United States Department of Agriculture

NRCS Plant Materials Program

Plant Materials and Techniques for Establishing and Improving Southwestern Willow Flycatcher Habitat

Figure 1: Willow flycatcher in hand - color band RWB – Arizona.
Photo by USGS

Improving Southwestern Willow Flycatcher Habitat

The southwestern willow flycatcher (*Empidonax traillii extimus*) is a small neotropical migratory bird. It has greenish or brownish feathers with a white throat and a pale olive breast. The flycatcher breeds and nests in the Southwestern United States from about April to September. Willow flycatcher wintering sites are in the subtropical and tropical regions of southern Mexico, Central America, and northern South America. The known geographical area historically occupied by migrating and breeding flycatchers includes riparian habitats in southern California, southern Nevada, southern Utah, southern Colorado, Arizona, New Mexico, western Texas and extreme northwestern Mexico.

The flycatcher's current range is similar to its historic range; however, the amount of suitable habitat within the range is greatly reduced from historic levels. The flycatcher depends upon dense tree and shrub communities alongside rivers, streams, or other wetlands. These areas have become increasingly isolated and widely dispersed as the result of surface water diversion, groundwater pumping, changes in flood and fire regimes, and the establishment of non-native and invasive plants. The southwestern willow flycatcher is federally listed as Endangered under the Endangered Species Act.

Habitat Highlights

- The primary threat to southwestern willow flycatcher habitat is loss, fragmentation, and modification of riparian habitats
- Flycatchers typically nest in relatively dense riparian vegetation at elevations from near sea level to more than 8,530 feet
- Breeding habitats generally include dense tree or shrub cover, dense twig structure, and high levels of green foliage
- Flycatcher territories and nests typically are within riparian areas adjacent to open water, cienegas, marshy seeps, or saturated soil

Habitat Requirements

Vegetation characteristics of southwestern willow flycatcher breeding habitat generally include dense tree or shrub cover that is ≥10 feet tall with dense twig structure and high levels of green foliage; many patches with tall canopy vegetation also include dense midstory vegetation in the 7-16 feet range. Generally, surface water is present; surface soils are intermittently saturated to support herbaceous wetland vegetation and ground water is at shallow depths to sustain woody riparian vegetation. Some of the more common tree and shrub species currently known to comprise nesting habitat include Goodding's willow, coyote (narrowleaf) willow, arroyo willow, boxelder, tamarisk (salt cedar), and Russian olive.

Habitat characteristics such as dominant plant species, size and shape of habitat patch, tree canopy structure, vegetation height, and vegetation density vary widely among breeding sites. Breeding habitats are broken into categories based on the composition of the tree/shrub vegetation at the site.

Figure 2: Southwestern willow flycatcher habitat on the Lower Rio Grande near Hatch, NM.
Photo by Darrell Ahlers, NM Bureau of Reclamation

Native broadleaf

These sites range from dense stands of shrub willows to mixed stands of native broadleaf trees and shrubs. There is often a very dense lower structure comprised of herbaceous wetland plants supported by saturated surface soils. Vegetation surrounding the site can range from open meadow, to agricultural lands, to upland scrub.

Monotypic exotic

The monotypic exotic sites include dense stands of exotics such as saltcedar or Russian olive that form a nearly continuous closed canopy. These stands are very difficult to penetrate due to dense, defoliated branches.

Mixed native/exotic

These sites include dense mixtures of native broadleaf trees and shrubs mixed with exotic/introduced species. A particular site may be dominated primarily by natives or exotics, or be a more-or-less equal mixture.

Figure 3: Native broadleaf habitat along the Verde River; cottonwood and willow gallery.
Photo by Stu Tuttle, Arizona NRCS

Table 1: Habitat and Habitat Requirements of the Southwestern Willow Flycatcher

Habitat	Habitat Requirements
Food—young	Generalist insectivore, diet high in flies, bugs and butterflies/moths
Food—adult	Generalist insectivore, major prey include bugs, bees and wasps, flies, and leafhoppers
Breeding, nesting, brood-rearing cover	Dense riparian habitats. Dense tree or shrub cover that is at least 10 feet tall (with or without a higher overstory layer), dense twig structure, and high levels of live green foliage
Water	Surface water typically present or soil moisture is high enough to maintain the appropriate vegetation characteristics
Interspersion	Native broadleaf, exotic and mixed native/exotic tree and shrub riparian vegetation
Minimum habitat size	2.5 acres below 6,000 feet in elevation 0.25 acres above 6,000 feet due to different habitat use

Establishing or Restoring Southwestern Willow Flycatcher Habitat

The critical habitat for the southwestern willow flycatcher has been divided into six recovery units spanning portions of six states: Arizona, California, Colorado, Nevada, New Mexico, and Utah. Protection and restoration of riparian area habitat in each recovery unit is critical to the success of the southwestern willow flycatcher. The flycatcher nests in native vegetation where available, but also nests in thickets with non-native invasive species like tamarisk and Russian olive. Efforts to control non-native species can be detrimental to willow flycatchers in mixed and exotic habitats, especially if control projects are implemented in the absence of suitable native riparian plant habitat of equal or higher functional value or if control projects are implemented without a restoration plan.

Successful restoration of riparian habitat requires thorough planning and consideration of several variables including depth to groundwater and its seasonal fluctuation, soil and water salinity, channel condition, livestock and wildlife grazing/browsing, and weed control. Planting of riparian species is not always required if native materials are located in the area and natural flooding still occurs on a regular basis. When this is not the case, direct seeding, pole planting and transplanting of container stock are used in riparian habitat restoration.

Figure 4: Mixed native/exotic habitat along the Verde River in Arizona; salt cedar in foreground, cottonwood and willow in the background. Photo by Stu Tuttle, AZ NRCS

Species Selection

To determine what species to use in restoration, an onsite assessment of the existing plant community and knowledge of the site history is essential. The assessment will provide information about the potential plant community and those species to target for revegetation. The selection of appropriate native species and plant selections (e.g., cultivars or germplasm) is critical to provide appropriate habitat and ensure that the plants are adapted to the site location and conditions. Local source ecotypes may also be used if appropriate for your area.

USDA Natural Resources Conservation Service (NRCS) Plant Materials Program native plant selections that may be applicable for southwestern willow flycatcher habitat restoration are listed in table 2. This list is specific to Plant Materials Program selections and is not all inclusive of desirable species for flycatcher habitat restoration. Rather, the selections listed have proven traits that increase the probability of successful establishment in their area of adaptation. Many of the grasses in table 2 are typically available from suppliers specializing in native plants. The availability of the tree and shrub species in table 2 is currently very limited with only a few specialized growers producing some of these woody plants.

Figure 5: Southwestern Willow Flycatcher Habitat on the lower Rio Grande at Elephant Butte Reservoir in NM.
Photo by Darrell Ahlers, NM Bureau of Reclamation

Table 2: USDA-NRCS Plant Materials Program Plant Selections Available for Revegetating Disturbed Upland Habitat and Southwestern Willow Flycatcher Riparian Corridor Vegetation

Shrubs/Trees	Plant Selections	Area of Adaptation
desert willow (*Chilopsis linearis*)	Barranco Hope Regal	NM, AZ, CO, CA NM, AZ, CO, CA NM, AZ, CO, CA
New Mexico forestiera (*Forestiera pubescens var. pubescens*)	Jemez	NM, CO
skunkbush sumac (*Rhus trilobata*)	Autumn Amber	NM, CO
black chokecherry (*Prunus virginiana*)	Colorow Germplasm	CO
fourwing saltbush (*Atriplex canescens*)	Marana Rincon Santa Rita	CA CO, AZ, NM, NV, UT AZ
winterfat (*Krascheninnikovia lanata*)	Hatch	CO, CA
Grasses	**Plant Selections**	**Area of Adaptation**
alkali sacaton (*Sporobolus airoides*)	Vegas Germplasm Salado	AZ, NV, CA NM, AZ, CA
alkali muhly (*Muhlenbergia asperifolia*)	Moapa Germplasm Westwater Germplasm	AZ, NV, CA NM
California brome (*Bromus carinatus*)	Central Coast 2600 germplasm	CA
big sacaton (*Sporobolus wrightii*)	Windbreaker	NM, AZ, CA, CO
cane bluestem (*Bothriochloa barbinodis*)	Grant Germplasm Saltillo Origin Germplasm	NM, AZ AZ
sideoats grama (*Bouteloua curtipendula*)	Niner Vaughn	NM, CO NM, CO
black grama (*Bouteloua eriopoda*)	Nogal	NM, AZ
blue grama (*Bouteloua gracilis*)	Hachita Alma Lovington	NM, CO NM, CO NM, CO
bottlebrush squirreltail (*Elymus elymoides*)	Tusas Germplasm Pueblo Germplasm Wapiti Germplasm	NM, AZ CO CO
western wheatgrass (*Pascopyrum smithii*)	Arriba	NM, CO
galleta (*Pleuraphis jamesii*)	Viva	NM, AZ, UT, CO, CA, NV
slender wheatgrass (*Elymus trachycaulus ssp. trachycaulus*)	San Luis	CO
saltgrass (*Distichlis spicata*)	LK517f Germplasm	CA
Arizona cottontop (*Digitaria californica*)	Loetta	AZ, NM
plains lovegrass (*Eragrostis intermedia*)	Bonita	AZ
plains bristlegrass (*Setaria leucopila*)	Stevan	AZ, NM
whiplash pappusgrass (*Pappophorum vaginatum*)	Pima Germplasm	AZ
spike dropseed (*Sporobolus contractus*)	Cochise	AZ
Indian ricegrass (*Achnatherum hymenoides*)	White River Germplasm Paloma Star Lake Germplasm	CO, UT NM, CO, AZ NM, UT, CO, AZ
Wildflowers and Legumes	**Plant Selections**	**Area of Adaptation**
bladderpod (*Cleome isomeris*)	Dorado	OR
California buckwheat (*Eriogonum fasciculatum*)	Duro	CA

Species Establishment

Direct seeding is generally appropriate for grasses, forbs and a few shrubs. Important factors influencing the success of direct seeding include seedbed preparation, accurate depth control of seed placement, and application of mulch. Seedings should be scheduled to take advantage of the Southwest monsoon season. A series of precipitation events capable of establishing seeded species is a rare occurrence in the arid West and seeding failures are common.

Common riparian trees like the cottonwood and Gooding's willow can be established from dormant pole cuttings. Multi-stem shrub willows such as coyote (narrowleaf) willow are most often planted as dormant whip cuttings because these species typically produce smaller diameter (3/4-1") cutting material. Most riparian trees are phreatophytes (deep rooted plants that obtain water from the water table). For successful planting of phreatophytic plants, their roots need to extend to the capillary fringe above the water table or they must be irrigated until their roots reach the capillary fringe. Pole cuttings are harvested and planted while dormant (early winter to early spring). Deep pots, also known as tall pots, and longstem planting stock have been used to successfully establish other riparian trees and shrubs when the root balls of the containerized plants are in contact with the capillary fringe. Planting of containerized stock is usually most successful in the fall months.

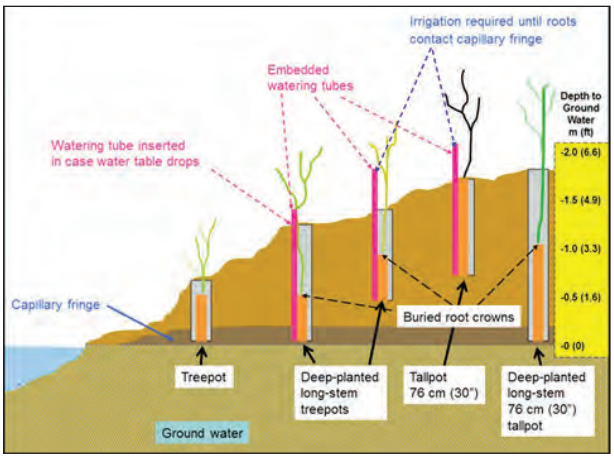

Figure 6: Diagram showing appropriate placement of pole plantings and containerized stock.
Provided by Dave Dreesen, NM NRCS

Table 3 is a listing of trees and shrubs, along with their establishment methods, that are frequently used in riparian area restoration. The availability of shrub and tree species listed in table 3 is currently very limited with only a few specialized growers producing some of these woody plants.

Figure 7: Willow pole plantings in an area cleared of tamarisk.
Photo by Casey Burns, UT NRCS

Table 3: Riparian species successfully established by deep-planting dormant pole cuttings (PC), dormant whip cuttings (WC), rooted tallpot container plants (TP), or rooted longstem container plants (LS)

Trees	**Primary Establishment Method**	**Secondary Establishment Method**
Rio Grande cottonwood (*Populus deltoides ssp. wislizeni*)	PC	TP, LS
Fremont cottonwood (*Populus fremontii ssp. fremontii)*	PC	TP, LS
plains cottonwood (*Populus deltoides ssp. monilifera*)	PC	TP, LS
narrowleaf cottonwood (*Populus angustifolia*)	PC	TP, LS
lanceleaf cottonwood (*Populus × acuminata (pro sp.) [angustifolia × deltoides*])	PC	TP, LS
Goodding's willow (*Salix gooddingii*)	PC	TP, LS
peachleaf willow (*Salix amygdaloides*)	PC	TP, LS
netleaf hackberry (*Celtis laevigata var. reticulata*)	LS	TP
Arizona sycamore (*Platanus wrightii*)	LS	TP
screwbean mesquite (*Prosopis pubescens*)	LS	TP
Shrubs		
narrowleaf or coyote willow (*Salix exigua*)	WC	TP, LS
arroyo willow (*Salix lasiolepis*)	WC	TP, LS
boxelder (*Acer negundo*)	LS	TP
false indigo bush (*Amorpha fruticosa*)	LS	TP
fourwing saltbush (*Atriplex canescens*)	TP	LS
Emory's baccharis (*Baccharis emoryi*)	LS	TP
stretchberry or New Mexico olive or New Mexico privet (*Forestiera pubescens var. pubescens*)	LS	TP
Torrey wolfberry (*Lycium torreyi*)	TP	LS
littleleaf sumac (*Rhus microphylla*)	LS	TP
skunkbush sumac (*Rhus trilobata*)	LS	TP
golden currant (*Ribes aureum*)	LS	TP
silver buffaloberry (*Shepherdia argentea*)	LS	TP

Figure 8: Willow flycatcher nest with chicks.
Photo by USGS.

Managing Habitat

Grazing and browsing of areas under active restoration should be deferred particularly during the first three years of initial establishment when the newly established plants are most vulnerable. Tall poultry wire tree guards are often required if small herbivore browsing is expected. Large herbivore browsing will require elk-proof exclosures. After establishment, grazing must be managed so the restored ecosystem will be sustainable.

In some parts of the Southwest, tamarisk beetles are defoliating stands of tamarisk and decreasing available habitat for the willow flycatcher. In mixed native/exotic habitats, the native vegetation may re-establish without additional inputs if historic flooding patterns are still occurring or if they can be re-established. In monotypic exotic habitats, extensive efforts at restoration may be required to prevent the former tamarisk habitat being replaced by native or exotic forbs and grasses rather than the trees and shrubs the willow flycatcher needs.

This document is meant as a general guide to the southwestern willow flycatcher's habitat needs and the plant materials available for habitat restoration. For more information on any of the discussed topics, please contact your local USDA NRCS field office at http://offices.sc.egov.usda.gov/locator/app.

Figure 9: Goodding's willow pole plantings protected by tree guards.
Photo by Dave Dreesen, NM NRCS

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The NRCS Plant Materials Program selects conservation plants and develops innovative planting technology to solve the Nation's most important resource concerns. Plants are critical to holding productive soils in place, keeping nutrients from entering streams, and improving habitat for wildlife. To find out more about the Plant Materials Program and the technical information available, please visit: http://plant-materials.nrcs.usda.gov.

More information about the southwestern willow flycatcher and its habitat can be found by visiting the following:

U.S. Fish and Wildlife Service
Southwestern Willow Flycatcher Recovery Plan: http://www.fws.gov
USGS Colorado Plateau Research Station: http://sbsc.wr.usgs.gov/cprs/
Arizona Game and Fish Department: http://www.azgfd.gov
Colorado Parks and Wildlife: http://cpw.state.co.us/
California Department of Fish and Wildlife: https://www.wildlife.ca.gov/
Utah Division of Wildlife Resources: http://wildlife.utah.gov/

Photo credits from cover page

Top: *Southwestern willow flycatcher habitat in Colorado's San Luis Valley*. Picture by Chanda Pettie, CO NRCS.

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