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Southwestern Willow Flycatcher Conservation Program

Programmatic Environmental Assessment—September 2019

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I. Purpose and Need

The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS) is implementing a conservation program for the southwestern willow flycatcher (SWFL, flycatcher; *Empidonax traillii extimus*), a small, neotropical migrant bird found in Arizona, California, Colorado, Nevada, New Mexico, Texas, and Utah. This endangered bird nests and feeds in dense forests of native trees (e.g., willow) and non-native[1] saltcedar (*Tamarix* species). The purpose of the program is compliance with section 7(a)(1) of the Endangered Species Act and the need is to promote the recovery of the flycatcher.

As part of its Endangered Species Act 7(a)(1) conservation program for the flycatcher, APHIS has decided to implement several of the conservation measures that our review and consultations with the U.S. Fish and Wildlife Service has identified as having conservation value and feasibility, and are also within the agency's legal authority. These conservation measures follow from other measures the agency has taken previously, and will support further conservation measures the agency is considering taking in future years.

In 1986, the USDA Agricultural Research Service (ARS) began research into the potential for biological control of saltcedar. From 2000 to 2003, ARS conducted open field release trials of tamarisk leaf beetles (*Diorhabda* species) to determine the conditions under which releases could be made in areas 200 miles or more from SWFL habitat. These field trials took place after ARS consulted with the U.S. Fish and Wildlife Service (USFWS) to ensure compliance with the Endangered Species Act (ESA). APHIS permitted the releases after it completed additional environmental risk analyses and provided the public an opportunity to comment on the documents (USDA-APHIS, 1999a). In 2005, APHIS initiated a biological control program for saltcedar defoliation in the northern United States using the tamarisk leaf beetle as the biological control agent.

[1] APHIS acknowledges the sometimes arbitrary designations of plant species origins as non-native and exotic, and the pejorative use of these terms. The descriptions of plants as weeds or invasive are properly used in the ecological vernacular to denote plants with non-desirable traits rather than area of origin. In addition, both native and non-native plants may be capable of invading areas, and utilizing resources more efficiently than existing plant competitors. APHIS will describe plants as invasive when their competitive advantage results in their apparent dominance of an ecosystem to the extensive detriment of other plants.

In 2006, Congress passed the Salt Cedar and Russian Olive Control Demonstration Act directing the Secretary of the Interior, in cooperation with the Secretaries of Agriculture and Defense, to:

- Assess the extent of the infestation by saltcedar and Russian olive (*Elaeagnus angustifolia* L.) trees in the western United States;
- Demonstrate strategic solutions for the long-term management of saltcedar and Russian olive trees and reestablishment of native vegetation; and,
- Assess economic means to dispose of biomass created as a result of removing saltcedar and Russian olive trees.

In March 2005, APHIS consulted with USFWS on a proposed saltcedar control program using the tamarisk leaf beetle in 13 States. APHIS determined with concurrence from USFWS that release of a northern-adapted strain of tamarisk leaf beetles was not likely to adversely affect federally listed species or their critical habitats. This program was both permitted and carried out by APHIS and separate from the ARS program. The program established tamarisk leaf beetle populations at certain locations that would serve as "nursery" sites or insectaries for further distribution within those States.

In 2010, APHIS terminated the biological control program and cancelled all tamarisk leaf beetle release permits because of the potential for effects on flycatcher habitat (USDA-APHIS, 2010). APHIS has the authority under the Plant Protection Act to restrict interstate movement of plant pests; however, intrastate movement continues to this day in some states. Although release of the tamarisk leaf beetle was in limited locations outside of the habitat of the flycatcher, greater than anticipated natural and intentional human-assisted movement of the beetle resulted in the presence of tamarisk leaf beetles in flycatcher habitat. The tamarisk leaf beetle was selected as a biological control agent because it defoliates saltcedar trees; however, in SWFL habitat, this defoliation has the potential to reduce nesting success.

On September 30, 2013, the Center for Biological Diversity filed a lawsuit against USDA, Department of the Interior (DOI), and USFWS alleging that the Federal saltcedar biological control program violated the National Environmental Policy Act (NEPA) and the ESA[2]. On May 3, 2016, the Court granted the plaintiff's second of five claims, finding that APHIS did not comply with ESA section 7(a)(1), which requires Federal agencies utilize their authorities to carry out programs for the conservation of endangered and threatened species. On June 19, 2018, the Court ordered USDA and APHIS to publish proposed conservation program alternatives in compliance with ESA section 7(a)(1) and solicit public comments on the proposed alternatives.

[2] On March 27, 2009, the CBD initially filed a lawsuit against APHIS for the Agency's failure to reinitiate consultation with USFWS after tamarisk beetles were found in formally designated critical habitat of the flycatcher in Arizona.

APHIS needs to utilize its authorities by carrying out a program for the conservation of the flycatcher to ensure the Agency complies with ESA section 7(a)(1) and the court order. APHIS published in the Federal Register a notice of intent to prepare this Environmental Assessment (EA) on October 26, 2018 to begin scoping on aspects of a proposed conservation program (Docket No. APHIS-2018-0064). APHIS also sent the notice of intent to 15 Tribal governments, the Natural Resources Conservation Service (NRCS), the Bureau of Land Management, the USFWS – Ecological Services and the National Wildlife Refuge System, the U.S. Geological Survey (USGS), the National Park Service, seven states, and 21 individuals from non-governmental groups (conservation and academic researchers). After the 30-day comment period, APHIS received 21 comments submitted through regulations.gov (https://www.regulations.gov/docket?D=APHIS-2018-0064) and two comments sent directly to the conservation program coordinator.

APHIS published a notice of the availability of the draft EA in the Federal Register on July 9, 2019 (84 FR 32701), and posted the EA as APHIS-2018-0064-0024 in regulations.gov. The comment period was open for 30 days until August 8, 2019 during which APHIS received 12 comments through regulations.gov; by August 13, APHIS received an additional nine comments some of which were sent directly to the conservation program coordinator. The comments were received from private citizens, SWFL and ecology researchers, conservation organizations, and Federal, State, and regional (i.e. water districts) regulatory entities. To the greatest extent possible, this final programmatic EA addresses issues raised in the public's comments within the text.

APHIS thanks the commenters who expressed their support for the preferred alternative. Although selection of specific projects cannot be guaranteed, APHIS takes expressions of continued interest as evidence of the viability and potential effectiveness of their projects. APHIS also thanks commenters who provided historical information that is now part of the project record. While NEPA documents cannot be encyclopedic, prior considerations and the relative success of past projects are important aspects that will inform future decision-making.

APHIS is implementing a conservation program for the flycatcher to satisfy the agency’s obligations under ESA section 7(a)(1). APHIS plans to assist existing conservation programs, contribute funding, monitor beetle impacts, and evaluate additional projects with the potential to benefit the flycatcher. The initial decision-making process will focus on projects with anticipated biological benefits, a minimization of socioeconomic impacts, and educational value. APHIS anticipates project selection will occur in-house and be dependent on available funding. Habitat improvement projects where APHIS can take actions within our authority in an exchange of services partnership to create habitat that can be occupied by flycatchers will be rated more highly. Water resource management will be added as a consideration in the project selection process. Comments with suggestions concerning specific sites, priority ratings, and critical

habitat will be considered as part of the project selection process. APHIS routinely uses the findings from ARS and other researchers in its decision-making, and intends to use the best available science to support the prioritization of restoration projects. To the extent necessary, APHIS will solicit support from USFWS and other experts on topics such as riparian ecology, endangered species, soil salinity, and flycatcher recovery efforts. Monitoring projects that support these efforts will be needed over time to assess the effectiveness of the overall conservation program in accordance with the adaptive management approach chosen by APHIS.

Public comments that asked APHIS to support designation of all wilderness study areas and roadless areas in the flycatcher range to permanent wilderness status were received. Wilderness designations are beyond APHIS' authority; however, during consultations with land management agencies, APHIS can mention this opinion to those who make those decisions. Completely stopping the domestic sale of tamarisk is not within APHIS's authority because it is not a Federally listed noxious weed or a quarantine pest. While an APHIS public outreach program discourages the intrastate movement of the beetles and explains that interstate movement of beetles requires a permit from APHIS, it is very difficult for APHIS to enforce movement prohibitions in domestic situations.

APHIS agrees with several commenters on the draft EA that the composition of a Federal Advisory Committee Act (FACA) group can strongly influence agency decision-making. For this reason, APHIS will use the priority setting scheme described in this final EA rather than establishing a FACA at this time. APHIS reserves the right to determine the composition of a FACA and seat representative members in the future. APHIS recognizes that creating an advisory group at this time is likely to divert funding from the science-based projects that would support recovery of the flycatcher. Consequently, it appears that prioritizing project proposals based on these public comments is likely to be highly cost effective in the initial funding rounds rather than establishing a FACA or other advisory group. Nevertheless, APHIS reserves the right to establish an advisory group in the future based on need. At that time APHIS would solicit support from available USFWS Flycatcher Recovery Team members, as well as USGS, the U.S. Bureau of Reclamation, State wildlife or natural resource agencies, and USFWS Ecological Services and Field Offices. At the present time, APHIS finds that seating a FACA board is less important than developing a habitat improvement program that contributes to SWFL population recovery.

APHIS has a broad mission area that includes protecting and promoting agricultural health. APHIS issues regulations to protect animal and plant health in accordance with agency authorities specified in the Plant Protection Act and the Animal Health Protection Act. Because APHIS is primarily a regulatory agency and is not a land management agency, it does not have authority to compel other parties to change water use regimes. APHIS likewise does not have authority to compel other parties to manage their land resources for the benefit of any threatened

or endangered species, including the flycatcher. Therefore, APHIS can only indirectly change established water use regimes or plant trees by working with other entities that have those authorities. The proposed conservation program seeks to aid in the conservation of flycatchers in various areas of the United States. APHIS considered how the Agency's conservation program could build on the programs of other USDA agencies. APHIS contacted five agencies and compiled information on their conservation programs directly or indirectly benefitting the flycatcher. APHIS will look for opportunities to coordinate conservation actions to increase the benefit to the flycatcher in the future. The broad programmatic scope of the proposed action is to develop a conservation program pursuant to ESA for the flycatcher based on APHIS' authorities and opportunities to cooperate with property owners, conservation groups, and government agencies with either land management or research-oriented missions.

USDA conservation programs directly or indirectly benefitting the flycatcher include:

- ARS is a member of the Upper San Pedro Partnership, a consortium of agencies and organizations working together to meet the long-term water needs of the Sierra Vista watershed by achieving sustainable yield of the regional aquifer to preserve southern Arizona's San Pedro Riparian National Conservation Area and Fort Huachuca. The partnership promotes preservation and restoration[3] alternatives for ecosystem services in the Southwest.
- ARS is a member of the National Science Foundation Science and Technology Center for Sustainability of Semi-Arid Hydrology and Riparian Areas, a partnership program that enables innovative research and education projects of national importance that require a center mode of support to achieve the research, education, and knowledge-transfer goals shared by the partners. Led by the University of Arizona, this Science and Technology Center uses an interdisciplinary approach to provide science-based technical, economic, legal, and policy expertise necessary for water development, use, and conservation policies.
- The National Institute of Food and Agriculture (NIFA) Sustainable Agriculture Program seeks to provide more profitable farm income, promote environmental stewardship, and enhance quality of life for farm families and communities. NIFA promotes sustainable agriculture through national program leadership and funding for research and extension. It offers competitive grant programs and a professional development program, and it collaborates with other federal agencies through the USDA Sustainable Development Council. One commenter exhorted APHIS to, "provide grant funding to scientific experts

[3] The use of the term "restoration" by the USDA agencies is broadly applied to a variety of riparian habitat conservation actions. APHIS solicited this information specifically to describe SWFL conservation projects. APHIS has not had the opportunity to evaluate the benefit of these actions to the flycatcher. APHIS will refrain from describing habitat improvement projects as "restoration" in this EA, except when citing information or practices provided by others. APHIS will instead name the specific actions under consideration (e.g. vegetation management) and where those actions are yet to be determined we will use the general description "habitat improvement".

on flycatcher and beetle issues to assist them in updating or performing any critical research previously identified by the Tamarisk Coalition's expert panel and other topical experts as current research needs awaiting funding." APHIS believes the following examples show the variety of research funding available through USDA for the purpose requested by the commenter.

- NIFA provided a grant to researchers at the University of California at Davis to improve understanding of ecosystem processes affecting conservation, ecological restoration, and natural resource management. This project studies wetland ecosystem processes in order to provide better guidance for restoration of ecologically and economically important bulrush wetlands. The researchers propose to apply the knowledge gained to restoration of these wetlands in the Mojave Desert, which provide a unique habitat for several endangered species including the flycatcher.
- Beginning in March 2015 and continuing until February 2020, NIFA provided an annual grant of $1,000,000 to researchers at the University of Texas at El Paso, for adaptive management and participatory learning processes to improve management of regional water resources while training water resources professionals who are culturally and linguistically appropriate for the region. Over the past 100 years, the Middle Rio Grande has been the primary source of water for irrigated agriculture in the region. Due to recent drought and growing demand, the river alone no longer meets regional water needs, leading to increased groundwater use and dropping water tables. The researchers will extend the hydro-economic model to include environmental flows for flycatcher habitat to evaluate costs and benefits of water allocation to riparian habitat. Water and land management agencies can use this work to determine the basin-wide opportunity cost of providing flycatcher habitat.
- NIFA also funds a research project with Hatch funding (dedicated to the State Agricultural Experiment Station and Cooperative Extension Systems), titled Research, Education and Outreach Programs to Manage and Protect Water Resources Throughout Texas. The goals of the Texas Water Resources Institute are to help advance effective water management while protecting water quality and providing water for environmental purposes across Texas.
- NIFA funded two ongoing water resource research efforts led by the University of Arizona. One project, titled "Ecohydrology and Watershed Management of Western Ecosystems, and Resilience of Western Terrestrial" focuses on reforestation and management of land and forests for the production of timber, protecting resources against floods and erosion, production of forage for livestock, game and improvement of food and habitat for wildlife. The objectives of the second project, titled "Aquatic Ecosystems: Drivers, Challenges & Ecosystem Services" are to delineate the effects of biological invasions and climate change on semi-arid forest biodiversity, investigate the influence of wildland fire and other forces on forests and the resilience of high trophic level species.

- NIFA-funded researchers at the State University of New York College of Environmental Science and Forestry are developing tools and quantitative support for land and water conservation management plans to promote the sustainability and resilience of riparian forest ecosystems in arid and semi-arid landscapes. This ongoing work focuses on drought-prone ecosystems, where prolonged dry periods affect riparian habitat quantity and quality, thereby limiting their role as thermal and moisture refugia for many threatened and endangered species including songbirds and amphibians. The research is taking place within three Department of Defense bases in the Southwest, but will be widely applicable to other drought-prone lands.
- NIFA provided funding for on-going research at the New Mexico State University under a project entitled, "Sustainable Agriculture in North-Central New Mexico". The research objectives are to (a) develop and evaluate crop production methods that increase the efficiency of resource use, including land, water, and growing season length, and (b) to increase agricultural productivity and profitability on a per-unit area basis while maintaining or enhancing the natural resource base.
- The Farm Service Agency (FSA) administers the Conservation Reserve Program (CRP) that provides incentives for landowners to perform actions that improve wildlife habitat and water quality. The CRP is a voluntary program that contracts with agricultural producers so that environmentally sensitive agricultural land is used for conservation benefits. One commenter suggested APHIS should follow this approach of planning and coordination communicated through programs of educational and technical assistance to the public. This means use of skilled personnel and community advocates that can reach a mutual agreement on what is to be done. CRP participants establish long-term, resource-conserving vegetative species, such as approved grasses or trees (known as “covers”), to control soil erosion, improve the water quality and enhance wildlife habitat. FSA could not specify the total area or activities occurring within the historic range of the flycatcher.
- The Forest Service (FS) is the only land management agency within USDA, overseeing National Forests (NFs) and National Grasslands. The FS has performed a wide variety of conservation and beneficial actions within the four FS Regions that contain the summer range of the flycatcher, including species ecology research and habitat improvement. The FS and USFWS completed ESA section 7 consultations at several levels within the Agency including national, regional, and in some cases, NF levels. The resulting consultation documents include a Master Enhancement and Recovery Permit and a Draft Revised Land Management Plan, including components for flycatcher habitat management described below.
- The FS National Laboratory (Rocky Mountain Research Station) and the Albuquerque Forestry Sciences Laboratory conducted and published research on the flycatcher, environmental factors affecting its habitat, and conservation for this and other species.

- FS considered flycatcher conservation in regional planning and through ESA consultations with USFWS. FS promulgated the Colorado Roadless Rule, protecting thousands of acres of forested and riparian habitats, across 10 NFs from use by unauthorized motorized vehicles.
- FS - Region 3 comprises all of Arizona and New Mexico with 11 NFs. The Forest Supervisors are responsible for overseeing the implementation of protected species and habitat conservation projects. Since before 2010, FS protected flycatcher critical and occupied habitat on the Little Colorado River near Greer and on the San Francisco River near Alpine within the Apache-Sitgreaves NF in Arizona. At three sites totaling 236 acres, the FS installed and maintained fences to exclude grazing livestock. The site located on the San Francisco River is also protected from browsing by wild ungulates.
- Riparian restoration actions performed by the NF include focused irrigation and flood control, pond installation, and willow plantings to improve riparian habitat for the flycatcher and other riparian species. In 2008, FS imposed seasonal grazing limits through the El Rito - Lobato Grazing Allotment Management at El Rito Creek to improve flycatcher habitat. FS removed invasive plants to improve riparian habitat in the Camino Real Ranger District. The NF is planning the McGaffey Restoration Project that includes riparian restoration and hydrological improvements to benefit flycatcher habitat. Riparian habitat was also protected from feral livestock grazing with fencing installed and maintained since 2002 in the Questa Ranger District along McCrystal Creek on the Valle Vidal Unit.
- The Mt. Taylor Ranger District within the Cibola NF protected flycatcher habitat from livestock grazing in two riparian pastures along Bluewater Creek near Grants, New Mexico. The ranchers use the pastures (740 acres) two weeks per year, primarily for gathering cattle in the fall. The NF also fenced livestock out of a riparian exclosure (350 acres), protecting the area from all livestock grazing. Additionally, the FS surveyed for flycatchers in the Bluewater Creek watershed during 2009 and 2014. The revised Forest Plan (2019) includes measures to improve riparian habitat quantity and quality.
- The FS revised the National Forest Plans for the Coconino NF (2013), Prescott NF (2014) and Apache-Sitgreaves NF (2015). Only 358 acres (29 percent) of 1,238 acres of flycatcher critical habitat along the Verde River are within the Coconino NF. However, the Red Rocks Ranger District performed many flycatcher conservation actions in accordance with the Forest Plan. FS implemented rangeland management policies that manipulated grazing schedules so livestock in the NF would not occur within brown-headed cowbird traveling distance during the flycatcher breeding season. The NF eliminated livestock access to flycatcher habitat with exclosures in much of the suitable habitat along perennial streams causing the cattle to graze in pastures with limited riparian access, called “water gaps”. The NF began the Volunteer Exclosure Adoption Program, encouraging organizations to monitor multiple times a year for trespass livestock and perform fence maintenance annually. The NF is currently working to

remove feral livestock along the Verde River in the portion designated as Wild and Scenic. The NF mapped movement of radio-tagged cowbirds to determine their use of riparian areas from adjoining private land within the NF.

- The Coconino NF limited recreational use of flycatcher habitat with policies and actions. The NF closed some roads and improved drainage on major roads that contribute sediment to perennial streams, improving aquatic and riparian habitat for several threatened and endangered species. The NF avoided permitting recreation in riparian areas with protected species concerns when these activities would result in increased use and ground disturbing activities. The NF instituted closures for camping along portions of Red Tank Draw, Dry Beaver Creek, Wet Beaver Creek, and Sycamore Creek and closed the Verde River riparian areas to motorized access at Tissaw and Lower Oak Creek to protect habitat. The Fossil Creek area management instituted recreational capacity control through a reservation system and removed camping from along the creek, which allowed recovery of riparian habitat. In response to unregulated recreation, the NF delineated designated dispersed parking and camping areas and installed interim habitat protection signs along Walker Creek and Wet Beaver Creek.
- The Prescott NF includes 37.7 miles of the upper Verde River (Chino Valley Ranger District) that is eligible for Wild and Scenic River designation, and 16-miles below Camp Verde that is designated a Wild and Scenic River (Verde Ranger District). Surveys have confirmed the presence of flycatchers on Arizona Game and Fish Department land adjacent to the NF and at Perkinsville in this river reach. FS conducted conservation actions along the upper Verde River to benefit listed species including the flycatcher. The Prescott NF has not authorized livestock grazing use of the 16-miles of the Verde Wild and Scenic River since 2005. FS installed barriers to control dispersed recreational vehicle access to and along the river at the Bear Siding and the Perkinsville river access points. The NF decommissioned a short section of road and installed barriers (e.g., boulders and fencing) to control dispersed recreation and off-road use at the Black Canyon River access point and the Beasley Flat Recreation Area. The majority of approximately 40 miles of the Verde River in the Verde Valley from Clarkdale downstream to Camp Verde is in private ownership. This entire reach is designated flycatcher critical habitat. The FS also does not authorize livestock grazing in this reach of river on NF lands.
- The Tonto NF conducted studies on flycatcher habitat and decided to install fences to exclude livestock grazing along Tonto Creek from Gisela, Arizona to Roosevelt Reservoir protecting approximately 20 miles of flycatcher habitat. FS also installed exclusion fencing along an additional five miles of the Salt River to the inflow of Roosevelt Reservoir. The NF restricted vehicles from driving in riparian flycatcher habitat around Roosevelt Lake.
- The Gila NF in New Mexico includes hundreds of acres of flycatcher critical habitat. Riparian habitat enhancement in the Gila River Bird area was conducted in the early

2000's and included construction of backwater habitat and extensive planting of riparian vegetation. Protection, maintenance and enhancement of this area by the NF contributes to development of suitable habitat that is now occupied by flycatchers.

- From approximately 1996 through 2006 the U.S. Bureau of Reclamation, Arizona Game and Fish Department, and others conducted flycatcher surveys, nest monitoring, and studies at Roosevelt Lake that contributed significantly to knowledge about the flycatcher and its habitats in Arizona. The Tonto NF is a cooperator with the Salt River Project at Horseshoe and Bartlett Reservoir to manage riparian habitats for the flycatcher. Tonto NF personnel are in the process of planning and developing other flycatcher habitat improvement projects that may include native tree planting, reconnecting habitats with the water table, and removing nonnative vegetation including saltcedar, in anticipation of the arrival of the tamarisk leaf beetle. NF personnel removed saltcedar and are planting native trees in burned riparian habitats along the lower Salt River in the Mesa Ranger District, and there are saltcedar removal projects on Arnett Creek in the Globe Ranger District.
- The Natural Resources Conservation Service (NRCS) Working Lands for Wildlife (WLFW) partnership encourages agricultural producers to create and improve wildlife habitat with conservation practices through technical and financial assistance. The conservation practices funded by NRCS aim to protect and restore breeding habitat, combat habitat losses caused by surface water diversion and groundwater pumping, address changes in flooding and fire regimes, and manage non-native and invasive plants. NRCS protected, maintained, and restored riparian habitat to increase and improve occupied, suitable, and potential breeding flycatcher habitat.
- Through WLFW, NRCS works with landowners to restore nesting habitat in the six flycatcher Recovery Units designated by USFWS. From October 2011 to September 2018 (i.e., the latest data reported for fiscal year (FY)2018), NRCS paid producers $6,025,514 through 81 contracts to improve 13,384 acres of habitat for the flycatcher. In 2015 NRCS estimated the amount of flycatcher nesting habitat in each of the Recovery Units where WLFW conservation partnerships were possible in the next 10 years. NRCS also estimated the area where WLFW conservation was likely before the last Farm Bill expired in September 2018 and expressed those numbers as 'milestones'. Since FY-12 the WLFW partnerships have exceeded the NRCS conservation acreage milestones in three of the flycatcher Recovery Units, and NRCS planned contracts to exceed the milestones in two others. NRCS improved 1,672 acres of habitat in the Coastal California Recovery Unit and plans to improve 814 more acres. NRCS improved 600 acres of habitat in the Rio Grande Recovery Unit and plans to improve 518 more acres. In the Upper Colorado Recovery Unit, the WLFW partnerships resulted in habitat improvements on 283 acres with plans for the inclusion of an additional 738 acres soon. NRCS set a milestone of 729 acres in the Gila Recovery Unit. Although by FY-18 only 293 acres of improvements occurred, the WLFW partners have plans for conservation

activities on another 778 acres. Similarly, the NRCS performed only 409 acres of conservation of the 448-acre milestone in the Lower Colorado Recovery Unit, and an additional 500 acres are planned through WLFW partnerships. Lastly, since FY-12, NRCS planted trees and shrubs on one acre of flycatcher habitat in the Basin and Mohave Recovery Unit.

- The conservation practices funded by NRCS under WLFW are broader than just riparian restoration. The SWFL conservation practices goals are to protect, maintain, and restore riparian habitat; increase and improve occupied, suitable, and potential breeding habitat; manage livestock grazing to increase quality and abundance of habitat; improve weed and invasive species management; and increase the connectivity of existing habitats. As such, some of the practices do restore riparian habitat or are located in or near riparian areas while others are not. NRCS reported the following WLFW practices funded for SWFL conservation from 2012 through 2018 that should be assumed to have been implemented in riparian areas: riparian forest buffer (83 acres), riparian herbaceous cover (seven acres), stream habitat improvement (46 acres), and wetland wildlife management (442 acres). During 2018, NRCS planned but did not implement these four practices on an additional 599 acres of flycatcher habitat. Those plans may have been implemented in 2019, or the practices will occur in the near future. NRCS also used WLFW partnerships to fund the implementation or planning of the "Restore and Manage Rare Habitats" conservation practice on 1,208 acres within the range of the flycatcher.
- NRCS encourages landowners to conserve flycatcher habitat acres through programs outside of WLFW partnerships. Since 2010 NRCS has assisted producers with the conservation of an additional 288.5 acres. The Wetland Reserve Program improved potential flycatcher habitat in New Mexico and Utah on 268 acres of stream and wetland restoration projects. NRCS planted 2,550 cottonwood, 7,500 willow, and 2,300 containerized shrubs on two projects totaling 36 acres. NRCS partnered with agricultural producers to manage non-native brush, primarily saltcedar and Russian olive, on 218 acres. NRCS constructed approximately three acres of water drainage swales and depressions through the "Restoration and Management of Rare and Declining Habitat" conservation practice. NRCS offered funding through Conservation Technical Assistance, the Wildlife Habitat Incentives Program, and the Environmental Quality Incentives Program for improvement and management of approximately 15 acres of stream habitat and over three acres of Critical Area Planting.

Under the no action alternative, APHIS would not develop new SWFL conservation programs or contribute funding to current SWFL conservation programs. This alternative represents the baseline against which APHIS will compare the proposed action to evaluate potential environmental impacts of that action. Under the preferred alternative, APHIS will fund surveys for the flycatcher and tamarisk leaf beetles, publically accessible restoration science information and habitat models based on current satellite imagery in FY20 and, for future years, consider a range of SWFL conservation actions including enhancing ongoing or planned conservation

programs, contributing funding or other resources, and monitoring the beetle's impact. The FY20 actions are those that the Agency could implement immediately, such as flycatcher surveys, updating a leaf beetle survey database and maps, or collaborating with federal, state, or local entities to improve flycatcher habitat assessment models. In the following years, APHIS would consider expanding its conservation program after evaluating the benefits and potential environmental impacts of additional projects such as habitat improvement actions and cowbird management. APHIS will consider all projects based on their merits. When prioritizing projects, the predicted time frame for success must be balanced against a no action alternative. In other words, the Agency will consider if it would be better to do nothing or take action that would focus on long-term benefits.

This programmatic EA examines the environmental effects associated with the selection of the program alternatives. APHIS will use this EA for planning and decision-making, in addition to informing the public about the environmental effects of the various conservation actions. If APHIS determines the proposed actions will have a significant impact on the environment, the Agency will prepare an environmental impact statement. In addition, APHIS will prepare additional environmental risk analyses as appropriate depending on the specific conservation project selected. These documents may be tiered as necessary to existing NEPA or ESA analyses completed by other agencies or conservation organizations. When appropriate, APHIS will consult with USFWS on each project to avoid harm to protected species. These ESA section 7(a)(2) consultations may be formal or informal depending on whether the project is likely to adversely affect any listed species. APHIS consultations with USFWS under ESA section 7(a)(1) on the conservation value of various projects is ongoing.

II. Alternatives

A. No Action Alternative

NEPA regulations (40 Code of Federal Regulations (C.F.R.) § 1508.25) require the scope of analysis to include a no action alternative in comparison to other reasonable courses of action. Under the no action alternative, APHIS would not develop or participate in any new conservation programs for the species. This alternative represents the baseline against which APHIS will compare the potential environmental impacts of the proposed action.

Under the preferred alternative, APHIS would continue to implement a conservation program for the flycatcher to satisfy the agency's obligations under ESA section 7(a)(1) and in response to the reduction of breeding habitat caused by the tamarisk leaf beetle. APHIS began implementing a conservation program for the flycatcher in response to the court's findings described in the May 3, 2016 Minute Order. These actions were described in the second APHIS declaration brief filed with the court on July 14, 2017 (Defendants' Declaration In Support of Defendants' Opposition to Plaintiffs' Motion for a Permanent Injunction).

APHIS began implementing a conservation program for the flycatcher in 2016. Since the genesis for the claim found against APHIS is that defoliation of saltcedar trees by the tamarisk leaf beetle is reducing nesting habitat for the flycatcher, APHIS evaluated imposing interstate quarantines on the beetle as a conservation action. APHIS determined the imposition of meaningful restrictions by establishing a quarantine on the tamarisk leaf beetle was not prudent because intrastate movement of this widely-distributed plant pest would continue and the affected states are unlikely to cooperate. Without such cooperation, APHIS' authority is limited to interstate regulatory actions, which would have limited potential for success. For these reasons, this simplest of actions could not be considered as a reasonable alternative in this EA.

During 2016 while APHIS was initiating the conservation program, the Agency solicited and received agreement from external subject matter experts to recommend additional potential actions the Agency could take to conserve the flycatcher:

- Dan Bean (Colorado Dept. of Ag. – Palisade Insectary)
- Greg Beatty (USFWS – SWFL Lead Biologist)
- Tom Dudley (UC Santa Barbara - Marine Science Institute, and the Cheadle Center for Biodiversity and Ecological Restoration)
- James Hatten (U.S. Geological Survey - Western Fisheries Research Center)
- Stu Tuttle (USDA NRCS, Wildlands for Wildlife SWFL Program Lead)

In December 2016, APHIS initiated a review of the tamarisk leaf beetle population distribution data and identified additional data needs required to develop a predictive spread model (i.e. temperature, precipitation, and elevation). APHIS performed an extensive scientific literature review and completed a Pest Risk Assessment (PRA) of the *Diorhabda* beetle on August 9, 2017. This research and analysis was essential to predict the potential for the beetle to establish in additional SWFL critical habitats, characterize the rate of dispersion into these habitats, and identify pertinent research and knowledge gaps. The PRA evaluated chemical and biological control methods that could limit or reduce the effects of tamarisk leaf beetles on the saltcedar trees serving as nesting habitat for the flycatcher. APHIS updated the PRA on November 1, 2018 to ensure the Agency was utilizing the most current information while formulating conservation program actions.

During the summer of 2017, APHIS conducted a targeted survey effort to learn the location and magnitude of tamarisk leaf beetle populations and to inform APHIS leaders in their evaluation of pest control options. APHIS surveyed locations in New Mexico and Arizona to identify the extent of the distribution of tamarisk leaf beetles. During May 2017, APHIS scientists tested lure baited traps in New Mexico, validating this survey technique and finding it provided more conclusive data. The surveys confirmed tamarisk leaf beetles were absent in central Arizona where flycatcher nesting habitat is most dependent on saltcedar.

APHIS has an on-going outreach effort to discourage further human-assisted movement and release of the tamarisk leaf beetle in Arizona and New Mexico, as well as other states with SWFL habitat. In January 2018, APHIS issued an English-language factsheet discouraging the movement of the beetles. APHIS' State Plant Health Directors (SPHDs) for Arizona and New Mexico received the flyer in March 2018. The New Mexico SPHD distributed the flyer during meetings with the Cooperative Agricultural Pest Survey program, Pueblo of San Felipe, and the Middle Rio Grande Endangered Species Collaborative Program. The Arizona SPHD provided a copy of the flier to the state department of agriculture, which was receptive to providing it as a resource when needed. In December 2018, APHIS published a Spanish version of the flyer.

APHIS created a communications plan that targets landowners and land managers and identifies the most appropriate local agencies and organizations that could cooperate with us in disseminating our message to this audience. In October 2018, APHIS created a new page on its website called "Moving Tamarisk Leaf Beetles" as a source of agency outreach to further discourage the intentional human-assisted movement of the beetle.

Under the no action alternative, APHIS would not expand these efforts to implement a SWFL conservation program.

B. Preferred Alternative

Under the proposed conservation program alternative, APHIS will fund surveys for the flycatcher and tamarisk leaf beetles during FY-20, fund a publicly accessible restoration science information repository, and fund habitat models based on current satellite imagery. For future years, APHIS will consider assisting existing conservation programs, contributing funding, monitoring beetle impact, and evaluating additional projects with the potential to benefit the flycatcher. The preferred alternative, implementation of a new SWFL conservation program, would employ the concept of adaptive management. Under adaptive management, conservation measures would change over time so long as the new measures do not pose greater risk to the human environment and nontarget organisms than the risk posed by existing program activities. Adaptive management would ensure program actions remain effective and use the best available technologies. Adaptive management would allow the Agency to assess the impact of habitat improvement activities on the flycatcher and further reduce potential negative impacts. Finally, the programmatic nature of this proposed action must allow for the flexibility that is necessary for a conservation program of this scope.

To ensure the Agency complies with the remedy remanded by the court on June 19, 2018, APHIS is considering ten groups of conservation measures. APHIS examined each measure carefully and thoroughly explored how to utilize its authorities to advance the recovery of the flycatcher. At this time, APHIS has identified opportunities to implement actions that address some of these measures and those program elements are described in greater detail below the list

of measures. APHIS remains committed to consideration of actions within its authority to accomplish the measures as part of the adaptive management approach when opportunities arise or circumstances change in the future.

1. *Riparian Restoration*. This measure involves contributing resources toward actions within APHIS' authority on projects where cooperators are performing intensive third-party riparian vegetation management efforts or otherwise facilitating the mass planting of native vegetation beneficial to SWFL (e.g., willows) at high-risk and medium-risk sites, as prioritized by RiversEdge West (REW, formerly the Tamarisk Coalition), to ensure that suitable habitat exists to mitigate the potential adverse effects of beetle defoliation of saltcedar. USFWS noted in their comments that agencies commonly misapply the term "restoration" to projects where saltcedar is removed and native vegetation is planted. They cited the U.S. Environmental Protection Agency (USEPA) definition with the key concept of improving biological, ecological, or natural processes and functions. USFWS clarified that "cut and plant" techniques, hereafter called vegetation management, do not account for the landscape conditions or natural processes and functions that are primarily responsible for creating the plant community (Poff et al., 1997).

Projects throughout the flycatcher's range will be rated on the presence of a variety of features, such as the presence of dependable water sources, either natural (e.g., bank lowering) or irrigated (e.g., agricultural field return flows). Another factor APHIS will consider while rating projects is current flycatcher breeding success or occupation, because maintaining or augmenting existing flycatcher breeding populations is a greater priority than allowing loss and potential replacement elsewhere (USFWS, 2002). This is not an exclusive list of factors and conservation recommendation from USFWS that APHIS will consider. APHIS funded SWFL surveys, described below the list of measures, will provide data for our analysis. Sites without appropriate conditions for habitat improvement will be rated with the lowest priority. Sites with the ability to monitor the plant and flycatcher success rates over time will receive higher ratings, as will sites where the removal effort is partnered with vegetation planting and management. APHIS anticipates forming partnerships with governmental land management agencies or non-profit organizations working on private property. Organizations with either the ability to accept appropriations or able to cooperate through interagency agreements will receive higher ratings. Since APHIS is not a land management agency, a primary factor is an actual opportunity to perform habitat improvement through a cooperative partnership with an agency or conservation organization who have access to the sites. APHIS would likely direct individual property owners to contact the NRCS or FSA for conservation practice assistance.

Several commenters advised APHIS to follow the process described in Restoration Ecology titled, "Planning Riparian Restoration in the Context of Tamarix Control in Western North America. Restoration Ecology" (Shafroth et al., 2008). To a certain extent, APHIS is using this process in that (1) goal identification; and (2) development of objectives (including evaluation of important ecological and non-ecological site factors) occurred through the Agency's public engagement (i.e. the Notice of Intent, and preparation of the Draft EA). APHIS will prioritize implementation of habitat improvement at sites based on the criteria listed above and the realistic development of a site-specific plan (i.e. steps 3-site prioritization, 4-development of a site-specific plan, and 5-project implementation). APHIS is committed to post-implementation monitoring and maintenance (step 6) and adaptive management (step 7). Where appropriate, the adaptive management would assess the positive or negative effects through staged habitat modification (i.e. trial plots or partial project implementation) that allows for gradual habitat conversion from saltcedar to native vegetation.

The article outlines two approaches to riparian habitat improvement following saltcedar removal. Passive riparian vegetation management involves removal of non-native species and allowing floods to expand an existing floodplain and distribute vegetation propagules, as well as management of livestock grazing pressure. Active riparian vegetation management also includes mechanical planting of rooted plants or poles and seeding vegetation. The success of active revegetation management depends on individual site characteristics, including soil horizon composition, surface and groundwater availability, soil salinity, and soil microbiota. APHIS will evaluate these factors before cooperating on active revegetation projects (see below, Surveys – Habitat improvement site physical, environmental and biological surveys). One commenter asked if APHIS would fund remediation of sites where some of the previously described characteristics are poor. If remediation is necessary prior to vegetation management, APHIS would consider all proposals based on their merits and the Agency's authorities.

APHIS is soliciting opportunities throughout the flycatcher's current and historical range to form exchange of services partnerships where the Agency will perform actions within its authority and the cooperators will plant native vegetation that is beneficial to SWFL. APHIS is not discriminating against sites that are not SWFL Critical Habitat or do not have equivalent designations (i.e. Habitat Conservation Plans) because APHIS will be evaluating every project based on its conservation benefit to the flycatcher. APHIS is most interested in forming partnerships for restoration projects, though the feasibility of any particular partnership and project will depend on consideration of the factors identified above, and that are beyond the scope of analysis in this programmatic review. Within the flycatcher's summer range these locations are where APHIS is most interested in accomplishing habitat improvement because of recommendations prepared by REW:

- Middle Rio Grande, including sites at the Elephant Butte Lake State Park and the Bosque del Apache National Wildlife Refuge;
- Gila River (entire reach);
- San Pedro River, including sites from the Narrows to the Gila River confluence;
- Bill Williams River, including sites at the Alamo Lake margin, the Big Sandy confluence, and the Santa Maria confluence;
- Burnt Springs and Colorado River confluence within Grand Canyon National Park managed by the National Park Service;
- Colorado River Mile 274 within Grand Canyon National Park managed by the National Park Service;
- Pearce Ferry within the Lake Mead National Recreation Area managed by the National Park Service;
- Cottonwood Cove on the western shore of Lake Mohave within the Lake Mead National Recreation Area managed by the National Park Service;
- Lands within the Fort Mohave Indian Reservation along the Colorado River above and adjoining Topock Marsh and the Havasu Wildlife Refuge;
- Colorado River, including sites at the Chemehuevi Indian Reservation below Lake Havasu;
- Virgin River, including sites at Mesquite, Mormon Mesa, Littlefield, and St. George;
- Muddy River, including sites at Overton Wildlife Management Area to Lake Mead;
- Lower Colorado River, including sites from Glen Canyon Dam to Lake Mead, Davis Dam to Parker Dam, and Parker Dam to Imperial Dam;
- Verde River, including sites from Horseshoe Lake to Salt River;
- Roosevelt Lake;
- Santa Maria River, including sites upstream from U.S. Highway 93 and from Date Creek to Alamo Lake;
- Big Sandy, including sites from the USGS gage to Alamo Lake; and
- Lower Tonto Creek.

One commenter provided APHIS estimates of both the area of previous habitat improvement projects at these sites and the potential area of future conservation activities at each location. APHIS is soliciting opportunities to improve flycatcher habitat throughout the bird's range and will evaluate participation based on many ecological and logistical factors wherever those potential partnerships arise. APHIS recognizes the effects of the tamarisk leaf beetle on flycatcher habitat necessitate vegetation management where saltcedar defoliation has occurred. In addition, the time needed to grow native trees as an alternative nesting habitat to saltcedar also raises the priority of performing habitat improvement where tamarisk leaf beetles have not arrived. These

factors will be considered, but the Agency believes the other feasibility factors (i.e. hydrological and biological) should have greater weight.

2. *Tamarisk Leaf Beetle Surveying and Data Collection*. This measure involves compiling and synthesizing the results of survey and data collection efforts leading to a better understanding of the tamarisk leaf beetle's past and projected movements into flycatcher habitat.

3. *Geographic Information System (GIS) Habitat Mapping*. This measure involves funding and assisting other Federal and State agencies with GIS mapping of saltcedar and native riparian cover across the southwestern United States—and specifically throughout the flycatcher's occupied range. Modeling species habitat at multiple landscape scales is critical for guiding species conservation planning (e.g., Razgour et al., 2011). Habitat models with coarse scale resolution, between 0.6 mile to 12.4 mile across (one to 20 km) and medium scale resolution 10 to 1,000 yards across, can inform location of specific conservation sites with crucial consideration of functional connectivity for a species across the landscape (Duflot et al., 2018; Gilby et al., 2018).

4. *Educational Campaign*. This measure involves continuing current public outreach efforts and collaborating with Federal, State, Tribal, and local authorities to prohibit or strongly discourage any further intrastate movement, distribution, or release of tamarisk leaf beetles as a means of slowing the beetle's spread into additional reaches of flycatcher habitat. While APHIS acknowledges the variety of opinions concerning saltcedar, the Agency intends that the best available science should be part of the educational campaign. This campaign may include public outreach in a variety of languages to meet the needs of minority or Native American residents near the project areas. This also would likely include developing outreach to private landowners on how to identify the tamarisk leaf beetle and its damage, and sharing information about habitat improvement.

5. *Streamlined Permitting Process*. This measure involves collaborating with USFWS and other relevant agencies to streamline the ESA permitting process for third parties engaged in habitat improvement work to benefit flycatchers. APHIS supports efforts to simplify the process to attain permits for activities that may affect protected species and their habitats. USDA – NRCS consulted with USFWS on multiple conservation actions, offered through the WLFW partnerships, to be performed on land owned or controlled by private producers. The consultation resulted in a list of conservation practices that have been preapproved by USFWS, therefore reducing the permitting burden on the private landowner. It is important to note USFWS and other agencies charged with protecting natural resources establish their own permit process for sound and justifiable reasons and

are not likely to be enthusiastic about interagency efforts to streamline their evaluation and analysis.

6. *Watershed Partnership Collaboration*. The court asked APHIS to consider working cooperatively with, and providing habitat improvement funding for, established watershed partnerships that have already developed detailed vegetation management plans, as listed below. APHIS has been soliciting these partnerships for several years and anticipates several will result in habitat improvement projects described in measure 1. *Riparian Restoration*.

7. *Streamlined Funding Sources*. This measure involves ensuring that funding streams for conservation projects are in easily accessible structures, such as block grants administered by the National Fish and Wildlife Foundation or a similar entity, rather than through cost share programs. APHIS currently has robust funding options including direct contracting with private companies and the ability to enter into cooperative agreements with state and local governments, colleges and universities, non-profit institutions, foreign governments and tribal organizations. APHIS does not fund programs through "block grants" but rather uses agreements to ensure proper oversight of agency resources.

8. *Information Repository*. This measure involves funding and facilitating a long-term centralized and standardized information repository concerning the tamarisk leaf beetle, its spread, vegetative resources in the southwestern United States, and the flycatcher's status. REW is a non-profit organization that advances the improvement of riparian lands through education, collaboration and technical assistance. Since 2001, REW hosted annual symposia and research conferences, presented developments in scientific research and the experiences of riparian habitat improvement professionals. REW provides the public and ecological restoration community an extensive amount of information such as revegetation best management practices, long-term funding procurement, project monitoring, and site maintenance. They also offer support systems including local level partnerships, communication and policy frameworks, and financial resources to achieve healthy and self-sustaining river systems. APHIS could contribute funds to create, update, and maintain an online information repository within the Resource Center housed on the REW website.

9. *Invasive Plant Control*. This measure involves reducing the amount of invasive plants and monitoring their return in riparian areas where native vegetation planting was done or is planned. This measure is an example of actions within APHIS' authority that could be exchanged in a cooperative partnership to facilitate habitat improvement (i.e. see measure 1. *Riparian Restoration* above). Invasive plant species that could be controlled include

saltcedar, Russian olive, Russian knapweed (*Acroptilon repens*), perennial pepperweed (*Lepidium latifolium*), camelthorn (*Acacia erioloba*), giant reed (*Arundo donax*), crimson fountain-grass (*Pennisetum setaceum*), ravenna-grass (*Saccharum ravennae*), Athel tamarix (*Tamarix aphylla*), tree tobacco (*Nicotiana glauca*), cheatgrass (*Bromus tectorum*), Russian thistle (*Salsola* spp.), Siberian elm (*Ulmus pumila*), tree-of-heaven (*Ailanthus altissima*), and palm trees. However, the removal of these plants are not necessarily important for flycatcher conservation, and in the case of saltcedar would require a strong justification in consultation with USFWS. Instead, the resources provided by APHIS for invasive plant control and subsequent monitoring on a given project would be a component of a broader comprehensive habitat improvement effort accomplished through the partnership with other governmental or conservation organizations. USFWS commented that exotic plants should be managed by reducing conditions that allow them to be successful, and they are largely a symptom of land and water management. APHIS is currently considering the following areas, and is soliciting additional potential habitat improvement sites:

- The Bosque del Apache National Wildlife Refuge is restoring approximately 2.5 river miles through a Burn Area Rehabilitation Project. USFWS wishes to further expand the project by restoring SWFL habitat effected by the fire. APHIS is considering providing funding to control and monitor invasive plants on 200 acres of flycatcher habitat immediately adjacent to the Rio Grande during the next five years.
- The Gila Watershed Partnership is a non-profit organization that works to improve and restore the upper Gila River. APHIS is considering funding invasive plant control over five years to provide alternative native nesting habitat for the flycatcher in 1,032 acres. USFWS expressed skepticism over the long-term viability of vegetation management activities performed along the Gila River.
- The Grand Staircase Escalante Partners (GSEP) requested funding over three years to monitor and control invasive plants on approximately 5,700 acres of public and private lands in the Escalante River watershed.
- The Friends of the Verde River is a public and private partnership who improve riparian habitat by removing invasive vegetation. They are working on two projects and requested APHIS to provide funding for protected species surveys, removal of invasive plants, and maintenance and monitoring to prevent reestablishment of noxious weeds. One project covers a five-mile reach of the Verde River (approximately 400 acres), and the other project is Peck's Lake, located on a Verde River terrace with an old oxbow wetland (435 acres). USFWS noted that saltcedar is a small component of the plant species composition on the upper Verde River, and so tamarisk beetle impacts will be localized and minor in that reach.

- The Washington County Water Control District and their partners are planning to improve and protect flycatcher habitat on the Virgin River near St. George, Utah. Seegmiller Marsh is located in an abandoned river channel meander and includes multiple depressions with wetlands, open water and upland areas with a mixture of native trees, giant reed, cattail, and dense stands of saltcedar in wet areas. It provides nearly 100 acres of valuable habitat for a multitude of wildlife species a portion of which is good nesting habitat for the flycatcher. The District asked APHIS for funding to control invasive plants and noted many activities associated with this project could facilitate the establishment of the native vegetation.
- The Lower San Pedro River Wildlife Area is a set of several land parcels comprising approximately 2,116 acres owned and managed by the Arizona Game and Fish Department (AGFD). This river acts as an important wildlife corridor within AGFD's Resource Category I for Wildlife and Wildlife Habitat Compensation. Habitats in this category are of the highest value to Arizona wildlife species, and are unique and irreplaceable on a statewide or ecoregion basis. AGFD plans to create additional habitat and enhance designated critical habitat for the flycatcher. The planned vegetation management is focused on a conversion to native riparian vegetative species for SWFL nesting habitat prior to the arrival of tamarisk leaf beetles. The project includes monitoring and maintenance of post-restoration vegetation communities as well as enhancing existing wetlands. USFWS noted that saltcedar is a small component of the plant species composition on the lower San Pedro River, and so tamarisk beetle impacts will be localized and minor in that reach.

10. *SWFL Data Collection Surveying*. This measure involves funding data collection surveys throughout the breeding range of the flycatcher. Data collected by researchers may include but is not limited to: flycatcher presence or absence surveys, determining breeding status for each bird, site evaluations and descriptions, flycatcher nest searches, flycatcher nest monitoring at breeding sites in order to calculate parasitism and predation rates, impact of habitat improvement efforts, and the amount of saltcedar defoliation caused by the tamarisk leaf beetle. Several commenters, including USFWS, suggested a range-wide survey informed by GIS habitat models would have higher conservation value than single site surveys.

APHIS received conservation program suggestions during the notice of intent comment period. Most of the commenters supported some or all of the ten measures listed above, and some additional measures were proposed as well as the adaptive management approach. The additional measures that were suggested include:

- Funding the construction, installation, and maintenance of strategically placed cowbird traps in flycatcher-occupied riparian habitat to reduce nest parasitism; and

- Funding additional development and testing of a tamarisk leaf beetle repellent by Montana State University.

APHIS has the goal of supporting the recovery of the flycatcher through improvement of riparian habitat while recognizing local land use constraints (social and economic interests) and by supporting the development and dissemination of the science necessary to support flycatcher recovery. Overall, it will evaluate projects based on the decision support system prioritization strategy. The decision support system prioritization strategy is a flexible decisionmaking process that allows the Agency to evaluate projects based on values held by stakeholders, anticipated biological benefits, certainty of success, socioeconomic impacts, and educational values (Beechie et al., 2008). After vetting the projects using the decision support system prioritization strategy, APHIS would then determine on a case-by-case basis whether sites and projects fit within the Agency's framework, authorities and needs by using the decision framework outlined in Figure 1. The framework includes ESA section 7(a)(1) consultation with the USFWS to ensure the selected projects have effective conservation practices that may result in range-wide or Wildlife Management Unit benefits for the flycatcher.

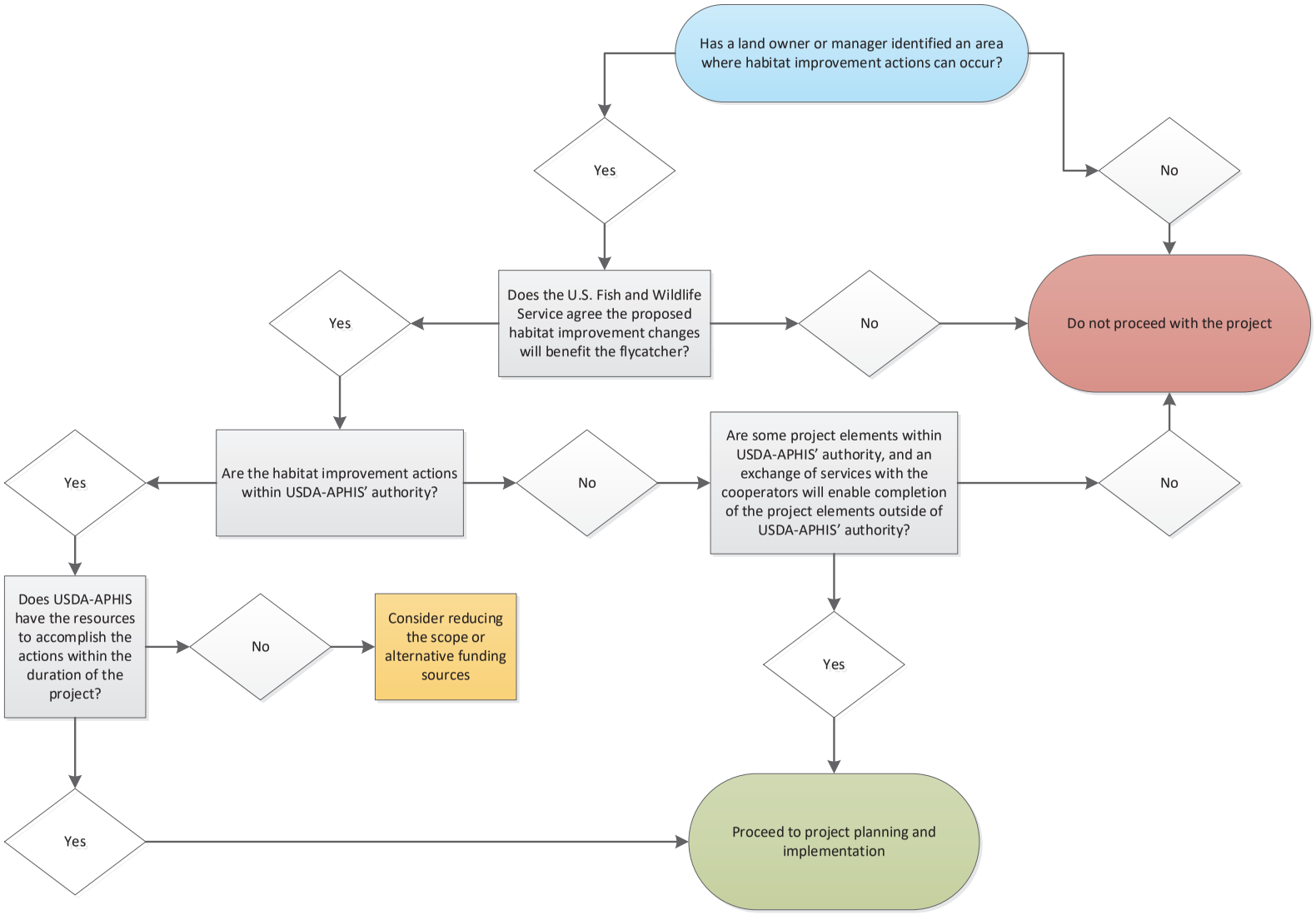

Figure 1. Decision framework used to determine if APHIS should proceed with a proposed flycatcher habitat improvement project.

APHIS anticipates continually receiving project proposals as part of its ongoing SWFL conservation program, and is most likely to implement projects with elements listed below. APHIS identified these elements after evaluating the ten groups of conservation measures, and the values reflected in the public comments. They are designed to improve the conservation status of the flycatcher and are within the reach of APHIS' authorities. We describe each element in more detail below.

Surveys – SWFL

APHIS funded and plans to continue funding researchers to conduct flycatcher presence or absence surveys, determine breeding status for each bird, and provide site evaluations and descriptions. Understanding the demographic factors that affect flycatcher population growth is essential in implementing appropriate conservation actions and restoration efforts (USFWS, 2002). Demographic data analysis combined with detailed knowledge of the natural history, breeding biology, and behavior of flycatchers will provide important insight into the factors that may influence productivity. In addition, nest searches and nest monitoring could be conducted at breeding sites to estimate cowbird parasitism and other predation rates. The survey and habitat data would inform research into the demographic factors that affect flycatcher populations. Findings are anticipated to improve implementation of appropriate conservation actions and habitat improvement efforts.

APHIS could use the flycatcher habitat GIS model to design a multiyear range-wide survey to assess the current distribution and abundance of the species. APHIS believes such survey efforts would best be designed and coordinated by USGS and USFWS, with assistance of State Wildlife agencies.

Surveys – Tamarisk leaf beetle

Saltcedar defoliation from the tamarisk leaf beetle increases temperatures in breeding habitat (Bateman and Johnson, 2015), which may exceed the flycatchers' embryonic thermal tolerance, ultimately reducing hatching success (Webb, 1987). Defoliation of saltcedar, ultimately resulting in tree mortality, can alter habitat quality and degrade breeding productivity of the flycatcher. In recent years, the beetle spread into SWFL habitat along the Rio Grande River in New Mexico, the lower Colorado River and the northwestern portion of the Gila River watershed near Wickenburg, Arizona. During the summer of 2019, the beetle was found on the Verde River near Cottonwood, Arizona. The impact of the tamarisk leaf beetle on flycatchers will depend on the particular response of the site and how successfully native plants establish after saltcedar begins to decline. There is currently a high level of uncertainty about expected long-term impacts, however, the effects will depend on the system and the specific wildlife species involved (Bateman and Johnson, 2015; Bloodworth et al., 2016). As the tamarisk leaf beetle continues to spread to non-infested areas of Arizona, APHIS could use survey results in prioritizing habitat improvement efforts. However, the Agency's overall approach is to evaluate every opportunity

to create new breeding habitat irrespective of beetle impacts. APHIS will solicit and rely on the data and information of other Federal and State agencies as well as conservation oriented groups for anticipating area specific effects of saltcedar defoliation by the tamarisk leaf beetle.

Under the preferred alternative, APHIS would focus on data collection that supports the success of flycatcher habitat improvement. APHIS also would be likely to enter into a Memorandum of Understanding with RiversEdge West to share *Diorhabda* species survey data, and support their online repository of beetle survey data. Their annual report of beetle locations is available at https://riversedgewest.org/sites/default/files/files/2017_Annual_Report_For%20Web_Condensed.pdf.

Surveys – Habitat improvement site physical, environmental, and biological surveys
APHIS would likely form collaborative partnerships with riparian conservation organizations to facilitate planting and establishment of native shrubs and trees in flycatcher breeding habitat. However, several other habitat creation or improvement efforts have failed because of scarce water resources, poor soil characteristics, the lack of mutualisms with beneficial root-associated fungi (mycorrhizas), unsuitable hydrological regimes, and inappropriate origin and genetic diversity of vegetation stocks resulting in low adaptability to cope with periodic water deficits and heat waves. APHIS would use surveys of potential vegetation management sites to evaluate the metrics that should be considered, including: water availability, plant genetic diversity, soil chemistry, hydrologic regime, mycorrhizal mutualist characteristics, climate change adaptation, and growth and mortality of vegetation. Because potential vegetation management actions are meant to benefit the flycatcher, the proximity of sites to past and current flycatcher habitat would also be a primary metric. Information from these surveys would support APHIS' conservation program habitat improvement decisions as part of its adaptive management strategy.

Invasive plant control on SWFL habitat conservation sites

Invasive vegetation
APHIS would likely form collaborative partnerships with riparian conservation organizations or governmental land management agencies where APHIS will provide funding for invasive plant control to complement habitat improvement activities already in progress or anticipated. Through this cooperative arrangement, APHIS would facilitate the improvement of flycatcher habitat through an exchange of services. APHIS will perform actions within the Agency's authority (i.e., invasive plant control), allowing the cooperators to improve other conservation actions. Although saltcedar is typically considered invasive, removal of this flycatcher nesting substrate is unlikely to gain approval from USFWS and the APHIS program managers. Where saltcedar flourishes, management methods that focus on removing saltcedar and planting native vegetation, but do not address the underlying cause for saltcedar persistence, will likely fail to influence the long-term plant species composition (Shafroth et al. 2008, USFWS 2002). APHIS will prioritize partnership opportunities where the goal is to maintain or augment existing flycatcher breeding populations over potential habitat replacement through a vegetation

management program elsewhere. USFWS commented that aggressive habit alteration would likely result in adverse effects to SWFL and its critical habitat, requiring careful evaluation (USFWS, 2019).

Saltcedar introduction into North America was from Asia in the early to mid-1800s. Uses of the plant include windbreaks, ornamentals, and erosion control. By 1890, saltcedar establishment in river systems and drainages in the southwest often displaced native vegetation. By the 1950s, saltcedar occupied most western riparian areas along major streams from the central Great Plains to the Pacific and from northern Mexico to southern Montana (USDA-APHIS, 2005). In 2005, researchers estimated saltcedar occupied 1 million to 1.6 million acres ranging from northern Mexico to central Montana and from central Kansas to central California (Shafroth et al., 2005). Historically, saltcedar was blamed for decreased water availability, degraded wildlife habitat, displaced native vegetation, and increased fire severity and frequency (Brock, 1994; DiTomaso, 1998; Drus, 2013). However, the scientific consensus on some of these views shifted toward recognizing that saltcedar is better adapted to the hydrological flow regimes of highly regulated rivers than native tree competitors.

Saltcedar is an important vegetative component of the flycatcher's breeding and foraging habitat (Durst et al. 2008, p. 15) (78 FR 355-357), and the reasons behind the presence and proliferation of saltcedar throughout the southwestern United States are often misunderstood by land managers/owners, agencies, and politicians (Gelt 2008, pp. 2-3; Nagler et al. 2009, pp. 11-31; Chew 2009; Stromberg et al., 2009). Rangewide, about 50% of all known flycatcher territories are located within sites where the habitat includes native/exotic vegetation mixtures (Durst et al. 2008, p.15). Nesting habitat comprised mostly of native vegetation accounts for fewer than half (44%) of the known flycatcher territories (Durst et al. 2008, p.15). Exotic plants (primarily saltcedar) can be important to nesting flycatchers by providing the preferred densely vegetated lower strata habitat structure (Durst et al. 2008, p.15) and supporting insect prey species for health and successful reproduction (Sogge et al. 2005, pp. 5-6). Specific research comparing the flycatcher's use of native plants and saltcedar was completed in central AZ by USGS (Sogge et al., 2005). While Sogge et al. (2005, p.1) cautioned against extending their conclusions to the flycatcher's entire range (because the study occurred at a single location), they found no evidence from their long-term study that nesting in saltcedar-dominated habitat is detrimental to flycatcher physiology, immunology, site fidelity, productivity, or survivorship. And while they detected a difference between the two habitats in the flycatcher's diet of insects, they did not determine that food resources are limiting or insufficient in one habitat compared to the other.

APHIS recognizes the value of saltcedar as flycatcher habitat, and does not view saltcedar removal as habitat improvement or "restoration". Because there remain a variety of opinions on saltcedar, APHIS has no plans to restrict the decisions of land managers or property owners to control saltcedar using mechanical or chemical treatments. The APHIS moratorium on interstate

movement and environmental release of *Diorhahda* beetles remains in effect since June 15, 2010. APHIS strongly discourages the use of tamarisk leaf beetles to control saltcedar within the range of the flycatcher.

To manage saltcedar and other invasive plants such as Russian olive in flycatcher habitat, APHIS would likely incorporate the targeted use of herbicides into its conservation program. The Agency may use herbicides to allow the establishment of native islands of vegetation within saltcedar dominated forest stands, where these islands would serve as alternative nesting substrate and refugia for the flycatcher as tamarisk leaf beetles defoliate saltcedar. These native islands of vegetation would also provide seed sources for natural recruitment of native riparian plants.

APHIS may provide funding for, or apply the following herbicides to, emerging invasive plants in riparian areas as part of broader habitat improvement projects at specific sites: triclopyr, imazapyr, 2,4-dichlorophenoxyacetic acid (2,4-D), glyphosate, and surfactants (Activator 90, spec 80/20, Ranier). Targeted herbicide applications would be made using a paintbrush or handheld backpack sprayer. Herbicide applicators would adhere to the requirements on the herbicide labels. To avoid disturbance of flycatchers and potential effects on their prey, herbicide treatments will not occur during the nesting season. Additional information regarding each herbicide is below.

(1) Triclopyr

Triclopyr is a selective systemic herbicide used for control of woody (e.g., saltcedar) and broadleaf (e.g., tree of heaven) plants. The acute oral median lethal dose (LD_{50}) ranges from 2,000 to 3,000 milligrams of herbicide active ingredient per kilogram of affected organism body weight (mg/kg) for various formulated triclopyr products. Triclopyr is slightly toxic to birds and practically nontoxic to fish. It has the potential to be mobile in soil and is degraded rapidly by soil microorganisms. Triclopyr degradation is mainly caused by sunlight when in water (USDA-APHIS, 2005).

(2) Imazapyr

Imazapyr use controls grasses and broadleaved weeds, brush, vines, and many deciduous trees. Absorption of the herbicide is through the leaves and roots, and then the chemical rapidly moves through the plant. Imazapyr and its formulations are low in toxicity to invertebrates and practically nontoxic to fish. Imazapyr is practically nontoxic to mammals and birds. The LD_{50} in birds was greater than 2,150 mg/kg and 4,800 to greater than 5,000 mg/kg for mammals. In tests in rats, the acute oral LD_{50} was greater than 5,000 mg/kg. Imazapyr can remain active in the soil for six months to two years. Imazapyr may be broken down by exposure to sunlight and soil microorganisms (USDA-APHIS, 2005).

(3) 2,4-D

2,4-D is a selective systemic herbicide used to control broadleaf weeds where the control of grasses is not desirable. Herbicide formulations vary, and the compound is available as salts, esters, or combinations of salts and esters. All but one of the formulations are liquid. 2,4-D is slightly to moderately toxic to mammals, practically nontoxic to moderately toxic to birds, and practically nontoxic to honey bees. Most 2,4-D formulations are classified as practically nontoxic to freshwater and marine fish, aquatic invertebrates, and amphibians. In contrast, 2,4-D esters are classified as highly toxic to these groups. The acute oral LD_{50} ranged from 579 mg acid equivalents per kilogram (a.e./kg) to 1,646 mg/kg for the various formulations in test rats (USDA-FS, 2006). The LD_{50} values in birds ranged from 404.6 mg a.e./kg body weight (bw) to greater than 3,851.2 mg a.e./kg bw. The half-life for 2,4-D typically ranges from 2−10 days for 2,4-D acid and esters, but the rate of degradation can be affected by many site factors, including high nitrogen concentrations (USDA-FS, 2006). Public comments suggested that 2,4-D esters should not be used based on their toxicity levels. For the aforementioned reasons, USDA anticipates giving lower priority to projects that propose using herbicides, and in particular, herbicides containing the ester form of 2,4-D.

(4) *Glyphosate*

Glyphosate is a broad-spectrum, systemic, general use herbicide. It is practically nontoxic by ingestion with a reported acute oral LD_{50} of 5,600 mg/kg in rats. It is practically nontoxic by skin exposure with dermal values of greater than 5,000 mg/kg. The USEPA does not recognize glyphosate as having chronic toxicity, reproductive, teratogenic, mutagenic, or carcinogenic effects. It is only slightly toxic to wild birds and aquatic invertebrates and practically nontoxic to fish. Glyphosate is moderately persistent in soil with an estimated half-life of 47 days. Although it is highly soluble in water, it does not leach appreciably and has low potential for runoff. Microbes are primarily responsible for breakdown of glyphosate; volatilization or photodegradation losses are negligible (USDA-APHIS, 2005).

(5) Surfactants

The addition of non-ionic, aquatic surfactants to triclopyr and glyphosate spray mixtures improves the results of these herbicides by reducing surface tension of the spray droplets. This allows for greater surface area contact, which enhances the opportunities for absorption into the leaf, resulting in a greater dose within the plant tissues and improved probability of killing the target vegetation (North Carolina Cooperative Extension, undated). Activator 90, spec 80/20 and Rainier-EA are examples of surfactants. These surfactants are highly soluble in water (Loveland Products, 2016; Ragan and Massey, Inc., 2017; Wilbur-Ellis Company, 2017). The acute oral LD_{50} in rats is greater than 1,300 mg/kg for 80/20 surfactants (Ragan and Massey, Inc., 2017) and ranges from 3,870−5,000 mg/kg for Activator 90 (Loveland Products, 2016). It has dermal toxicity values of greater than 2,000 mg/kg (Loveland Products, 2016; Ragan and Massey, Inc., 2017). The 96-hour LC_{50} for *Poecilia reticulata* is 12.7 mg/L, which is slightly toxic (Loveland Products, 2016), and 1.4 mg/L and 2.0 mg/L for rainbrow trout (*Oncorhynchus mykiss*) and

bluegill sunfish (*Lepomis macrochirus*), respectively, which is moderately toxic (Commonwealth of Massachusetts, 2016). Rainier-EA is approved for aquatic use and has no limitations associated with runoff or contamination (Sostrom, undated).

APHIS intends to avoid conducting invasive plant control in areas where livestock grazing occurs. APHIS would consult with land managers and applicable permittees prior to working in those areas. Furthermore, APHIS is not a land management agency and does not have the authority to dictate land or water uses either through regulation or by purchase. To the extent that APHIS needs could not be accommodated by the Agency's partners and the other parties with interests in an area, the flycatcher conservation program activities would not occur in those areas.

Cowbird removal

Brown-headed cowbirds (*Molothrus ater*) are endemic to short and mixed-grass prairies where they developed a commensal relationship with large ungulates. Due to urbanization, logging and farming, the cowbird expanded its range and increased in abundance (Schweitzer et al., 1998). Cowbirds are obligate brood parasites that depend on avian host species to incubate their eggs and rear their young. This nest parasitism can negatively impact flycatcher populations (USFWS, 2002). Cowbird eggs are laid synchronously with the host's eggs, and frequently parasitize birds smaller than them, including SWFL (Schweitzer et al., 1998).

In their recent 5-year review, the USFWS determined that cowbird parasitism is currently a moderate threat to SWFL (USFWS, 2017). In New Mexico, reported rates of flycatcher nest parasitism by cowbirds vary from 18 percent in the Cliff Gila Valley to 40 percent at other sites (USFWS, 2002). In one study, cowbirds only parasitized nests in narrow habitat patches with large edge components and snags that provided perches for cowbirds (Smith and Johnson, 2009). In another similar study, the likelihood of parasitism decreased by 50 percent for nests >100 m from an edge and by 75 percent for nests >200 m from an edge (Stumpf et al., 2012).

Conversely, prior studies in Arizona have shown cowbird nest parasitism rates are minimal at 2.8 percent, and cowbird trapping does not significantly reduce SWFL nest parasitism rates (Ellis et al., 2008). Researchers also recommended that use of cowbird trapping should not be considered unless parasitism rates for a species exceeds 20 percent to 30 percent. APHIS would use cowbird management only in areas where they are documented as nest predators. Monitoring flycatcher nest productivity during SWFL surveys described in this EA would help APHIS determine the relative effectiveness of cowbird management, and identify areas where this would be most beneficial. Upon obtaining this information, APHIS could then determine if it should implement a multiyear control program.

GIS mapping

The Arizona Game and Fish Department developed a flycatcher remote sensing GIS habitat model in 2003 with SWFL survey data acquired along the San Pedro and Gila Rivers, and from Salt River and Tonto Creek inlets to Roosevelt Lake in southern Arizona. The satellite model

uses a logistic regression equation to estimate the probability an area contains a flycatcher territory (Hatten and Paradzick, 2003). The model was then applied statewide in Arizona (Dockens et. al., 2004) and then projected along the Rio Grande River, New Mexico (Hatten and Sogge, 2007). In each case, the satellite model performed within expectations by identifying riparian areas with the highest densities of flycatcher territories. In 2016, the USGS applied the model to 57 Landsat images, mapping the entire range of the flycatcher, encompassing parts of six states and more than 1 billion 30-meter pixels (Hatten, 2016).

APHIS may collaborate with federal, state, and local entities to improve a SWFL habitat assessment model that uses satellite imagery to characterize habitat suitability and health. APHIS may contribute funding and expertise to the development of an online mapping platform for conservation groups and land management agencies to access the model results. Widespread access to the SWFL habitat assessment model would improve conservation planning and prioritization of large and small-scale habitat improvement efforts by property owners and managers.

In addition to funding, APHIS also would likely participate on review panels related to geospatial tool development and flycatcher habitat suitability modeling. APHIS could provide advice and feedback concerning the direction and scope of each task. The Agency's considerable expertise in quantitative modeling of systems analysis could provide advice for modeling and in the interpretation of results. APHIS could play an integral role in determining what questions are asked, identifying the methods to be used, and formulating different simulations and management scenarios.

Collaborative Partnerships

APHIS has the goal of supporting the recovery of the flycatcher through improvement of riparian habitat within our authority while recognizing local land use constraints (social and economic interests) and by contributing to the science necessary to support flycatcher recovery. APHIS would likely enter into collaborative partnerships with entities interested in improving the implementation of conservation activities to benefit the flycatcher. APHIS may focus on partnerships with individuals, agencies, or organizations with demonstrated technical expertise to evaluate the biological and ecological feasibility of habitat improvement projects. To the extent that Utah's existing Invasive Species Mitigation program or other State vegetation management programs are highly rated to improve flycatcher habitat, APHIS may support its efforts toward a timely transition of riparian areas back to native species. APHIS would likely collaborate with researchers or subject matter experts on novel conservation approaches and technologies. APHIS will continue to solicit, develop, and implement projects that are feasible, within its authority and mission, and that have conservation benefits for SWFL.

C. Alternatives Considered and Dismissed

Prior to initiating this EA, APHIS considered other options to support flycatcher conservation. The public also proposed a few additional options during the notice of intent comment period, and the draft EA comment period. APHIS incorporated the remaining viable options that are within the Agency's authority into the preferred alternative. The Agency also solicited opportunities to improve the habitat of native riparian species through cooperative partnerships where APHIS will remove invasive species allowing our cooperators to shift their resources toward other activities that can improve flycatcher conservation. APHIS dismissed alternatives from further consideration if they did not meet the purpose and need for the proposed action. The remainder of this section identifies some of the options that were considered and dismissed.

Another alternative considered and dismissed involved requesting other federal agencies to alter their current water management facility operations, which could reduce hydropower generation or water delivery. USFWS believes it is not reasonable to expect that native riparian habitat will flourish on floodplains or that planting native trees will establish naturally functioning native riparian forests after saltcedar defoliation and mortality along fully allocated and controlled rivers in the arid Southwest (USFWS, 2002). APHIS does not have authority over water control structures in the southwestern United States.

In December 2016, APHIS performed an extensive scientific literature review and completed a Pest Risk Analysis (PRA) of the *Diorhabda* beetle on August 9, 2017 (updated November 1, 2018). The PRA evaluated chemical and biological control methods that could limit or reduce the effects of tamarisk leaf beetles on the saltcedar trees serving as nesting habitat for the flycatcher. APHIS considered an alternative regarding the targeted use of controls against *Diorhabda* spp. in unoccupied flycatcher habitat because this would not directly affect SWFL conservation. Finally, the development of time-intensive beetle eradication programs does not fit the purpose of, and need for, developing an immediate flycatcher conservation program. For this reason, the Agency will not pursue long-term projects involving identification and development of predators or parasites of the tamarisk leaf beetle as biocontrol agents at this time.

The PRA also found that no controls are currently deployed to eradicate tamarisk leaf beetles anywhere in the world; therefore, the use of these management methods, if implemented, would require considerable research to prove their feasibility or effectiveness. The time required for investigation would not serve APHIS' intent to implement a flycatcher conservation program in a timely manner.

APHIS researchers found one study investigated the use of the insecticide imidacloprid to control *Diorhabda sublineata* on *Tamarix aphylla* in Mexico (Estrada-Muñoz and Sánchez-Peña, 2014). One significant limitation to the use of imidacloprid, for the control of tamarisk leaf beetles is the feasibility of application over large areas. While imidacloprid would likely be

effective, the applications are labor intensive, as soil drenches and injections are applied to one tree at a time over multiple years. Additionally, the use of soil drenches is restricted near riparian habitats. The applications are also costly. For example, ash tree injections of imidacloprid to control emerald ash borer were estimated to cost $73 per tree per year (Smitley et al., 2010). Although it is likely that treatment of individual trees could protect them from defoliation by the tamarisk beetle, it could potentially be environmentally and economically costly over large areas.

Mating disruption is a pest control practice typically used to disrupt the ability of males to find females by saturating the environment with synthetic female pheromones (Carde and Minks, 1995); it has primarily been used against Lepidoptera. APHIS researchers noted isolated areas, such as geographically separated saltcedar stands, that might be good areas for mating disruption. However, the estimated 800,000 hectares of saltcedar in riparian areas spread across the United States and Mexico (Carruthers et al., 2008) make it very difficult, if not impossible, to treat the entire suitable area. Mating disruption is only effective when population densities are low and populations are geographically isolated from each other (Carde, 1990; Carde and Minks, 1995; El-Sayed et al., 2006). Research would be needed to confirm the presence of female-produced sex pheromones in tamarisk leaf beetles, but the male aggregation pheromone likely precludes mating disruption from being a viable method of control because it attracts both sexes to an area in equal ratios, rather than attracting one sex to a single point source.

Mass trapping and attract-and-kill are similar methods successfully used to control Lepidoptera, Coleoptera, and Diptera (Rechcigl and Rechcigl, 1999; El-Sayed et al., 2006). Mass trapping uses pheromones that attract insects to a trap where they cannot escape and eventually die. Similarly, attract-and-kill technologies use pheromones to attract insects to a point source where they come into contact with an insecticide (El-Sayed et al., 2006). Like mating disruption, mass trapping is most effective with isolated low-density populations and is not successful with moderate to high populations over large areas (Fisher et al., 1985; Potter and Held, 2002; Wawrzynski and Ascerno, 1998; El-Sayed et al., 2006; Rechcigl and Rechcigl, 1999). For this reason, mass trapping by itself is unlikely to be successful in significantly reducing tamarisk leaf beetle populations in most settings. APHIS would need research on the size of suitable buffer zones, population dynamics, beetle biology, pheromone rates, dispersal distances, and trap types to determine the feasibility of mass trapping or attract-and-kill technologies for use on tamarisk leaf beetles.

APHIS also dismissed developing a sterile insect technology (SIT) release program. SIT involves the mass release of reproductively sterile male insects to mate with the wild population of females, preventing the production of offspring for the following generation (Lance and McInnis, 2005). To be successful, a SIT treatment requires the ability to rear, sterilize, and distribute sterile males in sufficient numbers and of sufficient competitive ability to outcompete wild male populations (Lance and McInnis, 2005). Mass rearing facilities are not in place for

tamarisk leaf beetles and are expected to be very costly to develop. Furthermore, because the beetle populations are well established in the United States and these insects are capable of rapid population increases (Lewis et al., 2003; Carruthers et al., 2006), it is unlikely that sterile beetles would be able to outcompete wild males in the populations.

Entomopathogenic nematodes (EPNs) are generalist insect predators used in biological control for decades (Lessord, 2016). One study identified several EPNs as generalist predators infesting *Diorhabda*. However, all EPNs tested could also infect *Galleria mellonella* (Lepidoptera) larvae (Foye et al., 2016), indicating that the identified EPNs do not have a narrow enough host range for use as biological control agents against tamarisk leaf beetles. Riparian corridors are sensitive ecological habitats; introduction of a generalist predator would not be possible due to likely impacts to nontarget species. There were no other entomopathogens (fungi, viruses), parasitoids, or predators that specifically attack *Diorhabda* beetles found in the literature.

III. Potential Environmental Consequences

The affected environment includes the range of potential habitat for the flycatcher located in Arizona, southern parts of California, Nevada, Utah, Colorado, and the western two-thirds of New Mexico. SWFL are limited to riparian zones with surface water or moist soils from May through July. This forms the baseline conditions of the affected environment impacted by potential conservation activities in potential flycatcher habitat. APHIS uses this information as the basis to evaluate potential impacts of the program. The affected environment is incorporated by reference from the "Program for Biological Control of Saltcedar (*Tamarix* spp.) in Thirteen States" environmental assessment (USDA-APHIS, 2005).

This section also evaluates at a broad scale the potential environmental impacts associated with each of the alternatives. APHIS will undertake additional environmental review, as needed, at subsequent stages of program implementation. The no action alternative is compared to the potential of the preferred alternative to affect human health, nontarget species (including threatened and endangered species), and environmental quality. This EA presents a short description of the environmental baseline for each environmental resource analyzed, followed by an analysis of the potential environmental impact to that resource. The potential impacts may be direct, indirect, or cumulative, and of short or long duration. The impacts may also be either beneficial or adverse.

A. No Action Alternative: No Flycatcher Conservation Program

This subsection considers the potential environmental consequences under the no action alternative by summarizing information associated with the physical environment, biological resources, human health and safety, environmental justice, Tribal consultation, and historic and cultural resources.

1. Physical Environment

Air

The Clean Air Act (CAA) is the primary Federal law that protects the Nation's air quality for the purposes of public health and welfare. The CAA requires the USEPA to establish National Ambient Air Quality Standards (NAAQS) for specific pollutants. These pollutants are known as criteria pollutants, and they include ozone, particulate matter, carbon monoxide (CO), nitrogen dioxide, sulfur dioxide (SO_2), and lead. The NAAQS are intended to represent the maximum concentration of a particular pollutant in the ambient air that will not adversely impact public health or welfare. The stringency of air pollution regulations in a particular area is based upon whether that area is in attainment (e.g., compliance) or nonattainment (e.g., not in compliance) with the NAAQS. National levels of criteria pollutants have been trending downward from 1990 to 2006 (Figure 2). While the no action alternative will not directly alter any pollutant levels, the increased risk of fire associated with saltcedar forests could release some or all of these pollutants into the air during a wildfire, which could indirectly impact air quality.

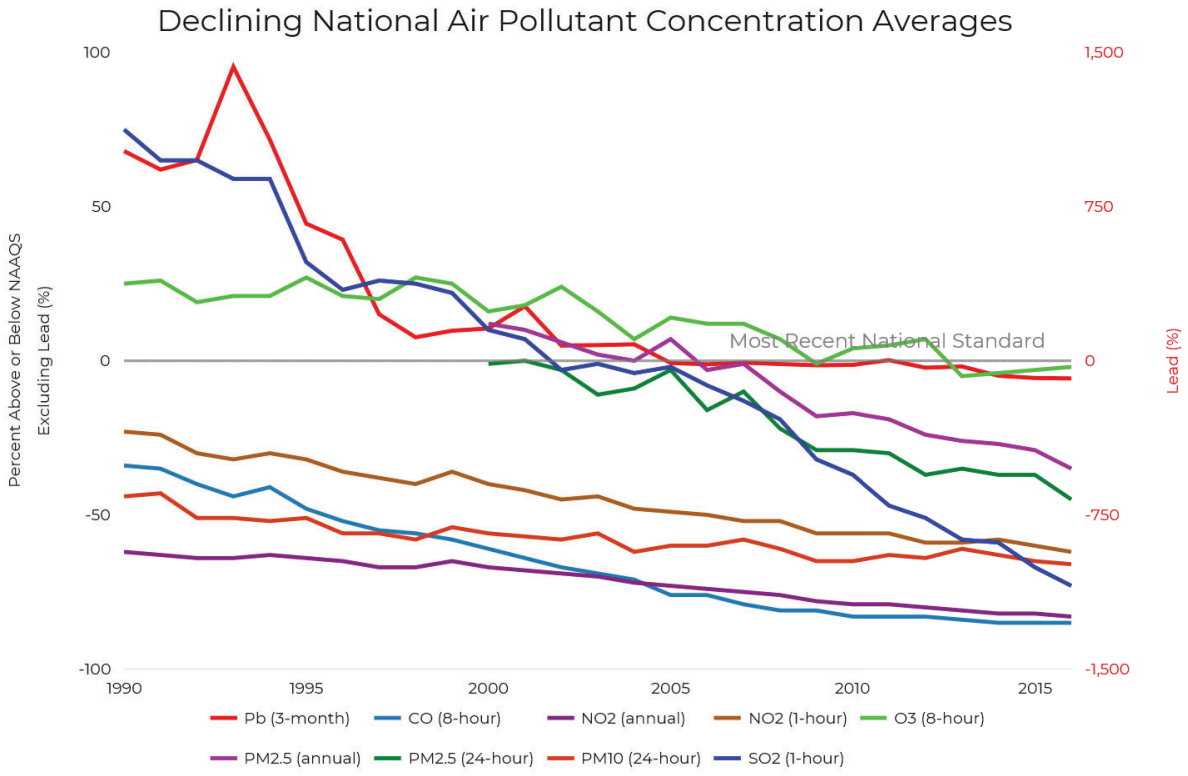

Figure 2. National levels of criteria pollutants from 1990-2016. Source: USEPA (https://gispub.epa.gov/air/trendsreport/2017/#highlights)

Greenhouse gases impact air quality; these gases include carbon dioxide (CO_2), methane, nitrous oxide, and fluorinated gases. Global atmospheric concentrations of these gases have risen significantly over time (USEPA, 2016). Figure 3 shows the increasing concentration of CO_2 in

the atmosphere from 800,000 BCE to 2015. Assuming greenhouse gas emissions continue to increase, higher temperatures associated with these emissions could cause more frequent and severe droughts in the southwest region, with a potential decline of river flow in southern basins. Continued greenhouse gas emissions could also lead to increased frequency of wildfires (U.S. Global Change Research Program, 2018).

Climate change can make riparian habitat improvement challenging. Smaller habitats may disappear while larger habitats may be resilient in adapting to changing conditions. According to Dwire et al. (2018), most riparian ecosystems will experience some degree of increased stress as a result of changing climatic conditions. The effects associated with climate change tend to decrease the likelihood of the best-case scenario occurring. Under the no action alternative, APHIS would not increase the resiliency of flycatcher habitat to climate change.

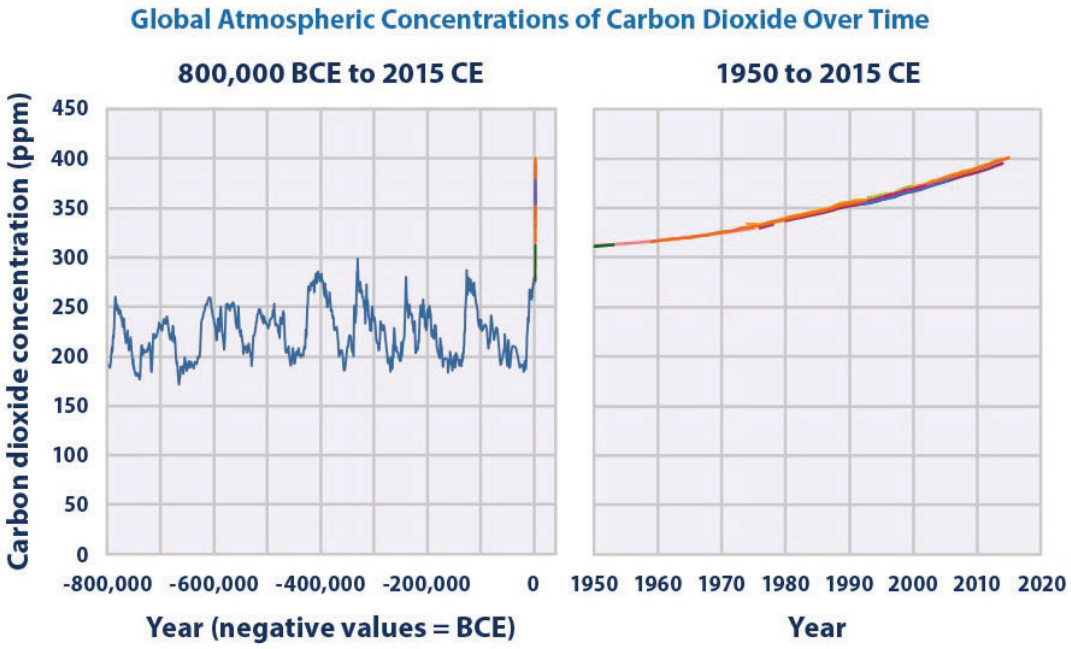

Figure 3. Global atmospheric concentrations of carbon dioxide (CO_2) from 800,000 BCE to 2015, measured in parts per million (ppm). Source: USEPA (https://www.epa.gov/climate-indicators/climate-change-indicators-atmospheric-concentrations-greenhouse-gases).

Water

The Clean Water Act, the Safe Drinking Water Act, and the Water Quality Act are the primary federal laws protecting the Nation's waters. Federal activities also must seek to avoid or mitigate actions that would adversely affect areas immediately adjacent to wild and scenic rivers (National Wild and Scenic Rivers Act of 1968, as amended (16 U.S.C. §§ 1271-1287)).

Protection of riparian areas occurs under the Clean Water Act, which regulates the use and modification of floodplains and wetlands. Surface water runoff can affect surface water quality by depositing sediment, minerals, or contaminants into water bodies. Meteorological factors such as rainfall intensity and duration, and physical factors such as vegetation, soil type, and topography influence surface water runoff (USGS, 2016). Groundwater levels vary seasonally and annually depending on hydrologic conditions. Groundwater is ecologically important because it supplies water to wetlands, and through groundwater-surface water interaction, groundwater contributes flow to surface water bodies (USGS, 1999).

In the southwestern United States, surface and groundwater is valued for agricultural irrigation, residential, municipal, recreational, industrial uses, and hydroelectric production (App, 2012). The construction of dams began in the late 1800s (App, 2012). As of 2018, Colorado had 1,803 dams; California had 1,580 dams; Utah had 860 dams; Nevada had 525 dams; New Mexico had 407 dams; and Arizona had 376 dams harnessing water resources (USACE, 2019). Germination of native vegetation in riparian ecosystems often requires seasonal flooding. However, the construction of dams altered the regularity and intensity in which this occurs (App, 2012).

Under the no action alternative, APHIS would not contribute to the habitat improvement of watersheds. Watersheds and listed segments of rivers in the southwest would be at risk of having their natural, cultural, and recreational values further degraded. Saltcedar could continue to colonize watersheds, or, alternatively, riparian forests may be altered following defoliation of saltcedar leading to increased runoff.

Soil

Riparian soils in the west are affected by increased salinity associated with the natural salinity of the areas, agricultural return flow into the floodplain, and the lack of floods that reduce or prevent the removal of accumulating salts (USDA APHIS, 2005; Shafroth et al., 2010). USFWS commented that salinity levels will fluctuate over time (higher and lower) along regulated rivers that receive periodic flood flows and long periods of time without higher flows, such as portions of the Gila, Salt, and Verde rivers in Arizona, and middle Rio Grande in New Mexico. Soil salinity has increased to levels that no longer support non salt-tolerant riparian plants, and this has facilitated the increase in saltcedar over native plants that are not as tolerant to saline conditions (Shafroth et al., 2008; Shafroth et al., 2010). The no action alternative would not change this dynamic.

Impairment of soil stability occurs when there is replacement of native plants with fibrous root systems by invasive vegetation with deep taproots. This change in ecological balance leads to a long-term reduction in the vegetation carrying capacity of soil, increases in soil erosion, and increased stream bank instability (Lacey et al., 1989; USDA-FS, 2005). Under the no action alternative, APHIS would not alter riparian vegetation in the southwest; therefore, non-native

vegetation impacts to the soil would continue. There would be no disturbance to soils from vehicle or other machinery use associated with flycatcher conservation.

2. Biological Resources

Biological resources include plant and animal species and the habitats where they live. For this EA, biological resources will focus on plants, wildlife, and protected species. The plant and wildlife subsections include both native and non-native species. Protected species refers to migratory birds protected under the Migratory Bird Treaty Act of 1918 (MBTA), as amended, and threatened and endangered species and their critical habitats as protected under ESA.

Vegetation

Riparian zones occur throughout the United States as long strips of vegetation adjacent to streams, rivers, lakes, reservoirs, and other inland aquatic systems that affect or are affected by the presence of water (Fischer et al., 2001). Riparian ecosystems provide essential ecological functions, especially in western North America. In the western regions, there is typically a strong visual contrast between riparian and upland vegetation communities. Riparian vegetation often consists of a lush mixture of trees, shrubs, and other vegetation, while adjacent upland areas generally consist of sparse stands of desert shrubs, forbs, and grasses. Other western riparian zones, such as those in the Rocky Mountains and Pacific Northwest, typically occur along fast-moving streams in deeply incised valleys (USDA-APHIS, 2005).

Civilizations historically settled along river systems. In the southwest, Native Americans built cliff dwellings, pueblos, and jacals along the rivers. In the 1500s, European settlers arrived in the southwest with their livestock and agriculture. Over time, human settlement caused the entire arid and semi-arid riparian ecosystem to become degraded (Johnson and Carothers, 1982).

Saltcedar is an introduced salt-tolerant shrub or small tree from Asia intended for use in windbreaks, for stream bank erosion control, and as ornamentals (Table 1) that has spread widely in riparian zones in the western United States. The species and hybrid complexes usually cannot be morphologically distinguished in the field (USDA-APHIS, 2005). Saltcedar provides fair to good cover for elk (*Cervus canadensis*), deer (*Odocoileus* spp.), small mammals, upland game birds, and waterfowl. Reportedly, black-tailed jackrabbit (*Lepus californicus*) use saltcedar as a food source, and beaver (*Castor* spp.) will eat young saltcedar shoots. Goats (*Capra hircus*) can consume saltcedar as a forage source without an increased need for water. Both sheep (*Ovis aries*) and goats can feed on saltcedar with limited impacts on animal performance over short periods of time (Knight et al., 2018). However, saltcedar is considered poor forage for both livestock and wildlife (Johnson et al., 2007). In some areas, saltcedar is ecologically equivalent to native habitat, leading to 49 species of birds breeding in

saltcedar across the western United States. In Arizona and New Mexico there are 11 bird species of regional or national concern recognized as frequently breeding in saltcedar (Paxton et al., 2011).

Table 1. Saltcedar in the continental United States.

Scientific Name (Tamaricaceae)	**Common Name**	**Distribution (by state abbreviation)**	**Pertinent Characteristics**
Tamarix africana Poir.	African tamarisk	AZ, CA, LA, SC, TX	Ornamental
T. aphylla (L.) Karst.	Athel tree	AZ, CA, NV, TX, UT	Evergreen used in windbreaks; rarely invasive
T. aralensis Bunge	Russian tamarisk	CA, NC	Ornamental
T. canariensis Willd.	Canary Island tamarisk	AZ, GA, LA, NC, SC	Invasive; invasive hybrid is *T. canariensis* x *T. gallica*
T. chinensis Lour.	Five-stamen tamarisk	AR, AZ, CA, CO, MT, NC, NM, NV, OH, OK, OR, TX, UT, WY	Invasive
T. gallica L.	French tamarisk	CA, GA, LA, NC, NM, SC, TX, WA	Occasionally invasive
T. parviflora DC.	Smallflower tamarisk	AZ, CA, CO, CT, DE, FL, GA, ID, IL, KS, KY, LA, MA, MI, MO, MS, MT, NC, NJ, NM, NV, OK, OR, PA, SC, TN, TX, UT, VA, WA	Invasive; ornamental
T. ramosissima Ledeb.	saltcedar	AR, AZ, CA, CO, GA, KS, LA, MS, NC, ND, NE, NM, NV, OK, SC, SD, TX, UT, VA	Cultivated and invasive; invasive hybrids are *T. ramosissima* x *T. chinenesis* and *T. ramosissima* x *T. canariensis*
T. tetragyna Ehrenb.	Four-stamen tamarisk	GA	Ornamental

Sources: USDA (https://plants.sc.egov.usda.gov/java/nameSearch; CABI (https://www.cabi.org/isc/datasheet/52503)

Saltcedar commonly occurs along floodplains, riverbanks, stream courses, salt flats, marshes, reservoirs, and irrigation ditches in arid regions. It often forms pure thickets that extend for miles. It can inhabit a wide variety of ecosystems including oak and hickory, elm-ash-cottonwood, Ponderosa pine, sagebrush, desert shrub, chaparral-mountain shrub, mountain grasslands, Plains grasslands, and prairie, desert grasslands (Barranco, 2001).

Within the SWFL breeding range, saltcedar flourishes primarily because anthropogenic stressors (irrigation, flood control, etc.) degraded or altered conditions that favor the establishment of native tree species. Because native cottonwoods and willows are shallow-water dependent trees that require elevated groundwater conditions to germinate and grow, altered groundwater conditions from actions such as flood control prevent these native species from germinating, growing, and flourishing (Stromberg et al., 2007). Additional environmental conditions hampering these species are greater salinity, depth to groundwater (or limited rooting depth), and distance to the river channel. Overall, saltcedar out-competes native mesic species based on its ability to resist water stress combined with its higher salt and fire tolerances (Knight et al., 2018). Under this alternative, saltcedar will continue to flourish in areas without the tamarisk leaf beetle. Figure 4 shows that two species of *Diorhabda* have become established within the flycatcher migratory range (i.e., most of Arizona and New Mexico, most of southern California, southern Colorado, Nevada and Utah, western Texas). Unfortunately saltcedar is a substantial component of forested riparian areas in central Arizona and the tamarisk leaf beetle is expected to spread there in the next few years. Additionally, APHIS would not provide funding and assistance for GIS mapping of saltcedar and native riparian vegetation across the flycatcher's occupied range.

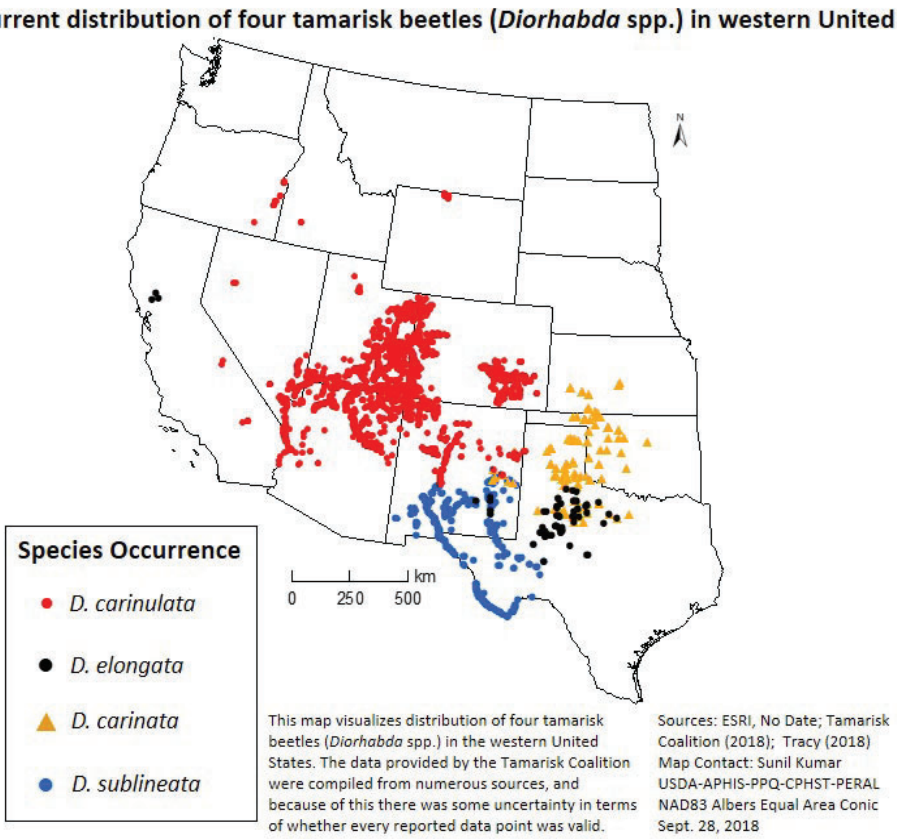

Figure 4: Current distribution of four tamarisk beetles (*Diorhabda* spp.) in the western United States (USDA-APHIS, 2018).

Other invasive plants located in flycatcher habitat are listed in Table 2. Priority species for APHIS to control, as part of cooperative habitat improvement partnerships on projects to facilitate the growth of native trees, are Russian olive, Russian thistle, and cheatgrass. In general, these species outcompete native vegetation, gain a competitive advantage during wildfires, and spread their seeds rapidly and widely.

Table 2. Invasive vegetation (excluding saltcedar) located in Southwestern Willow Flycatcher habitat.

Common Name	**Scientific Name**	**Type of Plant**	**Distribution**	**Ecosystem Effects**
Russian olive	*Elaeagnus angustifolia*	Tree/shrub	Throughout United States	Outcompetes native vegetation
Russian knapweed	*Rhaponticum repens*	Herb/forb	Western, central, and Midwestern United States	Crowds out native species and desirable forage; toxic to horses
Perennial pepperweed	*Lepidium latifolium*	Grass	Western United States; sporadic elsewhere	Forms dense monocultures and crowds out native species; increases erosion
Camel thorn	*Alhagi maurorum*	Tree/shrub	Western United States	Rapidly colonizes areas
Giant reed	*Arundo donax*	Grass	Western and southern United States; sporadic elsewhere	Suppresses and excludes native vegetation; increases fire risks; interferes with flood control
Fountain grass	*Pennisetum setaceum*	Grass	Western, central, and southern United States	Increases fire risks
Ravenna grass	*Saccharum ravennae*	Grass	Predominantly in the western and southwestern United States	Spreads rapidly and outcompetes native species
Athel tamarix	*Tamarix aphylla*	Tree/shrub	Southwestern United States; Texas	Outcompetes native vegetation; diminishes early successional habitat
Tree tobacco	*Nicotiana glauca*	Tree/shrub	Southwestern and southern United States; Ohio	Poisonous
Cheatgrass	*Bromus tectorum*	Grass	Throughout the United States	Outcompetes other species; gains a competitive advantage through promotion of fire

Common Name	Scientific Name	Type of Plant	Distribution	Ecosystem Effects
Russian thistle	*Salsola* spp.	Herb/forb	Majority of the United States	Spreads seeds widely; exploits disturbed ecosystems
Siberian elm	*Ulmus pumila*	Tree/shrub	Majority of the United States	Forms dense thickets; outcompetes native vegetation
Tree-of-heaven	*Ailanthus altissima*	Tree/shrub	Majority of the United States	Forms dense, clonal thickets; outcompetes native vegetation

Source: EDDMapS (http://www.eddmaps.org/); USDA (www.invasivespeciesinfo.gov); CABI; DiTomaso and Kyser (https://wric.ucdavis.edu/information/natural%20areas/wr_T/Tripidium.pdf); NPS (https://www.nps.gov/samo/planyourvisit/upload/recpub_invasiveweedguide.pdf)

The effects from invasive plants on the potential for fire vary with the magnitude of the infestation and overall ecological conditions (USDA-FS, 2012). Fire appears to be less common in riparian ecosystems where saltcedar is not present (Busch and Smith, 1993). Increased fire frequency is attributed to differences among ignition sources, fire frequency in surrounding uplands, and abundance of organic matter (Zouhar, 2003). Higher levels of organic matter contribute to reduced base flows, lowered water tables, less frequent or reduced flooding, and result from water diversions, agriculture, and altered land uses (Ellis et al., 1998; Everitt, 1998; Theobald et al., 2010). While cottonwood and willow species can sprout after a fire, saltcedar may tolerate a burned environment better than these native species, especially in dammed river areas (Zouhar, 2003).

Due to the concern over the impact of saltcedar on native habitat, APHIS issued permits for the release of *Diorhabda* spp. as a biological control agent for saltcedar. The tamarisk leaf beetles thrived beyond their expected geographical and physical limitations and ultimately moved into SWFL habitat. Tamarisk leaf beetles defoliate saltcedar during the early part of the flycatcher's breeding season, reducing the vegetative cover they rely on for successful nesting. By 2018 there were, ". . . many thousands of hectares of completely or partially defoliated tamarisk on riparian floodplains without replacement vegetation in the early stages of infestation" (Nagler et al., 2018). Decline of saltcedar stands can decrease habitat quality for fauna and riparian breeding birds by thinning crown cover.

Under the no action alternative, APHIS would not take additional actions to conserve flycatcher habitat. APHIS would not attempt to gain a further understanding of the tamarisk leaf beetle's past and projected movements into flycatcher habitat. This would impact APHIS's understanding

of the potential impacts on ecosystem health regardless of the presence or absence of the tamarisk leaf beetle. Likewise, APHIS would not participate in partnerships for revegetation of areas impacted by the tamarisk leaf beetle.

APHIS would not use herbicides as part of cooperative habitat improvement partnerships on projects to facilitate the growth of native trees under the no action alternative. As a result, native vegetation may continue to be outcompeted by invasive vegetation in flycatcher habitat (see Table 2, above). Potential human disturbance of native vegetation caused by trampling or herbicides would not occur under this alternative.

Wildlife

(1) Overview

Riparian areas serve as migration routes and habitat connectors for a variety of wildlife. Even though riparian habitats constitute less than 2 percent of the land in the southwest, riparian habitats support the highest density and abundance of plants and animals of any habitat type (NPS, 2016). Riparian habitat performs numerous ecosystem functions; however, man-made changes to this ecosystem have caused long-term adverse effects (Montgomery, 1996; NPS, 2016).

Saltcedar can serve as an ecologically important functional analog to displaced native species that are no longer able to survive on altered riparian sites (Barranco, 2001). In certain locations, saltcedar may actually be a key element of the flora, standing in for natives and providing habitat for wildlife (Barranco, 2001). Without intensive vegetation management efforts in areas likely to be affected by the tamarisk leaf beetle, widespread saltcedar mortality may result in net loss in riparian habitat (Paxton et al., 2011).

In other areas, invasive species such as saltcedar and Russian olive may continue to degrade native habitat, potentially affecting federally listed and sensitive plant and animal populations. Under the no action alternative, APHIS would not fund the use of herbicides to remove invasive vegetation in strategic locations. This could lead to additional changes in the area's fire regime or other ecosystem functions that subsequently affect upland wildlife species.

Under the no action alternative, native wildlife habitat could decrease. The tree composition in riparian areas will continue to change from cottonwoods, willows, and other associated species to monocultures of saltcedar. A reduction in plant diversity could interrupt insect life cycles, which could decrease food for birds, and subsequently affects their predators. Over time, this could reduce nest areas and forage for species found in the riparian ecosystem including yellow-billed cuckoo (*Coccyzus Americanus*), leopard frog (*Rana chiricauensis*), and common black hawk (*Buteogallus anthracinus*) (USDA-FS, 2012).

(2) Migratory Bird Treaty Act

Federal law prohibits an individual to pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird or any part, nest, or egg of any such bird (16 U.S.C. §§ 703-712; 50 C.F.R. § 21).

Studies show that riparian habitat in the southwestern United States supports a higher breeding diversity of birds than all other western habitat combined (Montgomery, 1996; Carlisle et al., 2009). Riparian areas also are critical to migratory birds as stopover locations during their migration (Carlisle et al., 2009). In addition to SWFL, potential migratory birds that may be found in flycatcher habitat include the yellow-billed cuckoo, yellow warbler (*Setophaga petechia*), gray hawk (*Buteo jamaicensis*), common black hawk, Lucy's warbler (*S. coronata*), broad-billed hummingbird (*Cynanthus latirostris*), and northern beardless-tyrannulet (*Camptostoma imberbe*) (Rich, 2002).

Because humans have altered the majority of riparian habitat in the southwest, protection of existing riparian ecosystems is a critical component of migratory bird conservation. The no action alternative is not likely to enhance or improve habitat for SWFL and other migratory birds.

(3) Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 U.S.C. § 668) prohibits the take of bald or golden eagles unless permitted by the USFWS. The term "take" is defined as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb" (50 C.F.R. § 22.3). Disturb means to agitate or bother to a degree that causes . . . injury . . . a decrease in its productivity . . . or nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior (§ 22.3).

While golden eagles (*Aguila chrysaetos*) are periodically found in riparian areas (USFWS, 2014a), they are more frequently associated with grasslands, forested habitat, woodland brushlands, and arid deserts. They build nests on cliffs or in the tallest trees within a forest to obtain an unobstructed view of the surrounding habitat (USFWS, 2011). Golden eagles are sensitive to disturbance at their nests and generally nest in areas where human development and activity are minimal (USFWS, 2014a).

Bald eagles are associated with riparian areas along coasts, rivers, and lakes (USFWS, 2014b). For example, in Arizona, bald eagles are found at most major riparian areas statewide and have nests concentrated along the Salt and Verde rivers (Arizona Game and Fish Department, undated). Under the no action alternative, APHIS would not disturb bald or golden eagles.

(4) Endangered Species Act

In the arid and semi-arid western United States, riparian corridors are areas of unusually high biodiversity that are critically important as habitat for wildlife, especially threatened and endangered species. Seventy percent of threatened and endangered vertebrates in Arizona depend on riparian habitat (Johnson, 1989, as cited in Zaimes, 2007). Table 3 provides examples of federally listed vertebrate species in the western United States that are dependent on riparian habitat.

Table 3. Examples of federally listed vertebrate species in the western United States that depend on riparian habitat.

Common Name	**Scientific Name**	**Federal Listing Status**	**States of Occurrence**
Preble's meadow jumping mouse	*Zapus hudsonius preblei*	Threatened, with critical habitat	Colorado, Wyoming
California tiger salamander, Sonoma County, Santa Barbara County, and Central California Distinct Population Segment	*Ambystoma californiense*	Endangered, Threatened, with critical habitat	California
Santa Cruz long-toed salamander	*Ambystoma macrodactylum croceum*	Endangered	California
Sonora tiger salamander	*Ambystoma tigrinum stebbinsi*	Endangered	Arizona
Desert slender salamander	*Batrachoseps aridus*	Endangered	California
Georgetown salamander	*Eurycea naufragia*	Threatened with critical habitat	Texas
Salado salamander	*Eurycea chisholmensis*	Threatened with critical habitat	Texas
San Marcos salamander	*Eurycea nana*	Threatened with critical habitat	Texas
Yosemite toad	*Anaxyrus canorus*	Threatened with critical habitat	California
California red-legged frog	*Rana draytonii*	Threatened with critical habitat	California
Chiricahua leopard frog	*Rana chiricauensis*	Threatened with critical habitat	Arizona, New Mexico
Mountain yellow-legged frog, Northern California and Southern California Distinct Populations Segments	*Rana muscosa*	Endangered with critical habitat	California
Oregon spotted frog	*Rana pretiosa*	Threatened with critical habitat	California, Oregon, Washington
Sierra Nevada yellow-legged frog	*Rana sierrae*	Endangered with critical habitat	California

Common Name	Scientific Name	Federal Listing Status	States of Occurrence
Southwestern willow flycatcher	*Empidonax trailii extimus*	Endangered with critical habitat	Arizona, California, Colorado, Nevada, New Mexico, Texas, Utah
Least Bell's vireo	*Vireo bellii pusillus*	Endangered with critical habitat	California
Yuma clapper rail	*Rallus longirostris yumanensis*	Endangered	Arizona, California
Yellow-billed cuckoo	*Coccyzus americanus*	Threatened with proposed critical habitat	Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Texas, Utah, Washington, Wyoming

(a) Southwestern Willow Flycatcher

The southwestern willow flycatcher (SWFL, flycatcher; *Empidonax traillii extimus*) is a small, neotropical migrant, mid-summer breeding, riparian-obligate bird. Publication of the southwestern subspecies, *E. t. extimus*, as a federally listed endangered species was on February 27, 1995; the other four subspecies are not listed as threatened or endangered (USFWS, 2018). Designation of critical habitat on October 19, 2005 included approximately 120,824 acres in Arizona, southern California, southeastern Nevada, New Mexico, and southwestern Utah (USFWS, 2018 citing 70 FR 60886). Revision of the critical habitat on January 3, 2013 increased the acreage to approximately 208,973 acres on a combination of Federal, State, tribal, and private lands in Inyo, Kern, Los Angeles, Riverside, Santa Barbara, San Bernardino, San Diego, and Ventura Counties in California; Clark, Lincoln, and Nye Counties in southern Nevada; Kane, San Juan, and Washington Counties in southern Utah; Alamosa, Conejos, Costilla, and La Plata Counties in southern Colorado; Apache, Cochise, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Pima, Pinal, Santa Cruz, and Yavapai Counties in Arizona; and Catron, Grant, Hidalgo, Mora, Rio Arriba, Socorro, Taos, and Valencia Counties in New Mexico (USFWS, 2018 citing 78 FR 344-534).

SWFL nests are a small open cup, most often 6.5 to 23 feet above ground, in a fork or on a horizontal branch of a medium-sized bush or small tree surrounded by dense vegetation. The average clutch size is two to five eggs, and a second clutch may occur if the first

clutch fails. Typically, it breeds within the first 10 to 13 feet above ground in relatively dense riparian tree and shrub communities associated with rivers, swamps, and other wetlands, including lakes and reservoirs. Habitat patches exceed one-quarter acre in size and are at least 30 feet wide. Historically nesting in native vegetation including willows, seepwillow (*Baccharis salicifolia*), boxelder (*Acer negundo*), common buttonbush (*Cephalanthus occidentalis*), and cottonwood, this subspecies now also uses thickets dominated by non-native species of saltcedar and Russian olive, or in mixed native/ non-native stands (USFWS, 2014c). It may prefer nesting in saltcedar even when suitable willows are nearby and available to act as an additional resource (USDA-APHIS, 2005).

The 2002 Final Recovery Plan for the flycatcher indicated nest productivity in saltcedar-dominated sites was similar to native willow-dominated sites. Studies examining nesting success during or after saltcedar defoliation by the tamarisk leaf beetle generally did not find increases in nest predation, parasitism, or abandonment. The researchers also found an initial increase in bird numbers led to a flycatcher population decline before insect populations reached their peak (Paxton et al., 2011). (Paxton et al., 2011). These longer-term flycatcher declines suggested defoliated or partially defoliated saltcedar offer less protection from higher temperatures; consequently, repeated cycles of defoliation after nest initiation followed by regrowth the next spring may lead to local extirpation. SWFL colonization of new sites is up to 30 km from a source population, and then decreases with distance (Paxton et al., 2011). Under the no action alternative, the continued spread of the tamarisk leaf beetle has the potential to significantly alter the distribution, abundance, and quality of flycatcher nesting habitat and impact breeding attempts.

Prior to 2005, negative impacts to SWFL occurred from the loss of riparian habitat associated with urban and agricultural development, hydrologic modifications, fires, invasive plants, and overgrazing by domestic livestock and wildlife. Indirect negative impacts on flycatchers from saltcedar included increases in ambient temperature and the potential for wildfires that burn nests (USDA-APHIS, 2005). As of 2014, threats to flycatchers included removing, thinning, or destroying riparian vegetation; water diversions and groundwater pumping that alters riparian vegetation; overstocking or other mismanagement of livestock; cowbird parasitism, and recreational development (USFWS, 2014c).

In their recent 5-year review, the USFWS determined that cowbird parasitism is currently a moderate threat to SWFL (USFWS, 2017). In New Mexico, reported rates of flycatcher nest parasitism by cowbirds vary from 18 percent in the Cliff Gila Valley to 40 percent at other sites (USFWS, 2002). In one study, cowbirds only parasitized nests in narrow habitat patches with large edge components and snags that provided perches for cowbirds (Smith and Johnson, 2009). In another similar study, the likelihood of parasitism

decreased by 50 percent for nests >100 m from an edge and by 75 percent for nests >200 m from an edge (Stumpf et al., 2012). Under the no action alternative, APHIS would not conduct cowbird removal activities for the direct benefit of flycatchers.

(b) Other Threatened and Endangered Species in the Southwest

Dudley and DeLoach (2004) describe and cite studies indicating potential adverse effects of saltcedar in the habitat of federally listed species including: interior least tern (*Sterna antillarum*), yellow-billed cuckoo, Peninsular bighorn sheep (*Ovis canadensis cremnobates*), Yuma clapper rail (*Rallus longirostris yumanensis*), desert slender salamander (*Batrachoseps aridus*), Rio Grande silvery minnow (*Hybognathus amarus*), Colorado pikeminnow (*Ptychocheilus lucius*), desert pupfish (*Cyprinodon macularis*), and Ash Meadows speckled dace (*Rhinichthys osculus nevadensis*). One such study noted that the yellow-billed cuckoo depends on a combination of dense understory vegetation with a cottonwood overstory, and areas dominated by saltcedar were found to be uninhabited by the bird (Laymon and Halterman, 1987). The USFWS considers saltcedar to be a major threat to the habitat of the yellow-billed cuckoo (USDOI, 2014).

Section 7 of the ESA and ESA's implementing regulations require Federal agencies to ensure that their actions are not likely to jeopardize the continued existence of federally listed threatened and endangered species or result in the destruction or adverse modification of critical habitat. The no action alternative would not directly benefit flycatcher habitat, or other riparian areas or species, such as yellow-billed cuckoos through actions new to the USDA.

3. Human Health and Safety

Ongoing degradation of riparian areas from water diversion, livestock grazing, and shifting land uses creates competition among the various water users within the complex social and political environment (Dwire et al., 2018). The prioritization of water uses in the western United States reflects the urgent need for this resource, making human health and safety an integral aspect of riparian habitat conservation.

As a result of the altered riparian landscape and an increase in saltcedar, there is a threat to human welfare posed by an increased wildfire risk. During a wildfire, smoke releases a wide variety of compounds including: CO, CO_2, nitrous oxides (NO_x), SO_2, hydrogen chloride (HCl), aerosols, polynuclear aromatic hydrocarbons (PAH) contained within fine particulate matter, aldehydes and formaldehyde produced from the incomplete combustion of burning biomass, particulate matter, benzene, and acrolein (USDA-APHIS, 2016 citing Reisen and Brown, 2009; Burling et al., 2010; Broyles, 2013; Reinhardt and Ottmar, 2004). Depending on the toxic agent and amount inhaled, symptoms resulting from exposure to smoke can range from cough, shortness of breath, bronchoconstriction, irritation of eyes, and chest pain to headaches, dizziness, nausea, loss of mental acuity, and fatigue (USDA-APHIS, 2016 citing Bytnerowicz et

al., 2009; U.S. Department of Labor, 2002). The no action alternative will not alter the potential for wildfires in southwestern riparian habitat.

4. Environmental Justice

Federal agencies identify and address disproportionately high and adverse human health or environmental impacts of proposed activities, as described in Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. The no action alternative would not pose new effects to low-income, minority, or Tribal populations in the affected area because the activities associated with this alternative are already underway and have been previously considered by USDA.

Federal agencies also comply with EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. This EO requires each Federal agency, consistent with its mission, to identify and assess environmental health and safety risks that may disproportionately affect children and to ensure its policies, programs, activities, and standards address the potential for disproportionate risks to children. APHIS developed agency guidance for its programs to follow to ensure the protection of children (USDA-APHIS, 1999). The no action alternative does not pose any highly disproportionate adverse effects to children because the activities associated with this alternative are already underway and were previously considered by USDA. In general, unsupervised children and school buildings are not in or near riparian areas. School buses and other vehicles may transit near riparian habitats, but are unlikely to discharge passengers or remain in the areas for extended intervals.

5. Tribal Consultation and Coordination

EO 13175, *Consultation and Coordination with Indian Tribal Governments*, calls for agency communication and collaboration with Tribal officials when proposed Federal actions have the potential for Tribal implications. The no action alternative does not have new Tribal implications and none were associated with prior consultations.

6. Historic and Cultural Resources

The National Historic Preservation Act of 1966, as amended (16 United States Code (U.S.C.) §§ 470 et seq.), requires Federal agencies to consider the potential for impact to properties included in, or eligible for inclusion in the National Register of Historic Places (36 C.F.R. §§ 63 and 800) through consultation with interested parties where a proposed action may occur. In the southwestern United States, this would include districts, buildings, structures, sites, and landscapes. The no action alternative does not pose adverse effects to these resources because the activities associated with this alternative are already underway and were previously considered by USDA.

B. Preferred Alternative

This subsection considers the potential environmental consequences for the proposed conservation program alternative by summarizing information associated with the physical

environment, biological resources, human health and safety, environmental justice, Tribal consultation, and historic and cultural resources. The specific location of a project is not likely to alter the type or frequency of any direct or indirect impacts. The proposed conservation program alternative includes adaptive management practices to reduce potential negative impacts and continue habitat improvement efficacy.

1. Physical Environment

Air

APHIS considers impacts to air resources as significant if they exceed the NAAQS for particulate matter, ozone precursors, and greenhouse gas emissions. APHIS anticipates implementation of the preferred alternative could result in short-term localized minor impacts to air quality during implementation of conservation program activities. However, site-specific environmental documentation would take into account these potential impacts, and would provide mitigation measures to reduce or avoid minor or temporary negative impacts to air quality. Additionally, the replacement of defoliated saltcedar with native trees may lessen the effect of climate change on the flycatcher because broad-leafed plants are thought to provide better shade than saltcedar, which would increase flycatcher reproductive success in hotter climates (Bagne and Finch, 2013).

Water

APHIS considers impacts to water resources as significant if the impacts lead to long-term violations of applicable water quality standards in an action area. Many flycatcher conservation program activities are likely to improve water quality by improving vegetative cover, stabilizing stream banks, and reducing runoff and flooding. The reduction of overbank flooding along controlled rivers favors dense saltcedar forests that provide nesting habitat, but also reduces wetland habitat used for feeding. It is possible, however, for some conservation practices (e.g., mechanical removal of invasive species, burning, herbicide use) to cause temporary adverse effects to water quality (increased sediment, water temperature, turbidity, loss of shade, increased nutrient levels, or contaminants). APHIS expects long-term improvements to water quality are likely to outweigh short-term effects of these types of activities.

Native vegetation and saltcedar can both transpire large amounts of groundwater and desiccate soils, while native riparian vegetation stabilizes stream banks and prevents erosion (LCRMSCP, 2019). With the use of test plots and strategic evaluation of different native vegetation genotypes under the preferred alternative, APHIS anticipates the planting of native species would assist with the control of invasive species and provide ground cover, leading to improvments in water quality. APHIS anticipates habitat vegetation management would increase water consumption within some watersheds with fully-allocated water rights. To the extent that it becomes possible, APHIS would encourage cooperators to lease or acquire water rights to ensure viability of planted vegetation or offset increased water consumption.

Herbicide use can cause a temporary increase in sedimentation, and herbicide residues can be transported to water bodies if they are not properly applied. Direct adverse effects to waterways could occur if (1) waters receive herbicides from sprays, drift, or spills; or (2) run-off transports herbicides to surface and ground water in solution or on soil particles moved by hydraulic forces or wind. However, APHIS would use herbicides labeled for use in riparian areas. Herbicide application methods using a sprayer or paintbrush would further mitigate impacts to water quality by reducing the movement. Under the preferred alternative, APHIS would prepare site-specific environmental analyses as part of the ongoing SWFL conservation program and would take into account potential impacts. The Agency also would provide the means to avoid or mitigate any identified minor or temporary negative impacts to water resources. Therefore, APHIS does not anticipate there will be any long-term negative impacts to surface or groundwater quality.

Soil

Erosion and Sedimentation

APHIS considers impacts to soil resources as significant if proposed activities substantially increase erosion and sedimentation or adversely affect unique soil conditions. APHIS does not expect this situation to occur under the preferred alternative because theselected habitat improvement projects are designed to protect and improve native plant communities, which would have a positive effect on soil conditions.

The response of native vegetation in areas where invasive plants are controlled can vary depending on numerous ecological factors favoring their initial establishment. APHIS recognizes that native vegetation is not likely to establish immediately after weed removal. This situation could temporarily leave areas without vegetation, which could lead to short-term soil erosion (USDA-APHIS, 2005). General erosion control measures that could be used on a site-specific basis might include the following:

- Clear smaller areas of vegetation at different intervals
- Schedule vegetation removal for low-rainfall periods
- Cover disturbed soils with vegetation immediately after removal is complete
- USFWS suggests that action agencies replace native plants at a 10:1 ratio either mechanically or by hand if not naturally replaced within one to two years

APHIS will evaluate each site for the potential for soil erosion, and will select specific mitigation measures on a site-specific basis.

Mycorrhizal Fungi

Establishment of native plant communities in project areas could affect and could be affected by the mycorrhizal fungi community present in soil. Cottonwoods (*Populus fremontii*) with saltcedar neighbors demonstrate only 50 percent of the colonization by mycorrhizal mutualists,

and these mycorrhizal communites are significantly different than those in pure cottonwood stands (Meinhardt and Gehring, 2012). Cottonwoods with saltcedar neighbors also only exhibit about 50 percent of the shoot biomass compared to cottonwoods neighboring other cottonwoods or willow (*Salix* species) (Meinhardt and Gehring, 2012). However, all three differences could be partially ameliorated through mycorrhizal inoculation (e.g., Meinhardt and Gehring, 2012). Initial results from current greenhouse and field trials indicate that saltcedar legacy soil reduces initial cottonwood survival and growth, and that these effects can be partially ameliorated by inoculation, but that inoculation interacts with other factors such that its use should be planned carefully in collaboration with subject experts to avoid negative impacts (unpublished data, Hull et al. and Markovchick et al.). APHIS will work with experts in this area before conducting mycorrhizal inoculations at any project site involving native plant vegetation establishment.

Herbicides

Herbicides that selectively target invasive species would provide native riparian species with an opportunity to enter and establish, which could reduce soil erosion and enhance nutrient cycling in a treated area. Potential negative effects of herbicide application could include decreased or altered microbial populations in the soil (Adomako and Akyeampong, 2016). These potential negative effects are expected to be short-term, especially when compared to the long-term positive effect to overall soil quality.

Disturbance and Compaction

Many of the activities associated with flycatcher conservation programs will result in temporary soil surface disturbance or compaction. The most frequent types of ground disturbance would be from vehicles and pedestrians. APHIS will identify the potential for negative effects on soil quality as part of the process for selecting conservation projects.

2. Biological Resources

Vegetation

Under the preferred alternative, APHIS would select projects with the greatest potential to restore flycatcher habitat while limiting investment in areas that will provide little long-term benefit. Successful vegetation management efforts would incorporate an adaptive management approach. This approach would enable APHIS to use small pilot sites to guide the development of best management practices and inform full-scale habitat improvements while navigating challenges associated with invasive species, climate change, and altered hydrology.

APHIS will prioritize conservation partnerships where vegetation management efforts can occur in areas that meet the following criteria:

1. Areas that can support the establishment and maintenance of dense riparian vegetation and hydrological conditions suitable for breeding flycatchers both now and in the future.

2. Areas colonized by flycatchers that are at risk from current or future defoliation by tamarisk leaf beetle.
3. Areas within approximately 10 miles of active flycatcher territories. APHIS anticipates this distance will vary somewhat to ensure the activities can avoid interfering with flycatchers while improving adjacent habitat. This concept of "flexibly adjacent" tries to balance SWFL habits of site fidelity against where it is possible to do conservation actions.

Mechanical (excavation) and chemical control are two methods used for the removal of invasive shrubs and trees. Stems cut off at ground level are painted with the herbicide triclopyr, or for stems smaller than three inches in diameter, a basal stem treatment mix of triclopyr with methylated seed oil as a carrier. The planting of native trees could proceed during the time needed for complete penetration of the herbicides into the roots of treated plants. These applications use large amounts of herbicide per acre, are labor intensive, and time consuming (Johnson et al., 2007). Effective control of young Russian olive trees can be attained with foliar and basal bark applications of glyphosate, imazapyr, and triclopyr. For mature trees, the herbicide may be injected into the trunk or it may be applied to the stump after it is cut (USDA-FS, 2012).

APHIS may form collaborative partnerships under this alternative that include providing funding for invasive species removal crews at various targeted sites in the action area. This assistance would complement activities already in progress. Prior to use of any herbicides in flycatcher habitat, APHIS would consider which invasive vegetation to target at a site, in addition to impacts to other parts of the ecosystem, including mycorrhizal fungi, flycatcher prey, etc. APHIS would evaluate these potential impacts further in a site-specific environmental analysis. The conditions in which saltcedar grows contribute to increased wildfire frequency and intensity in southwestern riparian habitats. Therefore, to maximize long-term success of vegetation management programs in saltcedar-dominated stands, APHIS would also consider incorporating fuel breaks to decrease the risk of fire spreading into restored areas and removing dead wood under the preferred alternative.

Under the preferred alternative, conservation program actions such as seeding with native species will provide vegetative competition for invasive plants. Establishment of native plants following removal of invasive species will prevent areas of bare ground from being vulnerable to infestation of weeds (USDA-FS, 2012). Some conservation projects may include mycorrhizal inoculants to increase establishment success, as discussed above in the soil section.

Although the long-term effects of conservation program actions result in conservation benefits for flycatchers, short-term adverse effects could occur in association with habitat improvement, enhancement, and management activities. APHIS will skeptically consider any vegetation

management project that proposes removal of saltcedar because USFWS has determined it is a primary constituent element along with other flycatcher nesting substrate trees (e.g., willows). Vegetation modification (brush management, shrub control, and prescribed burning) and some specific conservation practices involve the removal or reduction of unwanted vegetation.

Vegetation modification may be permanent or temporary, and it may consist of targeted or complete removal of undesirable or invasive species. This could result in temporary soil and vegetation disturbance, increased fire hazard, a reduction in riparian habitat, and an increased potential to adversely affect the insect prey base. With the exception of imazapyr, that can remain active in the soil and plant tissues for six months to two years, the herbicides currently considered by APHIS do not persist in the environment, and lingering effects are not expected after chemical degradation. Minor effects to nontarget vegetation will be mitigated by overall increases in plant diversity as the dominance of invasive plant species is reduced. The potential for colonization of invasive plants on disturbed sites also exists but would be mitigated by post-treatment monitoring performed by APHIS. Despite these short-term impacts, APHIS expects the effective implementation of conservation program actions under the preferred alternative to reduce threats to flycatchers, including improving habitat conditions across their range.

Wildlife

(1) Overview

APHIS considers impacts to wildlife as significant if there are severe and/or widespread adverse environmental impacts to fish and wildlife, threatened and endangered species, or critical habitat for biological resources. Many of the potential flycatcher conservation activities (e.g., native seed planting) will cause minimal effects to wildlife. However, flycatcher conservation practices temporarily increase the presence or level of human activities (noise and visual disturbance). This is of particular concern during migratory bird breeding and nesting season. Temporary adverse effects can include increased levels of stress hormones, disturbance or flushing of young broods, and decreased fitness. APHIS expects these types of adverse effects to be localized and temporary, and the use of mitigation measures (e.g., time of year restrictions, alternating access routes) will reduce the risks of adverse effects at the scale upon which populations or a species may be negatively impacted. Some conservation practices will temporarily reduce available cover and food sources, making flycatchers and other species vulnerable to predation. However, APHIS anticipates long-term restoration of native plant communities to improve the overall quality of habitat.

Herbicide exposure risks to wildlife under the preferred alternative will be minimal. The risk analyses discussed in chapter 2 of this EA indicate that potential risks to individual animals are low for most of the herbicides. Additionally, triclopyr and imazapyr application occurs via paintbrush or injection into the bark, and there is no broadcast spraying involved. Therefore, the chance of impacting native terrestrial wildlife by these methods of application are very low.

However, USFWS and public comments concerning unintended impacts of herbicides in the environment suggest that herbicide-based projects should be rated lower (or given less priority) than habitat improvement projects focusing on the ecological balance in areas near SWFL breeding sites.

APHIS also anticipates minimal effects to fish and their habitats. Only herbicides labeled for use adjacent to water would be used in riparian areas. There would be no broadcast spraying in riparian zones. Some siltation may occur due to weed removal and work crews, but buffers of riparian vegetation will impede soil movement toward streams. In places where there is no buffer zone, APHIS expects the work would not occur during flood events. Disturbances would be short-term, with increased siltation being of minor significance over the long-term. The results of SWFL conservation program activities will ultimately improve habitat conditions for native fish species, including improving water quality and the presence of native insects and microfauna.

APHIS does not anticipate removal of saltcedar will conserve the flycatcher. However, alteration of the composition of plants in a riparian community, as would be the intention of vegetation management projects, can also effect the soil microbiota. Suppression of mycorrhizal mutualists can shift pollinator communities and reduce floral visits up to 67 percent (e.g., Cahill et al., 2008). This could have long-term effects on native plant population viability and communities, and critically, numbers of flycatcher prey items. Mycorrhizal mutualists are known generally to promote drought tolerance and growth of native plants under drought conditions (e.g., Patterson et al., 2018; Al-Karaki et al., 2004), and increase pest and herbivory resistance (e.g., Gange et al., 2005).

Brood parasitism, when combined with predation, habitat loss, reduced habitat quality and small population size, can be a significant contributor to declines of local flycatcher populations. Therefore, the USFWS determined that cowbird parasitism is currently a moderate threat to SWFL (USFWS, 2017). Under the preferred alternative, APHIS could conduct cowbird control to reduce brood parasitism in areas where data demonstrates that parasitism on a local population exceeds critical rates.

(2) Migratory Bird Treaty Act

Under the preferred alternative, APHIS expects to fund or participate in a wide range of activities designed to improve flycatcher habitat. These activities would have a positive effect on migratory birds. In one study, Ellis (1998) determined that while neotropical migrants were detected in saltcedar during all seasons, sites with native vegetation supported more species. This study also suggested that while many migratory birds would be successful in sites with extensive exotic vegetation, others require native vegetation for survival. While conservation practices may temporarily disturb migratory birds, APHIS expects long-term benefits from these activities because invasive plants are considered a stressor for some migratory birds (USFWS, undated). Some examples of anticipated disturbance associated with flycatcher conservation program

activities include the use of off-road vehicles and noise. To minimize impacts to migratory birds, APHIS will conduct as many activities as possible outside of the nesting season. If activities cannot be conducted outside of nesting season, APHIS will ensure surveys are conducted prior to scheduled activities to determine if active migratory bird nests are present. If active nests are present, either APHIS will establish a buffer zone, or the conservation programs will be delayed until nestlings have fledged or breeding behaviors are no longer present. APHIS would establish additional site-specific migratory bird conservation measures, as needed, prior to beginning any flycatcher conservation program activities.

(3) Bald and Golden Eagle Protection Act

If bald or golden eagles were discovered in the vicinity of a SWFL conservation program action, APHIS would contact the USFWS and implement recommendations for avoiding disturbance at nest sites. For bald eagles, APHIS would follow guidance as provided in the National Bald Eagle Management Guidelines (USFWS, 2007). These guidelines include a 330−660 foot buffer from an active nest, depending on the visibility and level of activity near the nest. APHIS expects herbicide exposure to terrestrial and aquatic nontarget organisms to be very low, and subsequently, the potential for exposure of eagles to herbicides to also be very low.

(4) Endangered Species Act

Implementation of the conservation program would provide a benefit to the flycatcher, and potential benefits to other federally listed riparian species including the yellow-billed cuckoo. However, certain aspects of the conservation program could potentially adversely affect federally listed species as a result of human disturbance and herbicide use. They are summarized as follows:

(a) Surveys

Survey activities in flycatcher breeding habitat could cause disturbance of nesting birds. Disturbance can cause the female to abandon the nest (USFWS, 2002). Researchers should avoid disturbing birds during the nest building and egg laying stages when they are more likely to abandon the nest (Rourke et al., 1999). All persons conducting surveys and monitoring nests of flycatchers are required to obtain a federal endangered species permit from USFWS, and all permittees are required to attend a USFWS sanctioned SWFL survey training workshop (Rourke et al., 1999). The training workshop is important for assuring consistency in survey methods and minimizing disturbance of flycatchers (USFWS, 2002).

In FY2019, APHIS funded data collection surveys at sites in Arizona and Nevada. Researchers conducting these surveys were permitted and trained by USFWS. APHIS will ensure researchers conducting future surveys are also properly permitted for those activities.

(b) Herbicides

APHIS expects exposure to terrestrial and aquatic nontarget organisms to be minimal from triclopyr, imazapyr, 2,4-D, glyphosate, and surfactants. Significant drift or runoff is not expected because applications are not broadcast. Instead, applications will use either a backpack sprayer to deliver a coarse droplet size, injection of the materials into plants, or painting of the material on individual plants. All of these application methods reduce or eliminate the potential for drift and runoff.

APHIS expects the low probability of offsite transport for any of the products to result in very low exposure to nontarget organisms. Risk to nontarget organisms is greatest for plants as they are the most sensitive group to each application; however, APHIS expects impacts to terrestrial plants to be minimal. These impacts will only potentially occur for those plants that are immediately adjacent to treated plants. APHIS will minimize impacts to terrestrial plants by following label directions for each herbicide treatment.

APHIS does not expect significant exposure to aquatic plants based on the method of application and adherence to label restrictions regarding applications near aquatic areas. The Agency does not expect exposure in aquatic systems to occur at levels that could result in any direct impacts to aquatic plants, or at levels that would suggest indirect impacts to aquatic organisms that depend on aquatic plants as a food source or as habitat. APHIS will conduct appropriate site-specific NEPA analysis and ESA Section 7 consultation as the Agency identifies sites for inclusion in its SWFL conservation program.

(c) GIS Mapping

The process of GIS mapping would not have an effect on flycatcher populations in the field, and would not require ESA Section 7(a)2 consultation.

(d) Cowbird Removal

The USFWS previously permitted egg-addling to address cowbird issues. Egg addling is any process where the egg becomes unviable. Methods include piercing, shaking, oiling, egg replacement, and egg removal. Cowbird trapping can increase flycatcher reproductive success (Whitfield et al., 1999). However, cowbird control may be more useful for short-term crisis management than for long-term benefit (Kus and Whitfield, 2005) because other species threats (such as habitat loss resulting from a reduction in natural water resources) are likely to have a greater impact on the flycatcher population.

Similar to surveys, disturbance of nesting flycatchers is an important concern when conducting cowbird control activities. The USFWS would require a permit for activities in flycatcher habitat. Conservation measures that APHIS could use to minimize

flycatcher disturbance include not using a repeated access route, and limiting survey activity to 30-45 minutes at a time.

APHIS personnel conducted cowbird control activities in the past, and this type of work is within the Agency's authority to carry out. Where SWFL survey data suggests cowbirds are significantly affecting flycatcher fecundity, or if USFWS identifies an appropriate site where cowbird control could be beneficial to flycatchers, APHIS would consider pursuing this activity. Before the Agency carries out any specific cowbird control projects, it would complete a site-specific NEPA and ESA section 7 consultation and acquire necessary USFWS permits.

3. Human Health and Safety

The proposed conservation program seeks to restore riparian health with its associated intangible ecosystem services. The public may see some economic benefits from increases in native vegetation; recreational activities would likely experience these benefits. The public uses riparian areas for recreational activities such as camping, fishing, hiking, biking, and birding. The public may temporarily lose the use of these lands during program activities. However, benefits from the preservation of vegetation and flycatcher habitat would accrue to recreational activities in the long-term.

This document considers vegetation monitoring as part of its conservation plan combined with the development and implementation of revegetation technologies. The program applies pesticides in a way that minimizes soil, water, and air exposures. APHIS personnel and contractors must comply with all USEPA use requirements and meet all recommendations for personnel protective equipment (PPE) during pesticide delivery. Adherence to label requirements and additional program measures designed to reduce exposure to workers (e.g., PPE requirements include long-sleeved shirt and long pants and shoes plus socks) and the public (e.g., mitigations to protect water sources, mitigations to limit spray drift, and restricted-entry intervals) result in a low health risk to all human population segments from program use of chemicals. APHIS does not anticipate the chemicals proposed for use in this program would bioaccumulate. The lack of significant routes of exposure to human health and the environment, along with favorable toxicity profiles for these compounds, suggest cumulative impacts would not occur with their use.

Program herbicides include auxin-like growth regulators that selectively control broadleaf species (e.g., 2,4-D and triclopyr), while the herbicide, glyphosate, disrupts the synthesis of amino acids essential for plant growth (DiTomaso et al., 2010; USDA-APHIS, 2016). The Programmatic Asian Longhorned Beetle Eradication Environmental Impact Statement Appendices E and F have triclopyr and imazapyr risk assessments that discuss acute and chronic toxicities (USDA-APHIS, 2015), and are incorporated by reference. Risks associated with the use of glyphosate are as discussed in the U.S. Forest Service's risk assessment (USDA-FS,

2011), which is incorporated by reference. For additional chemical uses that arise on a site-specific basis, APHIS would complete a site-specific analysis of human health and safety concerns prior to chemical use.

Under the proposed action, there continues to be a threat to human welfare posed by smoke from wildfires affecting saltcedar plants; the risk of fire increases as the number of saltcedar plants increases. During a wildfire, the burning of treated plant material would release additional combustion products into the smoke. The safety data sheet (SDS) for each chemical provides recommendations for PPE, and identifies combustion products that have the potential to be in smoke from a wildfire of treated vegetation. It is important to recognize that already applied chemicals are at greatly reduced concentrations than would occur in a fire involving a concentrated formulation. All program chemical applications are at low rates and the chemicals degrade rapidly in the environment, further reducing the potential for exposure to products of herbicide combustion in the event a fire occurs after treatment.

4. Environmental Justice

APHIS SWFL conservation program activities are likely to take place in rural areas, and it is highly unlikely that there will be any people residing in or near this program's treatment areas. The human populations near potential program areas are likely to be in widely scattered, single, rural dwellings with low population density. The Agency expects the distance from program areas to environmental justice communities to influence if there are direct adverse impacts to those communities. In general, APHIS programs notify residents (or their representatives) within program treatment areas to reduce the potential for incidental exposure to residents, including children. For this reason, notification of program treatments must be done cooperatively to ensure recreational users and tourists (which may include children), as well as park employees avoid treated areas for an appropriate amount of time.

Local communities in the vicinity of program actions will indirectly benefit from the program through conservation and maintenance of land (improved rural landscape) and through locally spent monies. When planning a site-specific action, APHIS will consider the potential for highly disproportionate and adverse human health or environmental impacts of its actions on low-income, minority, and Tribal communities by consulting with the nearest available land managers or property owners. When planning a site-specific action, APHIS will ask about the presence of culturally significant sites, and inquire about the locally preferred way to accommodate any needs associated with those sites. The Agency would discuss options prior to implementing a decision, and cooperatively notify the public on an as-needed basis. Once a site-specific program begins, the Agency would address low-income and minority population concerns expressed by individuals as they arise.

The preferred alternative is not likely to pose any highly disproportionate adverse effects to children because program activities would not occur when children are present in the immediate

area. In general, unsupervised children and school buildings are not in or near riparian areas. Program activities would not occur on, in, or near school properties, or while school buses are likely to be transiting within a 500-feet zone around treatment areas. School buses and other vehicles may transit near riparian habitats, but are unlikely to discharge passengers or remain in the areas for extended intervals.

5. Tribal Consultation and Coordination

Executive Order 13175 "Consultation and Coordination with Indian Tribal Governments," calls for agency communication and collaboration with Tribal officials for proposed Federal actions with potential Tribal implications. The Archaeological Resources Protection Act of 1979 (16 U.S.C. §§ 470aa-mm), secures the protection of archaeological resources and sites on public and Tribal lands. USDA representatives would confer with the appropriate Tribal authority and local property owners and managers to avoid planning program activities that conflict with cultural events or observances on Tribal lands. Program activities are not expected to occur at cultural sites. There is no reason to expect treatments or drift from a program treatment to adversely affect natural surfaces, such as rock formations and carvings. Consequently, site-specific documentation would consolidate the findings on the potential for impacts to sites, artifacts, and cultural events along with Agency plans to mitigate those impacts.

APHIS corresponded with all federally recognized Tribes in the program area and began coordination with two Tribal governments (Gila River Indian Community and Pueblo of San Felipe). Prior to committing to conservation actions that could affect Tribal interests, Agency personnel will notify Tribal land managers of the potential plans and solicit participation and cooperation to ensure effective government-to-government communications occur. Consultation with local Tribal representatives occurs prior to the onset of program activities to fully inform the Tribes of possible actions the Agency may take on or near Tribal lands.

6. Historic and Cultural Resources

The proposed program activities will not alter, change (restore or rehabilitate), modify, relocate, abandon, or destroy any historic buildings, edifices, or nearby infrastructure. APHIS has no intention of interfering with archaeological resources or Traditional Cultural Properties. Program activities are not expected to be located in areas already identified as rich in cultural resources. These sites will not be selected for inclusion in this project, and if they are inadvertently discovered, they will be immediately abandoned and appropriate authorities will be immediately contacted. APHIS acknowledges that archaeological sites are frequently found adjacent to, or in close proximity to, riparian and wetland areas, and buried cultural deposits are occasionally exposed by meandering waterways. To the extent that new sites become identified as a project proceeds, APHIS will consult with the appropriate authorities which may include contemporary indigenous groups. Therefore, program activities will not directly or indirectly alter characteristics of a historic property that qualify it for inclusion in the National Register of Historic Properties. Program activities will not be applied to or directly affect the buildings.

While treatments have the potential to affect some landscape plants, the areas around historic buildings are highly unlikely to be riparian corridors selected for a conservation project. For these reasons, APHIS would consult with State Historic Preservation Officers and local property managers only if the listed historic or cultural resources are within one mile of a selected conservation program area. To assist in defining the Area of Potential Effects for section 106 consultation purposes, APHIS finds a one mile perimeter surrounding each of our conservation program areas is highly likely to identify any existing historic properties with the potential to be affected by a project.

The potential for indirect impacts from flycatcher conservation measures is remote in distance and likely to be ephemeral because vegetative features of the viewshed would continue to adapt over time as the ecosystem changes. For example, saltcedar reductions may become associated with increased willow and cottonwood – as replacement of one tree species by another occurs; there are no long-term impacts to the views from historic properties.

C. Cumulative Impacts

Cumulative impacts on the environment result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of the entity conducting those other actions (40 C.F.R. § 1508.7). Cumulative effects most likely arise when a relationship exists between a proposed action and other actions expected to occur in a similar location or during a similar period in time. Cumulative effects may not be reasonably foreseeable until a variety of direct and indirect impacts interact with each other or over time.

Cumulative impacts to the flycatcher include, but are not limited to, the following broad types of impacts:

- Ongoing grazing and farming activities that will continue to occur on properties within the action area;
- NRCS, NIFA, and FS flycatcher conservation program activities occurring in the action area;
- Changes in land use patterns or practices that could affect critical habitat; and
- Encroachment of human development into a species' habitat.

The current tamarisk leaf beetle's presence in flycatcher habitat is the result of cumulative impacts from the release program, natural tamarisk leaf beetle dispersion, and intentional tamarisk leaf beetle movement. Under the no action alternative, these activities are discouraged by APHIS policies, and appear to continue unabated. Under many of the proposed action activities, there may not be a direct reduction in the presence of the tamarisk leaf beetle. Instead, as long-term changes in the habitat occur, APHIS expects this insect's role in the ecosystem will approach an equilibrium level.

APHIS does not expect cumulative impacts to soil and water for both the no action and preferred alternatives. The acreage and intensity of current and future activities related to urbanization, water development, agricultural clearing, and roadway construction are more likely to significantly impact the physical qualities of the environment than SWFL conservation programs. APHIS expects the impacts from the actions discussed in this EA to result in only minor or transient impacts; therefore, any increase in cumulative impacts would be negligible. There would be only short-term disturbances to soil related to the removal of invasive vegetation. The amount of erosion from flycatcher conservation activities would be minor relative to the erosion potential from current and future agricultural and water development activities.

The herbicides described in this EA are short-lived and degrade in the environment. Mitigations and best management practices will reduce the chances of herbicides moving into water. Therefore, application of herbicides at the approved application rates under the preferred alternative will not contribute to cumulative impacts to water quality.

Similar to cumulative impacts to soil and water, APHIS anticipates the potential for cumulative impacts to air quality to be minor under both the no action and preferred alternatives. Vehicle emissions associated with getting to and from project sites would be temporary, ephemeral, and minor relative to the ongoing and future emissions from urbanization, highway traffic, agricultural production, and water development activities. Any release of air pollutants associated with mechanical removal of invasive vegetation and vehicle emissions would cease upon completion of program activities at each site. Future actions that could increase emissions (e.g., changes in housing developments and road expansions leading to more traffic) are difficult to quantify for a variety of reasons, such as emissions from mobile sources being subject to changing fuel mileage and emissions standards and regulations. Restored native vegetation is associated with a decrease in the frequency of wildfires. APHIS expects there would be a reduction in air pollutants after project completion and additional decreases in the potential for release of air pollutants from wildfires. Overall, the contribution of air pollutants from the preferred alternative would remain minor compared to overall emissions in the southwestern United States.

The potential human health impacts of the preferred alternative are expected to be minimal, and in the context of potential cumulative impacts to past, present, and future activities, these impacts would be incrementally minor. Direct effects from the SWFL conservation program could include a short-term alteration in the recreational value of some areas during invasive vegetation removal; however, these effects would be minor in relation to other activities in the area, such as construction and water development activities. A positive cumulative impact from the flycatcher

conservation activities would be enhanced birding opportunities following the establishment of native vegetation.

A potential cumulative impact to ecological resources is related to the short-term reduction in riparian habitat combined with the spread of invasive weed seeds. Nearly all past, present, and future projects in the southwestern United States have the potential to introduce weed seeds into non-infested areas, resulting in the spread of invasive vegetation. The movement of vehicles from one site to another is the primary action that could contribute to the spread of invasive weeds. Seeds can also become lodged in the tread of shoes. To minimize the potential for spreading invasive species, tire and shoe treads should be examined before leaving a work site.

The cumulative impacts from the preferred alternative are not expected to comprise a significant contribution in comparison to impacts from habitat fragmentation, human population growth, development, water usage, and increased recreational activities. APHIS intends to restrict herbicide use in the proposed SWFL conservation program to avoid the potential for nontarget fish and wildlife impacts. The herbicides selected for use pose a low risk to most nontarget populations.

The cumulative impacts from the preferred alternative, when assessed in relation to the current baseline and past, present, and future activities, constitute a small incremental change in the human environment. Some of these cumulative changes may be positive, such as a reduction in fire tolerant invasive vegetation. The preferred alternative seeks to minimize potentially negative cumulative impacts by following best management practices and training personnel to reduce or avoid adverse impacts to flycatcher and the surrounding environment.

IV. Listing of Agencies Consulted

Arizona Ecological Services Office
Fish and Wildlife Service
U.S. Department of the Interior
9828 North 31st Avenue, Suite C3
Phoenix, AZ 85051

Environmental and Risk Analysis Services
Policy and Program Development
Animal and Plant Health Inspection Service
U.S. Department of Agriculture
4700 River Road, Unit 149
Riverdale, MD 20737

Watershed, Fish, Wildlife, Air & Rare Plants
Forest Service
U.S. Department of Agriculture
201 14th Street SW
Washington, DC 20024

Division of Plant Systems-Protection
National Institute of Food and Agriculture
U.S. Department of Agriculture
3405 Waterfront Centre
Washington DC 20205-2201

Landscape Initiatives Team
Natural Resources Conservation Service
U.S. Department of Agriculture
10 E. Babcock St, Rm 443
Bozeman, MT 59715

Permitting and Compliance Coordination
Plant Protection and Quarantine
Animal and Plant Health Inspection Service
U.S. Department of Agriculture
4700 River Road, Unit 150
Riverdale, MD 20737

Wildlife Services
Animal and Plant Health Inspection Service
U.S. Department of Agriculture
8836 N 23 Avenue, Suite 2
Phoenix, Arizona 85021

V. References

Adomako, M.O. and S. Akyeampong. 2016. Effects of some commonly used herbicides on soil microbial population. Journal of Environment and Earth Science 6: 30-38.

Al-Karaki, G., McMichael, B., Zak, J. 2004. Field response of wheat to arbuscular mycorrhizal fungi and drought stress. Mycorrhiza. 14. 263-9. 10.1007/s00572-003-0265-2.

App, C. 2012. Dams in southwestern US [Blog post]. Retrieved from https://swdams.wordpress.com/.

Arizona Game and Fish Department. Undated. Arizona wildlife: raptors. Phoenix, Arizona. Retrieved from https://www.azgfd.com/PortalImages/files/FocusWild/pdfs/raptor_booklet.pdf.

Bagne, K.E. and D.M. Finch. 2013. Vulnerability of species to climate change in the southwest: threatened, endangered, and at-risk species at Fort Huachuca, Arizona. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. General Technical Report RMRS-GTR-302. Retrieved from https://www.fs.fed.us/rm/pubs/rmrs_gtr302.pdf.

Barranco, A. 2001. Invasive species summary project: saltcedar (Tamarix ramosissima). Retrieved from http://www.columbia.edu/itc/cerc/danoff-burg/invasion_bio/inv_spp_summ/Tamarix_ramosissima.html.

Bateman, H.L. and M.J. Johnson. 2015. Effects of Biocontrol and Restoration on Wildlife in Southwestern Riparian Habitats. Report submitted to Southern Rockies and Desert Landscape Conservation Cooperative.

Beechie, T., Pess, G., and P. Roni. 2008. Setting river restoration priorities: a review of approaches and general protocol for identifying and prioritizing actions. North American Journal of Fisheries Management 28: 891-905.

Bloodworth, B.R., P.B. Shafroth, A.A. Sher, R.B. Manners, D.W. Bean, M.J. Johnson and O. Hinojosa-Huerta. 2016. Tamarisk Beetle (Diorhabda spp.) in the Colorado River basin: synthesis of an expert panel forum. Colorado Mesa University, Ruth Powell Hutchins Water Center, Scientific and Technical Report No.1

Brock, J. H . 1994. Tamarix spp. (salt cedar), an invasive exotic woody plant in arid and semi-arid riparian habitats of Western USA. Pages 27-44 in Ecology and Management of Invasive Riverside Plants. John Wiley and Sons Ltd., West Sussex, England.

Busch, D. E., and S. D. Smith. 1993. Effects of fire on water and salinity relations of riparian woody taxa. Oecologia 94: 186-194.

CABI. Invasive Species Compendium. CAB International. Retrieved from https://www.cabi.org/isc/datasheet/52503.

Cahill, J.F., Elle, E., Smith, G.R., Shore, B.H. 2008. Disruption of a belowground mutualism alters interactions between plants and their floral visitors. Ecology, 89(7) 1791–1801

Carde, R. T. 1990. Principles of mating disruption. Pages 47-71 in R. L. Ridgway, R. M. Silverstein, and M. N. Inscoe, (eds.). Behavior-Modifying Chemicals for Pest Management - Applications of Pheromones and Other Attractants. Marcel Dekker, New York.

Carde, R. T., and A. K. Minks. 1995. Control of moth pests by mating disruption: successes and constraints. Annual Review of Entomology 40(1):559-585.

Carlisle, J.D., Skagen, S.K., Kus, B.E., Van Riper III, C., Paxton, K.L., and J.F. Kelly. 2009. Landbird migration in the American West: recent progress and future research directions. The Condor 111(2): 211-225.

Carruthers, R., J. Herr, J. Knight, J. DeLoach, M. Hoddle, and M. Johnson. 2006. A brief overview of the biological control of saltcedar. California Conference on Biological Control V, Riverside, CA. July 25-27, 2006.

Carruthers, R. I., C. J. DeLoach, J. C. Herr, G. L. Anderson, and A. E. Knutson. 2008. Saltcedar areawide pest management in the western USA. Pages 271-299 in O. Koul, G. Cuperus, and N. Elliott, (eds.). Areawide Pest Management: Theory and Implementation. CAB International.

Chew, M.K. 2009. The monstering of tamarisk: How scientists made a plant into a problem. Journal of the History of Biology, Published Online, 13, March, 2009.

Commonwealth of Massachusetts. 2016. Adjuvants. Aquatic Herbicide Active Ingredients. Retrieved from https://www.mass.gov/files/documents/2016/08/td/adjuvants.pdf.

DiTomaso, J.M. 1998. Impact, biology, and ecology of saltcedar (Tamarix spp.) in the southwestern United States. Weed Technology 12(2):326-336.

DiTomaso, J.M., and G.B. Kyser. 2013. Weed control in natural areas in the western United States. Weed Research and Information Center, University of California. 544 pp. Retrieved from https://wric.ucdavis.edu/information/natural%20areas/wr_T/Tripidium.pdf

DiTomaso, J. M., R. A. Masters, and V. F. Peterson. 2010. Rangeland invasive plant management. Rangelands 32:43-47. Grzybowski, J.A., R.B. Clappa, and J. T. Marshall, Jr. 1986. History and current population status of the Black-capped Vireo in Oklahoma. Am. Birds. 40(5): 1151–1161.

Dockens, P.E.T., Paradzick, C.E., and Hatten, J.R., 2004, Application of a Southwestern willow flycatcher GIS-based habitat model—An estimate of breeding habitat in Arizona, 2001, in Dockens, P.E.T., and Paradzick, C.E., eds., Mapping and monitoring Southwestern willow flycatcher breeding habitat in Arizona—A remote sensing approach: Phoenix, Arizona Game and Fish Department Nongame and Endangered Wildlife Program Technical Report 223, p. 28–59.

Drus, G.M., Dudley, T.L., Brooks, M.L. and Matchett, J.R. 2013. The effect of leaf beetle herbivory on the fire behavior of tamarisk (Tamarix ramosissima Lebed.). International Journal of Wildland Fire 2013, 22, 446–458.

Dudley, T.L., and C.J. DeLoach. 2004. Saltcedar (Tamarix spp.), Endangered Species, and Biological Weed Control—Can They Mix? Weed Technology 18: 1542–1551.

Durst, S.L., M.K. Sogge, H.C. English, H.A. Walker, B.E. Kus, and S.J. Sferra. 2008. Southwestern willow flycatcher breeding site and territory summary – 2007. U.S. Geological Survey, Colorado Plateau Research Station, Flagstaff, AZ.

Dwire, K.A., Mellmann-Brown, S., and J.T. Gurrieri. 2018. Potential effects of climate change on riparian areas, wetlands, and groundwater-dependent ecosystems in the Blue Mountains, Oregon, USA. Climate Services 10: 44-52.

Duflot R., Avon C., Roche P., Bergès L. 2018. Combining habitat suitability models and spatial graphs for more effective landscape conservation planning: An applied methodological framework and a species case study. Journal for Nature Conservation 46:38-47. https://doi.org/10.1016/j.jnc.2018.08.005

EDDMapS. 2019. Early Detection & Distribution Mapping System. The University of Georgia - Center for Invasive Species and Ecosystem Health. Retrieved from http://www.eddmaps.org/.

Ellis, L.M., Crawford, C.S., and M.C. Molles Jr. 1998. Comparison of litter dynamics in native and exotic riparian vegetation along the Middle Rio Grande of central New Mexico, U.S.A. Journal of Arid Environments 38: 283-296.

Ellis, L.A., Weddle, D.M., Stump, S.D., English, H.C., and Graber, A.E., 2008, Southwestern willow flycatcher final survey and monitoring report: Arizona Game and Fish Department, Research Technical Guidance Bulletin #10, Phoenix, AZ.

El-Sayed, A., D. Suckling, C. Wearing, and J. Byers. 2006. Potential of mass trapping for long-term pest management and eradication of invasive species. Journal of Economic Entomology 99(5):1550-1564.

Estrada-Muñoz, G. A., and S. R. Sánchez-Peña. 2014. Imidacloprid drench on athel trees (Tamarix aphylla): effect on foliage consumption and knock-down of Diorhabda sublineata at Chihuahua, Mexico. Southwestern Entomologist 39(3):439-450.

Everitt, B.L. 1998. Chronology of the spread of tamarisk in the Central Rio Grande. Wetlands 18(4): 658-668.

Fischer, R.A., C.O. Martin, J.T. Ratti, and J. Guidice. 2001. Riparian Terminology: Confusion and Clarification. (ERDC TN-EMRRP-SR-25), U.S. Army Engineer Research and Development Center, Vicksburg, MS. Retrieved from www.wes.army.mil/el/emrrp.

Fisher, M., P. Van Den Driessche, and H. Barclay. 1985. A density dependent model of pheromone trapping. Theoretical Population Biology 27(1):91-104.

Foye, S. D., C. M. Greenwood, and K. E. Risser. 2016. Virulence of entomopathogenic nematodes native to western Oklahoma against Diorhabda carinulata (Faldermann, 1837)(Coleoptera: Chrysomelidae). The Coleopterists Bulletin 70(1):149-152.

Gelt, J. 2008. Saltcedar found to be friend, not foe of western waterways. Arizona Water Resources, University of Arizona, 17(2) Nov.-Dec.

Gilby, B.L., Olds, A.D., Connolly, R.M., Henderson, C.J., Schlacher, T.A. 2018. Spatial restoration ecology: Placing restoration in a landscape context. BioScience 68(12):1007-1019.

Hatten, J.R., and Paradzick, C.E., 2003, A multiscaled model of southwestern willow flycatcher breeding habitat: Journal of Wildlife Management, v. 67, p. 774–788.

Hatten, J.R., and Sogge, M.K., 2007, Using a remote sensing/GIS model to predict Southwestern willow flycatcher breeding habitat along the Rio Grande, New Mexico: U.S. Geological Survey Open-File Report 2007-1207, http://pubs.usgs.gov/of/2007/1207/.

Hatten, J.R., 2016, A Satellite Model of Southwestern Willow Flycatcher (Empidonax traillii extimus) Breeding Habitat and a Simulation of Potential Effects of Tamarisk Leaf Beetles (Diorhabda spp.), Southwestern United States: U.S. Geological Survey Open-File Report 2016-1120, http://pubs.usgs.gov/of/2016/1120/.

Johnson R.R. and S.W. Carothers. 1982. Riparian habitats and recreation: interrelationships and impacts in the southwest and Rocky Mountain region. Eisenhower Consortium Bulletin 12. 31 pp. Retrieved from https://www.fs.fed.us/rm/boise/AWAE/labs/awae_flagstaff/Hot_Topics/ripthreatbib/johnson_carothers_riphabrec.pdf.

Johnson, W., Davison, J., Young, J., and T. Kadrmas. 2007. Managing saltcedar. University of Nevada Cooperative Extension. Fact Sheet FS-02-93.

Knight, C.W., Scott, C.B. and C.J. Owens. 2018. Intake and nutritional quality of salt cedar. Texas Journal of Agriculture and Natural Resources 31:12-19.

Kus, B. and M. Whitfield. 2005. Parasitism, productivity, and population growth: response of least Bell's vireos (Vireo bellii pusillus) and southwestern willow flycatchers (Empidonax traillii extimus) to cowbird Molothrus spp.) control. Ornithological Monographs. 57: 16–27.

Lacey, J.R., Marlow, C.B., and J.R. Lane. 1989. Influence of spotted knapweed (Centaurea maculosa) on surface runoff and sediment yield. Weed Technology 3(4): 627-631.

Lance, D., and D. McInnis. 2005. Biological basis of the sterile insect technique. Pages 69-94 in V.A. Dyck, J. Hendrichs, and A.S. Robinson, (eds.). Sterile Insect Technique. Springer.

Laymon, S. A. and M. D. Halterman. 1987. Can the western subspecies of the yellow-billed cuckoo be saved from extinction? Western Birds 18: 19–25.

Lessord, T. G. 2016. Evaluation of native entomopathogenic nematodes for biological control of plum curculio in New York apple orchards. Cornell University, Ithaca, NY.

Lewis, P. A., C. J. DeLoach, A. E. Knutson, J. L. Tracy, and T. O. Robbins. 2003. Biology of Diorhabda elongata deserticola (Coleoptera: Chrysomelidae), an Asian leaf beetle for biological control of saltcedars (Tamarix spp.) in the United States. Biological Control 27(2):101-116.

Loveland Products. 2016. Activator 90 Safety Data Sheet. SDS Number: 1000001730-16-LPI. Retrieved from http://horizon.wiki/images/e/e9/Loveland_Products_Inc_Activator_90_Surfactant_SDS.pdf.

Meinhardt, K.A., and C.A. Gehring. 2012. Disrupting mycorrhizal mutualisms: A potential mechanism by which exotic tamarisk outcompetes native cottonwoods. Ecological Applications 22:532–549.

Montgomery, G.L. 1996. Riparian areas reservoirs of diversity. Working Paper No. 13. U.S. Department of Agriculture, Natural Resources Conservation Service, Lincoln, NE. Retrieved from https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/rca/?cid=nrcs143_014206.

Nagler, P.L., E.P. Glenn, C.S. Jarnevich, and P.B. Shafroth. 2009. Chapter 2: Distribution and abundance of saltcedar and Russian olive in the western United States. Pages 7-32 in P.B. Shafroth, C.A. Brown, and D.M. Merritt, editors, Saltcedar and Russian olive Control and Demonstration Act science assessment. U.S. Geological Survey, Scientific Investigations Report 2009-5247.

Nagler, P.L., Nguyen, U., Bateman, H.L., Jarchow, C.J., Glenn, E.P., Waugh, W.J., and C. van Riper III. 2018. Northern tamarisk beetle (Diorhabda carinulata) and tamarisk (Tamarix spp.) interactions in the Colorado River basin. Restoration Ecology 26(2): 348-359.

National Park Service. Undated. Invasive weed field guide. Santa Monica Mountains National Recreation Area. Retrieved from https://www.nps.gov/samo/planyourvisit/upload/recpub_invasiveweedguide.pdf.

National Park Service. 2016. Rivers, streams, and wetlands. Science of the American Southwest. National Park Service. Retrieved from https://www.nps.gov/subjects/swscience/rivers-streams.htm.

North Carolina State Cooperative Extension. undated. Soybeans: spray adjuvants. Retrieved from https://soybeans.ces.ncsu.edu/spray-adjuvants/.

NPS – See National Park Service

Patterson, A., Flores-Renteria, L., Whipple, A., Whitham, T., Gehring, C. 2018. Common garden experiments disentangle plant genetic and environmental contributions to ectomycorrhizal fungal community structure. New Phytologist (2019) 221: 493–502

Paxton, E.H., Theimer, T.C. and M.K. Sogge. 2011. Tamarisk biocontrol using tamarisk beetles: Potential consequences for riparian birds in the southwestern United States. The Condor 113(2): 255-265.

Poff, N.L., Allan, J.D., Bain, M.B., Karr, J.R., Prestegaard, K.L., Richter, B.D., Sparks, R.E., Stromberg, J.C. 1997. The Natural Flow Regime. BioScience 47(11):769-784

Potter, D. A., and D. W. Held. 2002. Biology and management of the Japanese beetle. Annual Review of Entomology 47(1):175-205.

Ragan and Massey, Inc. 2017. Farmworks 80/20 Surfactant Safety Data Sheet. Retrieved from http://raganandmassey.com/wp-content/uploads/2017/02/FW_8020Surfactant_SDS.pdf.

Razgour, O., Hanmer, J., Jones, G. 2011. Using multi-scale modelling to predict habitat suitability for species of conservation concern: the grey long-eared bat as a case study. Biological Conservation 144(12):2922-2930. https://doi.org/10.1016/j.biocon.2011.08.010

Rechcigl, J. E., and N. A. Rechcigl. 1999. Biological and biotechnological control of insect pests. CRC Press.

Rich, T.D. 2002. Using breeding land birds in the assessment of western riparian systems. Wildlife Society Bulletin 30(4): 1128-1139.

Rourke, J.W., T.D. McCarthey, R.F. Davidson, A.M. Santaniello. 1999. Southwestern willow flycatcher nest monitoring protocol. Nongame and Endangered Wildlife Program Technical Report 144. Arizona Game and Fish Department, Phoenix, Arizona.

Schweitzer, S.H., Finch, D.M., and D.M. Leslie, Jr. 1998. The brown-headed cowbird and its riparian-dependent hosts in New Mexico. General Technical Report RMRS-GTR-1. Fort Collins, CO; U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 23 p.

Shafroth, P.B., Cleverly, J.R., Dudley, T.L., Taylor, J.P., Van Riper III, C., Weeks, E.P., and J.N. Stuart. 2005. Control of Tamarix in the western United States: implications for water salvage, wildlife use, and riparian restoration. Environmental Management 35: 231-246.

Shafroth, P.B., Beauchamp, V.B., Briggs, M.K., Lair, K., Scott, M.L., and A.A. Sher. 2008, Planning riparian restoration in the context of Tamarix control in Western North America: Restoration Ecology v. 16, p. 97–112.

Shafroth, P.B., C.A. Brown, and D.M. Merritt (eds.). 2010. Saltcedar and Russian olive control demonstration act science assessment: U.S. Geological Survey Scientific Investigations Report 2009-5247. 143 pp.

Smith, J., and K. Johnson. 2009. Water requirements for Southwestern Willow Flycatcher habitat and nesting at the Pueblo of Isleta, 2008 Final Report. Natural Heritage New Mexico, Museum of Southwestern Biology, Albuquerque, New Mexico.

Smitley, D. R., J. J. Doccola, and D. L. Cox. 2010. Multiple-year protection of ash trees from emerald ash borer with a single trunk injection of emamectin benzoate, and single-year protection with an imidacloprid basal drench. Journal of Arboriculture 36(5):206.

Sogge, M.K., E.H. Paxton, and A.A. Tudor. 2005. Saltcedar and southwestern willow flycatchers: lessons from long-term studies in central Arizona. Monitoring science and technology symposium: unifying knowledge for sustainability in the Western Hemisphere. 2004 September 20-24; Denver, CO. Proceedings RMRS-P037CD.: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO.

Sostrom. Undated. Updates on surfactants: changing familiar products into better formulations. Wilbur-Ellis Company LLC. Retrieved from https://westernforestry.org/wp-content/uploads/2015/12/Sostrom.pdf.

Stromberg, J.C., Lite, S.J., Marler, R., Paradzick, C., Shafroth, P.B., Shorrock, D., White, J.M., and M.S. White. 2007. Altered stream-flow regimes and invasive plant species: the Tamarix case. Global Ecology and Biogeography 16: 381-393.

Stromberg, J.C., M.K. Chew, P.L. Nagler, and E.P. Glenn. 2009. Changing perceptions of change: the role of scientists in tamarix and river management. Restoration Ecology 17(2):177–186.

Stumpf, K.J., Theimer, T.C., McLeod, M.A., and T.J. Koronkiewicz. 2012. Distance from riparian edge reduces brood parasitism of Southwestern Willow Flycatchers, whereas parasitism increases nest predation risk. The Journal of Wildlife Management 76(2): 269-277.

Theobald, D., J.B. Norman, and D.M. Merritt. 2010. Assessments of threats to riparian ecosystems in the western U.S. Retrieved from https://www.researchgate.net/profile/David_Merritt2/publication/242639999_Assessments_of_Threats_to_Riparian_Ecosystems_in_the_Western_US/links/00b7d52d1864cecf49000000.pdf.

USACE – See U.S. Army Corps of Engineers

U.S. Army Corps of Engineers. 2019. 2018 National Inventory of Dams, summary of states. Retrieved from https://nid-test.sec.usace.army.mil/ords/f?p=105:22:8842046237075::NO:::.

USDA – See U.S. Department of Agriculture

USDA-APHIS – See U.S. Department of Agriculture-Animal and Plant Health Inspection Service

USDA-FS – See U.S. Department of Agriculture-Forest Service

U.S. Department of Agriculture-Animal and Plant Health Inspection Service. 1999a. Field Release of a Nonindigenous Leaf Beetle, Diorhabda elongata (Coleoptera: Chrysomelidae), for Biological Control of Deciduous Saltcedar, Tamarix ramosissima and T. parviflora (Tamaricaceae) Environmental Assessment--Final Draft

U.S. Department of Agriculture-Animal and Plant Health Inspection Service. 2005. Program for biological control of saltcedar (Tamarix spp.) in thirteen states. Environmental assessment, June 2005. Fort Collins, CO. Retrieved from https://www.aphis.usda.gov/plant_health/ea/downloads/salteafonsi.pdf.

U.S. Department of Agriculture-Animal and Plant Health Inspection Service. 2010. USDA APHIS PPQ Moratorium for Biological Control of Saltcedar (Tamarix species) using the biological control agent Diorhabda species (Coleoptera: Chrysomelidae) June 15, 2010.

U.S. Department of Agriculture-Animal and Plant Health Inspection Service. 2015. Asian Longhorned Beetle Eradication Program, Final Programmatic Environmental Impact Statement – September 2015. Retrieved from https://www.aphis.usda.gov/plant_health/ea/downloads/2015/alb-eradication-program-eis.pdf.

U.S. Department of Agriculture-Animal and Plant Health Inspection Service. 2018. Pest risk analysis of tamarisk leaf beetles, Diorhabda spp., with an evaluation of its potential to spread into

southwestern willow flycatcher, Empidonax traillii extimus, critical habitats and evaluation of control options Version 2 October 31, 2018.

U.S. Department of Agriculture-Animal and Plant Health Inspection Service. 2016. Rangeland Grasshopper and Mormon Cricket Suppression Program, Draft Environmental Impact Statement, December 2018.

U.S. Department of Agriculture-Forest Service. 2005. Final environmental impact statement for the invasive plant control project: Carson and Santa Fe National Forests in Colfax, Los Alamos, Mora, Rio Arriba, San Miguel, Santa Fe, Sandoval, and Taos Counties, New Mexico. U.S. Department of Agriculture, Forest Service, Southwestern Region. 375 pp. Retrieved from https://www.fs.usda.gov/nfs/11558/www/nepa/54698_FSPLT3_1631483.pdf.

U.S. Department of Agriculture-Forest Service. 2006. 2,4-D Human Health and Ecological Risk Assessment Final Report. Forest Health Protection, USDA Forest Service, Arlington, VA. 245 pp.

U.S. Department of Agriculture-Forest Service S. 2011. Glyphosate - Human health and ecological risk assessment, Final Report. SERA TR-052-22-03b.

U.S. Department of Agriculture-Forest Service. 2012. Environmental assessment for integrated treatment of noxious or invasive plants. Tonto National Forest – Gila, Maricopa, Pinal, and Yavapai Counties, Arizona. August 2012.

U.S. Department of Interior. 2014. Fish and Wildlife Service. Endangered and threatened wildlife and plants; Endangered and Threatened Wildlife and Plants; Determination of threatened status for the western distinct population segment of the yellow-billed cuckoo (Coccyzus americanus); Federal Register, Vol. 79, p. 59991–60038, October 3, 2014.

USDOI – See U.S. Department of Interior

USEPA – See U.S. Environmental Protection Agency

U.S. Environmental Protection Agency. 2016. Climate change indicators: atmospheric concentrations of greenhouse gases. Retrieved from https://www.epa.gov/climate-indicators/climate-change-indicators-atmospheric-concentrations-greenhouse-gases.

USFWS – See U.S. Fish and Wildlife Service

U.S. Fish and Wildlife Service. Undated. Conservation measures for impacts to migratory birds resulting from transportation activities. Retrieved from https://www.fws.gov/migratorybirds/pdf/management/transportationcms.pdf.

U.S. Fish and Wildlife Service. 2002. Southwestern Willow Flycatcher final recovery plan. Region 2. Albuquerque, NM. i–ix + 210 pp., Appendices A–O.

U.S. Fish and Wildlife Service. 2007. National bald eagle management guidelines. 23 pp. Retrieved from https://www.fws.gov/southdakotafieldoffice/NationalBaldEagleManagementGuidelines.pdf.

U.S. Fish and Wildlife Service. 2011. Golden eagles status fact sheet. Retrieved from https://www.fws.gov/migratorybirds/pdf/management/golden-eagle-fact-sheet.pdf.

U.S. Fish and Wildlife Service. 2014a. Golden eagle (Aquila chrysaetos). Eagles in the Pacific Northwest. Retrieved from https://www.fws.gov/pacific/eagle/all_about_eagles/Golden_Eagles_pg2.html.

U.S. Fish and Wildlife Service. 2014b. Bald eagle (Haliaeetus leucocephalus). South Dakota Field Office. Retrieved from https://www.fws.gov/southdakotafieldoffice/EAGLE.htm.

U.S. Fish and Wildlife Service. 2014c. Southwestern Willow Flycatcher (Empidonax traillii extimus). Nevada Fish and Wildlife Office, Pacific Southwest Region. Retrieved from https://www.fws.gov/nevada/protected_species/birds/species/swwf.html.

U.S. Fish and Wildlife Service. 2017. Notice of 12-month petition finding and 5-year review. 93 pp. Retrieved from https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=B094.

U.S. Fish and Wildlife Service. 2018. Species Profile for Southwestern Willow Flycatcher (Empidonax traillii extimus). ECOS Environmental Conservation Online System. Retrieved from https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=6749.

U.S. Fish and Wildlife Service. 2019. Comment submitted on draft EA.

U.S. Global Change Research Program. 2018. Fourth National Climate Assessment. Chapter 25: Southwest. Retrieved from https://nca2018.globalchange.gov/chapter/25/.

USGS – See U.S. Geological Survey

U.S. Geological Survey. 1999. Sustainability of ground-water resources. U.S. Geological Survey Circular 1186. 79 pp. Retrieved from https://pubs.usgs.gov/circ/circ1186/pdf/circ1186.pdf.

U.S. Geological Survey. 2016. Runoff (surface water runoff). The USGS Water Science School. Retrieved from https://water.usgs.gov/edu/runoff.html.

Wawrzynski, R. P., and M. E. Ascerno. 1998. Mass trapping for Japanese beetle (Coleoptera: Scarabaeidae) suppression in isolated areas. Journal of Arboriculture 24:303-307.

Webb, D.R. 1987. Thermal tolerance of avian embryos: A review. Condor 89:874–8

Whitfield, M.J., K.M. Enos, and S.P. Rowe. 1999. Is brown-headed cowbird trapping effective for managing populations of the endangered southwestern willow flycatcher? Studies in Avian Biology. 18: 260–266.

Wilbur-Ellis Company. 2017. Rainier-EA Safety Data Sheet. Retrieved from http://www.cdms.net/ldat/mpC39006.pdf.

Zaimes, G.N. 2007. Defining Arizona's Riparian Areas and their Importance to the Landscape. Pp. 1–13. In: Understanding Arizona's Riparian Areas. G.N. Zaimes (ed.) Arizona Cooperative Extension, University of Arizona, Tucson, Arizona.

Zouhar, K. 2003. Tamarix spp. In: Fire Effects Information System, [Online]. US. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Retrieved from https://www.fs.fed.us/database/feis/plants/tree/tamspp/all.html#FIRE EFFECTS5.