture and a maximum of seven weeks of deferred spring use in a second pasture. The third pasture would have received an entire year of rest. The entire TCRU was rested from March 1, 1994 until December 31, 1994. Two hundred head of cattle were placed in the upper pasture on January 1, 1995. However, repeated flooding removed pasture and monitoring enclosure fencing. The interagency team decided to manage the TCRU as one large pasture rather than try to rebuild and maintain fencing following each flood. As modified, the proposed action would involve the grazing of 200 head of cattle from January 1 through April 15 in two out of three years, with complete rest the third year.

Monitoring activities for the TCRU were contracted to Biosystems Analysis, Inc. The goals of the monitoring activities were to collect data on historical and present riparian habitat conditions and land use practices, condition of the watershed, floodplain geomorphology, and the impact of flood flows within the TCRU, to assess the level of grazing utilization occurring within upland and riparian communities, to assess the possible affects of watershed hydrology, man-caused impacts, and local climate variability on the riparian vegetation, and to delineate recruitment areas and stands of sub-mature habitat. As part of the management and monitoring effort, data will be collected using a variety of sources. Data will be reviewed after one grazing cycle (three years) and two grazing cycles (six years) to determine what adjustments to livestock management, if any, need to be made.

In order to minimize impacts of the proposed action on SWWFs within the breeding area at Tonto Creek the Forest has indicated that they will complete the following actions:

1. Conduct an annual review of the grazing permits issued to determine the feasibility of grazing the suggested number of cattle in pastures based on the presence/absence of annuals, current lake levels, and the amount of area inundated. The Forest will conduct this review and report the results of the review to the Service on an annual basis for the first three years of the grazing permit.
2. Monitor habitat conditions in the SWWF breeding area and adjacent riparian habitat from the breeding area north to A-Cross Road to determine if existing management is adversely affecting either the SWWF breeding area or adjacent riparian habitats. The Forest will report their observations and conclusions to the Service on an annual basis for the first three years of the grazing permit.
3. Participate in the proposed statewide effort to be initiated by the Service for SWWF surveying and cowbird control. The Forest will contribute personnel and/or funds to this effort once implementation has begun. In the interim, the Forest will ensure that the SWWF breeding area at Tonto Creek is surveyed each year and that monitoring is completed. Monitoring will involve the documentation of abundance, distribution, territory size, habitat composition within territories and nest habitat composition, productivity, cowbird parasitism, success of nests, other avian species in the area, and the presence/absence of cowbirds in the area. All surveying and monitoring efforts will be conducted in accordance with procedures outlined in *A Survey Protocol for the Southwestern Willow Flycatcher (Empidonax traillii extimus)* (Tibbitts *et al.* 1994) by personnel trained in the use of the protocol and who have obtained the proper ESA permitting.
4. Implement a cowbird management program at the willow flycatcher breeding area. The Forest will begin this program annually by April 1 and continue through July 31, or until the willow flycatcher breeding season has ended (if earlier than July 31). The program will utilize a minimum of two traps to be checked daily. The Forest will provide a report annually in conjunction with willow flycatcher monitoring results discussed in Item 3 and will include a map showing locations of traps, daily number and sex of cowbirds and non-target species captured per trap, and the dates of captures. Implementation of the management program will be conducted by the Forest until and unless the statewide cowbird management program is initiated by the Service and the Forest elects to participate in that program. The Forest assumes responsibility for ensuring that the cowbird management program is conducted until such time as the statewide effort is initiated.
5. Remove all cattle from the TCRU by March 15 of each year, or ensure by construction of fencing and monitoring that all cattle remain outside of the SWWF breeding area and riparian area south of A-Cross Road after March 15 of each year.
6. Implement all actions described in items one through five above for at least the first three years of the permit. The Forest commits to meeting with the Service at the end of the three year period to reassess conditions at the SWWF breeding area and in the adjacent riparian habitat south of A-Cross Road and determine whether continuation of items one through five above is warranted.

## Description of the Project Area

### 1. Tonto Basin Allotment

The Tonto Basin Allotment encompasses over 107,000 acres northwest of Theodore Roosevelt Lake. Vegetation in the center of the allotment is primarily desert shrub and desert grassland species including mesquite (*Prosopis juliflora*), cat claw (*Acacia greggii*), jojoba (*Simmondsia chinensis*), palo verde (*Cercidium* spp.), creosote (*Larrea tridentata*), and annual grasses. The EA prepared for the Tonto Basin Allotment indicates that desertscrub covers approximately 40 percent of the allotment, and represents the dominant vegetation community.

Pinyon-juniper/mixed shrub vegetation community is also represented, covering approximately 25 percent of the allotment. Species representative of this community include juniper species (*Juniperus* spp.), pinyon pine (*Pinus edulis*), oak species (*Quercus* spp.), and a variety of annual grasses and forbs.

Chaparral vegetation is common throughout the higher elevations, constituting approximately 15 percent of the allotment. Species found within the chaparral community include scrub oak (*Quercus turbinella*), mountain mahogany (*Cercocarpus montanus*), ceanothus (*Ceanothus* spp.), silk tassel (*Garrya flavescens*), mountain laurel (*Rhus ovata*), squaw berry (*Rhus trilobata*), and cat claw. Higher elevations along the east and north facing slopes of the western edge of the allotment, as well as higher elevation areas along the Pleasant Valley Ranger District on the northern boundary support ponderosa pine (*Pinus ponderosa*). The ponderosa pine vegetation community covers approximately 20 percent of the allotment.

Additional vegetation and wildlife species found within the allotment are listed within the EA and RDP for the Tonto Basin Allotment and the TCRU.

### 2. TCRU

The TCRU encompasses approximately 5,900 acres along Tonto Creek from its confluence with Gun Creek downstream 15.7 miles to its terminus in Roosevelt Lake. The TCRU bisects the Tonto Basin Allotment. Vegetation associations within the TCRU include Fremont cottonwood (*Populus fremontii*), cottonwood/willow/desert willow (*Salix gooddingii* and *Chilopsis linearis*), mesquite bosque, burro brush (*Hymenoclea monogyra*)/seepwillow (*Baccharis glutinosa*), cattail (*Typha* spp.), and tamarisk (*Tamarix* sp.). The RDP classified cottonwood associations along Tonto Creek as decadent stands isolated from flooding events by their position on the elevated terraces of old floodplains. The majority of these trees were classified as over-mature and mostly in a state of rapid decline. In those sites inaccessible to livestock, ash (*Fraxinus velutina*) and Mexican elderberry (*Sambucus caerulea*) may also be found.

The cottonwood/willow/desert willow association occurs in wetter areas, usually with perennial stream flow or a shallow water table. The RDP for TCRU indicated that these stands are decadent and in decline, or are characterized as disturbed sites where cottonwood and willow saplings have retarded growth rates due to sustained livestock grazing pressures. Some sites with cottonwood/willow/desert willow potential are dominated by burro brush and seepwillow, which are unpalatable to livestock.

The mesquite bosque, cattail/emergent, and tamarisk associations are minor components of the TCRU. Mesquite bosque habitat has been reduced within Tonto Creek due to channel changes and erosion of old terraces, agricultural clearing, fire wood cutting, sand and gravel mining, residential development, and grazing. The cattail emergent association is dominated by cattail, rush (*Juncus* spp.), sedges (*Carex/Cyperus* spp.), and knot grass (*Paspalum* spp.), and has been reduced by grazing practices and site deterioration. It is currently found only in the wettest area around springs or where groundwater is close to the surface. While tamarisk plants are the dominant species on the Tonto Creek delta, tamarisk is sparsely distributed within the TCRU riparian area.

The burro brush/seepwillow association is the most extensive vegetation type along Tonto Creek in the TCRU. Burro brush, seepwillow, and desert broom (*Baccharis sarothroides*) are the dominant species, probably largely because they are unpalatable to livestock and because they are prolific seed producers which rapidly invade disturbed sites.

According to the RDP, Tonto Creek originates in the Mogollon Rim northeast of Payson, Arizona flowing south for fifty miles before its terminus in Roosevelt Lake. Tonto Creek is within the Lower Tonto Creek Basin which encompasses approximately 280 square miles. The channel and floodplain of Tonto Creek are approximately 1/2 mile wide, with an average gradient of 23 feet per mile (0.4 percent). Peak flows in Tonto Creek typically occur in the winter or spring in response to precipitation or snowmelt and again in the late summer from rains falling during the monsoon. The average peak flows for the winter period is 20,700 cubic feet per second (cfs), while the average peak flow during the summer period is 10,900 cfs.

Tonto Creek has been modified by numerous activities and events. According to the RDP, approximately 10 percent of the riparian area currently supports woody riparian vegetation, and 40 percent is sparsely vegetated rock rubble. Activities leading to current conditions include historic grazing practices, timber cutting for fuel, timber cutting for cattle forage during droughts, sand and gravel excavation, agricultural clearing, residential development, and flooding. The channel is braided in several of its reaches in the lower basin. Streamflow in the lower basin is often diminished with the lower reaches of Tonto Creek often dry in the summer.

### Species Description

SWWF are small birds, approximately 15 centimeters (cm) (5.75 inches) long. They have a grayish-green back and wings, whitish throat, light grey-olive breast, and pale yellowish belly. Two wingbars are visible while the eye ring is faint or absent. The upper mandible is dark, the lower is light.

SWWFs are a riparian obligate species, nesting in riparian thickets associated with rivers, streams, and other wetlands where dense growth of willow, *Baccharis*, buttonbush (*Cephalanthus occidentalis*), box elder (*Acer negundo*), tamarisk, or other plants are present, often with a scattered overstory of cottonwood. SWWFs virtually always nest near surface water or saturated soil. At some nest sites surface water may be present early in the breeding season with only damp soil present by late June or early July (Muiznieks et al. 1994). The water table must be close enough to the surface to support riparian vegetation.

The Service included the SWWF on its Animal Notice of Review as a category 2 candidate species on January 6, 1989 (Service 1989). The SWWF was proposed for listing as endangered, with critical habitat, on July 23, 1993 (Service 1993), and the final rule listing the SWWF as endangered was published on February 27, 1995. The listing became effective on March 29, 1995 (Service 1995). The State of Arizona also lists the SWWF as endangered (AGFD 1988). Following the review of comments received during the public comment period, the Service deferred designation of critical habitat, invoking an extension on this decision until July 23, 1995.

### Environmental Baseline

The environmental baseline serves to define the current status of the listed species and its habitat to provide a measure against which to assess the effects of the action now under consultation. While the baseline must focus on the conditions in the action area, the analysis must include information on the status of the species throughout its range. Any evaluation of the effects of the action under consultation must be made in the context of the overall status of the affected species.

The environmental baseline has two components. The first is a summary of the status of the affected species throughout its range. The effects of any completed or ongoing recovery actions are included, as are conservation actions, reasonable and prudent measures and reasonable and prudent alternatives that have been initiated as a result of completed section 7 consultations. The second is a summary of the past and present impacts of all Federal, State and private activities in the area of the proposed action, the anticipated impacts of all proposed Federal activities in the action area that have already undergone formal or early section 7 consultation, and the impact of any State or private activities which are contemporaneous with this consultation process.

### Species Status

The range of the SWWF includes southern California, extreme southern portions of Nevada and Utah, all of Arizona and New Mexico, west Texas, and extreme southwestern Colorado (Unitt 1987, Browning 1993). While this range encompasses a large geographic area, riparian nesting habitat has always been relatively rare in this predominantly arid region. Historical (1902 collections of Herbert Brown, University of Arizona) and more recent information (Egbert 1981, Whitfield 1990) indicate that SWWFs can be a locally abundant, almost colonial species where extensive riparian habitat exists. However, loss and modification of nesting habitat is a primary threat to this species (Phillips *et al.* 1964, Unitt 1987, Service 1993). Large scale losses of southwestern wetlands have occurred, particularly the cottonwood/willow riparian habitats of SWWFs (Phillips *et al.* 1964, Carothers 1977, Rea 1983, Johnson and Haight 1984, Katibah 1984, Johnson *et al.* 1987, Unitt 1987, General Accounting Office 1988, Bowler 1989, Szaro 1989, Dahl 1990, State of Arizona 1990, Howe and Knopf 1991).

Changes in riparian plant communities have resulted in the reduction, degradation and elimination of nesting habitat for the SWWF curtailing the ranges, distributions, and numbers of all three willow flycatcher species in western North America (Gaines 1974, Serena 1982, Cannon and Knopf 1984, Klebenow and Oakleaf 1984, Taylor 1986, Unitt 1987, Schlorff 1990, Ehrlich *et al.* 1992). Loss and modification of southwestern riparian habitats have resulted from urban and agricultural development, water diversion and impoundment, channelization, livestock overgrazing, off-road vehicle and other recreational uses, and hydrological changes resulting from these and other land uses.

The former range of the SWWF in Arizona included portions of all major watersheds (Colorado, Salt, Verde, Gila, Santa Cruz, and San Pedro Rivers) (Willard 1912, Phillips 1948, Unitt 1987). However, SWWF habitat has declined throughout Arizona. Extensive loss and modification of riparian habitats have occurred throughout much of the state, and the habitat of the SWWF is now largely absent or altered (Phillips 1948, Phillips *et al.* 1964). Former populations on the lower Salt River and Santa Cruz River have been extirpated, while populations on the lower Colorado River, upper Salt River, and Verde River were thought to be extirpated. Birds were found at these locations during the 1993 and 1994 surveys. However, only small groups of one to seven SWWF territories were detected on the lower Colorado River, Santa Maria River, lower San Pedro River, Verde River, upper Tonto Creek, upper Salt River, upper Gila River, Little Colorado River, and the Colorado River in Grand Canyon National Park and Glen Canyon National Recreation Area (Muiznieks *et al.* 1994).

Unitt (1987) concluded that "Probably the steepest decline in the population levels of *extimus* has occurred in Arizona...*extimus* has been extirpated from much of the area from which it was originally described, the riparian woodlands of southern Arizona." The Service believes that at current population levels, and with continuing threats, extinction of this species is foreseeable. SWWFs are absent from many of the areas they previously occupied, or are present in reduced numbers.

The SWWF was listed as an endangered species in response to loss of historic habitat and large declines in population size. Factors contributing to the decline of the species include loss and fragmentation of riparian habitat due to urban and agricultural development, water diversion and impoundment, channelization, livestock grazing, off-road vehicle and other recreational uses, and hydrologic changes resulting from these and other land uses. Additional factors contributing to its decline include invasion of exotic plant species, loss of wintering habitat, depredation, and brood parasitism by brown-headed cowbird (*Molothrus ater*). Brown-headed cowbirds (cowbirds) lay their eggs in the nests of other species directly affecting their hosts by reducing nest success. Historically, cowbirds were associated with bison (*Bison bison*) on the Central Plains and were uncommon in the southwestern United States. Cowbirds became increasingly widespread in the late 1800s and 1900s as human settlements and livestock operations spread across the Southwest (Hanna 1928, Gaines 1974, Mayfield 1977a).

Where studied, high rates of cowbird parasitism of willow flycatchers has coincided with population declines, or, at a minimum, resulted in reduced or complete elimination of nesting success by willow flycatchers. In California, parasitism rates ranged from 50 percent to 80 percent between 1987 and 1992, and the population decreased 27 percent (Whitfield 1990, Harris 1991, Whitfield and Laymon, Kern River Research Center, unpubl. data). A parasitism rate of 100 percent was documented for SWWFs in the Grand Canyon during 1993, when no flycatchers were fledged (Sogge *et al.* 1993).

Steady reductions in nest success over time eventually lead to population declines, and, ultimately, extirpation. High parasitism rates (up to 83 percent) resulted in the precipitous decline of the endangered Kirtland's warbler (*Dendroica kirtlandii*) (Mayfield 1977b). Mayfield (1977a) speculated that a species (or population) might be able to survive a 24 percent parasitism rate, but that losses much higher than that "would be alarming." Populations experiencing the high rates of parasitism and low reproductive success observed in some populations of the SWWF are considered population "sinks," and are maintained only through immigration from other "source" populations (Pulliam 1988). Robinson *et al.* (1993), who documented a 76 percent parasitism rate for neotropical migrant species in three midwestern woodlands and a high population turnover rate, considered his sites to be population sinks and speculated that annual population changes within these woodlands reflected the availability of immigrants from outside the study area. The threat to SWWFs by cowbird parasitism is underscored by high parasitism rates and low nest success documented in widely-separated breeding populations, and by a small, declining number of remaining birds. If populations throughout the range of the willow flycatcher are experiencing similar rates of brood parasitism and nest success as those documented in California and the Grand Canyon of Arizona, then a source of immigrants may not be available to maintain existing populations in the future, and the species will experience further declines.

The current estimate for total numbers of remaining SWWFs throughout its seven state range is 500 or fewer nesting pairs (Unitt 1987, Service 1993). From 42 to 56 territories were located in extensive surveys in Arizona in 1993 (Muiznieks *et al.* 1994) and approximately 120 territories were located as a result of additional surveys in Arizona in 1994 (Sferra *et al.* 1995).

Potential, suitable, and occupied SWWF nesting habitat exists within the proposed project area. Smaller stands and stringers of cottonwood/willow representing potential habitat are distributed discontinuously along Tonto Creek. Although distribution is discontinuous, that portion of Tonto Creek south of A-Cross Road supports cottonwood and willow that has high potential for developing into SWWF habitat. Surveys completed during 1993 found three territories at the Tonto Creek inflow to Roosevelt Lake. Singing males were observed on five different dates. The area occupied consisted of a tamarisk overstory with a few mature willows, and water-filled depressions (Sogge *et al.* 1993). During 1994 surveys, a total of 15 birds were observed at the site including seven pairs and one unmated territorial male. Seven nests were identified in the area, six with SWWF young, and one with contents unknown. Although the success of all nesting attempts was not closely monitored during the 1994 season, data gathered during these surveys indicated that at least one SWWF was fledged at this site (Sferra *et al.* 1995). Preliminary survey results for 1995 indicate there were eight pairs of flycatchers occupying eight nests at this site (Messing, Bureau of Reclamation, pers. comm.).

Although tamarisk is not a native riparian plant species, recent surveys have shown that the SWWF will use tamarisk for nesting. Tamarisk has spread rapidly along southwestern watercourses, typically at the expense of native riparian vegetation, especially cottonwood/willow communities. Some authors believe tamarisk may not provide SWWF nests the thermal protection that native broadleaf species do at lower elevations (Hunter *et al.* 1987, Hunter *et al.* 1988).

The spread and persistence of tamarisk has resulted in significant changes in riparian plant communities. The multi-layered canopy and herbaceous understory is often replaced by one monotypic layer. Plant species diversity has declined in many areas, and relative species abundance shifted in others. Other effects include changes in percent cover, total biomass, fire cycles, thermal regimes, and perhaps insect fauna (Kerpez and Smith 1987, Carothers and Brown 1991, Rosenberg *et al.* 1991, and Busch and Smith 1993). Long-term monitoring of nests found in tamarisk along the Colorado River in the Grand Canyon has revealed that these nests have consistently experienced high rates (in excess of 60 percent) of brood parasitism by cowbirds. Cowbirds have been documented travelling distances of over 4.2 miles from congregating sites to areas where host nests may be found.

With only seven nests known in the project area, and an even smaller number of young fledged, the threat of brood parasitism by cowbirds to the Tonto Creek population can not be dismissed. Courtship and pairs of cowbirds were observed on Roosevelt Lake near the Salt River inflow by breeding bird atlas volunteers. Altercations between SWWFs and

cowbirds were observed along the edge of the tamarisk patch at the Salt River inflow. In addition, two song sparrows (*Melospiza melodia*) and one yellow warbler (*Dendroica petechia*) were observed feeding cowbird nestlings at the Tonto Creek site (Sferra *et al.* 1995).

### Past Actions

Tonto Creek in the proposed project area has been subject to the effects of Federal, State, and private entities. The most significant physical change was the construction of Roosevelt Dam. Consultation has been accomplished on Federal actions initiated since 1973, most notably on the Central Arizona Project effects to Roosevelt Dam and Reservoir and on the Tonto National Forest Land Management Plan. Following completion of improvements to the dam, the lake conservation pool level will be raised from 2136 feet to 2151 feet and will inundate areas currently supporting a variety of species. Reclamation received a biological opinion on this action on March 30, 1990 with respect to bald eagle (*Haliaeetus leucocephalus*) near Pinto Creek. Since that time, consultation has been reinitiated for potential affects to the SWWF. The Service and Reclamation are in informal consultation at this time to address this issue.

Service records show 79 informal and formal consultations for actions in the Tonto Creek area since 1988. Past consultations focused on a variety of activities including review of allotment management plans, development and repair of roads and trails, mining activities, recreation developments, prescribed burns, water developments, and Reclamation activities related to raising of lake levels at Roosevelt Lake and the development of the TCRU. In addition, private actions conducted in this area include maintenance of diversion structures, channelization of the river, sand and gravel mining, and residential development.

As noted within the RDP, these activities have had adverse impacts on Tonto Creek. The channel of the creek has become braided. Riparian vegetation has been altered or removed. In addition, it is possible that the channel is aggrading due to the construction of Roosevelt Lake. The RDP quotes an early settler in the area who described Tonto Creek as "timbered with the local creek bottom type of timber from bluff to bluff, the water seeped rather than flowed down through a series of sloughs and fish over a foot in length could be caught with little trouble". Currently, the channel and floodplain of Tonto Creek are estimated to contain 5,080 acres with high density riparian vegetation over 17 percent of the area, medium density riparian vegetation over 53 percent of the area, and low density riparian vegetation over 23 percent of the area. Cottonwood and cottonwood/willow communities along Tonto Creek are mostly comprised of over-mature vegetation, with little regeneration occurring, indicating that this area continues to undergo disturbance. In addition, the most extensive community type consists of burro brush, seepwillow, and desert broom, all species that are unpalatable to livestock.

Grazing, road development and maintenance, mining, water diversions, recreation, and removal of timber for fuel and cattle feed have reduced the availability of suitable habitat along Tonto Creek for SWWFs through modification or elimination of stream flow and associated riparian and floodplain areas. As previously discussed, loss and modification of nesting habitat is one of the primary threats to this species (Phillips *et al.* 1964, Unitt 1987,

Service 1993). Additionally, Bock *et al.* (1993) found that 40 percent of the riparian bird species they examined, including various subspecies of willow flycatchers, were negatively affected by livestock grazing. Livestock grazing facilitates the expansion of the cowbird's range, increasing its abundance and distribution. As previously discussed, parasitism rates of up to 100 percent have been documented for SWWFs in parts of Arizona. To ensure the survival and recovery of the flycatcher, efforts to preserve and restore habitats and reduce the level of brood parasitism will be necessary.

## EFFECTS OF THE PROPOSED ACTION

### Direct and Indirect Effects

Because SWWFs are currently breeding within a dense tamarisk patch, and tamarisk is unpalatable to cattle, habitat degradation through consumption of vegetation within the breeding area is not a primary concern. However, because this area offers shade, moist soils, and cooler temperatures, cattle may be attracted to the area during periods of high temperature. During a site visit on June 20, 1995, we noted several cattle trails within the occupied habitat area. Similarly, SWWF survey crews present in the area on June 29, 1995, noted cattle within the SWWF breeding area. Cattle moving through areas where breeding SWWFs are nesting can break or disturb branches on which flycatcher nests have been constructed. In addition to vegetation loss and nest destruction, nests found in the increasingly fragmented habitat would be more susceptible to brood parasitism by cowbirds. Preliminary survey results for 1995 indicate that, of eight nests found at the Tonto Creek site, one failed, two fledged their young, one was predated, and one was parasitized. The status of the three remaining nests is unknown (Messing, Bureau of Reclamation, pers. comm.). This is the first recorded observation of nest parasitism at the Tonto Creek Site.

Within the TCRU there are currently no pasture fences, so that cattle introduced anywhere within the single pasture would potentially have access to all portions of the pasture and may concentrate where feed, shade, water, or nutrients are available. Livestock grazing in the SWWF breeding area and adjacent habitat will result in the establishment of additional trails or paths further contributing to habitat fragmentation and modification. As additional livestock walk through the area, trails are established, seedlings trampled, soil compacted, and eventually the canopy closure is diminished by preventing the establishment or reestablishment of vegetation.

Livestock concentrations at tanks, corrals, holding pastures, nutrient supplements, or areas with extensive shade facilitate cowbird parasitism. Proposed structural improvements that will create additional points of concentration within approximately five miles of the SWWF breeding area include the Corner Corral at the common corner of Greenback, Bathtub, Bouquet, and Cline Mesa pastures, a trough at the Corner Corral, and fencing creating smaller pastures, and therefore greater numbers of cattle per acre, between the Methodist and Lake pastures and between the Bouquet, Cline Mesa, Greenback, and Bathtub pastures.

Cowbirds are attracted not only to livestock concentrations, but also to livestock in a dispersed setting. The Cline Mesa, southern Bouquet, southeastern Mesquite Flat, Lake, Goose Holding, and Methodist pastures are all within a five mile radius of the SWWF breeding habitat. Two hundred cattle would graze in these pastures during the SWWF breeding season as follows:

Southern Bouquet Pasture -	06/01 - 07/31 (Year 1)
	05/01 - 07/31 (Year 2)
Mesquite Flat Pasture -	02/01 - 05/31 (Year 1 & 3)
Cline Mesa Pasture -	03/01 - 05/31 (Year 1)
	05/01 - 06/30 (Year 3)
Lake Pasture -	02/01 - 05/31 (Year 1)
	03/01 - 06/30 (Year 2)
	04/01 - 07/31 (Year 3)
Methodist Pasture -	06/01 - 07/31 (Year 2)
Goose Holding Pasture -	As needed

### Effects on Survival

Implementation of the proposed actions is intended to improve existing watershed, riparian, and aquatic conditions in the project area while continuing to provide for viable livestock operations. Anticipated improvements would result from increasing the amount of annual growing season rest which is provided for through the rest rotation system and through structural improvements such as new watering facilities. It is assumed that the time to full implementation is 10 years, which is the life of the grazing permits. Achieving the intended improvements in habitat conditions would likely require greater than 10 years. However, because SWWFs do not require a mature cottonwood overstory for suitable habitat, some of those improvements may be realized within the 10 year time frame if existing, immature riparian vegetation within the TCRU is protected sufficiently to allow it to achieve its potential.

Habitat degradation that has occurred as a result of cattle in this area has been caused by trailing, which can result in habitat fragmentation and facilitation of cowbird nest parasitism. In addition, the ability for SWWFs to expand to adjacent riparian areas would be compromised if grazing within cottonwood/willow stands decreases the amount and density of vegetation, slows the growth rate of vegetation, or leads to alteration of channel morphology. However, facilitation of cowbird parasitism within the SWWF breeding area is the primary concern with respect to the proposed action. This area has been documented as supporting SWWFs during the breeding season for three consecutive years, including seven nesting pairs of SWWFs during the 1994 breeding season, when eggs and young were produced. Consequently, this area is important to the survival of the species because it supports habitat that is currently occupied. In addition, the population is important because it may be a "source" population contributing to the survival of the species in other portions of its range. Any impacts on the SWWF habitat, or on individual SWWFs within the Tonto Creek breeding area, have the potential to negatively impact the survival and recovery of the SWWF.

As part of the proposed action, the Forest has committed to ensuring that cattle remain outside of the SWWF breeding area by either removing all cattle from the TCRU by March 15 or by constructing and monitoring fencing. The fencing would exclude cattle from the SWWF breeding area and the riparian area south of A-Cross Road after March 15. Exclusion of cattle from the breeding area would prevent nest disturbance from cattle passing through the breeding area during the breeding season.

To address the issue of cowbird parasitism, the Forest has included within the proposed action monitoring of habitat conditions in the SWWF breeding area and adjacent riparian habitat from the breeding area north to A-Cross Road to determine if existing management is adversely affecting either the SWWF breeding area or adjacent riparian habitats. The Forest will report to the Service their observations and conclusions regarding the effects of grazing in these areas on an annual basis for the first three years of the grazing permit. In addition, the Forest has committed to participating in a proposed statewide effort for surveying and cowbird control to be initiated by the Service. The Forest will contribute personnel and/or funding to this effort once it has been initiated by the Service. In the interim, the Forest will ensure that the SWWF breeding area is surveyed each year during the breeding season, and that monitoring is complete following the survey protocol for the SWWF (Tibbitts *et al.* 1994). The Forest will also implement a cowbird management program at the SWWF breeding area and will maintain that program until and unless the Service initiates a cowbird program and they elect to participate in that program.

The Service anticipates that direct and indirect effects of the proposed activities for the Tonto Basin and TCRU will be offset by the surveying, monitoring, and cowbird trapping efforts described above. Because incidental take of individuals, loss or degradation of the Tonto Creek nesting site, an increase in nest parasitism, and loss or modification of adjacent habitat for population expansion would jeopardize the continued existence of the SWWF, the Forest has included within the proposed project description a commitment to meet with the Service three years after permit issuance to determine that surveying, monitoring, and cowbird trapping are effectively preventing a jeopardy situation.

### Cumulative Effects

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

Within the Tonto Basin allotment, there are several parcels of private property, one of which is at Cline Mesa, and is within five miles of the SWWF breeding area. In addition, of the approximately 5,900 acres within the TCRU, approximately 34 percent is privately owned. The increase in the cowbird population attributable to livestock grazing and other activities on private lands is not determinable at this time.

## INCIDENTAL TAKE

Section 9 of the Act, as amended, prohibits the taking (harass, harm, pursue, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species without a special exemption. The concept of harm includes habitat modification and degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. 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 taking within the bounds of the Act, provided such taking is in compliance with the incidental take statement provided in the biological opinion.

Take may result from the loss of a local nesting site, loss or disturbance of a nest, loss or modification of adjacent habitat for population expansion, and nest parasitism by cowbirds. The Service has developed this incidental take statement on the premise that all actions of the RPA will be implemented. The Service anticipates incidental take of SWWFs will be difficult to determine for the following reasons:

1. The number and location of cowbirds and SWWFs will vary from season to season.
2. The small, fluctuating number of breeding SWWFs in a given location precludes the application of numerical standards for take. In addition, nest placement and nest heights may hinder attempts to document the outcome of all nesting attempts at a given location.
3. The initial success of the cowbird management program cannot be predicted.

While the Service cannot predict the exact level of take that could occur, it is anticipated that cowbird parasitism in this area could result in the take of the entire breeding population at the Tonto Creek inflow, as has been demonstrated in other areas of salt cedar habitat. However, the Service has determined that the level of take can be minimized and would therefore not be likely to result in jeopardy to the species when the reasonable and prudent alternative actions listed above are implemented.

### Reasonable and Prudent Measures

Three reasonable and prudent measures have been identified for the proposed implementation of the Tonto Basin Allotment grazing strategy and the TCRU. It should be noted that these reasonable and prudent measures are provided as reinforcement of actions listed under the reasonable and prudent alternative, and do not require duplicative efforts on the part of the Forest.

1. The Forest will continue to monitor SWWF as part of the statewide Partners in Flight survey and monitoring effort.

2. The Forest will implement a cowbird management program at the SWWF breeding area.
3. The Forest will ensure that no cattle enter the TCRU during the breeding season for the SWWF.

Terms and Conditions

To be exempt from prohibitions of section 9 of the ESA, the Forest must ensure compliance with the following terms and conditions which implement the reasonable and prudent measures described above:

1. The following terms and conditions are required to implement reasonable and prudent measure 1:
  - 1.1 Obtain annually data including abundance, distribution, reproductive success, parasitism levels, causes of nest failure, territory size, habitat composition within territories, and nest-site habitat composition.
  - 1.2 Provide a list of other avian species breeding in the area and any observations of parasitism or predation.
  - 1.3 Conduct all surveying and monitoring efforts in accordance with procedures outlined in *A Survey Protocol for the Southwestern Willow Flycatcher (Empidonax traillii extimus)* (Tibbitts *et al.* 1994) by personnel trained in the use of the protocol and who have obtained the proper ESA permitting.
2. The following terms and conditions are required to implement reasonable and prudent measure 2:
  - 2.1 Initiate cowbird trapping program by April 1 and continue through July 31, or until the SWWF breeding season has ended (if earlier than July 31).
  - 2.2 Use a minimum of two traps.
  - 2.3 Provide a written report annually, in conjunction with SWWF monitoring results discussed in the terms and conditions for reasonable and prudent measure 1, that includes a map showing the locations of traps, daily numbers and sexes of cowbirds and non-target species captured per trap, and the dates of capture.
  - 2.4 Check traps daily, disposing of cowbirds in a humane manner and releasing any non-target species.
  - 2.5 Continue to conduct the trapping program until and unless a statewide cowbird management program is initiated and the Forest elects to participate in that program or until this species is de-listed.

3. The following terms and conditions are required to implement reasonable and prudent measure 3:
  - 3.1 Remove all cattle from the TCRU by March 15 of each year.
  - 3.2 Ensure through monitoring that cattle remain outside of the SWWF breeding area and riparian area south of A-Cross Road after March 15 of each year.
  - 3.3 Immediately remove all cattle entering the breeding area through breaks in fencing on neighboring allotments.

### Reporting Requirements

The Forest shall report to the Service any mortality of a SWWF during the course of the activity. If there is a mortality, the Service should be contacted within 72 hours.

### CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the 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.

The Service recommends the following actions:

1. Implement a study to determine foraging habitat use and prey selection. Data on prey selection and abundance over the course of the entire SWWF breeding season would enable more effective management strategies for SWWF.
2. Continue cowbird trapping, if considered necessary, after the species is de-listed and/or after cattle have been removed from the area if other, non-project related cowbirds continue to parasitize SWWF nests in this area.

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 AND CLOSING STATEMENT

This concludes formal conference on the proposed actions outlined in the BAE for the Tonto Basin Allotment and TCRU. As required by 50 CFR §402.16, reinitiation of formal consultation is required if 1) new information reveals effects of the agency action that may impact listed species or critical habitat in a manner or to an extent not considered in this

opinion, 2) 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 3) a new species is listed or critical habitat designated that may be affected by the action.

Failure to conduct the action as described would constitute project modification in a manner that could cause an adverse effect to the flycatcher not considered in the opinion and, as provided in 50 CFR §402.16, would require reinitiation of formal consultation. The Service requests notification from the Forest should the proposed action be implemented in a manner inconsistent with the proposed action as described within this opinion.

In future communications on this project, please refer to consultation number 2-21-92-F-360. The Service appreciates your continued efforts to conserve and recover endangered species. If we can be of any further assistance, please contact Mary Richardson or Bruce Palmer.

Sincerely,



Sam F. Spiller  
Field Supervisor

cc: Director, Fish and Wildlife Service, Washington, D.C. (SE)  
Field Supervisor, Fish and Wildlife Service, Carlsbad, CA  
Field Supervisor, Fish and Wildlife Service, Ventura, CA  
Forest Supervisor, Tonto National Forest, Phoenix, AZ  
State Supervisor, Fish and Wildlife Service, Albuquerque, NM  
State Supervisor, Fish and Wildlife Service, Austin, TX  
State Supervisor, Fish and Wildlife Service, Phoenix, AZ  
State Supervisor, Fish and Wildlife Service, Salt Lake City, UT  
Project Manager, Bureau of Reclamation, Arizona Projects Office, Phoenix AZ  
(Attn: Henry Messing)

Director, Arizona Game and Fish Department, Phoenix, AZ

LITERATURE CITED

- Arizona Game and Fish Department (AGFD). 1988. List of threatened native wildlife in Arizona. Arizona Game and Fish Commission, Phoenix, Arizona. 32 pp.
- Bock, C.E., V.A. Saab, T.D. Rich, and D.S. Dobkin. 1993. Effects of livestock grazing on neotropical migratory landbirds in western North America. Pages 296 - 309 *in* Status and Management of Neotropical Migratory Birds, D. Finch and P. Stangel, eds. Gen. Tech. Rep. RM-229. USDA Forest Service, Rocky Mountain Range and Experiment Station, Fort Collins, Colorado. 422 pp.
- Bowler, P.A. 1989. Riparian woodland: an endangered habitat in southern California. Pages 80 - 97 *in* Endangered Plant Communities of Southern California - Proceedings of the 15th annual symposium. Special Publication No. 3, Southern California Botanists and California State University, Fullerton.
- Browning, M.R. 1993. Comments on the taxonomy of *Empidonax traillii* (willow flycatcher). *Western Birds* 24:241-257.
- Busch, D.E. and S.D. Smith. 1993. Effects of fire on water salinity relations of riparian woody taxa. *Oecologia* 94:186-194.
- Cannon, R.W. and F.L. Knopf. 1984. Species composition of a willow community relative to seasonal grazing histories in Colorado. *Southwestern Naturalist* 29:234-237.
- Carothers, S.W. 1977. Importance, preservation, and management of riparian habitats: an overview. Pages 2-4 *in* Importance, preservation, and management of riparian habitats: a symposium, R.R. Johnson and D.A. Jones (eds.). General Technical Report RM-43. USDA Forest Service, Denver, Colorado.
- \_\_\_\_\_ and B.T. Brown. 1991. The Colorado River through the Grand Canyon: natural history and human change. University of Arizona Press. Tucson, Arizona. 235 pp.
- Dahl, T.D. 1990. Wetlands losses in the United States, 1780s to 1980s. USDI Fish and Wildlife Service, Washington, D.C. 13 pp.
- Egbert, J. 1981. Field inventories in New Mexico of selected Gila Valley birds: May - June, 1981. Report to the New Mexico Department of Game and Fish. Natural History Services, Cliff, New Mexico. 78 pp.
- Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1992. Birds in jeopardy: the imperiled and extinct birds of the United States and Canada, including Hawaii and Puerto Rico. Stanford University Press, Stanford, California. 259 pp.
- Gaines, D. 1974. A new look at the nesting riparian avifauna of the Sacramento Valley, California. *Western Birds* 5:61-79.

- General Accounting Office. 1988. Public rangelands: Some riparian areas restored but widespread improvement will be slow. General Accounting Office, U.S. Government, Washington, D.C.
- Hanna, W.C. 1928. Notes on the Dwarf Cowbird in southern California. *Condor* 30:161-162.
- Harris, J.H. 1991. Effects of brood parasitism by brown-headed cowbirds on willow flycatcher nesting success along the Kern River, California. *Western Birds* 22:13-26.
- Howe, W.H. and F.L. Knopf. 1991. On the imminent decline of Rio Grande cottonwoods in central New Mexico. *Southwestern Naturalist* 36:218-224.
- Hunter, W.C., R.D. Ohmart, and B.W. Anderson. 1987. Status of breeding riparian obligate birds in southwestern riverine systems. *Western Birds* 18:10-18.
- \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_. 1988. Use of exotic saltcedar (*Tamarix chinensis*) by birds in arid riparian systems. *Condor* 90:113-123.
- Johnson, R.R. and L.T. Haight. 1984. Riparian problems and initiatives in the American Southwest: a regional perspective. Pages 404-412 in *California riparian systems: ecology, conservation, and productive management*, R.E. Warner and K.M. Hendrix, eds. University of California Press, Berkeley, California. 1035 pp.
- Johnson, R.R., L.T. Haight, and J.M. Simpson. 1987. Endangered habitats versus endangered species: a management challenge. *Western Birds* 18:89-96.
- Katibah, E.F. 1984. A brief history of riparian forests in the Central Valley of California. Pages 23-29 in *California Riparian Systems: Ecology, Conservation, and Productive Management*, R.E. Warner and K.M. Hendrix, eds. University of California Press, Berkeley, California. 1034 pp.
- Kerpez, T.A. and N.S. Smith. 1987. Saltcedar control for wildlife habitat improvement in the southwestern United States. USDI Fish and Wildlife Service, Resource Publication 169, Washington, D.C. 17 pp.
- Klebenow, D.A. and R.J. Oakleaf. 1984. Historical avifaunal changes in the riparian zone of the Truckee River, Nevada. Pages 203-209 in *California Riparian Systems*, R.E. Warner and K.M. Hendrix, eds. University of California Press, Berkeley, California. 1034 pp.
- Mayfield, H.F. 1977a. Brown-headed cowbird: Agent of Extermination? *American Birds* 31(2):107-113.

- Mayfield, H.F. 1977b. Brood Parasitism: Reducing Interactions between Kirtland's Warblers and Brown-headed Cowbirds. Chapter 11, pages 85-91 in *Endangered Birds: Management Techniques for Preserving Threatened Species*, S.A. Temple, ed. University of Wisconsin Press, Madison, Wisconsin.
- Muiznieks, B.D., S.J. Sferra, T.E. Corman, M.K. Sogge, and T.J. Tibbitts. 1994. Arizona Partners in Flight southwestern willow flycatcher survey, 1993. Technical report: Nongame and Endangered Wildlife Program, Arizona Game and Fish Department, Phoenix, Arizona. 28 pp.
- Phillips, A.R. 1948. Geographic variation in *Empidonax traillii*. *Auk* 65:507-514.
- \_\_\_\_\_, J. Marshall, and G. Monson. 1964. The birds of Arizona. University of Arizona Press, Tucson, Arizona. 212 pp.
- Pulliam, H.R. 1988. Sources, sinks, and population regulation. *American Naturalist* 132:652-661.
- Rea, A.M. 1983. Once a river: bird life and habitat changes on the middle Gila. University of Arizona Press, Tucson, Arizona. 285 pp.
- Robinson, S.K., J.A. Gryzbowski, S.I. Rothstein, M.C. Brittingham, L.J. Petit, and F.R. Thompson. 1993. Management implications of cowbird parasitism on neotropical migrant songbirds. Pages 93-102 in *Status and Management of Neotropical Migratory Birds*, D. Finch and P. Stangel, eds. General Technical Report RM-229. USDA Forest Service, Rocky Mountain Range and Experiment Station, Fort Collins, Colorado. 422 pp.
- Rosenberg, K.V., R.D. Ohmart, W.C. Hunter, and B.W. Anderson. 1991. Birds of the lower Colorado River Valley. University of Arizona Press. Tucson, Arizona.
- Schlorff, R.W. 1990. Status Review of the willow flycatcher (*Empidonax traillii*) in California. Report to the California Department of Fish and Game, Department Candidate Species Status Report 90-1. 23 pp.
- Serena, M. 1982. The status and distribution of the willow flycatcher (*Empidonax traillii*) in selected portions of the Sierra Nevada, 1982. California Department of Fish and Game, Wildlife Management Branch Administrative Report 82-5.
- Sferra, S.J., Meyer, R.A., and T.E. Corman. 1995. Arizona Partners in Flight 1994 southwestern willow flycatcher survey. Nongame and Endangered Wildlife Program Technical Report 69. Arizona Game and Fish Department, Phoenix, Arizona. 46 pp.

- Sogge, M.K., T.J. Tibbitts, and S.J. Sferra. 1993. Status of the southwestern willow flycatcher along the Colorado River between Glen Canyon Dam and Lake Mead - 1993. Summary report. National Park Service Cooperative Park Studies Unit/Northern Arizona University, U.S. Fish and Wildlife Service, and Arizona Game and Fish Department report. 69 pp.
- State of Arizona. 1990. Final report and recommendations of the Governor's riparian habitat task force. Executive Order 89-16. Streams and Riparian Resources. Phoenix, Arizona. October 1990. 28 pp.
- Szaro, R.C. 1989. Riparian forest and scrubland community types of Arizona and New Mexico. *Desert Plants* 9:70-138.
- Taylor, D.M. 1986. Effects of cattle grazing on passerine birds nesting in riparian habitat. *Journal of Range Management* 39:254-258.
- Tibbitts, T.J., M.K. Sogge, and S.J. Sferra. 1994. A survey protocol for the southwestern willow flycatcher (*Empidonax traillii extimus*). Technical Report NPS/NAUCPRS/NRTR-94/04.
- U.S. Fish and Wildlife Service (Service). 1989. Endangered and Threatened Wildlife and Plants; Animal Notice of Review. January 6, 1989. *Federal Register* 54:554.
- U.S. Fish and Wildlife Service (Service). 1993. Notice of 12-month petition finding/proposal to list *Empidonax traillii extimus* as an endangered species, and to designate critical habitat. July 23, 1993. *Federal Register* 58:39495-39522.
- U.S. Fish and Wildlife Service (Service). 1995. Final rule to determining endangered status for the southwestern willow flycatcher. February 27, 1995. *Federal Register* 60:10694-10715).
- Unitt, P. 1987. *Empidonax traillii extimus*: An endangered subspecies. *Western Birds* 18:137-162.
- Whitfield, M.J. 1990. Willow flycatcher reproductive response to brown-headed cowbird parasitism. Masters Thesis, California State University, Chico, California. 25 pp.
- Willard, F.C. 1912. A week afield in southern Arizona. *Condor* 14:53-63.