Deborah M. Finch
Janie Agyagos
Tracy McCarthey
Robert M. Marshall
Scott H. Stoleson
Mary J. Whitfield

Chapter 10:
Management Recommendations

This chapter was developed over a series of meetings using a group-consensus process. Our recommendations are based on published results, on information compiled in the previous chapters, on expert opinion, and on unpublished data of conservation team members. This chapter is available as temporary guidance until the Recovery Plan for the southwestern willow flycatcher is published in the Federal Register. A draft Recovery Plan has been prepared by the Technical Subgroup of the Recovery Team and is under current review by the U.S. Fish and Wildlife Service and by Implementation Subgroup Members of the Recovery Team. The Technical Subgroup reviewed this Assessment management chapter to aid in drafting the Recovery Plan. Several members of the temporary Conservation Assessment Team were also members of the ongoing Recovery Team. Given that the draft plan was assembled over a 2-year period requiring more than 20 Recovery Team meetings, its guidance will be much more exhaustive and up-to-date than the recommendations identified herein. Upon publication of the final Recovery Plan, this chapter will be obsolete and should not be used in place of, or to contradict, the Plan.

To initiate discussion for this chapter, we first listed actual and potential threats to the survival and reproduction of the southwestern willow flycatcher, then listed potential ways to mitigate or eliminate threats. In some cases, insufficient research limited our understanding of how perceived threats actually harmed flycatchers or their habitats, or what steps to take to mitigate the threat. For example, lack of published knowledge of the range and habitats used by flycatchers on the wintering grounds constrained our discussion of management recommendations on this topic. We also describe methods to improve and restore willow flycatcher habitats as well as ways to distribute information and educate people about how to protect and recover flycatcher populations. We include specific sections addressing potential threats to willow flycatchers from biological factors, invasive exotic plants, catastrophic fire and management activities, as well as methods for habitat and watershed restoration and improvement. Many of our recommendations may also be of use in conserving and protecting populations of other sensitive bird species that occupy riparian ecosystems, such as the Yellow-billed Cuckoo (*Coccyzus americanus*) or the endangered Least Bell's Vireo (*Vireo bellii pusillus*).

Throughout the chapter, we refer to WIFL habitats as potential, suitable, or occupied. Potential habitats are defined as sites that lack one or more habitat component(s) that WIFLs require but that can be manipulated to make the site suitable for occupancy. Potential habitat types include those that are naturally regenerating and close to suitable, and those that

need more time or active improvement before suitability is achieved. Unoccupied suitable habitats are defined as unoccupied sites that are or appear suitable for WIFL occupancy without manipulation. Unoccupied suitable habitats are similar to occupied habitats except that they lack WIFLs. Occupied habitats are suitable without saying and are those where evidence of WIFL breeding, such as observations of territorial males, breeding pairs, mating behavior, carrying of twigs and food items, nests, and fledglings, have been recorded and verified.

Reducing the Probability of Biological Threats

Brown-headed Cowbird Parasitism

Brown-headed cowbirds frequently lay eggs in willow flycatcher nests; cowbird parasitism substantially reduces the nesting success of flycatchers and is often a significant biological threat to flycatcher productivity. Adult cowbirds can reduce host nesting success by stimulating nest desertion, and removing, piercing, or depredating host eggs. Cowbird nestlings frequently outcompete host nestlings and fledglings for food, causing host chick starvation, and occasionally nudge host nestlings out of the nest. To prevent loss of host eggs and nestlings caused by cowbirds, a series of preventative steps are strongly recommended.

Monitoring—We recommend that the potential for threat to the southwestern willow flycatcher from cowbird parasitism be monitored at all occupied sites. Monitoring consists of determining cowbird presence or abundance via surveys, population counts, or radiotracking (Verner and Ritter 1983, Beezley and Rieger 1987, Rothstein et al. 1987, Whitfield in press); surveying flycatcher nests for presence of cowbird eggs and nestlings (Harris 1991, Whitfield 1995); and determining cowbird parasitism rates at WIFL nests (Whitfield 1990, Whitfield in press). If parasitism rates exceed the threshold of 10% (Whitfield in press), then cowbird trapping should be initiated along with an analysis of WIFL productivity. Because parasitism rates vary with site, year, patch size, and population size of flycatchers and cowbirds (Robinson et al. 1993, 1995), sites should be monitored for more than one season. It is possible that the trapping threshold may vary in relation to site conditions and host nesting success. If cowbird parasitism does not exceed the predefined threshold (10% threshold being conservative), continue monitoring.

If sites have not been monitored for cowbird parasitism, trap cowbirds if more than three willow flycatcher territories are present. If cowbirds are not present at WIFL-occupied sites, continue surveying for both flycatchers and cowbirds in subsequent years.

Control Program—There are short-term and long-term aspects to a cowbird control program (Schweitzer et al. 1996). Cowbirds are known to be attracted to riparian habitats that have been fragmented into smaller patches, narrow, linear corridors, and edge habitats (Robinson et al. 1993, 1995). Management practices over the long term should emphasize:

- Reducing phreatophyte removal, wildfire, water loss, and exotic plant invasion.
- Increasing habitat patch sizes and migration corridors, and reducing the extent of edge.
- Educating human communities about cowbird attractants, including types of birdfeeder seed (e.g., millet) that attract cowbirds.

Over the short term, we recommend implementation of the Griffith Brown-headed Cowbird Trapping Protocol (Griffith and Griffith 1996) to control cowbird numbers. During the trapping effort, cowbirds and parasitism rates should be monitored over multiple years to determine if trapping is having the desired effect of reducing parasitism rates (Robinson et al. 1993, Whitfield in press). For trap-shy birds, other methods of cowbird removal such as shooting may be needed (Schweitzer et al. 1996). In addition to trapping, cowbird attractants such as livestock should be removed from WIFL breeding sites. Other attractants include trash, food, agricultural fields, bird feeders, plowed fields, livestock feedlots, dairies, and pack stations. Possible actions to reduce the probability of attracting cowbirds include removing attractants, covering trash, and scheduling more frequent trash pickups. If attractant removal is not possible, use attractants as sites for trapping. Removing attractants from lands adjacent to occupied sites is also worthwhile, although the feasibility of attractant removal will need to be evaluated on a site-specific basis. Attractants that are feasible to move include cows, trash, and birdfeeders; non-feasible removal may include stationary attractants such as cropfields and feedlots.

At trap sites, space traps according to habitat size and landscape features, distribution of WIFLs and cowbirds, and available finances (refer to Griffith and Griffith 1996, in press). Where cowbirds are concentrated in known feeding sites in close proximity to WIFL sites, consider trapping off site and in conjunction with on-site trapping. We do not define a distance for off-site trapping because of site-specific variation in cowbird commuting distances, habitat use, and landscape pattern (Stephen Rothstein, pers. comm., Frank Thompson pers. comm.). Note that permission to trap on private lands will be needed. Federal landmanagers adjacent to private lands having WIFL sites will need to work with private landowners to trap cowbirds. Initiating cooperative efforts to trap cowbirds in mixed-ownership lands is a responsibility of the federal, state, or municipal agency.

Multiple years of trapping are recommended. Trapping efforts may be reduced or stopped if all of the following are observed:

- Significant reduction of cowbird numbers based on cowbird trapping rates.
- Significant reduction of parasitism rate on WIFL nests.
- WIFL population shows a significant upward trends at the site(s).

Trapping should be renewed at previously-trapped sites if parasitism rates ≥10%. A depiction of the feedback loop for initiating trapping is given in Figure 10-1.

To trap cowbirds, we recommend using the Griffith trap design, trap size, and protocol. Trap size can be reduced by half when finances are limiting, at remote sites, or when cowbird densities are low. Use the recommended trap size when cowbird densities are high and/or at feeding lots where cowbirds are concentrated. Alternatives for trap materials include PVC to reduce trap weight; shadecloth to reduce heat stress; or plywood for shading when windy. Predator control mechanisms may need to be added to the trap design to deter raccoons, weasels, snakes, and other predators. Traps placed in or adjacent to livestock-occupied pastures generally have good success in trapping cowbirds, but they need to be protected from livestock damage.

When to stop cowbird trapping depends on site-specific conditions and whether WIFL populations are recovering at each site. Maintenance trapping may be needed over prolonged periods of time even when increased WIFL nesting success is detected. WIFL populations should show significant increases before they can be considered locally recovered.

Predators

Willow flycatchers, like most songbirds, have open-cup nests that can be readily accessed by a variety of natural predators. These can include small mammals such as raccoons, skunks, squirrels, and packrats; birds such as hawks, owls, roadrunners, and corvids; tree-climbing snakes such as racers; lizards; and domesticated and feral cats and dogs. Nest predation usually explains the greatest proportion of nest failure in local flycatcher populations (Whitfield 1990). Adult flycatchers can be captured on the wing by many raptors such as falcons, accipiters, and possibly owls. Other predators can catch adult flycatchers at their nests or at their singing and foraging perches. To reduce predation rates, the following steps are recommended:

- Control presence of predator attractants such as trash and food.
- Use sensitive techniques (e.g., avoid tree-climbing, minimize time at nest, avoid touching or moving nest and young) when conducting nest monitoring.
- Educate public about cats and dogs as predators of birds.

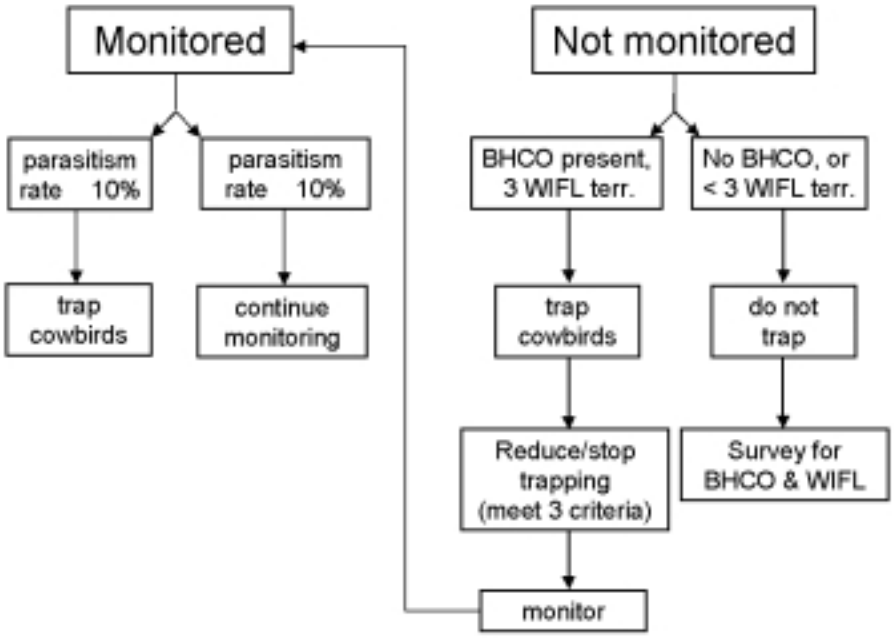

Figure 10-1. Cowbird trapping feedback loop.

- Trap domestic feral cats, when they are perceived as a problem.
- Reduce predator intrusion into flycatcher habitat at edges and along trails by increasing habitat patch size, reducing patch isolation, and closing trails.
- If possible, identify predators during nest monitoring.
- If monitored nests have high predation rates, develop and implement feasible predator control measures in the local area.

Evaluate nest predation signs to determine kinds of predators. Identity of nest predators is valuable information for deciding how to reduce predation levels, if necessary. However, effective control measures and strategies still need to be designed for many identified predators. Nest observers should be careful to avoid attracting mammalian predators to the nest. Such predators are known to follow humans or their scent trails. To mitigate this problem, nest observers should vary their pathways to nests and take steps to eliminate human scent using napthalene or other scent removers.

Beaver

If beaver are present at occupied, suitable, or potential WIFL sites, managers should determine if they are benefiting WIFLs (e.g., beaver dams may be creating backwater, a habitat condition associated with WIFL occupancy) or damaging habitat by removing vegetation. Beaver damage is more likely to be a problem at sites where riparian habitat is linear and habitat patches are small or where their dams cause habitats to become inundated (e.g., high elevation sites). If beavers are determined to be beneficial to WIFLs, beavers should be left in place and the site should be monitored to assess future conditions. If beavers are determined to be detrimental to WIFLs (e.g., by removing essential WIFL habitat), consider active reduction or removal of the beaver population. Site-specific analyses are needed to make determinations.

As part of a habitat restoration program, beaver reintroduction may be a useful tool to enhance a site, creating conditions such as still water that encourage colonization by flycatchers.

Parasites and Disease

There is little evidence that southwestern willow flycatchers have problems with parasites or disease. In addition, management capability to address such problems may be limited. Determining whether parasites or disease are a significant problem is the first step in deciding how to address them. In cases where other bird species are being studied in an area occupied by willow flycatchers, we suggest that they be intensively examined for evidence of parasitism or disease. Any evidence of parasitism detected by WIFL nest surveyors should always be recorded. Field forms should be modified to include space for documenting evidence of parasites or disease. If flycatchers are found dead at nests or elsewhere, their carcasses should be collected and analyzed for parasites or disease. To evaluate incidence of botfly larvae, we recommend that nests be collected and analyzed by investigators having permits to do so.

Genetics

Southwestern willow flycatchers may be facing problems typically associated with small populations such as genetic isolation and inbreeding. To evaluate presence of genetic problems, the incidence of deformities will need to be documented through the collection of tissue samples. This should be conducted by qualified scientists. Reports of possible genetic problems and specimens should be sent to the U.S. Fish and Wildlife Service. Tissue analyses can be referred to the U.S. Fish and Wildlife Service's Disease Lab in Madison, WI. The best approach to reducing the probability of genetic isolation and inbreeding is to apply habitat restoration and population recovery methods to increase WIFL abundance and expand its distribution.

Mitigating Loss of Native Habitat Due to Invasion by Exotic Plants

Invasive exotic plants such as salt cedar (*Tamarix ramosissima, T. chinensis*), Russian olive (*Elaeagnus angustifolia*), Siberian elm (*Ulmus pumila*), tree-of-heaven (*Ailanthus altissima*), white mulberry (*Morus alba*) and giant reed (*Arundo donax*) are replacing native vegetation along many rivers and streams in the Southwest (Campbell and Dick-Peddie 1964, Robinson 1965, Ohmart et al. 1977, Dick-Peddie 1993, Crawford et al. 1993, Ohmart 1994). Habitat changes resulting from the spread of salt cedar can influence bird species composition and use (Hunter et al. 1987, 1988). Whether encroachment of riparian habitats by exotics has had a negative effect on willow flycatchers is debatable. At some monotypic and mixed salt cedar sites, for example, WIFL nests have been found and many of these nests have successfully fledged WIFLs. At higher elevations, salt cedar thickets are often the only habitat with suitable structure available for the WIFL to nest in. Yet, effects of salt cedar invasion of riparian zones, particularly at lower elevations occupied by cottonwoods, may be more negative than positive owing to increased fuel loading, increased frequency of catastrophic fires related to salt cedar

flammability, loss of native plant communities to type conversion, and loss of flycatcher habitat to wildfire. Anderson et al. (1977) noted that 21 of the 25 tamarisk stands they studied had burned in the prior 15 years. When dense tamarisk thickets burns, the fires are typically fast moving and intense. For example, during just 3 years, recent fires totaled 1,000 ha of riparian habitat along the Lower Colorado River—a substantial amount considering only about 6,200 ha of suitable bird habitat currently exists along this river (U.S. Bureau of Reclamation 1999).

With emphasis on salt cedar, we recommend the following steps be initiated to avert catastrophic fire risk and prevent further loss of native plants due to exotic plant invasion while maintaining WIFL breeding sites where exotics are already present:

- Justify the need for exotic plant control at a particular site prior to taking action.
- Develop a watch list of exotic plant species in riparian ecosystems with focus on rate of spread, WIFL use, and effects on native plant species and ecosystems.
- In occupied sites, leave exotics as is, unless exotics are significantly increasing and detrimentally altering habitats.
- If exotics are encroaching on previously occupied sites, consider removing exotics and restoring sites.
- If exotics encroach on occupied sites that were exotic-free, eradicate exotics without disturbance (i.e., during the non-breeding season). Evaluate symptoms and address causes of exotic encroachment. If conditions are not appropriate for restoration of native plants, then remove of exotics may not be of strong benefit.
- Monitor effects of increasing presence of exotics at occupied sites. If signs of negative effects on WIFL numbers or nesting success are detected, then remove invasive exotics. For example, type conversion and structural alterations of habitat may signal a decline in habitat quality that could potentially influence WIFL populations or productivity.
- In suitable and potential habitats dominated by native plants, suppress encroachment of exotics.
- In suitable habitats dominated by exotics, survey for WIFL at least 3 years prior to removal of exotics. Removal should be conducted in incremental blocks of no more than 25% annually at surveyed sites.
- Evaluate potential for restoration success by investigating measures of watertable depth, salinity, geomorphology, and hydrology. If sites are amenable for restoration, exotics may be removed. If not amenable, management of exotics is not cost-effective and may be detrimental to other animal species.
- Several aspects should be considered with respect to biological control of exotics (*sensu* DeLoach 1997):
  - — Removal of exotics may be detrimental if the site is not capable of replacing salt cedar with natives or if erosion is increased as a consequence of removal.
  - — A more comprehensive approach that includes restoration is needed before implementing biological control.
  - — Adequate field testing is needed before evaluations of biocontrol agents can be considered completed.
  - — Managers must first evaluate whether or not exotics should be removed from WIFL habitat; once the decision is made to remove exotics, managers need to decide what method of control is most appropriate.
  - — If biocontrol is considered to be the best method of control, then adequate laboratory tests and isolated field experiments are needed prior to full release.
  - — State of knowledge of biotechnology is currently inadequate to recommend full release.

In addition to salt cedar, the following exotic species should be considered when designing removal programs:

- ***Giant Reed***—Removal is beneficial because native vegetation will replace it and because WIFLs have not been documented to use reed for nesting.
- ***Russian Olive***—The distribution of Russian Olive is limited to New Mexico, Colorado, and northeastern Arizona. This exotic can provide habitat structure and nest trees for WIFLs, and WIFLs are known to nest in it. Detrimental effects of this exotic to WIFLs are unknown.
- ***Tree of Heaven***—This exotic occurs locally in Arizona, California, and New Mexico. Very little is known about the relationship between WIFLs and Tree of Heaven. This exotic is not highly concentrated in riparian habitats and detrimental effects to WIFLs, if any, are unknown. We recommend that it be included on a watch list.
- ***Siberian Elm and White Mulberry***—Concern about these exotics are similar to that reported for Tree of Heaven. Detrimental effects to WIFLs, if any, are unknown. We recommend that they be included on a watch list.

Reducing the Threat of Catastrophic Fire

In 1997, six WIFL sites in Arizona were destroyed by fires. This catastrophe alerted managers to the need to have better plans in place for preventing

and responding to unexpected wildfire events. Before a fire occurs, we urge the following steps be taken for all occupied breeding WIFL sites:

- Prepare a site-by-site fire management plan for each occupied site in coordination with local fire-fighters. These plans should include steps for preventing fires, as well as methods for protecting willow flycatchers and their habitats if a fire occurs.
- Refer to the White Canyon Fire Biological Opinion (U.S. Fish and Wildlife Service, Ecological Services, Phoenix, AZ) as an example of a responsible fire management plan.
- Identify water sources that are not near or in occupied WIFL habitat in the fire plan.
- Erect fire prevention signs.
- Restrict use of campfires and camping in high risk areas.
- Reduce fuels adjacent to occupied sites using tools such as fuel breaks, mechanical clearing, prescribed burning except in salt cedar, herbicides.
- Host training sessions and implement other measures to educate fire-fighters about WIFL resource values and locations. This will ensure that flycatcher protection is included in the fire plan.
- Identify who needs to be trained.
- Seasonal grazing is not recommended as a fuel reduction method in occupied WIFL sites because predominant fuels are woody materials, i.e., not primary livestock forage (also see livestock management criteria). But livestock grazing may be appropriate in adjacent uplands where fuel loads can lead to fire spread to riparian zones.

When a fire event does occur in habitat occupied by willow flycatchers, the "fire management plan" should immediately be implemented. Emergency consultation with U.S. Fish and Wildlife Service should be initiated to ensure that destruction of WIFL habitat is avoided. Care should be taken when establishing fuel breaks during the fire. The potential costs of using fuel breaks are: fragmentation of WIFL habitat, increased erosion, establishment of a potential travel corridor for predators or access point for recreationists, destruction of potential or suitable habitat, and invasion by exotic or undesirable plants. Alternatively, the benefits of fuel breaks include the installation of a fire barrier that limits fire spread, the creation of a fire-fighting attack point, and the minimization of direct fire threats to WIFL-occupied habitats.

After a fire event, habitats may need to be restored. If WIFL habitats have been destroyed, fire rehabilitation efforts should be implemented with WIFL habitat requirements in mind. Emergency consultation can be included after post-fire rehabilitation plans have been initiated.

Reducing Potential Threats Caused by Management Activities

Pesticides

Pesticide use by landowners and agencies in areas near occupied WIFL habitats should be evaluated periodically. Water quality tests can be conducted to determine if pesticides are entering the ecosystem. Visible pesticide effects (e.g., plant or arthropod responses) at WIFL and adjacent sites should be documented. Any deformities or abnormal behavior of WIFLs or co-existing birds should be reported by nest surveyors and migration banders to the U.S. Fish and Wildlife Service. Deformities in California WlFLs have been documented with photographs, suggesting that pesticides may pose a threat to WlFLs as well as other associated fauna. If pesticides are perceived to be a problem, a pesticide reduction plan and public education efforts should be implemented. To verify pesticide contamination, abandoned WIFL eggs and individuals of surrogate species can be tested further. Pesticide use in a region can possibly be inferred based on distribution of sales.

Livestock and Other Ungulates

In potential and suitable but unoccupied WIFL habitats, site conditions should be evaluated prior to exclusion of livestock. Changes in livestock rotation schedules and the timing and period of pasture use can go a long way toward restoring riparian habitats to benefit WIFLs. If site conditions are suitable (see criteria below), controlled grazing can be permitted during the dormant season of woody species. When grazing is allowed, vegetation should be monitored to determine if the site is undergoing unusual damage from grazing. To allow regeneration of habitat, we recommend that ungulates be excluded during the growing season (at minimum) of woody species. To restore degraded or overgrazed riparian habitats, it may be desirable to exclude cattle altogether. To allow potential habitat to progress to a stage that is suitable for WIFL occupancy, livestock removal is appropriate. However, if priorities for livestock exclusion from potential habitats must be established, then those habitats adjacent to or near occupied WIFL habitats are higher priorities for protection from grazing than potential habitats that are at a great distance from WIFL occupied sites.

If breeding WlFLs occur at the site, we recommend complete exclosure to all livestock and other ungulates year-round. For all excluded sites, managers should conduct frequent inspections to identify trespass livestock. In occupied sites, remove trespass livestock by drawing them out using attractants (hay, mineral blocks) rather than herding. If livestock

cannot be attracted out of the occupied area, wait until September 1 (post-WIFL breeding season) before driving livestock out.

Under proper management, livestock presence may sometimes be compatible with habitat quality. Therefore, exceptions to year-round livestock removal from occupied habitats on public lands should be available if the livestock owner can demonstrate to the permitting agency that grazing during the nongrowing season of woody species at a specific site does not adversely affect WIFL habitat structure and composition. The following documentation should be supplied to justify exceptions:

- Dated pictures of habitat conditions before and after grazing at specified photo points repeated at the same time each year.
- On-site demonstration visits.
- Data of measured vegetation before and after grazing. Measurements should be taken of stem densities, foliage height diversity, canopy cover, plant species composition, and aerial extent (patch size) of habitat.

The timing, duration, and intensity of grazing should not preclude recruitment or adversely affect existing regeneration of riparian plants. If time is not available to monitor vegetation, then grazing should not be permitted. These criteria for excepting livestock exclusion apply to all 3 habitat levels (occupied, suitable, potential). Managers and stockraisers alike must maintain an open mind when working together and avoid being influenced by biased information or unsubstantiated opinions. By building trust and cooperation, effective and honest decisions can be made.

Recreation

We recommend that recreational impacts at occupied, suitable, and potential sites be evaluated regularly to detect any habitat damage, cowbird presence, or other factors that may impact WIFL. Activities such as camping, hiking, fishing, boating, biking, photography, and driving vehicles are known to have varying impacts on nesting birds, depending on the intensity, timing, location, noise level, predictability, and type of disturbance as well as the species, abundance, and habituation level of birds (Knight and Gutzwiller 1994). The following preventative steps are recommended to mitigate negative effects of recreational activities:

- Close areas to off-road vehicles year round in potential, suitable, and occupied habitats.
- Exclude human access from occupied sites; use “Area Closed” signs.
- Fence off occupied habitat; do not allow entry during breeding season.
- If area closures are implemented, ensure that closure orders are written to allow entry by authorized personnel (e.g., researchers, surveyors, etc.)
- Occupied habitats that are closed during the breeding season should be open for day use only in the non-breeding season. Campfires should not be permitted at any time.
- Avoid construction of new campground or day use facilities in occupied, suitable, or potential sites.
- Evaluate if recreational impacts are occurring to habitat during the non-breeding season. Limit use with permits if needed. Implement year-round closure to recreation if warranted based on analysis of impacts.
- No product harvest within occupied or suitable habitat during the breeding season. The demand for willow and cottonwood seedlings may be met, but permit product harvest only outside of the breeding season and only where it will have beneficial results (e.g., increased vigor and resprouting in decadent stands).
- To avoid attracting predators and cowbirds, provide adequate trash receptacles and frequent trash pick-up in developed campgrounds and dispersed campsites adjacent to or near WIFL occupied sites.
- Use interpretive signs with a message such as “prevent fires to avoid destruction of wildlife habitat”.
- Prohibit construction of new roads or trails in or adjacent to occupied, suitable, or potential WIFL habitat.
- For WIFL habitats accessible by boats, use speed limits, buoys, and closures to restrict boating use and access. Nests located close to water level can be disturbed by waves from boats. Also, fishing lines and lures may disturb nests and/or birds.
- Work with the local community to find alternative recreation areas away from occupied, suitable, or potential areas.

Water Management

Southwestern willow flycatchers occupy breeding habitats associated with water. Breeding sites are typically found near still or slow-moving water. Managing for the presence of water is a critical factor in sustaining occupied flycatcher habitats and in encouraging recolonization of potential and suitable habitats. Regulated stream flow from dams, levees, and channelization is thought to be one of the most important factors explaining the decline of cottonwood and willow woodlands in riparian ecosystems (Rood and Heinze-Milne 1989, Fenner et al. 1985, Rood and Mahoney 1990). Given that such water manipulation and demand can be extreme in the

Southwest (Brown et al. 1977, Fenner et al. 1985, Crawford et al. 1993), close monitoring of in-stream flow is critical to ensure sufficient water for sustaining and regenerating willow flycatcher habitat. To protect water resources, implementation of a water-management strategy that accounts for habitat needs of flycatchers is urged. Components of such a strategy are outlined as follows:

- Enforce existing laws to minimize illegal water withdrawal.
- Evaluate effects of goundwater withdrawal and pumping on riparian habitat. If a problem exists, work with water users to mitigate water loss by using financial incentives, public education, etc.
- Where applicable or possible, maintain or acquire instream flow water rights or work with water rights holders to increase instream flow.
- Evaluate alternative methods to diverting water from riparian areas. Although it has its own drawbacks, pumping may be a worthy compromise if it results in greater instream flow.
- Work with users to maintain, increase, and create WIFL habitat.
- Eliminate phreatophyte control at occupied sites and minimize control at suitable and potential sites.
- Along established earthen ditches, encourage vegetative growth by avoiding mowing and clearing. Evaluate mowing cycles.
- Work with agencies engaged in phreatophyte control to minimize disturbance to suitable and potential habitat.
- Evaluate dredging plans for waterways, including rivers, streams, ditches, ponds, and lakes to minimize habitat damage. Work with flood control agencies to minimize habitat damage and evaluate management plans.
- Develop public education on water uses (e.g., switching to drip systems rather than flood or sprinkler irrigation).
- Develop plans to minimize destructive effects of catastrophic floods, including those caused by poor riparian conditions. Do this by emphasizing improvement or restoration of healthy riparian habitat (refer to habitat restoration section). Small-scale flood events may be desirable to create backwater habitat for WIFL and to control salinity. Identify what can be done to recover habitat after destruction occurs. Remember that healthy riparian systems are capable of sustaining high runoff events.
- Develop plans to minimize impacts to WIFL habitat at dams and impoundments.
- Avoid dam construction and operations that will inundate WIFL habitat.
- Evaluate potential for creating WIFL habitat below dams by releasing water to mimic natural hydrology and water conditions conducive to WIFL use.

Mining

Proposed mining (e.g., sand, gravel) sites in riparian areas of public lands should be surveyed for WIFLs and habitat suitability and potentiality prior to mine development. If habitat is occupied, suitable, or potential, alternative sites should be selected, whenever possible. Where mining is ongoing, managers should develop a mitigation plan to minimize disturbance to WIFL habitat during mining operations. After mining is completed, a reclamation plan that requires restoration of WIFL habitat should be developed and implemented.

Direct Disturbance by Management

Construction and maintenance of man-made structures in the vicinity of WIFL habitats is likely to disturb birds while they are nesting, and steps should be taken to minimize or eliminate this disturbance. Habitat maintenance or maintenance of fences, powerlines, dams, roads, trails, facilities, and houses that occur in or adjacent to occupied sites should preferably be scheduled during the non-breeding season with minimal damage to habitats. If damage occurs, habitats should be restored. If emergency repairs are needed, disturbance to nesting birds should be minimized.

Upland management activities such as grazing, mining, development, wood-cutting, offroad vehicle use, prescribed fires, and road construction may sometimes have a downslope effect on riparian zones, through increased soil erosion, increased runoff, runoff of contaminated water, and reduced vegetation protection. Effects of upland management activities on riparian habitats in watersheds that have occupied, suitable, or potential WIFL habitat should be evaluated periodically. A plan to minimize effects on riparian habitats prior to implementation of upland management or while management activities are ongoing should be developed.

Working with Private Landowners

Lands owned privately play an important role in maintaining WIFL populations. The largest known population of the southwestern willow flycatcher, for example, is on a private ranch leased from Pacific Western Corporation in the Cliff-Gila Valley of New Mexico. Working cooperatively with private landowners to maintain and enhance riparian habitats,

especially but not exclusively those occupied by WIFL, is a high priority. To assist landowners in making informed decisions about WIFL habitat, agency representatives should provide oral and written information to them about methods and goals for improving riparian systems to healthy states. Walking tours to riparian sites on private properties provide time for establishing a relationship with the landowner. Developing mutual trust is an important goal in establishing a cooperative relationship. The collaborative development of conservation agreements and plans to prevent damage to WIFL habitats on private lands while maintaining landowner livelihoods should be an objective. The establishment of conservation easements is also a worthy investment.

Acquiring lands with WIFL habitats using a similar land base for exchange should be a high priority for land-managing agencies or conservation groups such as The Nature Conservancy. Large parcel ownerships are more desirable than small parcel ownerships. Land transactions that result in subdivisions should be avoided.

Habitat and Watershed Restoration and Improvement

Unhealthy or damaged riparian areas can be improved using a variety of restoration techniques. We emphasize, however, that protection of existing habitat is the soundest, most cost-effective management approach. In areas managed for livestock, a high degree of flexibility in livestock operations is beneficial. Changes in livestock rotation schedules, timing and period of pasture use, method of herding, and type of livestock can go a long way toward restoring riparian habitats.

Replanting lost vegetation is not a substitute for habitat protection. In addition, conditions may not be suitable for revegetation efforts if the site has been irreparably damaged, if nonnegotiable factors limit the extent of restoration possible, or if the site was never conducive to vegetation growth in the first place. We discourage revegetation (plantings) if other kinds of positive management (e.g., stock removal) are available and appropriate. Plantings, however, may be appropriate when the following conditions are met:

- The seed sources are native.
- Revegetation is necessary to control water.
- Plantings are used to jump-start habitat restoration (e.g., by creating multi-layered structures or accelerating natural processes).
- Plantings are used to control exotic plants and prevent them from returning.
- Plantings are needed to prevent erosion and stabilize stream banks.

If the decision is made that revegetation is desirable but the area is not initially suitable because of the presence of exotics, it may be appropriate to supplement with more water, provided this will allow the site to support WIFLs.

Sites need to be evaluated for conditions appropriate for WIFL habitat restoration based on factors such as soils, watertable, water quality, geomorphology, elevation, genetic stock of vegetation, floodplain characteristics, lower gradients, and historical records. Conditions are suitable for habitat restoration when:

- Adequate surface water and ground water are present (i.e., surface water is present until the end of May). Suitable conditions can include moist areas with potential to restore surface flow.
- A natural or simulated flooding regime exists.
- The site is in close proximity to occupied or historically-used WIFL habitat.
- There is commitment to long-term management at the site.
- The site can become relatively self-sustaining over time.

Approaches for creating suitable conditions for WIFL colonization and occupancy include:

- Creation of slow water conditions (through Section 7 consultation) by excavating to groundwater (e.g., Gila National Forest; Kern River Preserve); by controlled inundation (e.g., Bosque del Apache National Wildlife Refuge); or by using beavers to dam small pools of water where appropriate.
- Appropriating instream flow.
- Acquiring habitat with water rights.
- Establishing farming landbanks to discourage use of flood control structures and enable meander patterns of stream.
- Working with private landowners to establish crop rest-rotation areas.
- Establishing conservation easements.
- Maintaining vegetation along stream banks to distribute flood flows across floodplain and to slow water velocity. This will help to re-hydrate the floodplain and enhance further plant germination and growth.

Wintering and Migration Habitats

The dearth of information on where and what habitats WIFLs use in winter and migration limits our ability to make recommendations. When more information is available on the wintering range and habitats of WIFLs, it will be easier to identify threats and solutions on the wintering grounds. Information can

be solicited from investigators who study birds in Latin America by posting requests on web sites and newsletters published by organizations such as the Ornithological Society of North America, the National Audubon Society, and The Nature Conservancy. Partnerships with Latin American organizations should be encouraged to survey habitats for the presence of wintering flycatchers, and to gain new information on threats and habitat use. Involving Partners in Flight, the international, interagency coalition for conserving Neotropical migratory birds, in winter surveys would also be beneficial.

A bird survey program administered by Mexican agencies is needed, and North American organizations can assist Mexican biologists in developing this. Possible breeding sites in northern Mexico also need to be inventoried (e.g., Rio Santa Tomas; Santa Cruz; San Pedro), and more information is needed on migration routes and habitats through Mexico.

Rivers known to be used by migrating willow flycatchers include the Colorado River, the Gila River, and the Rio Grande. The time needed for migration consumes more than a quarter of the annual cycle of willow flycatchers. Individuals must stop periodically to refuel their energy reserves, and therefore, habitats that sustain an abundant food supply of arthropods may represent higher quality habitat to migrating flycatchers than habitats with depauperate arthropod faunas. Habitats in close proximity to water may enable flycatchers to replenish water that was lost during flight. Exposure to inclement weather and predators can also be mitigated during migration if suitable habitat is available for cover. Habitat protection along major migration routes should be emphasized more than it has been in the past. For example, practices such as mowing phreatophytes to improve stream channels and water flow is likely to reduce quantities of WIFL migration habitat. We recommend that mowing cycles be modified to allow a longer growing period of channel vegetation and to retain some vegetation at intervals along each channel. Rather than mowing every year, consider mowing every 3 years.

Length of stopover time, body fat condition, and captures rates are thought to be relevant measures of quality of migration habitats. According to Yong and Finch (1997) unmowed coyote willow along the middle Rio Grande was used more frequently and by fatter willow flycatchers during migration than mowed willow, cottonwood, agricultural fields, or Russian olive. To ensure successful migration by willow flycatchers, we recommend that steps be taken to protect and enhance willow thickets along southwestern drainages used by migrating willow flycatchers.

Information and Education

We recommend that Partners In Flight (PIF) state working groups take the lead on developing information and education (I&E) materials about the southwestern willow flycatcher. PIF state working groups have I&E committees already in place that can do this work. In addition, individual agencies and conservation organizations are encouraged to develop I&E materials on the willow flycatcher. Some ideas for I&E materials include slideshows and scripts that are duplicated and sold at cost; videos of WIFL, their habitats, and interviews with WIFL experts; brochures; posters; newspaper and magazine articles; interpretation signs at campsites; interpretive talks; and a paragraph on WIFL at the PIF web site. Funding sources need to be developed for I&E materials and for research reports.

Scientists are encouraged to promptly publish WIFL results and distribute reports and reprints to their constituencies. Progress reports and updates prepared by agencies and conservation groups should be widely circulated to other organizations and interested parties. A list-server for WIFL discussions and news updates can be established on the Internet. New publications such as this Conservation Assessment should be marketed and distributed to pre-established mail lists. Drawings and photos help to make technical documents more user-friendly. Information-sharing sessions should be held periodically to keep interested parties updated on new developments in the WIFL arena. We also recommend that a symposium devoted to the WIFL (or endangered riparian bird species in general) be sponsored by agencies or professional societies and a proceedings of the symposium be published and circulated to WIFL mail lists.

Managers need more research and technical information to effectively manage WIFLs and their habitats. Technical information can be supplied through consultations, publications, WIFL training sessions, and “show-me” tours. One of the most significant publications that managers could apply on the ground is a recovery plan for the southwestern willow flycatcher (now in progress). Finally, new knowledge and methods to protect and recover WIFL are needed; more specifics are identified in the next chapter.

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