



United States Department of the Interior

FISH AND WILDLIFE SERVICE



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September 13, 2018

Memorandum

To: Refuge Manager, Bosque del Apache National Wildlife Refuge, San Antonio, New Mexico

From: Field Supervisor, U.S. Fish and Wildlife Service, New Mexico Ecological Services Field Office, Albuquerque, New Mexico 

Subject: Biological Opinion 02ENNM00-2018-F-0614 for Proposed New Mexico Meadow Jumping Mouse Habitat Rehabilitation and Wetland Management

Thank you for your request for intra-service formal consultation pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544; ESA), as amended, for the proposed project titled "Mouse Habitat Rehabilitation and Wetland Management" located in Socorro County, New Mexico (Service 2018a). We received your original cover letter and Biological Assessment on October 12, 2017 and your revised Biological Assessment on March 29, 2018, requesting formal consultation between the New Mexico Ecological Services Field Office (NMESFO) and the Bosque del Apache National Wildlife Refuge (BDANWR) on the proposed project.

The Biological Assessment addresses effects associated with the proposed project to the endangered New Mexico Meadow Jumping Mouse (*Zapus hudsonius luteus*) (jumping mouse), the endangered Southwestern Willow Flycatcher (*Empidonax traillii extimus*) (flycatcher) and its designated critical habitat, and the western distinct population segment of the threatened Yellow-billed Cuckoo (*Coccyzus americanus*) (cuckoo). Critical habitat is currently being proposed for the cuckoo.

You determined that the proposed project “may affect, but is not likely to adversely affect” the cuckoo and its proposed critical habitat. We concur with your species determination for the cuckoo and the cuckoo’s proposed critical habitat. We concur based on lack of occupancy within and adjacent to the project area, as well as the lack of habitat within the project area providing primary constituent elements.

You determined that the project will have “no effect” to flycatcher critical habitat because the project will completely avoid any habitat that is suitable for flycatcher breeding activity. The Endangered Species Act does not require Federal Agencies to consult on projects determined to have “no effect” on listed species or designated critical habitat. However, we will instead commend the conservation measures proposed for flycatcher critical habitat by BDANWR.

You also determined that the proposed project “may affect, is likely to adversely affect” the jumping mouse as well as jumping mouse critical habitat, and the flycatcher, and therefore requested formal consultation for these species. This document transmits the U.S. Fish and Wildlife Service’s (Service) biological opinion (BO) based on our review of the proposed project and its effects on the flycatcher and jumping mouse and associated designated critical habitat pursuant to the ESA.

We appreciate the BDANWR’s efforts to identify and minimize effects to federally listed species from this project. In future communications regarding this project please refer to consultation number 02ENNM00-2017-F-0614. If you have any questions or would like to discuss any part of this BO, please contact David Campbell at (505) 761-4745 or david_campbell@fws.gov; or Vicky Ryan at (505) 761-4738 or vicky_ryan@fws.gov; or Clinton Smith at (505) 761-4743 or clinton_smith@fws.gov.

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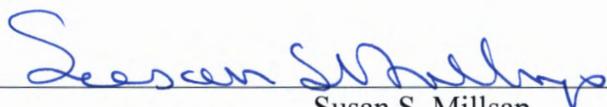
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico

Biologist, Bosque del Apache National Wildlife Refuge, San Antonio, New Mexico

**Biological Opinion on the Proposed New Mexico Meadow Jumping
Mouse Habitat Rehabilitation and Wetland Management, Socorro
County, New Mexico**

Consultation Number 02ENNM00-2018-F-0614

September 13, 2018



Susan S. Millsap
NMESFO Field Supervisor

BIOLOGICAL OPINION

CONSULTATION HISTORY

We received your original cover letter and Biological Assessment on October 12, 2017 and your revised Biological Assessment on March 29, 2018, requesting formal consultation between the New Mexico Ecological Services Field Office (NMESFO) and the Bosque del Apache National Wildlife Refuge (BDANWR) on the proposed project. Since the original request for consultation, a field visit and meetings (4/11/2018, 6/13/2018 and 9/6/2018), phone calls (7/25/2018, 8/10/2018 and 8/29/2018) and emails have taken place for clarification on project details.

DESCRIPTION OF THE ACTION AREA

The proposed action area is located within the BDANWR boundary in Socorro County New Mexico (Figure 1). Activities proposed will occur west of the active floodway (west of the Low Flow Conveyance Channel and levee). Specifically, management units (units) covered in this document include BDANWR's 18BE, Triangle, 24AN, 18A1, 18A2, 18A3, 18A4, 18A5, 17B and any future units in the action area (Figure 2). The BDANWR currently has a total of 60+ units (dependent on availability of fallow farm fields/water availability) covering approximately 2,300 acres of habitat. Physical or biological features (PBF) associated with the jumping mouse or flycatchers on the periphery of the units is currently limited, but has the potential to increase in the future.

DESCRIPTION OF THE PROPOSED ACTION

Jumping Mouse or Flycatcher Habitat Rehabilitation within wetlands – Mowing and Disking

The refuge plans to selectively implement mowing and disking prescriptions on up to three occupied jumping mouse units annually, during the summer, fall or winter months. Mowing and disking prescriptions will be completed by using mowers, slash busters and tillage implements affixed to tractors, which will enter these mid-late successional units in order to reset the plant community to an earlier successional stage. Slash busters will not be used within 15 meters (50 feet) of active flycatcher nests due to chance of debris entering nesting area. This proposed action may occur within occupied designated jumping mouse critical habitat that doesn't contain jumping mouse critical habitat PBFs.

The units that will be receiving mowing and disking prescriptions will be selected based on the quality of habitat. For example, habitat in a unit is considered to be in poor quality for jumping mouse when nighttime feeding areas are composed of approximately 60% woody material as opposed to young herbaceous growth. Habitat quality typically declines between 3 to 7 years of natural growth. The units receiving the mowing and/or disking prescriptions will be done on a cyclical basis (approximately every 3 to 7 years and dependent on plant community response). Occupied jumping mouse units immediately adjacent to each other will not be disturbed during the same year to minimize disturbance. This will ensure that there is always available feeding habitat within adjacent units to support the jumping mouse's nighttime feeding activities.

The time of year in which these disturbances would occur (summer, fall or winter) would depend on plant community characteristics that have established within the selected unit(s). For example, if a unit is lacking a spikerush (*Eleocharis palustris*) component to the jumping mouse habitat community, then a fall disking disturbance might be more appropriate. If the spikerush component is too extensive and/or shrub species are taking over, then a summer treatment would be more appropriate. Refuge field personnel would determine the best prescription and season for the unit in order to favor jumping mouse plant production.

Whenever possible, jumping mouse restoration efforts would occur between August 15 through May 15 (after flycatchers have already completed nesting activities and have left the action area). However, these actions may also occur in the spring or summer within 0.25 mile of occupied flycatcher nesting sites (every 3 to 7 years) and depending on vegetation characteristics.

Annual Mowing Adjacent to Occupied Jumping Mouse or Flycatcher Habitat

To control the growth of cocklebur (*Xanthium strumarium*), the units may be mowed annually during the months of June, July or August depending on seed head production. This activity would occur within the units in areas not considered suitable for the jumping mouse, flycatcher or cuckoo. Suitable habitat, for the purposes of this BO, is considered areas that contain the physical or biological features for jumping mouse or flycatchers as mentioned in the Status of Species sections below. On years when the amount of cocklebur overwhelms the desirable plant community, the mowing would occur prior to seed dispersal to control reproduction and minimize the future encroachment of cocklebur. Once the unit is mowed, it is typically flooded within 24 hours and the water is then held for approximately three days to kill cocklebur. This method has been very successful in increasing plant diversity, and may increase the expansion of a more desirable plant community for jumping mouse.

Annual Disking Adjacent to Occupied Jumping Mouse or Flycatcher for General Plant Production

Any unit on the refuge may receive a disking prescription in place of a scheduled cocklebur or jumping mouse habitat rehabilitation treatment. As with cocklebur mowing, these activities would occur within the units in areas not considered suitable for the jumping mouse, flycatcher or cuckoo (see previous section for description of suitable habitat).

Refuge staff will use tractors with disk implements to break up soils and mix organic matter in order to re-invigorate the seed bank and promote desirable plant responses the following year. After the unit is disked, the unit may be flooded for the same duration as a cocklebur treatment. These activities may occur during jumping mouse and flycatcher activity period (spring-fall). As an example, for units that have progressed to a monotypic perennial plant community or the unit is taken over by a non-desirable plant species (ex: knotgrass) driven by rhizomatous reproduction, a disturbance that allows the root system to dry out during the hotter times of the year will yield longer term positive results.

Conservation Measures

The following Conservation Measures are included in the proposed action:

Flycatcher

Surveys will be conducted in areas or units considered suitable for the purposes of this BO no earlier than one year prior within areas where disturbance efforts are to occur.

In the event that mowing or disking is required during the flycatcher breeding season and within a 0.25 mile buffer of an occupied flycatcher nest, refuge staff will:

- Start the pass at the farthest possible distance, with each pass getting one tractor/disk width closer to the occupied flycatcher nest (Figure 3).
- Ease into and depart from the 0.25 mile buffer as quickly and quietly as possible to minimize duration of noise disturbance near the nest site.
- Not return for at least 10 minutes (when possible) since staff must continue to mow or disk the remainder of the unit as prescribed.

Flycatcher habitat that exhibits the physical or biological features for this species will not be treated during these efforts, and all mid to late successional stage willows will be avoided by proposed actions.

Jumping mouse

Surveys will be conducted annually to identify where jumping mouse are located within BDANWR.

Activities will occur during the day when jumping mouse are known to occupy their day nests away from mowing or disking activities. By timing the mowing or disking activities to occur during the day, jumping mouse are not likely to be within the action area when proposed activities occur.

Activities will occur in occupied jumping mouse units two weeks after standing water is no longer present. Because the jumping mouse requires flowing water that provides saturated soils that supports vegetation during the jumping mouse's active season, they would not be expected to be present.

Units containing suitable habitat or the physical or biological features for jumping mouse, adjacent to occupied units receiving mowing or disking treatments, will be left untreated. By leaving adjacent units untreated, displaced jumping mouse requiring alternative foraging opportunities will have a place to go within 0.1 miles (160 meters) of the disturbed unit. This is under the distance recognized by Wright and Frey (2015) of 192 meters (approximately 0.12 miles) in which "gaps in suitable habitat larger than the 95% movement distance of jumping mouse (i.e., 192 meters) may hinder population expansion".

STATUS OF SPECIES/DESIGNATED CRITICAL HABITAT

New Mexico Meadow Jumping Mouse and Critical Habitat

The jumping mouse was listed as endangered on June 10, 2014 (Service 2014a). Final designated critical habitat was published on March 16, 2016 (Service 2016a). The jumping mouse is a small mammal that measures approximately 187 to 255 millimeters (7.4 to 10 inches) in total length (VanPelt 1993). It is generally nocturnal, but occasionally diurnal. The jumping mouse hibernates about nine months out of the year and is only active three or four months during the summer (Morrison 1987, VanPelt 1993, Frey 2005). Within this short time frame, it must breed, birth, raise young, and store up sufficient fat reserves to survive the next year's hibernation period. In addition, the species only lives up to three years and has one litter annually with an average of five young (Morrison 1987, VanPelt 1993).

The jumping mouse is a habitat specialist (Frey 2006a). It nests in dry soils, but uses moist, streamside, dense riparian/wetland vegetation up to an elevation of about 2,438 meters (m; 8,000 feet (ft)) (Frey 2006a). The jumping mouse appears to only utilize two riparian community types: 1) persistent emergent herbaceous wetlands (i.e., beaked sedge and reed canary grass alliances); and 2) scrub-shrub wetlands (i.e., riparian areas along perennial streams that are composed of willows and alders) (Frey 2005). It will also use microhabitats of patches or stringers of tall dense sedges on moist soil along the edge of permanent water. Home ranges vary between 0.15 and 1.1 hectares (ha; 0.37 and 2.7 acres) and may overlap (Smith 1999).

The historical distribution of the jumping mouse likely included riparian wetlands along streams in the Sangre de Cristo and San Juan Mountains from southern Colorado to central New Mexico, including the Jemez and Sacramento Mountains and the Rio Grande Valley from Española to Bosque del Apache National Wildlife Refuge, and into parts of the White Mountains in eastern Arizona (Service 2014b).

Based on historical (1980s and 1990s) and current (from 2005 to 2017) data, the distribution and abundance of the jumping mouse has declined significantly range-wide. The majority of extirpations have occurred since the late 1980s to early 1990s, as about 70 formerly occupied locations are now considered extirpated. Since 2005, there have been 43 documented remaining populations (12 in Colorado, 15 in New Mexico, and 16 in Arizona) spread across the eight geographic management areas described in the final listing rule. Ten of the twelve Colorado populations are located on the Southern Ute Indian Reservation in southwestern Colorado, and specific jumping mouse locations are not currently available from these sites. Nearly all of the current populations are isolated and widely separated, and nearly all of the 43 populations located since 2005 have patches of suitable habitat that are too small to support resilient populations of jumping mouse. In addition, 11 of the 31 populations documented since 2005 have been substantially compromised since 2011 (due to water shortages, grazing, or wildfire and post-fire flooding), and these populations could already be extirpated (Service 2014a).

In total, approximately 5,657 ha (13,973 acres) along 272.4 kilometers (km; 169.3 miles) of flowing streams, ditches, and canals has been designated as critical habitat in eight critical habitat units within Colfax, Mora, Otero, Sandoval, and Socorro Counties in New Mexico; Las Animas, Archuleta, and La Plata Counties in Colorado; and Greenlee and Apache Counties in Arizona (Service 2016a).

The primary constituent elements (now referred to as Physical or Biological Features (PBF) per 81 FR 7414-7440) of jumping mouse critical habitat are those elements of the physical or biological features in an area that provide for life-history processes and are essential to the conservation of the jumping mouse. The PBF listed in the critical habitat for the jumping mouse (81 FR 14293) are:

1. Riparian communities along perennial or seasonally available water characterized by one of two wetland vegetation community types:
 - a. Persistent emergent herbaceous wetlands especially characterized by presence of primarily forbs and sedges (*Carex* spp. or *Schoenoplectus* spp.) or
 - b. Scrub-shrub riparian areas that are dominated by willows (*Salix* spp.) or alders (*Alnus* spp.); and
2. Flowing water that provides saturated soils throughout the jumping mouse's active season that supports tall (average stubble height of herbaceous vegetation of at least 69 centimeters (27 inches)); and
3. Sufficient areas of 9 to 24 km (5.6 to 15 miles) along a stream, ditch, or canal that contain suitable or restorable habitat to support movements of individual New Mexico meadow jumping mouse; and
4. Include adjacent floodplain and upland areas extending approximately 100 m (330 ft) outward from the water's edge (as defined by the bankfull stage of streams).

For more detailed information on the jumping mouse's biology, status of the species and critical habitat, see the Species Status Report (Service 2014b), Recovery Outline (Service 2014c) and designation of critical habitat (Service 2016a). See the Environmental Baseline below for more details on the life history and demographics of the jumping mouse.

Flycatcher and Flycatcher Critical Habitat

The flycatcher was federally listed as endangered in 1995, without critical habitat (Service 1995). The flycatcher is a small, insect-eating generalist, neotropical migrant bird (Service 2002). It grows to about 15 centimeters (5.8 inches) in length. It eats a wide range of invertebrate prey including flying, ground and vegetation-dwelling insects of terrestrial and aquatic origins (Drost et al. 2003). The flycatcher spends the winter in locations such as southern Mexico, Central and South America (Paxton et al. 2011).

Flycatchers use riparian habitats that are generally dense, shrubby, moist, and that have abundant flying insects (Service 2002). Riparian habitat is used throughout the flycatcher's range for breeding and stop-over habitat during their long-distance migration. Breeding habitat is largely associated with perennial (persistent) streamflow that can support the expanse of vegetation characteristics needed by breeding flycatchers. The hydrologic regime and supply of surface and subsurface water is a driving factor in the long-term maintenance, growth, recycling, and regeneration of flycatcher habitat (Service 2002).

At the end of 2007, 1,299 flycatcher breeding territories were estimated to occur throughout southern California, southern Nevada, southern Utah, southern Colorado, Arizona, and New Mexico (Service 2014d). Some of the flycatcher breeding sites having the highest number of territories are found along the middle Rio Grande (MRG) and upper Gila River in New Mexico, and Roosevelt Lake and the San Pedro and Gila River confluence area in central Arizona.

Critical habitat was first designated in 1997, but was recently redesignated in 2013 (Service 1997, 2013a). San Ildefonso, Santa Clara, and Ohkay Owingeh Pueblo lands are excluded from designated critical habitat (Service 2013a). Range wide there are 84,568 ha (208,973 acres) of designated critical habitat.

The primary constituent elements (now referred to as Physical or Biological Features (PBFs) per 81 FR 7414-7440) of flycatcher critical habitat are those elements of the physical or biological features in an area that provide for life-history processes and are essential to the conservation of the flycatcher. The PBF listed in the critical habitat for the flycatcher are:

1. Riparian vegetation. Riparian habitat along a dynamic river or lakeside, in a natural or manmade successional environment (for nesting, foraging, migration, dispersal, and shelter) that is comprised of trees and shrubs (that can include Gooddings willow (*Salix gooddingii*), coyote willow (*Salix exigua*), Geyer's willow (*Salix geyeriana*), arroyo willow (*Salix lasiolepis*), red willow (*Salix laevigata*), yewleaf willow (*Salix taxifolia*), pacific willow (*Salix lucida*), boxelder (*Acer negundo*), tamarisk (*Tamarix* spp.), Russian olive (*Eleagnus angustifolia*), buttonbush (*Cephalanthus* spp.), cottonwood (*Populus* spp.), stinging nettle (*Urtica dioica*), alder (*Alnus* spp.), velvet ash (*Fraxinus velutina*), poison hemlock (*Conium maculatum*), blackberry (*Rubus* spp.), seep willow (*Baccharis salicifolia*), oak (*Quercus* spp.), rose (*Rosa* spp.), sycamore (*Platanus* spp.), false indigo (*Baptisia australis*), Pacific poison ivy (*Toxicodendron diversilobum*), grape (*Vitis* spp.), Virginia creeper (*Parthenocissus quinquefolia*), Siberian elm (*Ulmus pumila*), and walnut (*Juglans* spp.) and some combination of:
 - a. Dense riparian vegetation with thickets of trees and shrubs that can range in height from about 2 to 30 m (about 6 to 98 ft). Lower-stature thickets [2 to 4 m (6 to 13 ft) tall] are found at higher elevation riparian forests and tall-stature thickets are found at middle and lower-elevation riparian forests;
 - b. Areas of dense riparian foliage at least from the ground level up to approximately 4 m (13 ft) above ground or dense foliage only at the shrub or tree level as a low, dense canopy;

- c. Sites for nesting that contain a dense (about 50–100 percent) tree or shrub (or both) canopy (the amount of cover provided by tree and shrub branches measured from the ground);
 - d. Dense patches of riparian forests that are interspersed with small openings of open water or marsh or areas with shorter and sparser vegetation that creates a variety of habitat that is not uniformly dense. Patch size may be as small as 0.1 ha (0.25 acres) or as large as 70 ha (175 acres).
2. Insect prey populations. A variety of insect prey populations found within or adjacent to riparian floodplains or moist environments, which can include: flying ants, wasps, and bees (Hymenoptera); dragonflies (Odonata); flies (Diptera); true bugs (Hemiptera); beetles (Coleoptera); butterflies, moths, and caterpillars (Lepidoptera); and spittlebugs (Homoptera).

For more detailed information on the flycatcher's biology, status of the species and critical habitat, see the Recovery Plan (Service 2002), designation of critical habitat (Service 2013a), and 5-year review (Service 2014d). See the Environmental Baseline below for more details on the life history and demographics of the flycatcher.

ENVIRONMENTAL BASELINE

Under section 7(a)(2) of the ESA, when considering the effects of the action on federally listed species, we are required to take into consideration the environmental baseline. Regulations implementing the ESA (50 CFR 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in progress. The environmental baseline defines the status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

For all species and the project area in general, climate change impacts are expected to occur into the future. The Intergovernmental Panel on Climate Change (IPCC) used models and various greenhouse gas emissions scenarios to make projections of climate change globally and for broad regions through the 21st century (Meehl et al. 2007; Randall et al. 2007; Solomon et al. 2007). The IPCC concluded: 1) it is virtually certain there will be warmer and more frequent hot days and nights over most of the earth's land areas; 2) it is very likely there will be increased frequency of heat waves over most land areas, and the frequency of heavy precipitation events will increase over most areas; and 3) it is likely that increases in extreme weather events will occur in the areas affected by droughts (Christensen et al. 2007; Prinn et al. 2011). The jumping mouse and flycatcher, along with their habitat, will almost certainly be affected in some manner by climate change; however, the magnitude and extent of the change cannot be quantified at this time.

Status of the species and critical habitat and factors affecting the species' environment within the action area

New Mexico Meadow Jumping Mouse

Jumping mouse were first recorded from BDANWR in the 1930s (Findley et al. 1975). More recent surveys and museum records from the late 1980s, early 1990s, and 2009-2010 found jumping mouse occupying suitable habitat on BDANWR (Morrison 1988, Najera 1994, Zwank et al. 1997, Frey 2006b, Frey and Wright 2012). Morrison (1992), conducted trapping at BDANWR during 1987 and noted that the jumping mouse was “found to persist at many sites, inhabiting narrow riparian zones along irrigation ditches”. In 2009-2010, 29 individual jumping mouse were captured (Frey and Wright 2012). Based on habitat assessment, trapping and radio telemetry results Frey and Wright (2012) estimated that the population of jumping mouse on BDANWR consisted of perhaps < 50 individuals associated with 2.7 km (1.7 miles) of the Riverside Canal. No jumping mouse were captured during surveys in 2013; however, in 2014, one individual was captured (Frey 2013, Service 2013b, 2013c, 2013d, Service 2014b). In 2015, six jumping mouse were captured (Service 2016b). Lehnen et al. (2018), used a photographic monitoring sampling method which did not involve trapping and handling jumping mouse. Photographic monitoring consists of high resolution trail cameras, placed on mounts as "camera traps". From the camera traps, jumping mouse were detected within 82 photographs from 26 visits (a visit is defined as the same species photographed at a location within the same hour) taken at 18 locations at BDANWR (Figure 4). Lehnen et al. (2018) vegetation surveys found lower quality jumping mouse habitat in previously surveyed jumping mouse management units. They noted that “it seems likely the current population is also smaller” (Lehnen et al. 2018).

Jumping mouse exhibit extreme site-fidelity for daily activities (i.e., movements to and from day nesting and feeding areas) on BDANWR (Frey and Wright 2012). Frey and Wright (2012) reported that the typical maximum distance traveled between successive telemetry locations by jumping mouse on BDANWR was 300 m (984 ft). In addition, most daily movements based on 95 percent of maximum straight-line distances traveled locations were 192 m (630 ft) or less (Frey and Wright 2012). Moreover, the maximum distance travelled between two successive points by all radio collared jumping mouse on BDANWR was 744 m (2,441 ft), but most regular daily and seasonal movements were less than 100 m (328 ft) (Frey and Wright 2012). One jumping mouse also moved 1 km (3,280 ft) between years (Frey and Wright 2012); however, it is unclear how frequently jumping mouse travel long-distances (> 1 km (0.6 miles)) movements.

New Mexico Meadow Jumping Mouse Critical Habitat

The action area overlaps New Mexico meadow jumping mouse critical habitat Unit 6 – Bosque del Apache National Wildlife Refuge. The BDANWR is the only locality within the middle Rio Grande where jumping mouse are still considered to exist (Service 2014b). This critical habitat unit contains a total of 403 ha (995 acres) for a length of 21.1 km (13.1 miles). This unit includes parts of a complex ditch system with associated irrigation of BDANWR management units, making habitat within this area unique. This critical habitat unit begins in the northern part of BDANWR and generally follows the Riverside Canal to the southern end (Frey and Wright 2012; Service 2014b). At the time of listing (Service 2016a), only 4.1 ha

(10.1 acres) within critical habitat Unit 6 was considered occupied based upon survey data of the jumping mouse since 2009. The occupied area is located along a 2.7-km (1.7-miles) segment of the Riverside Canal (Frey and Wright 2012; Service 2014b).

Habitat with at least 33% predicted probability of occurrence based on spatial distribution predictions, field measurements and habitat analysis models (Lehnen et al. 2018) was estimated to be approximately 6.7 ha (16.6 acres) in 2015 and 4.4 ha (10.8 acres) in 2017. The 2017 estimate is similar to the amount listed in the last jumping mouse species status assessment (4.1 ha (10.1 acres); Service 2014b). In the jumping mouse critical habitat designation (Service 2016a) restoring currently degraded habitat was deemed “essential to the conservation of the subspecies”. This restoration would expand available habitat within a critical habitat unit that could one day become occupied by the jumping mouse and provide for potentially increasing population size within the riparian system (Service 2016a). Since habitat within BDANWR is consider “unique” activities such as mowing may be key for improving conditions in occupied and unoccupied jumping mouse critical habitat (Service 2016a).

Flycatcher and Flycatcher Critical Habitat

Current population of the flycatcher within the action area specifically is 15 territories which were observed during 2017 protocol surveys. The action area is located within the Rio Grande Recovery Unit for the flycatcher encompasses the San Luis Valley, Upper, Middle, and Lower Rio Grande Management Units (Service 2002, 2011, 2012). Increases in the number of territories have occurred within this Recovery Unit, primarily due to increasing numbers within the MRG Management Unit (Albuquerque to Elephant Butte Reservoir). In 2002, a total of 197 territories were known to occur within the Recovery Unit, mostly along the mainstem Rio Grande (Sogge et al. 2003), representing approximately 17 percent of the territories rangewide. By 2007, this number had increased to an estimated 230 territories (Service 2014d). There were 396 territories detected in the MRG Management Unit in 2017 (Service 2018b). Since 1999, most territories within the MRG Management Unit (81 percent) have been located within the lower San Marcial Reach near Elephant Butte Reservoir (Moore and Ahlers 2018). In the MRG Management Unit, the numerical recovery goal is 100 territories, which has been far surpassed in most recent years (Moore and Ahlers 2018). The only other unit with large numbers of territories is the Gila Recovery Unit in southwestern New Mexico which had 659 (50 percent) of the rangewide total in 2007 (Service 2014d). The amount of habitat available to flycatchers varies by reach.

The trend in flycatcher nest success has been quite variable in recent years and the number of breeding territories is anticipated to decline due primarily to climate change impacts to habitat and prey base; habitat loss due to the saltcedar leaf beetle; and succession of riparian vegetation to an unsuitable state for flycatchers (Moore and Ahlers 2018). At this time, we cannot quantify this anticipated decline due to a lack of information.

B. Factors affecting the species and critical habitat within the action area

The action area is entirely contained within the BDANWR, Socorro County, New Mexico. Relevant consultations that have occurred on BDANWR and in the action area include:

- **Final Biological and Conference Opinion for Bureau of Reclamation, Bureau of Indian Affairs, and Non-Federal Water Management and Maintenance Activities on the Middle Rio Grande, New Mexico (2016)** – Formal consultation including hydrology and river maintenance (including habitat restoration) along the Rio Grande from the Colorado/New Mexico state line to Elephant Butte Dam. Determination of “may effect, likely to adversely affect” for southwestern willow flycatcher, yellow-billed cuckoo, and Rio Grande silvery minnow and their designated/proposed critical habitat, and “no effect” for New Mexico meadow jumping mouse and its critical habitat based on proposed actions and conservation measures. Consultation Number 02ENNM00-2013-F-0033. A portion of this project includes infrastructure changes to irrigation ditches within BDANWR that will allow for increased efficiencies in refuge water management. Water deliveries for jumping mouse habitat are not anticipated to negatively change.
- **Bosque del Apache Unit 28 Salt Cedar Removal and Channel Re-alignment Project (2016)** – Removal of invasive vegetation and re-shape channel in BDANWR Unit 28. This project is anticipated to create additional mouse habitat by mimicking the dynamic nature of the river when it used to be able to realign naturally. Determination of “may effect, is not likely to adversely affect” for New Mexico meadow jumping mouse, southwestern willow flycatcher, yellow-billed cuckoo, and their designated/proposed critical habitat based on proposed actions and conservation measures. Consultation #02ENNM00-2016-I-0360. The construction associated with this project is now complete, and maintenance and establishment of habitat is in progress.
- **Bosque del Apache NM Fire District Prescribed Burn in 4 Jumping Mouse Units (2015)** – Treatment of four jumping mouse units with prescribed fire in the fall. Determination of “may effect, is not likely to adversely affect” for New Mexico meadow jumping mouse, southwestern willow flycatcher, yellow-billed cuckoo, and their designated/proposed critical habitat based on proposed actions and conservation measures. Consultation #02ENNM00-2016-I-0028. This project restored suitable jumping mouse habitat (exhibiting PBF) through prescribed fire treatment in 18A5, 18BE, 18BW and Triangle units.
- **Bosque del Apache Unit 24 Living Streams (2015)** – Construction of shallow earthen channel to mimic a perennial riparian habitat. Determination of “may effect, is not likely to adversely affect” for New Mexico meadow jumping mouse, southwestern willow flycatcher, yellow-billed cuckoo, and their designated/proposed critical habitat based on proposed actions and conservation measures. Consultation #02ENNM00-2015-I-0764. Project completed in 2016 with 2 acres of suitable jumping mouse habitat (exhibiting PBF) restored and improving additional 3 acres. Additional adjacent established flycatcher habitat enhanced by increasing available surface water.
- **Bosque del Apache Annual Channel/ditch, Roadside and Viewing Window Maintenance (2014)** – Mowing access roads and channel/ditches for maintenance and repairs. Determination of “may effect, is not likely to adversely affect” for New Mexico

meadow jumping mouse, southwestern willow flycatcher, yellow-billed cuckoo, and their designated/proposed critical habitat based on proposed actions and conservation measures. Consultation #02ENNM00-2015-0058. Activities associated with this project do not occur within suitable habitat for jumping mouse, flycatcher or cuckoo.

- **Bosque del Apache Unit 18 Wetland Rehabilitation (2014)** – Conduct mechanical wetland rehabilitation in managed wetland impoundments to set back plant succession. Determination of “may effect, is not likely to adversely affect” for southwestern willow flycatcher, yellow-billed cuckoo, and their designated/proposed critical habitat and “may effect, likely to adversely affect” for New Mexico meadow jumping mouse and its critical habitat based on proposed actions and conservation measures. Incidental take of one acre of potential jumping mouse habitat given for this project. Consultation #02ENNM00-2013-FC-0111. This project resulted in one week of mechanical activities including disking 15 acres in unit 18A1 and 37 acres in unit 18A5. These activities occurred after the jumping mouse was hibernating and mainly involved improving conditions for shorebirds and waterbirds.
- **Bosque del Apache NWR NAWCA Projects (2012)** – Conduct mechanical and herbicide invasive species removal (unit 18C), installation of Langemann gate to restore flooded forested wetland for wading bird rookery, improving water delivery system on the refuge (units 24D 1-3, 24E and 31), and replace inefficient water control structure to improve water delivery system (units 17A and 18A). Determination of “may effect, is not likely to adversely affect” for Rio Grande silvery minnow, southwestern willow flycatcher, yellow-billed cuckoo, and their designated/proposed critical habitat and “may effect, likely to adversely affect” for New Mexico meadow jumping mouse and its critical habitat based on proposed actions and conservation measures. Consultation #02ENNM00-2012-I-0108. Activities associated with this project removed over 200 acres of invasive vegetation, provided a more consistent flow to over 100 acres of forested wetlands, improved water delivery in the old river channel and other downstream units off the main delivery system, and help better control water management for annual see production and New Mexico meadow jumping mouse habitat requirements.

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action, which will be added to the environmental baseline. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

Jumping Mouse

All activities associated with mowing and disking will occur during the day. Jumping mouse do not use units during the day but they may utilize areas within the units as nighttime feeding areas. During the day (summer through fall) the jumping mouse is known to day nest within

open salt grass areas. Salt grass areas are not found within the units. Therefore, it is unlikely that direct impacts to individuals will occur. However, since the jumping mouse may use areas within the units for nighttime feeding areas, indirect effects including expending additional energy resources in locating alternative foraging locations, reduction in offspring number and reduced ability to store sufficient fat reserves for hibernation period, may occur the year of disturbance, although the habitat being restored lacks all the necessary PBF. Indirect effects could be greater if left un-changed as the habitat would likely continue to degrade if left untreated. In the long term, available seeds and suitable habitat structure should increase the first year after disturbance and allow for high quality habitat to remain for at least 3 to 7 years.

Jumping Mouse Critical Habitat

Lehnen et al. (2018) found jumping mouse in 4.4 ha (10.8 acres) within jumping mouse critical habitat on BDANWR. Although jumping mouse still use this habitat, some areas within this habitat are becoming unproductive or do not contain all the necessary PBF. Activities associated with the proposed action should improve habitat conditions for jumping mouse in units with jumping mouse critical habitat in them. To ensure that activities on jumping mouse critical habitat are minimized, the refuge will not disturb units that are immediately adjacent to each other during the same year. This will ensure that there is always available feeding habitat within adjacent units to support the jumping mouse's nighttime feeding activities. Since jumping mouse can travel anywhere from 100 – 300 m (328 – 924 ft; Frey and Wright 2012) and the average length of critical habitat within these units is approximately 250 m (820 ft; estimate based upon aerial images and measurements utilizing Geographic Information Systems (GIS 10.3.1)), adjacent untreated units should be close enough so that jumping mouse can use them for foraging, helping to offset indirect effects to the jumping mouse.

There are currently 62 units of jumping mouse critical habitat on BDANWR. Nine units are occupied with jumping mouse (Lehnen et al. 2018) and 53 additional unoccupied units exist with jumping mouse critical habitat. The unoccupied units lack some or all of the PBF (and some would require extensive restoration or water diversion efforts) to support jumping mouse. Like the nine currently occupied units, portions of these units would also require management actions to become productive for jumping mouse. These units will also be treated on a 3 to 7 years cyclical basis (dependent on plant community response). The refuge will extend the practice of not disturbing adjacent units to these other units as well, in the event that they become occupied due to treatment efforts. This will help ensure that available nighttime feeding habitat and disturbance is minimized in units that are immediately adjacent to each other during the year when a treatment is conducted. The average length of jumping mouse critical habitat within the 53 units is approximately 702 m (2,300 ft; if we remove 4 units that were over 2,000 m (6,560 ft) in length then the average length is 547 m (1,795 ft)). These estimates are based upon aerial images and measurements utilizing Geographic Information Systems (GIS 10.3.1). When taking these distances and accounting for jumping mouse travel distances (100 – 300 m (328 – 924 ft); Frey and Wright 2012), the majority of adjacent units within the 53 currently “unoccupied” units in jumping mouse critical habitat should still be within jumping mouse’s range for foraging, helping to offset indirect effects to the jumping mouse if they occupy these units in the future.

Flycatcher

Indirect impacts to this species include noise disturbance during mowing or disking activities which would decrease the ability for flycatchers to communicate with each other effectively. Increasing numbers of publications have shown effects of noise disturbance on wildlife. Animals depend on hearing natural sounds in the environment for things like communication, establishing territories, finding habitat, courting and mating, rearing and protecting young, finding food, and avoiding predators (National Park Service 2018).

Noise disturbance studies for flycatchers are lacking, but the ovenbird (*Seiurus aurocapillus*) is a similarly sized migratory songbird and both species occupy similar forested habitats. Habib et al. (2007) assessed the impacts of noise on ovenbird pairing success and found a significant reduction in pairing success at breeding sites affected by noise disturbance compared with noiseless areas. Habib et al. (2007) hypothesized that noise interferes with a male's song, such that females may not hear the male's song at greater distances or females may perceive males to be of lower quality because of distortion of song characteristics. Should communication be limited, individuals within a territory would have limited ability to warn each other of dangers (such as predators for example). Communication limiting activities such as mowing or disking would occur between May 15 and August 15, which would coincide with the migratory and breeding season for flycatchers.

The BDANWR will be managing approximately 60+ units annually, and out of those 60+ units there are approximately 12 units with habitat suitable enough to warrant surveys, 6 of which are occupied by flycatchers (or 20% of all units could accommodate breeding flycatchers and 10% of all units are occupied). All mowing or disking treatment within units is anticipated to occur during the breeding season, which will be dependent on the vegetation species characteristics and hydrological conditions. On average refuge staff typically take between 2 to 5 hours to mow or disc units not containing flycatcher nest buffers, so it is assumed that they could take up to 5 hours to treat a unit containing a flycatcher nest buffer. Based on 2017 flycatcher data, flycatcher territory buffers typically encompass parts of 3 to 8 units (Figure 5 and 6). Thus, 5 hours for 8 units would be 40 consecutive hours. If a flycatcher nest buffer encompasses more than 8 units and the refuge will treat more than 8 units within the buffer then the refuge will contact NMESFO for recommendation. It is important to note that an individual territory would not be subject to the full 40 hours of noise disturbance, but rather just an unknown portion of that time when the mowing or disking takes place within 0.25 mile of a territory. The number of hours of noise disturbance flycatchers can be subject to and to what extent the noise disturbance affects the species is largely unknown. Our analysis in the following paragraph provides the greatest conservation for the flycatcher given our uncertainty.

In 2017, there were 15 territories comprised of 22 individuals (7 pairs, and 8 unpaired males) within 6 units. The Service assumes that an unknown number of flycatcher territories will not successfully establish a pair or will not be as successful in their nesting effort as a result of the mowing or disking activities each year due to the inability to properly communicate with each other. To address the uncertainty associated with the appropriate distance that should be avoided during the breeding season, as well as how much the noise disturbance associated with the proposed action impacts flycatcher adults, chicks, and fledglings, the NMESFO will work with

BDANWR staff on developing and implementing noise disturbance monitoring. Noise disturbance monitoring will involve both NMESFO and BDANWR devoting equipment and/or staff resources. The amount of time associated with the noise disturbance monitoring is estimated to be 1 to 2 biologists for 3 to 4 days of monitoring development, and up to 10 days during the flycatcher breeding season to assist with monitoring efforts. The noise disturbance monitoring will take place for approximately 3 flycatcher breeding seasons, or until sufficient data has been collected to justify changing the buffer distance or monitoring efforts. Until the results of the monitoring are complete, we will anticipate non-fatal harassment will impact up to 91 percent of all territories located within the action area. From monitoring data collected within the action area from 2014 to 2017, the amount of flycatcher territories located within 0.25 mile of treatment areas ranges from 73 – 91 percent (Table 1). It is anticipated that post-monitoring results will show that impacts are less severe than anticipated in this effects analysis.

Table 1. Flycatcher population within the action area and within 0.25 mile of treatment.

Year	Territories Outside of Noise Disturbance	Total Territories within Action Area	Percentage of Territories within 0.25 Mile of Proposed Treatment Areas/Noise Disturbance
2014	5	30	83%
2015	2	23	91%
2016	4	19	79%
2017	4	15	73%

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions on endangered species that are reasonably certain to occur in the action area considered in this consultation. Future Federal actions that are unrelated to the actions are not considered because they require separate consultation pursuant to section 7 of the ESA.

The action area is on federally owned land, with an interest in conservation and no sudden changes in management affecting the flycatcher or jumping mouse are anticipated. We anticipate that the local urban and rural communities will continue to grow, over time, which in turn would lead to an unknown amount of increases in recreation or agricultural activities. Increases in recreation could lead to effects such as increased noise disturbance or decreases in habitat suitability. For example, increased numbers of individuals visiting the action area could also increase vehicular traffic, increase potential for weedy vegetation species establishment as opposed to native species that are preferred by flycatchers. Local state, tribal and municipal effects (such as irrigation/agricultural needs for example) have been previously considered in this BO within the Baseline section and more specifically in the Final Biological and Conference Opinion for Bureau of Reclamation, Bureau of Indian Affairs, and Non-Federal Water Management and Maintenance Activities on the Middle Rio Grande, New Mexico (Consultation Number 02ENNM00-2013-F-0033). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

CONCLUSION

“*Jeopardize the continued existence of*” means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR § 402.02).

“*Recovery*” means improvement in the status of listed species to the point at which listing is no longer appropriate under the criteria set out in section 4(a)(1) of the ESA (50 CFR § 402.02).

This biological opinion relies on the revised regulatory definition of “*destruction or adverse modification*” of designated or proposed critical habitat from 50 CFR § 402.02. As of February 11, 2016, the definition of “*destruction or adverse modification*” has been revised to align it with the conservation purposes of the Endangered Species Act of 1976, as amended, and the ESA’s definition of “critical habitat” (81 FR 7214). Specifically the rule states: “Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features.” The revised definition continues to focus on the role that critical habitat plays for the conservation of listed species and acknowledges that the development of physical and biological features may be necessary to enable the critical habitat to support the species recovery.

New Mexico Meadow Jumping Mouse

After reviewing the current status of the jumping mouse, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the jumping mouse. Consequently, we do not expect the effects of the proposed action to impede the survival or recovery of the jumping mouse. We make these findings for the following reasons:

1. The project-associated mowing, disking and flooding activities in units would involve the operation of heavy equipment during the active season for the jumping mouse however, the jumping mouse should not be found in areas within the units during the daytime when activities will occur. The likelihood of disrupting foraging and reproductive behavior, injuring, or killing individual jumping mouse through project activities is low.
2. The conservation measures that will be implemented as part of the proposed action should not result in any take of the jumping mouse.
3. The proposed action is anticipated to improve habitat conditions for the jumping mouse in the long-term.
4. To ensure available feeding habitat and to minimize disturbance, units adjacent to each other will not be treated during the same year.

New Mexico Meadow Jumping Mouse Critical Habitat

After reviewing the current status of the jumping mouse critical habitat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to destroy or adversely modify critical habitat for the New Mexico meadow jumping mouse. We make these findings for the following reasons:

1. The proposed action would impact approximately 4.4 hectares (10.8 ac) of occupied jumping mouse critical habitat every 3 to 7 years in eight occupied units in jumping mouse critical habitat Unit 6 – Bosque del Apache National Wildlife Refuge. The total acreage of Unit 6 is 403 hectares (995 acres). Therefore, the proposed action would temporarily affect approximately 0.01% of occupied jumping mouse critical habitat every 3 to 7 years in Unit 6.
2. Based on the conservation measure, occupied units receiving treatments will have adjacent untreated units for jumping mouse alternate foraging opportunities. This should minimize the adverse effects to jumping mouse critical habitat.
3. The proposed action is anticipated to improve habitat conditions for the jumping mouse, and the action is expected to ameliorate the PBF of critical habitat over the long-term.

Flycatcher

After reviewing the current status of the flycatcher, the environmental baseline for the action area, and the effects of the proposed action, it is the Service's biological opinion that the project, as proposed, is not likely to jeopardize the continued existence of the endangered flycatcher. Consequently, we do not expect the effects of the proposed action to impede the survival or recovery of the flycatcher. We make these findings for the following reasons:

1. The proposed action will occur within a relatively small portion of the species' entire range and impact a small portion of the overall population. Although non-fatal take in the form of harassment of up to 91 percent of the territories within the action area from project implementation is likely, this would be the equivalent of up to 25 territories (dependent on action area population totals – see Table 1) out of roughly 400 along the Middle Rio Grande in the state of New Mexico (or out of an estimated 1,299 territories range-wide).
2. It is anticipated that the project will not directly kill or injure flycatchers within the action area, but instead cause harassment through construction noise disturbance and the lack of being able to communicate effectively. To address the uncertainty associated with the amount of harassment associated with noise disturbance and the appropriate buffer distance, the BDANWR and NMESFO will complete a noise disturbance monitoring program.
3. No amount of suitable habitat will be removed.
4. Annual surveys will take place to monitor the population to track the status of the species.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. “Harm” is further defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. “Harass” is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. “Incidental take” is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

Amount or Extent of Take for Jumping Mouse

Based on the best available information concerning the jumping mouse, the habitat needs of the species, and nearby documented occurrences along with the project description, the proximity to water, the vegetation structure within the action area, and information furnished by the refuge, take is considered likely. The conservation measures that the refuge will implement and the fact that activities will occur during the day when the jumping mouse will not be using areas within the units will minimize take to the jumping mouse; however, as previously stated, the implementation of the project may occur during the active season (summer) for the jumping mouse. Additionally, 2017 survey data indicate that part of the proposed action area is occupied by the jumping mouse (Lehnen et al. 2018). It is estimated that temporary changes in the habitat characteristics needed by the species will occur as a result of the project.

We anticipate that in most cases, take as a result of the proposed action will be in the form of harassment of the jumping mouse through effects that disturb or alter habitat during project activities. Individual jumping mouse should not be injured or killed directly from the operation of heavy equipment since jumping mouse do not use the areas within the units during the day. Some jumping mouse may be affected indirectly due to changes of food and cover resources, disturbance to vegetation and soil compaction that may occur as a result of the implementation of the proposed action.

Based on the best available data regarding the density of jumping mouse in the area (Frey and Wright 2012; Service 2014b; Lehnen et al. 2018) we estimate an average population density of <5 individuals per acre, which amounts to <50 adult individuals throughout 4.4 ha (10.8 acres) of occupied jumping mouse critical habitat. This area of occupied jumping mouse critical habitat is in eight units along a segment of the Riverside canal. Since the proposed action includes restoring parts of the “occupied jumping mouse critical habitat” every 3 to 7 years, the

Service estimates that implementation of the proposed action will result in approximately 1.47 ha (3.60 acres) of habitat modification of occupied jumping mouse critical habitat or the harassment of up to 17 individual jumping mouse annually.

However, there is a great deal of uncertainty around this estimate. The Service anticipates that take of jumping mouse will be difficult to detect because the species has a small body and detection of an injured individual will be extremely difficult. As a result, we are using occupied jumping mouse critical habitat (i.e. riparian habitat that exhibits the PBF) within the action area as a surrogate for determining when the authorized take has been exceeded. This metric is appropriate because occupied jumping mouse critical habitat has dense herbaceous riparian vegetation that are anticipated to be altered or disturbed during project implementation. It is likely that some level of habitat alteration will result in incidental take during implementation of the proposed action.

- Take will be considered exceeded if occupied jumping mouse habitat in two adjacent units are treated in one year or if occupied mouse habitat is less than 4.1 ha (10.1 acres) by summer 2020 and in subsequent growing seasons as a result of the proposed action.

Amount or Extent of Take for Flycatcher

Based on the best available information for the flycatcher, the habitat needs of this species, the project description, and information provided in the intra-service consultation (Service 2018a), incidental take is reasonably certain to occur and is expected to be in the form of harassment. The impacts to this species specifically include decreased ability for communication. Flycatchers within a territory could occupy the project area during construction, but noise disturbance during construction would decrease the ability for flycatchers to communicate with each other effectively, assuming the male could attract a female in those conditions to begin with. Should communication be limited, individuals within a territory would have limited ability to warn each other of dangers (such as predators for example). This would also impact nest success.

Based on previous detection information, we anticipate that the number of flycatcher territories remaining in the action area and subject to harassment will be up to 25 territories depending on overall population size, the location of territories, and the location/timing of treatment in individual units. Because determining the exact number of flycatchers impacted from the proposed action will be difficult to identify in the field, we determined the following:

- Take will be considered exceeded if treatments occur for more than 40 non-consecutive hours annually within 0.25 mile of any single flycatcher territory during the breeding season of May 15-August 15.

Effect of Take

Jumping Mouse

In this biological opinion, we determined that the level of anticipated take is not likely to result in jeopardy to the jumping mouse. While the proposed action may adversely affect the jumping mouse in the short-term through harassment as described above, we anticipate overall negative impacts to the species as a whole to be low because jumping mouse should be outside of the action area during the day when activities will be occurring. Long term positive impacts are expected.

Flycatcher

In this biological opinion, we determined that the level of anticipated take is not likely to result in jeopardy to the flycatcher. While the proposed action may adversely affect the flycatcher in the short-term through harassment as described above, we anticipate overall impacts to the species as a whole to be low because the action area contains a relatively small percentage of territories range-wide.

REASONABLE AND PRUDENT MEASURES

All necessary and appropriate measures to avoid or minimize effects on the jumping mouse and flycatcher resulting from implementation of this project have been incorporated into the project's proposed conservation measures. Therefore, the Service believes the following reasonable and prudent measures are necessary and appropriate to minimize incidental take of these species:

1. All project personnel (i.e. equipment operators) will be aware of the potential presence of jumping mouse and flycatchers, and will be required to communicate any sightings of individuals and their nests to the NMESFO.
2. The BDANWR will monitor the populations of the jumping mouse, flycatcher and their habitats in the action area. The BDANWR will also provide a summary of monitoring results and activities associated with the proposed action to the NMESFO annually.
3. The BDANWR will work to identify and minimize take of jumping mouse and flycatcher due to the proposed action on the refuge.

Terms and Conditions

To implement RPM 1 (All project personnel (i.e. equipment operators) will be aware of the potential presence of jumping mouse and flycatchers, and will be required to communicate any sightings of individuals and their nests to the NMESFO):

- 1.1 The BDANWR equipment operators will be informed about the potential presence of jumping mouse and flycatchers. In the event that an individual or nest is observed, the NMESFO shall be contacted so additional measures can be discussed to minimize impacts to these species.

To implement RPM 2 (The BDANWR will monitor the populations of the jumping mouse, flycatcher and their habitats in the action area. The BDANWR will also provide a summary of monitoring results and activities associated with the proposed action to the NMESFO annually.):

- 2.1 The BDANWR shall monitor the population and habitat use of jumping mouse and flycatchers in association with the proposed action.
- 2.2 The BDANWR staff shall provide a summary of proposed action activities and progress on each Term and Condition to the NMESFO annually for activities covered in this BO. This will include providing a status update on jumping mouse habitat surveys to determine the amount of occupied habitat due to the proposed action, as well as the number of units and hours spent within the 0.25 mile buffers of active flycatcher territories (i.e. information pertaining to whether or not take was exceeded).

To implement RPM 3 (The BDANWR will work to identify and minimize take of jumping mouse and flycatcher due to the proposed action on the refuge):

- 3.1 When possible, BDANWR will leave units untreated or treat units outside of jumping mouse active season and flycatcher nesting season.
- 3.2 Work with NMESFO, Southwestern Region Division of Biological Sciences Inventory and Monitoring staff and other experts to develop and implement survey and monitoring techniques for jumping mouse and flycatcher. Specifically, this shall include working with NMESFO on development and implementation of flycatcher noise disturbance monitoring. This monitoring will address uncertainty surrounding the proposed action to flycatcher adults, chicks, and young as well as identify the proper buffer distance to avoid impacts associated with the proposed action. One to two biologists with NMESFO will set aside 3 to 4 days for monitoring development and up to 10 days during the flycatcher breeding season to assist with monitoring efforts for approximately 3 years.
- 3.3 Until the results of the noise disturbance monitoring is complete (Term and Condition 3.2), BDANWR shall provide an additional observer to monitor active flycatcher nests when conducting mowing or disking within the 0.25 mile buffer around active nests. Results from this monitoring shall be provided to the NMESFO and can be used in association with Term and Condition 3.2 to determine if an adjustment to the current 0.25 mile buffer distance is warranted.

Disposition of Dead or Injured Listed Species

Upon locating a dead, injured, or sick listed species, initial notification must be made to the NMESFO, 2105 Osuna NE, Albuquerque, New Mexico, 87113, telephone (505) 364-2525, within 3 working days of its finding. Written notification must be made within 5 calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. Care must be taken in handling sick or injured animals to ensure effective treatment and in handling dead specimens to preserve the biological material in the best possible state. If possible, the remains of intact species shall be provided to the NMESFO. If the remains of the species are not intact or are not collected, the information noted above

shall be obtained and the carcass left in place. Injured animals should be transported to a qualified veterinarian by an authorized biologist. Should the treated species survive, contact the NMESFO regarding the final disposition of the animal.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. We recommend that BDANWR complete habitat surveys in treated unoccupied units adjacent to occupied jumping mouse units to determine if jumping mouse suitable habitat becomes established.
2. We recommend that BDANWR complete jumping mouse surveys in areas that have not been surveyed for jumping mouse within critical habitat and within suitable habitat outside of critical habitat.
3. We recommend that BDANWR initiate a disturbance study to monitor the impact associated with causing the jumping mouse to travel farther distances for foraging opportunities after treatments occur.
4. Beyond presence/absence surveys, we recommend that the refuge continue to collect information on the jumping mouse, such as diet, use of uplands, etc., to assist in better describing biological and ecological requirements.
5. We recommend that BDANWR organize all the past, current, and future jumping mouse records and flycatcher territories within an ArcGIS shapefile or geodatabase for ease of accessing occupancy data via a map based system.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

Incidental take of jumping will be considered exceeded if occupied jumping mouse habitat in two adjacent units are treated in one year or if occupied mouse habitat is less than 4.1 ha (10.1 acres) by summer 2020 and in subsequent growing seasons as a result of the proposed action. Incidental take of flycatchers will be considered exceeded if treatments as a result of the proposed action occur for more than 40 non-consecutive hours within 0.25 mile of any single territory during the breeding season (May 15 through August 15).

This concludes formal consultation on the Service's BDANWR's proposed project "Mouse Habitat Rehabilitation and Wetland Management" in Socorro County, New Mexico (Consultation #02ENNM00-2017-F-0614). As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over

the action has been maintained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may adversely affect listed species or designated critical habitat in a manner or to an extent not considered in this BO (i.e. should the flycatcher population drop below 7 territories (roughly half of the population in 2017) in the managed portion of BDANWR to the west of the low flow conveyance channel, the status of the species within the action area will be considered changed, and re-evaluation of the effects of this proposed action to the remaining population will need to take place); 3) the agency action is subsequently modified in a manner that causes an effect to a listed species or designated critical habitat that was not considered in this BO; or 4) a new species is listed or critical habitat designated that may be affected by this action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation of consultation with the Service.

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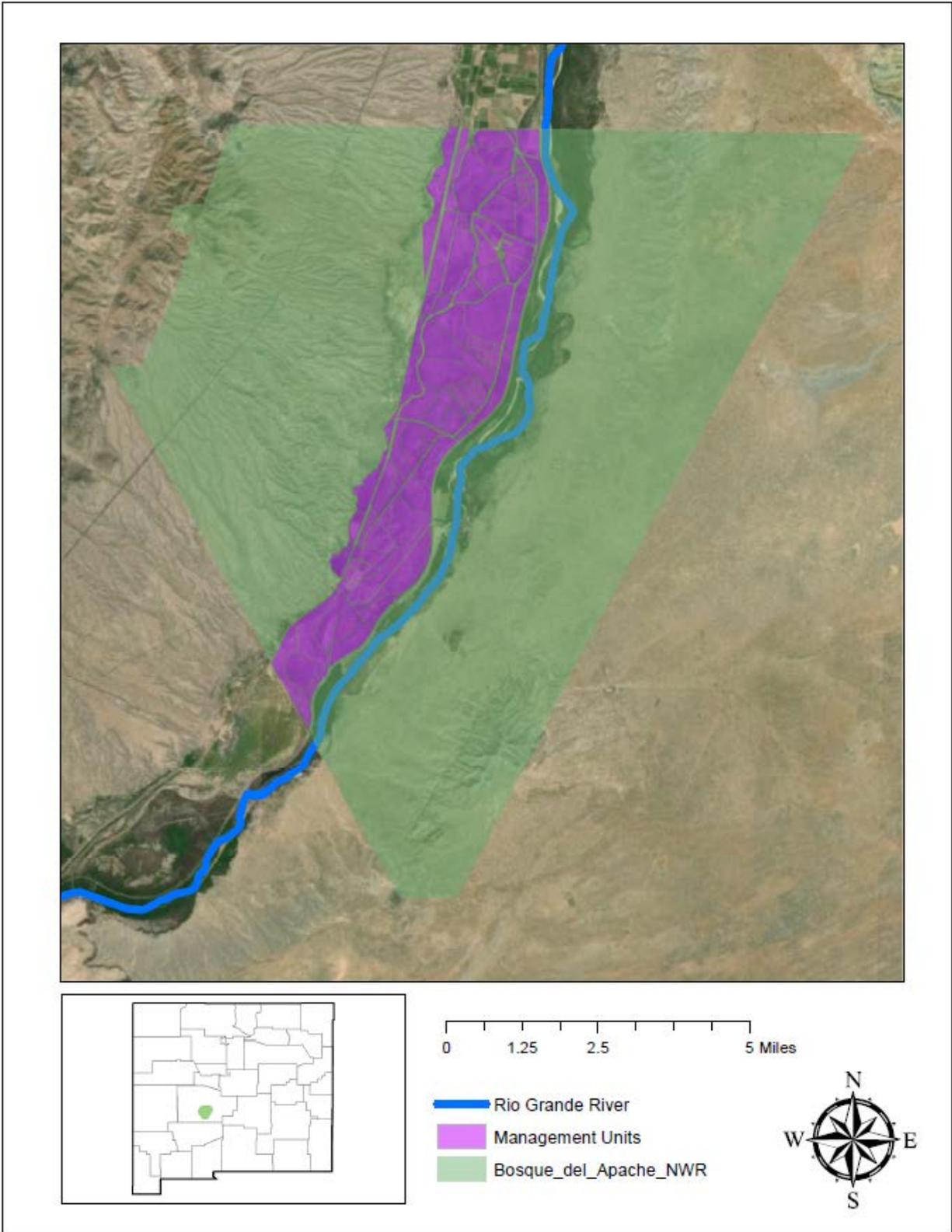


Figure 1. Map showing Bosque del Apache National Wildlife Refuge and management units on the refuge in Socorro County, New Mexico.

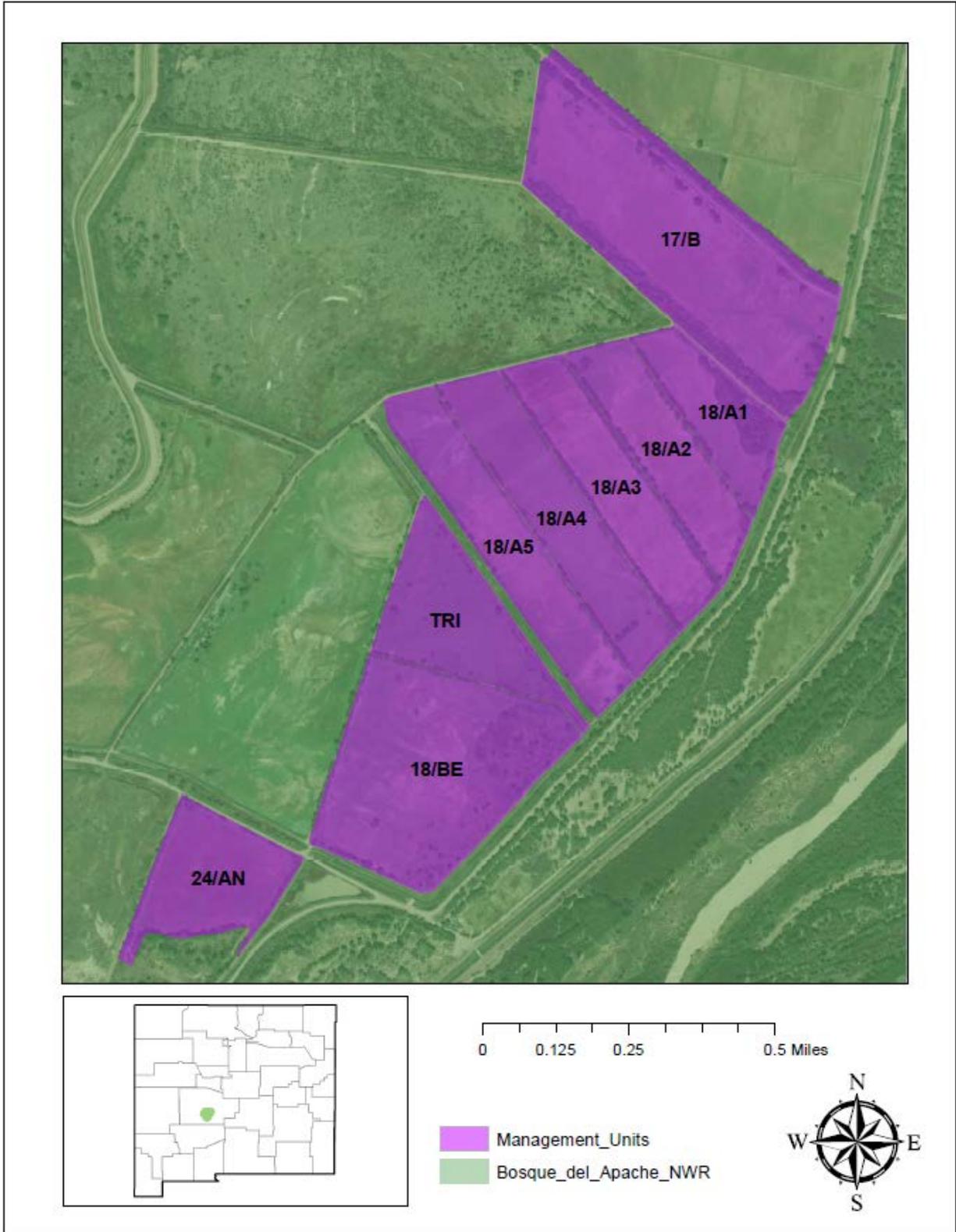


Figure 2. Map showing specific management units (18BE, Tri, 24AN, 18A1, 18A2, 18A3, 18A4, 18A5, and 17B) mentioned in Consultation number 02ENNM00-2017-F-0614 on Bosque del Apache National Wildlife Refuge in Socorro County, New Mexico.

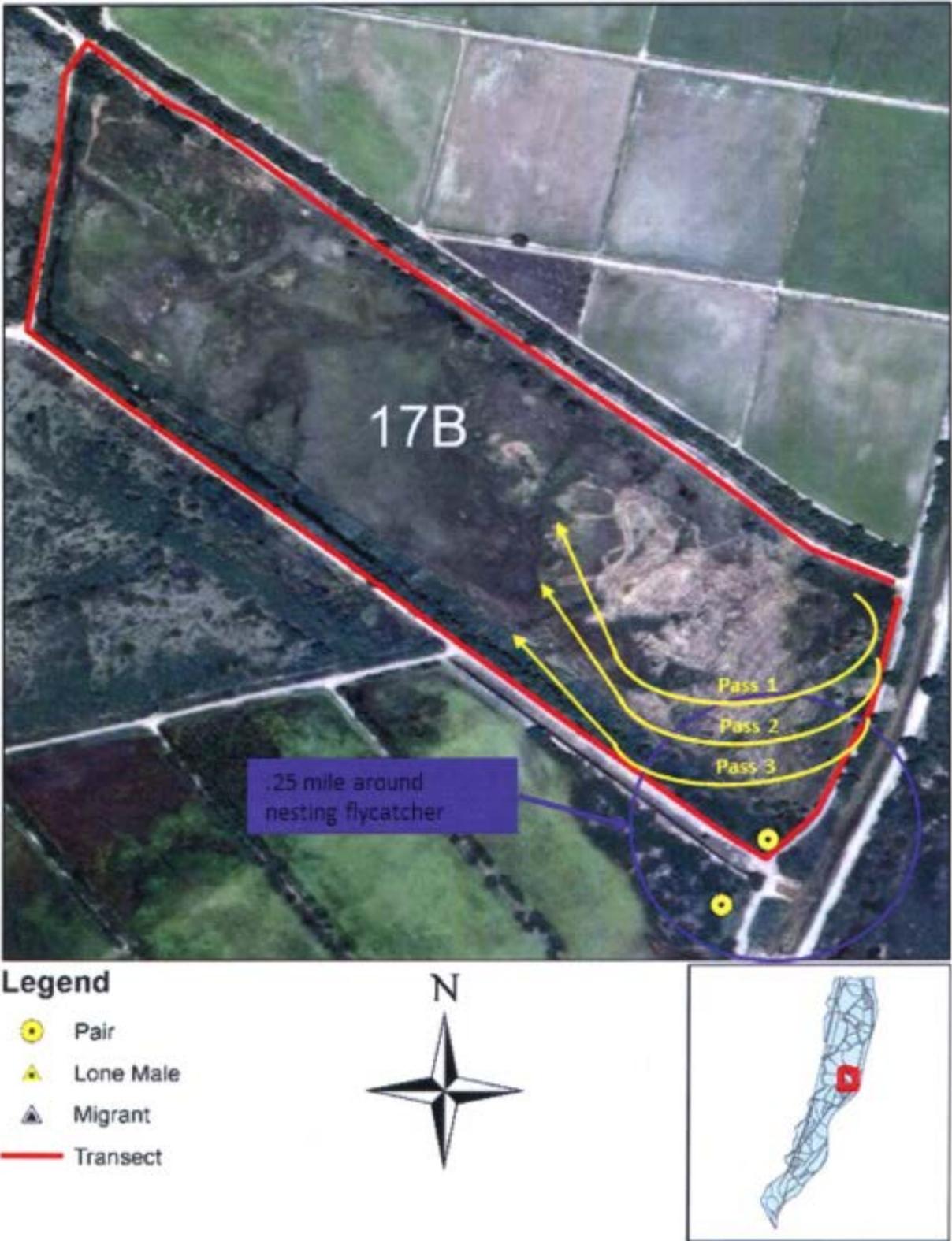


Figure 3. Hypothetical sketch map of tractor approach within 0.25 miles of an occupied southwestern willow flycatcher nest. This approach would apply to disking and mowing efforts proposed to take place on Bosque del Apache National Wildlife Refuge in Socorro County, New Mexico (from Service 2018a).

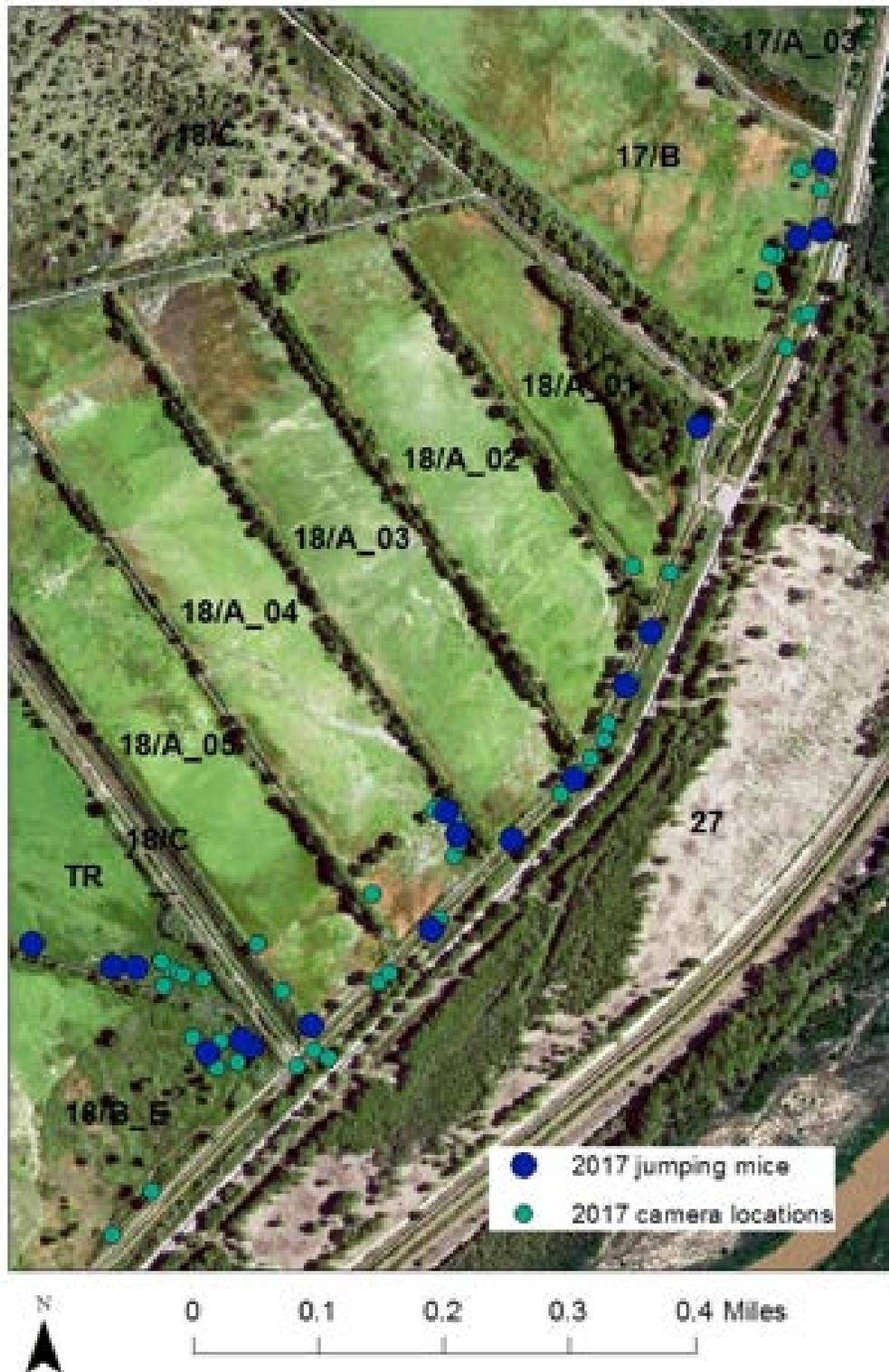


Figure 4. Managed wetland units on Bosque del Apache National Wildlife Refuge in Socorro County, New Mexico. Locations of New Mexico meadow jumping mouse camera traps (green dots) and mouse detections (blue dots) from May through October, 2017 (from Lehnen et. al. 2018; Service 2018a).

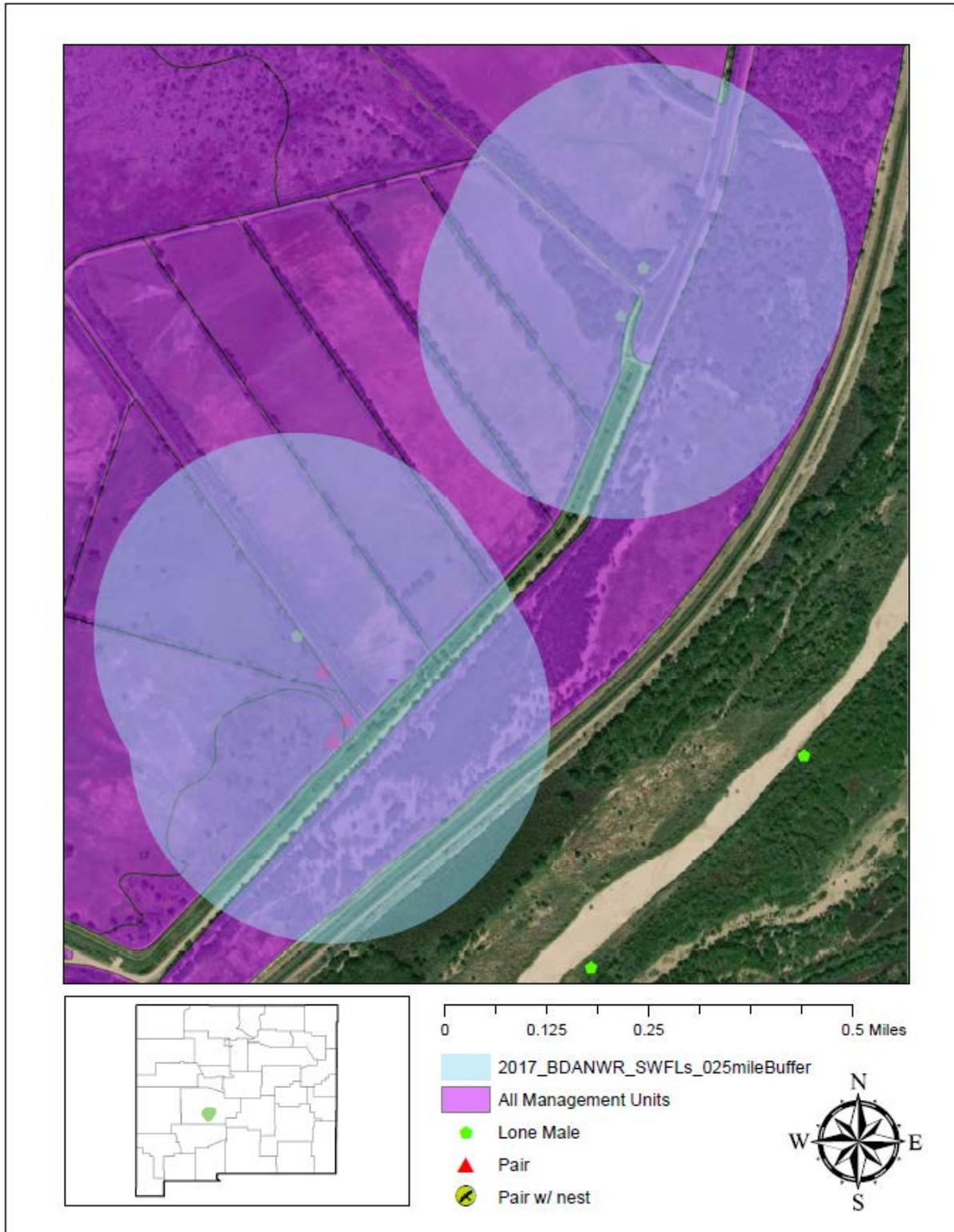


Figure 5. Buffer (0.25 miles) around Southwestern willow flycatcher (SWFL) territories in managed wetland units on Bosque del Apache National Wildlife Refuge in Socorro County, New Mexico. Locations of 2017 SWFL locations shown on map.

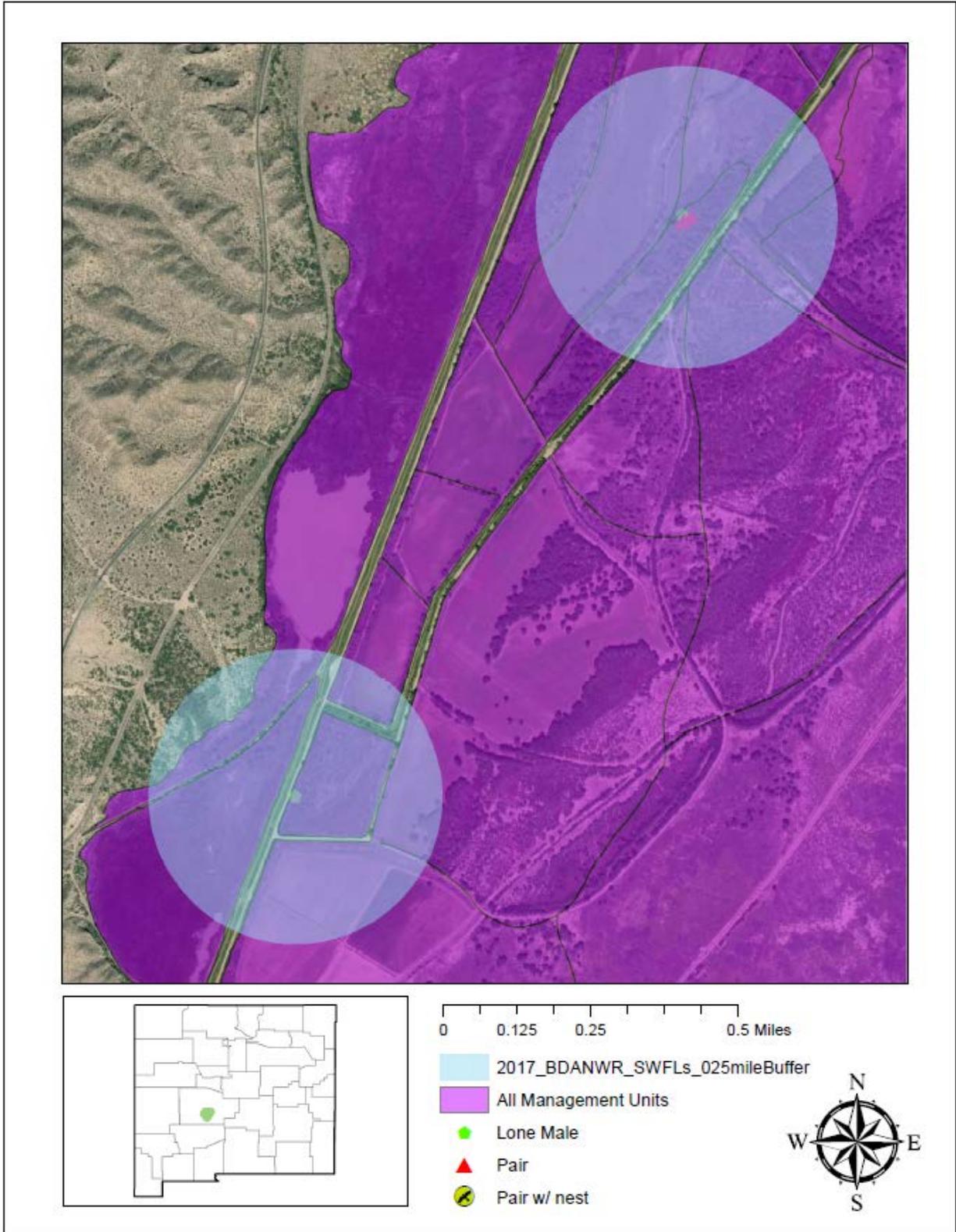


Figure 6. Buffer (0.25 miles) around Southwestern willow flycatcher (SWFL) territories in managed wetland units on Bosque del Apache National Wildlife Refuge in Socorro County, New Mexico. Locations of 2017 SWFL locations shown on map.