Memorandum

To: District Manager, Gila District, Bureau of Land Management, Tucson, Arizona

From: Field Supervisor

Subject: Formal Consultation and Conference Report on Twenty-five Fuel Break Treatment Sites on the Gila District within Graham, Pima, and Cochise Counties, Arizona

We are in receipt of Bureau of Land Management’s (BLM) request for formal consultation and conference with the U.S. Fish and Wildlife Service pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act) on the treatment of twenty-five fuel breaks on the Gila District within Graham, Pima, and Cochise counties, Arizona (proposed action). Your request, dated September 11, 2015, included the “Biological Assessment for Hazardous Fuels Reduction in the Gila District” (BA), and was received by us on September 14, 2015. The majority of project sites occur in one of three BLM National Conservation Areas: Gila Box Riparian National Conservation Area (Gila Box), Las Cienegas National Conservation Area (LCNCA), or the San Pedro Riparian National Conservation Area (SPRNCA). The remaining few projects occur either along the middle Gila River or in relatively isolated, upland areas. Several site-specific projects were included your BA that were previously consulted upon informally in 2015 (see 02EAAZ00-2015-1-0431) and will therefore not be addressed here. Others, the BLM found to have “no effect” to proposed or listed species, or their proposed or designated critical habitat. We will not be addressing these sites. Please see the table immediately below for a summary.

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<td>Keystone Peak Communications Site</td>
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<td>Mule Communication Site (Upland)</td>
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You determined that elements of the proposed action, in some areas, may affect, and are likely to adversely affect the northern Mexican gartersnake (*Thamnophis eques megalops*) and its proposed critical habitat, the southwestern willow flycatcher (*Empidonax traillii extimus*) and its critical habitat, and the Chiricahua leopard frog (*Lithobates chiricahuensis*).

Regarding other elements of the proposed action, you requested our concurrence with your determination of may affect, not likely to adversely affect critical habitat for the Chiricahua leopard frog, the southwestern willow flycatcher and its critical habitat, yellow-billed cuckoo (*Coccyzus americanus*) and its proposed critical habitat, Gila chub (*Gila intermedia*) and its critical habitat, Gila topminnow (*Poeciliopsis occidentalis occidentalis*), loach minnow (*Tiaroga cobitis*) and its critical habitat, razorback sucker (*Xyrauchen texanus*) and its designated critical habitat, spikedace (*Meda fulgida*) and its critical habitat, northern Mexican gartersnake and its proposed critical habitat, jaguar (*Panthera onca*), lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*), ocelot (*Leopardus pardalis*), and the Huachuca water umbel (*Lilaeopsis schaffneriana* var. *recurva*) and its critical habitat. We concur with your effects determinations; our rationale is provided within the discussion of each project site. Also note that this memorandum of formal consultation and informal concurrence serves as a Conference Report for respective proposed critical habitat for the northern Mexican gartersnake and yellow-billed cuckoo.

The action area for this analysis includes areas within the Gila Box, SPRNCA, LCNCA, and middle Gila River, and any potential downstream affected areas, as well as the immediate vicinity of the Keystone Peak Communication Site which is a spatially isolated, upland site within the BLM’s Gila District.

This consultation will remain in effect unless or until one or more reinitiation criteria (as explained below in the closing paragraphs) are met.

This memorandum is based on information provided in your BA provided in September 2015; the “Response to Consultation Questions from the FWS on the GDO Fuels Reduction for Northern Mexican Gartersnake Project” dated and provided on March 8, 2016; tabulated data emailed to us on April 7, 2016, revised and resubmitted on April 27, 2016, which included site location names, potentially present species, critical habitat, habitat type, and effects determinations (several of which changed from the September 2015 BA); and other published and unpublished sources of information obtained through meetings, via correspondence, or incorporated by reference into previously mentioned documents. A complete record of this consultation is on file at our office.

**Consultation History**

September 2015: Biological Assessment received.
December 2015: Formal consultation assigned.
March-April 2016: Technical meetings held with BLM staff.
March-July 2016: Additional technical documents shared between agency staffs.
September 2016: Draft Biological and Conference Opinion provided to BLM for review.
October 2016: BLM comments on draft Biological Opinion
November 2016: BLM comments incorporated and draft Biological Opinion finalized.

BIOLOGICAL OPINION

Description of the Proposed Action

The Description of the Proposed Action appearing in the BA is incorporated herein via reference. In brief, the proposed action involves BLM’s implementation of various methods for hazardous fuels reduction, at various locations within the Gila District. The hazardous fuels reduction treatments will be completed using mechanical, chemical, and prescribed fire treatment methods. Hazardous fuels reduction treatments that occur in riparian areas would be implemented from October 1st through March 15th (and extended to May 15th during seasons of above-normal winter precipitation exceeding 7 inches per year, using mowers, weed eaters, or other specialized vegetation mowing equipment). Treatments that occur in upland areas would be implemented from October 15th through May 15th.

BLM’s proposed treatment methods are summarized below.

Mechanical Treatments

This methodology involves implementation of various mechanical treatment methods and techniques to modify, thin, reduce, or remove hazardous fuels in the treatment units.

- Heavy or Specialized Equipment- Grubbing, mulching, chipping, mowing, grinding, thinning via heavy equipment with specialized attachments to achieve desired vegetation densities, canopy cover, crown spacing, and fuel height.
- Chainsaw or Specialized Power Tools Use of chainsaws, weed eaters, vegetation mowers, or other specialized hand operated power tools to achieve desired vegetation densities, canopy cover, crown spacing, and fuel height.
- Maintenance treatments (thinning) of riparian tree species would allow the trees to fill in open areas, but periodic treatments would be conducted to maintain a canopy spacing of 30 feet between trees within the fuel break. Once they become large enough to be limbed up, then they would no longer need to be thinned. Treatments would be conducted during the period from October 1st through March 15th.

Chemical Treatments

Chemical (herbicide) treatments will be implemented where ground-disturbing activities are not permitted and the control of re-sprouting and growth of new vegetation are desired. Upland sites may be treated with Triclopyr, Clopyralid, Picloram and riparian areas could be treated with Golphosate and Imazapyr. Chemical treatments will be supervised by BLM personnel with a
pesticide applicators license and would require a Pesticide Use Proposal (PUP) be prepared and approved prior to implementation. Chemical treatment will be implemented through ground-based spot application to individual plants. No aerial applications of herbicides are proposed.

- **Cut-Stump** - Small amounts of herbicide are applied directly to cambium layer of the fresh, flush cut stump of various tree and shrub species. Spot application, can be applied with backpack sprayer, hand held bottle sprayer, herbicide roller, or paint brush.
- **Basal Bark** - Small amounts of herbicide applied directly to the basal area of small tree, shrub, and grass species, generally utilized on saplings, re-sprouts, or low growing species with thin bark. Spot application, can be applied by hand held bottle sprayer, backpack sprayer, UTV/ATV mounted sprayer, or vehicle mounted sprayer.
- **Spot Spray** - Small Amounts of herbicide applied directly to the canopy layer of small trees and shrubs (4 feet or less). Spot application, can be applied by hand held bottle sprayer, backpack sprayer, UTV/ATV mounted sprayer, or vehicle mounted sprayer.

**Prescribed Fire Treatments (Slash Pile Burning)**

Prescribed fire treatments will be limited to the burning of slash piles generated during mechanical treatments or chemical treatments. Prescribed fire will generally be employed in areas where useable bio- mass (firewood, mulch, mill wood) has been removed and the remaining slash requires disposal.

- Each prescribed fire treatment would have a Prescribed Fire Plan prepared prior to implementation.
  - Burn plans would outline the number of personnel (overhead, ignitions, and holding forces), amount of equipment (fire engines), complexity analysis (burn treatment complexity), contingency plans (conversion to wildfire), risk management analysis (safety analysis), and weather parameters (burn prescription) for each pile burn treatment.
- Application of prescribed fire treatments to hand or mechanically built piles of slash generated during thinning treatments:
  - Burn piles would be stacked in areas with no canopy cover to avoid impacts to surrounding vegetation due to direct flame contact, radiant heat, and convective heat.
- Pile burns are implemented with the following guidelines:
  - This would be done during cool winter months (lower temperatures, higher humidity, slower winds speeds).
  - Burns may occur following moisture events (snow, rainfall).
  - Arizona Department of Environmental Quality (ADEQ) burn permits would be obtained prior to implementation.
  - Burning of slash from riparian areas and floodplains would be done far enough away from drainages to prevent the ash from reaching perennial surface waters following heavy precipitation events, typically more than 300 feet from stream bank.
• Where northern Mexican gartersnakes could occur pile burns will not be completed annually, but on a 3-5 year frequency. Hand built piles would be constructed over a period that may last 1-5 days and ignited when piling is completed. For large volumes of wood which may also have heavy, large diameter limbs, material would be piled by heavy equipment. Wood from a fire break site would be moved to the burn site and scattered (some loose piles may occur) for curing over a large area up to ¼ acre. Following curing, mechanized equipment and hand piling would be used to build the burn piles and the piles will be ignited the same week (5 days or less).

Conservation Measures and Best Management Practices (BMPs)

The BA identifies numerous, general conservation measures and BMPs designed to help reduce impacts from various treatments on wildlife and habitat; these are listed below. These measures and practices (provided in pages 13-20 as well as Appendices A and B in the BA) present a variety of potential benefits for species under consideration herein. These have been considered in our analyses and are incorporated by reference.

Effects Analysis Framework

We largely concur with the BLM’s “may affect, not likely to adversely affect” determinations for the corresponding species and project sites, and provide our rationale in the discussion of each project. Instances where we do not concur will be identified in the project discussion. Due to the inherent complexity of this consultation resulting from the large number of different species potentially affected, the number of individual and spatially dispersed project sites, the variety of activities proposed, and the myriad of potential effects, we have created the following summary. This table assigns numeric codes associated with independent factors that support our concurrence with your determination of “may affect, not likely to adversely affect” for species at each project site discussed below. We agree with the BLM’s detailed rationale (pp. 105-170 in the BA), which is incorporated herein by reference.

<table>
<thead>
<tr>
<th>Code</th>
<th>Concurrence Factor</th>
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<tbody>
<tr>
<td>CF1</td>
<td>Limited area affected by activity.</td>
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<tr>
<td>CF2</td>
<td>Low likelihood of species presence during project activities.</td>
</tr>
<tr>
<td>CF3</td>
<td>Limited duration of activities.</td>
</tr>
<tr>
<td>CF4</td>
<td>Project site habitat attributes unfavorable for species presence.</td>
</tr>
<tr>
<td>CF5</td>
<td>Project activities occur when species is inactive.</td>
</tr>
<tr>
<td>CF6</td>
<td>One or more conservation measures and/or best management practices effectively render effects discountable or insignificant.</td>
</tr>
<tr>
<td>CF7</td>
<td>Changes to habitat attributes anticipated to be minimal or will not occur.</td>
</tr>
<tr>
<td>CF8</td>
<td>Modified habitat attribute(s) well-replicated adjacent to project site.</td>
</tr>
<tr>
<td>CF9</td>
<td>Project site attributes discourage species presence or minimize species response.</td>
</tr>
<tr>
<td>CF10</td>
<td>Project activity spatially removed from most suitable habitat.</td>
</tr>
<tr>
<td>CF11</td>
<td>Potential change in human recreation/visitation level as a result of project implementation expected to be insignificant, discountable, or not expected to occur.</td>
</tr>
<tr>
<td>CF12</td>
<td>Project activity not anticipated to appreciably alter habitat function.</td>
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</tbody>
</table>
Gila Box: Environmental Baseline

The Gila River enters Arizona near the east side of the Peloncillo Mountains within the Duncan-Virden Valley. Shortly downstream from where the Gila River crosses into Arizona, it is fed by the San Francisco River as well as Eagle and Bonita Creeks. This reach is the approximate upstream end of the Gila Box. Human developments including dams, diversions, channelization, and water removal for domestic consumption and agricultural irrigation from pumpage have reduced instream flow and resulted in desiccation of significant reaches of the river and alteration of riparian and aquatic habitat and biotic communities (USBLM 2002). These uses of the river, as well as the widespread introduction and spread of harmful nonnative species, have drastically affected the native aquatic community and reduced the biomass and species richness of native species (USFWS 2014).

The Gila River through the Gila Box contains pool, glide, riffle, run, and sheet flow habitat ranked in order of prevalence by unit area (USBLM 2002). Along the Gila River grows woody vegetation (primarily seep willow) as well as emergent and submergent vegetation (USBLM 2002). Bank stability along the river ranges widely but is mostly described as unstable (as a result of adjacent poor riparian development) with intervening sections of moderate to high bank stability (USBLM 2002). In 2005, approximately 20 stream miles of the Gila River (divided into seven, three-mile segments) within the Gila Box were assessed using the Proper Functioning Condition classification system (USBLM 2005). Segment one, the most upstream of the seven segments, spans both public and private lands and contains a developed recreational site as well as overnight camp sites and was rated as functional-at risk with an upward trend. Segment two was rated as functional-at risk with an upward trend and contains an undeveloped hot spring as well as small patches of nonnative Bamboo. Segment three, also classified as functional-at risk with an upward trend, contains a stand of mature cottonwood trees near the confluence with the San Francisco River as well as large downed debris which dissipates flow. This reach is impacted by illegal off-highway vehicle trespass along sandbars and low-water crossings which is producing suspended sediment and increasing turbidity. The Eagle Creek confluence, tall rushes, and salt cedars are both present in segment four, which was rated as functional-at risk with an upward trend. Segment five, rated as functional-at risk with an upward trend, has little streambank vegetation along some portions and was affected by the 2005 flood but willows appear to be recruiting. Downstream, segment 6 was rated as nonfunctional because of streambank erosion; salt cedars are more prominent within this reach. The most-downstream reach within the Gila Box, segment seven, was rated as functional-at risk with an upward trend. The river widens within this segment with signs of unnatural erosion on the river’s east side; largely barren sandbars occur with scattered vegetation at their upstream and downstream portions.
The aquatic community in the Gila Box includes three native fish species that, in 2002, represented 31 percent of fish sampled and nine nonnative fish that represented the remainder of fish sampled (USBLM 2002). Fish species found in the Gila Box include natives including longfin dace (*Agostia chrysogaster*), Sonora sucker (*Catostomus insignis*), desert sucker (*Pantosteus clarki*), as well as nonnatives including the red shiner (*Cyprinella lutrensis*), fathead minnow (*Pimephales promelas*), common carp (*Cyprinus carpio*), channel catfish (*Ictalurus punctatus*), flathead catfish (*Pylodictis olivarius*), yellow bullhead (*Ameiurus natalis*), largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*), and western mosquitofish (*Gambusia affinis affinis*) (USBLM 2002). Longfin dace, red shiner, common carp, mosquitofish, channel catfish and flathead catfish appear to be the most distributed species within the Gila Box (USBLM 2002). Other aquatic species known from the Gila Box include crayfish (*Orconectes virilis*), American bullfrogs (*Lithobates catesbeiana*), lowland leopard frogs (*Lithobates yavapaiensis*), and Texas spiny softshell turtle (*Apalone trionxy spinefera*) (USBLM 2002).

**Gila Box: Site by Site Description of Projects and Analysis of Effects**

**Dry Canyon Recreation Site**

_Acreage and Land Ownership-_ 3.20 ac of BLM land

_Previously Treated_ – Yes

**Mechanical Treatment** - Utilization of weed eaters, chippers, and chain saws. Thinning tree and shrub species along roads, 10 feet on both sides of road and around camp sites. Cottonwood, willow, ash, hackberry, walnut trees do not occur within the footprint of the fuel break. Large mesquite trees will not be removed but re-growth of limbs may be limbed up periodically. Grasses and other fine fuels (weeds, annual grass) will be weed whacked (2”-6” stubble height)

**Chemical Treatment** - Herbicide treatments such as cut stump, spot spray and basal spray treatments (ground application) can be utilized to treat salt cedar and small mesquites, grey thorn or *Acacia* sp. in the treatment area. Treatments at this site will consist of cut stump and spot spraying of target species with aquatic formulations of Glyphosate and Imazapyr.

**Prescribed Fire Treatment** - Pile burning can be implemented to treat slash in winter. Piles will be stacked away from drainages and located at far edge of floodplain away from the Gila River in areas with no canopy cover to avoid impacts to surrounding vegetation due to direct flame contact, radiant heat, and convective heat. An engine and crew will be onsite to conduct the burning. A burn plan will be completed for each project site.

**Slash and Bio-mass** - Slash will be piled and burned, chipped/mulched with chips scattered on site, or lopped and scattered on site. Useable bio-mass (firewood) generated
during thinning and maintenance treatments can be stacked at campgrounds and day use sites and utilized onsite.

**Annual Maintenance** - This firebreak will be maintained annually between Oct 1st and March 15th. Weed eating of grasses (2”-6” stubble height), limbining (up to 6’ from ground) of re-sprouts on large trees (>20’ tall), and flush cutting new growth of mesquite and other tree and shrub species will be performed as needed. To achieve the desired outcome for the fuel break, there will be a maximum of 30 feet canopy spacing.

**Winter Precipitation** - During seasons of above normal winter precipitation (>7 inches per year), there can be enough growth of annual herbaceous vegetation (Red brome, Mediterranean grass) to carry fire. When this unusual condition occurs, the extra herbaceous vegetation production will require re-treatment of fuel breaks from March 15th-May 15th, and will be completed using mowers, weed eaters, or other specialized vegetation mowing equipment (walk behind power mowers).

**Time Required** - One 8 hour day with 2-4 people

**Personnel** - Annual maintenance may be completed by the BLM or by BLM co-operators/partners under the direction of BLM.

**Special Measures** - Slash pile burning can be implemented to treat slash in winter and would be stacked away from drainages and located in the open outside of the 100 year flood line.

**Species Potentially Affected and Corresponding Concurrence Factors** - yellow-billed cuckoo (CF1, CF2, CF3, CF6, CF8, CF9, CF11), Gila chub (CF1, CF2, CF4, CF6, CF7, CF12), Gila topminnow (CF1, CF2, CF4, CF6, CF7, CF12), loach minnow (CF1, CF2, CF4, CF6, CF7, CF12), razorback sucker (CF1, CF2, CF4, CF6, CF7, CF12), spikedace (CF1, CF2, CF4, CF6, CF7, CF12), northern Mexican gartersnake (CF1, CF2, CF3, CF11)

**Proposed or Designated Critical Habitat Potentially Affected and Corresponding Concurrence Factors** – yellow-billed cuckoo (CF1, CF6, CF7, CF12), loach minnow (CF6, CF7, CF8, CF12), razorback sucker (CF6, CF7, CF8, CF12), and spikedace (CF6, CF7, CF8, CF12)

**Potential Adverse Effects** – southwestern willow flycatcher; see effects analysis and incidental take statement under species-specific discussion below.

**Flying W Recreation Site**

**Acreage and Land Ownership** - 13.51 ac of BLM land

**Previously Treated** – Yes
Mechanical Treatment – Same as Dry Canyon Recreation Site.

Chemical Treatment - Same as Dry Canyon Recreation Site.

Prescribed Fire Treatment - Same as Dry Canyon Recreation Site.

Slash and Bio-mass - Same as Dry Canyon Recreation Site.

Annual Maintenance - Same as Dry Canyon Recreation Site.

Winter Precipitation - Same as Dry Canyon Recreation Site.

Time Required - Same as Dry Canyon Recreation Site.

Personnel - Same as Dry Canyon Recreation Site.

Special Measures - Same as Dry Canyon Recreation Site.

Species Potentially Affected and Concurrence Factors - yellow-billed cuckoo (CF1, CF2, CF3, CF6, CF8, CF9, CF11), Gila chub (CF2, CF4, CF6, CF7, CF11, CF12), Gila topminnow (CF2, CF4, CF6, CF7, CF11, CF12), loach minnow (CF2, CF4, CF6, CF7, CF11, CF12), razorback sucker (CF2, CF4, CF6, CF7, CF11, CF12), spikedace (CF2, CF4, CF6, CF7, CF11, CF12), northern Mexican gartersnake (CF1, CF2, CF3, CF11)

Proposed or Designated Critical Habitat Potentially Affected and Concurrence Factors – yellow-billed cuckoo (CF1, CF6, CF7, CF12), loach minnow (CF6, CF7, CF8, CF12), razorback sucker (CF6, CF7, CF8, CF12), spikedace (CF6, CF7, CF8, CF12)

Potential Adverse Effects – southwestern willow flycatcher; see effects analysis and incidental take statement under species-specific discussion below.

Serna Cabin Recreation Site

Acreage and Land Ownership- 2.46 ac of BLM land

Previously Treated – Yes

Mechanical Treatment – Same as Dry Canyon Recreation Site.

Chemical Treatment - Same as Dry Canyon Recreation Site.

Prescribed Fire Treatment - Same as Dry Canyon Recreation Site.

Slash and Bio-mass - Same as Dry Canyon Recreation Site.

Annual Maintenance - Same as Dry Canyon Recreation Site.
Winter Precipitation - Same as Dry Canyon Recreation Site.

Time Required - Same as Dry Canyon Recreation Site.

Personnel - Same as Dry Canyon Recreation Site.

Special Measures - Same as Dry Canyon Recreation Site.

Species Potentially Affected and Concurrence Factors - yellow-billed cuckoo (CF1, CF2, CF3, CF6, CF8, CF9, CF11), Gila chub (CF2, CF4, CF6, CF7, CF11, CF12), Gila topminnow (CF2, CF4, CF6, CF7, CF11, CF12), loach minnow (CF2, CF4, CF6, CF7, CF11, CF12), razorback sucker (CF2, CF4, CF6, CF7, CF11, CF12), spikedace (CF2, CF4, CF6, CF7, CF11, CF12), northern Mexican gartersnake (CF1, CF2, CF3, CF11)

Proposed or Designated Critical Habitat Potentially Affected and Concurrence Factors – yellow-billed cuckoo (CF1, CF6, CF7, CF12), loach minnow (CF6, CF7, CF8, CF12), razorback sucker (CF6, CF7, CF8, CF12), spikedace (CF6, CF7, CF8, CF12)

Potential Adverse Effects – southwestern willow flycatcher; see effects analysis and incidental take statement under species-specific discussion below.

Spring Canyon Recreation Site

Acreage and Land Ownership- 1.99 ac of BLM land

Previously Treated – Yes

Mechanical Treatment – Same as Dry Canyon Recreation Site.

Chemical Treatment - Same as Dry Canyon Recreation Site.

Prescribed Fire Treatment - Same as Dry Canyon Recreation Site.

Slash and Bio-mass - Same as Dry Canyon Recreation Site.

Annual Maintenance - Same as Dry Canyon Recreation Site.

Winter Precipitation - Same as Dry Canyon Recreation Site.

Time Required - Same as Dry Canyon Recreation Site.

Personnel - Same as Dry Canyon Recreation Site.

Special Measures - Same as Dry Canyon Recreation Site.
Species Potentially Affected and Concurrence Factors - yellow-billed cuckoo (CF1, CF2, CF3, CF6, CF8, CF9, CF11), Gila chub (CF2, CF4, CF6, CF7, CF11, CF12), Gila topminnow (CF2, CF4, CF6, CF7, CF11, CF12), loach minnow (CF2, CF4, CF6, CF7, CF11, CF12), razorback sucker (CF2, CF4, CF6, CF7, CF11, CF12), spikedace (CF2, CF4, CF6, CF7, CF11, CF12), northern Mexican gartersnake (CF1, CF2, CF3, CF11)

Proposed or Designated Critical Habitat Potentially Affected and Concurrence Factors – yellow-billed cuckoo (CF1, CF6, CF7, CF12), loach minnow (CF6, CF7, CF8, CF12), razorback sucker (CF6, CF7, CF8, CF12), spikedace (CF6, CF7, CF8, CF12)

Potential Adverse Effects – southwestern willow flycatcher; see effects analysis and incidental take statement under species-specific discussion below.

SPRNCA: Environmental Baseline

Europeans have influenced Southern Arizona for hundreds of years, and Native Americans have done so for much longer (Hastings and Turner 1965, Bahre and Hutchinson 1985, Bahre 1991, Tellman et al. 1997). Often-cited human impacts in the area include vegetation type conversion, dewatering surface waters and aquifers, erosion and channel down cutting, loss or reduction of native species, introduction and spread of nonnative species, and habitat loss. As with many of the river basins in the southwest, aquatic habitats (and fish communities) in the Gila basin have changed from historical conditions (Miller 1961, de la Torre 1970, Naiman and Soltz 1981, Miller et al. 1989, Minckley and Deacon 1991, Minckley and Marsh 2009). Aquatic habitats have been fragmented and reduced in quantity and quality due to diversion, groundwater mining, and natural and human-caused changes in the watershed and hydrologic regime (de la Torre 1970, Davis 1982, Tellman et al. 1997).

San Pedro River baseflow has declined in the 20th century largely due to changes in precipitation patterns and increases in riparian water consumption resulting from expansion of the riparian forest (Thomas and Pool 2006, Pool and Dickinson 2007, Leake et al. 2008, Kennedy and Gungle 2010). Groundwater withdrawals from the regional aquifer have yet to measurably impact flows in the mainstem San Pedro River upstream of the Tombstone gage (Thomas and Pool 2006, Kennedy and Gungle 2010, Lacher 2011). In the last decade (2000 to 2010), the San Pedro River low flows have been relatively stable based on USGS streamflow measurements, vertical gradients between the alluvial and regional aquifer as measured by the paired monitoring wells, environmental isotope data, and the wet/dry mapping of the San Pedro River.

However, groundwater levels continue to decline in parts of the regional aquifer due to groundwater withdrawals. Eventually, without other action, these groundwater withdrawals from the regional aquifer will impact the regional groundwater component of baseflow to the San Pedro River.

The San Pedro River Basin is typical of the Basin and Range Physiographic Province, with elongated northwest-southeast trending block-faulted mountains surrounding a central valley filled with deep alluvium. The basin is divided into two distinct geographic units, referenced as
the upper and lower basins. The Upper San Pedro Basin extends from the headwaters in Mexico to “the Narrows” north of Benson and the Lower San Pedro Basin extends from “the Narrows” to the Gila River (ADWR 1988). The Upper San Pedro Basin is further divided into the Benson and the Sierra Vista Subwatersheds.

Surface water in the San Pedro River is comprised of “stormflow” and “baseflow.” Stormflow results from precipitation. Baseflow is water that flows in the river in the absence of a rainfall event. Baseflow in the San Pedro River is composed of flow from the regional groundwater system and the recent Holocene alluvium (Kennedy and Gungle 2010).

The San Pedro River flow fluctuates seasonally with changes in precipitation and changes in water use by riparian vegetation. Summer stormflows are the largest of the year in response to monsoon storms. When monsoons end around late September, streamflows decrease until the riparian vegetation goes dormant in the winter. Consequently, during winter and early spring, less groundwater is taken up by the dormant riparian vegetation. The result is an increase in baseflow in the winter and early spring months. Frontal winter storms also create episodic increases in stormflow in the winter and early spring. In April, riparian vegetation resumes active growth and increases water use. By the dry, pre-monsoon period of May and June, streamflows are at their lowest levels of the year.

San Pedro River streamflows have declined in the 20th and 21st centuries. For example, the annual total flow of the San Pedro River at Charleston gage has declined from 57,000 AFY during the predevelopment period (1915 to 1940) to 22,000 AFY during the period between 1991 to 2002 (Thomas and Pool 2006); a 60 percent reduction. The research identified that reduced summer flows were responsible for about 70 percent of that decline, while fall and early winter declines made up 20 and seven percent, respectively. In July 2005, the flow of the San Pedro River at the Charleston gaging station was zero for the first time since records began.

The regional aquifer has recharge zones away from the river, primarily at mountain fronts and along ephemeral channels. The alluvial aquifer consists of the “bank storage” in the near-stream alluvial deposits and is recharged mainly from stormwater runoff.

The area within and surrounding the SPRNCA contains riverine marshlands, cottonwood/willow forests, salt cedar shrublands, mesquite forests, and sacaton grasslands. Riverine marshlands are wetlands that develop along perennial streams. They are vegetated by grasses, sedges, and rushes. These marsh plants line the banks of perennial low-flow channels and form pockets in oxbows, scour pools, and beaver ponds (Stromberg and Tellman 2009). Fremont’s cottonwood and Goodding’s willow gallery forest forms a visually prominent element of the San Pedro River corridor. Other co-occurring woody species are narrowleaf willow (Salix exigua), seepwillow (Baccharis salicifolia), and Emory’s baccharis (Baccharis emoryi). Saltcedar or tamarisk (Tamarix chinensis, T. ramosissima, or hybrids) is a stress-tolerant pioneer species occurring in the riparian zone intermediate between cottonwood and mesquite (Leenhouts et al. 2006). Mesquite is able to grow in a wide range of hydrogeomorphic settings including river floodplains, river terraces, ephemeral washes, alluvial fans, and desert uplands. Livestock grazing and reduced fire frequency may have contributed to the increased abundance
of mesquite in the riparian zone and elsewhere. Sacaton grasslands are dominated by big sacaton
(Sporobolus wrightii), alkali sacaton (S. airoides), vine mesquite (Panicum obtusum), and tobosa
grass (Pleuraphis mutica). The grasslands slow the velocity of flood runoff, trap sediment,
enhance infiltration of water, and contribute to the formation of shallow water tables and
perennial streams (Stromberg and Tellman 2009) when they are in the floodplain. Many sites in
the San Pedro river watershed were once vegetated by sacaton grasslands and now support
mesquite forest or sacaton-mesquite savannahs (Kepner et al. 2002), largely caused by channel
incision and exacerbated by livestock overgrazing. Sacaton grows in the San Pedro river
floodplain but is most extensive on the terraces.

With 61 observed mammal species, the San Pedro River watershed has one the highest
concentrations of mammal species in the U.S. (Duncan 1989). Of these mammals, beavers are
considered a keystone species that disproportionately affect the hydrology and vegetation of
riparian corridors. Beavers were extirpated from the San Pedro River in the in the mid-1980s but
were reintroduced in 1999 and 2000. Creation of beaver dams in other ecosystems has been
found to reduce stream channel gradient, reduce streamflow velocities, accelerate sediment
deposition, and elevate water tables (Stromberg and Tellman 2009).

The San Pedro River corridor also supports a diverse and abundant community of breeding and
migratory birds. The San Pedro River watershed hosts over 100 different breeding bird species
from May to August. Bird density and richness are highest in wooded vegetation types, with
values highest in the cottonwood/willow forests (Stromberg and Tellman 2009). In addition,
over 200 migratory bird species use the San Pedro riparian corridor (Krueper 1993).

The San Pedro River also supports a species-rich assemblage of Arizona lowland reptiles and
amphibians. There are 63 known species of reptiles and amphibians along the San Pedro River
corridor. Many species, especially native frogs and the northern Mexican gartersnake, have
departed in abundance. The San Pedro River historically was occupied by 13 native fish species
which ranged in size from the tiny desert pupfish and Gila topminnow to the huge Colorado
pikeminnow (Minckley 1973, Minckley and Marsh 2009). During the past 150 years, native fish
species have declined or disappeared from the San Pedro River, largely due to human-induced
factors and introduction of harmful nonnative species. Now the only native fish in the mainstem
of the upper San Pedro River are the longfin dace and the desert sucker. Non-native predatory
fish include largemouth bass, green sunfish, yellow and black bullheads which all constrain the
survival and recovery of native fish, amphibian, and obligate reptile species in the San Pedro
River (Minckley 1986, 1987; Stromberg and Tellman 2009).

Our formal consultation dated March 31, 2014 on the on-going operations of Fort Huachuca (see
consultation number 22410-2013-F-0247), contains a robust assessment of the area’s
environmental baseline, which we incorporate by reference.

**SPRNCA: Site by Site Description of Projects and Analysis of Effects**

Boquillas Ranch Site and Access Route
Acreage and Land Status - 20.01 ac of BLM land.

Previously Treated – Yes

Mechanical Treatment - Utilization of tractor with grubbing attachment, tractor with mower, weed eaters, chippers, and chain saws. Thin and limb up mesquite and shrub species, mow and weed eat grasses within ranch compound and around structures. Thin and limb mesquite and shrub species 10 feet on either side of the entrance road, limbing/removal of overhanging limbs (up to 16’), and grub new growth of mesquite and other tree and shrub species to maintain a 10’ area of cleared vegetation on both sides of the road. Cottonwood, willow, ash, hackberry, walnut trees and large mesquite trees would not be removed but may be limbed up to reduce ladder fuels.

Proximity to Riparian-mesquite Bosque Complex - site is in the floodplain mesquite bosque and touching the edge of a mature stand of cottonwoods.

Chemical Treatment - Herbicide treatments such as cut stump, spot spray and basal spray treatments (ground application) can be utilized to control re-sprouting and new growth of tree and shrub species (mesquite, acacia, ailanthus). Herbicides that may be utilized during treatments include:
  - Upland areas- Triclopyr, Clopyralid, and Picloram.
  - Riparian areas or near water sources- Aquatic formulations of Glyphosate and Imazapyr.

Prescribed Fire Treatment - Cure, stack and burn slash the following winter. Piles would be stacked away from drainages and located at far edge of floodplain away from the San Pedro River, in areas with no canopy cover to avoid impacts to surrounding vegetation due to direct flame contact, radiant heat, and convective heat. An engine and crew would be onsite to conduct the burning. A burn plan would be completed for each project site.

Slash and Bio-mass - Slash would be piled and burned, chipped/mulched with chips scattered on site, or lopped and scattered on site. Slash generated during thinning and maintenance can be utilized for erosion control, or as ground cover for artifact protection, vegetation permits cannot be issued for marketable wood products.

Annual Maintenance - This firebreak would be maintained annually between Oct 1st and March 15th. Weed eating and mowing of grasses (2”-6” stubble height), limbing of re-sprouts on large trees (up to 6’), grubbing of re-sprouting mesquite, and flush cutting new growth of mesquite and other tree and shrub species that threaten the integrity of the historic site infrastructure.

Winter Precipitation - During seasons of above normal winter precipitation (>7 inches per year), there can be enough growth of annual herbaceous vegetation (Red brome, Mediterranean grass) to carry fire. When this unusual condition occurs, the extra herbaceous vegetation production would require re-treatment of firebreaks from March 15th-May 15th and is completed using mowers, weed eaters, or other specialized
vegetation mowing equipment (walk behind power mowers).

_Time Required_ – Six 8 hour days with 2-4 people.

_Personnel_ - Annual maintenance may be completed by the BLM or by BLM co-
operators/partners under the direction of BLM.

_Species Potentially Affected and Concurrence Factors_ - yellow-billed cuckoo (CF3, CF6, CF7, CF8, CF12), jaguar (CF2, CF3, CF5, CF6, CF7, CF8, CF12), lesser long-nosed bat (CF2, CF3, CF4, CF5), ocelot (CF1, CF2, CF5, CF6, CF12), northern Mexican gartersnake (no concurrence), and Chiricahua leopard frog (CF2, CF4, CF6, CF7, CF8, CF12)

_Proposed or Designated Critical Habitat Potentially Affected and Concurrence Factors_ - northern Mexican gartersnake (CF7, CF8), Huachuca water umbel (CF7, CF10, CF12), and yellow-billed cuckoo (CF6, CF7, CF8, CF12)

_Potential Adverse Effects_ - southwestern willow flycatcher, northern Mexican gartersnake; see effects analysis and incidental take statement under species-specific discussion below.

_Curtis Ranch_

_Acreage and Land Status_ - 0.86 ac of BLM land

_Previously Treated_ – Yes

_Mechanical Treatment_ - Utilization of rubber tired grubbing equipment, tractor with mower, weed eaters, chippers, and chain saws. Thin mesquite and shrub species surrounding historic buildings. Limbing of re-growth of limbs on large mesquite trees (>20’ tall). To achieve desired outcome for the fuel break there would be a maximum of 30 feet canopy cover spacing. Mowing of grasses surrounding historic buildings.

_Distance from riparian-mesquite complex_ – 0.8 miles from cottonwood gallery and on outer edge of one of the largest mesquite bosques on the SPRNCA.

_Chemical Treatment_ - Herbicide treatments such as cut stump, spot spray and basal spray treatments (ground application) can be utilized to control re-sprouting of tree and shrub species. Herbicides that may be utilized during treatments include:

Upland areas- Triclopyr, Clopyralid, and Picloram.

Riparian areas or near water sources- Aquatic formulations of Glyphosate and Imazapyr.

_Prescribed Fire Treatment_ - Pile burning in winter and away from drainages and located at western edge of site can be implemented to treat slash. An engine and crew would be onsite to conduct the burning. A burn plan would be completed for each project site.
**Slash and Bio-mass** - Slash generated during thinning and maintenance can be piled and burned, chipped/mulched with chips scattered on site, or lopped and scattered on site. Vegetation permits cannot be issued for marketable wood products.

**Annual Maintenance** - This firebreak would be maintained annually between Oct 1st and March 15th. Weed eating and mowing of grasses (2”-4” stubble height), limbing of re-sprouts on large trees (up to 6’), and flush cutting new growth of mesquite (approx. every 2-4 years) to maintain canopy spacing (20’) and reduce ladder fuels. Maintenance also includes grubbing of new growth and re-sprouting and mesquite as needed (approx. every 2-4 years), to maintain canopy spacing and reduce ladder fuels.

**Winter Precipitation** - During seasons of above normal winter precipitation (>7 inches per year), there can be enough growth of annual herbaceous vegetation (Red brome, Mediterranean grass) to carry fire. When this unusual condition occurs, the extra herbaceous vegetation production will require re-treatment of firebreaks from March 15th-May 15th, and is completed using mowers, weed eaters, or other specialized vegetation mowing equipment (walk behind power mowers).

**Time Required** - Two eight hour days with 2-4 people.

**Personnel** - Annual maintenance may be completed by the BLM or by BLM co-operators/partners under the direction of BLM.

**Access** - Access to the Curtis Ranch firebreak would need to be coordinated with adjacent private land owner prior to implementation. Access would be from two-track. May limb branches along two-track for access purposes.

**Special Measures** - Slash would cure in place and then be piled and burned in the winter to avoid attracting and injuring Northern Mexican gartersnakes. Dead and down wood deposited by floods would be removed from firebreak and placed in adjacent area downstream. Leave a stubble height of 4-6” to protect banks in the three riparian areas.

**Species Potentially Affected and Concurrence Factors** - yellow-billed cuckoo (CF1, CF3, CF6, CF7, CF8, CF12), ocelot (CF1, CF2, CF3, CF5, CF6, CF12), and Chiricahua leopard frog (CF1, CF2, CF4, CF6, CF7, CF8, CF12)

**Proposed or Designated Critical Habitat Potentially Affected and Concurrence Factors** - yellow-billed cuckoo (CF6, CF7, CF8, CF12)

**Potential Adverse Effects** - southwestern willow flycatcher and northern Mexican gartersnake; see effects analysis and incidental take statements under species-specific discussion below.
Acreage and Land Status - 6.61 ac of BLM land

Previously Treated – Yes

Mechanical Treatment - Utilization of weed eaters, chippers, and chain saws. Thin and limb mesquite and other trees species within the Fairbank compound, around edges of parking areas and in and around corrals. Mow and weed eat grasses around compound, parking areas and corrals.

Proximity to Riparian-mesquite complex – the firebreak is within one of the largest mesquite bosques on the SPRNCA, but is located 0.25 miles from the cottonwood riparian gallery. Light use recreation site.

Chemical Treatment - Herbicide treatments such as cut stump, spot spray and basal spray treatments (ground application) can be utilized to control re-sprouting and new growth of tree and shrub species (mesquite). Herbicides that may be utilized during treatments include:

Upland areas - Triclopyr, Clopyralid, and Picloram.
Riparian areas or near water sources - Aquatic formulations of Glyphosate and Imazapyr.

Prescribed Fire treatment - Pile burning would be implemented to treat slash in winter and away from drainages and located at far edge of clearings away from the San Pedro River. An engine and crew would be onsite to conduct the burning. A burn plan would be completed for each project site.

Slash and Bio-mass - Slash generated during thinning and maintenance can be hauled off site to be piled and burned, chipped/mulched with chips scattered on site, lopped and scattered on site, utilized for erosion control, or as ground cover for artifact protection. Vegetation permits cannot be issued for marketable wood products.

Annual Maintenance - This firebreak would be maintained annually between Oct 1st and March 15th. Weed eating and mowing of grasses (2”-4” stubble height), limbing of tree limb re-sprouts on large trees (up to 6’ above ground), and flush cutting new growth of small mesquite (approx. every 2-4 years) to maintain canopy spacing (20’) and reduce ladder fuels. Other riparian trees such as willow, ash, hackberry, and walnut found on site would not be removed but may be limbed up to reduce ladder fuels.

Winter Precipitation - During seasons of above normal winter precipitation (>7 inches per year), there can be enough growth of annual herbaceous vegetation (Red brome, Mediterranean grass) to carry fire. When this unusual condition occurs, the extra herbaceous vegetation production would require re-treatment of firebreaks from March 15th-May 15th, and would be completed using mowers, weed eaters, or other specialized vegetation mowing equipment (walk behind power mowers).
Time Required - Three 8 hour days with 2-4 people.

Personnel - Annual maintenance may be completed by the BLM or by BLM co-
operators/partners under the direction of BLM. A staff biologist would be on site during
firebreak clearing activities.

Special Measures - Slash would cure in place and then be piled and burned in the winter
to avoid attracting and injuring Northern Mexican gartersnakes. Dead and down wood
deposited by floods would be removed from fire break and placed in adjacent area
downstream. Leave a stubble height of 4-6” to protect banks in the three riparian areas.

Species Potentially Affected and Concurrence Factors - yellow-billed cuckoo (CF1, CF3,
CF6, CF7, CF8, CF12), jaguar (CF2, CF3, CF5, CF6, CF7, CF8, CF12), lesser long-
nosed bat (CF2, CF3, CF4, CF5), ocelot (CF1, CF2, CF3, CF5, CF6, CF12), northern
Mexican gartersnake (no concurrence), and Chiricahua leopard frog (CF2, CF4, CF6,
CF7, CF8, CF12)

Proposed or Designated Critical Habitat Potentially Affected and Concurrence Factors -
northern Mexican gartersnake (CF7, CF8), Huachuca water umbel (CF7, CF10, CF12),
and yellow-billed cuckoo (CF6, CF7, CF8, CF12)

Potential Adverse Effects - southwestern willow flycatcher, northern Mexican
gartersnake; see effects analysis and incidental take statement under species-specific
discussion below.

Fortner

Acreage and Land Status - 0.45 ac of BLM land (approx. 400 ft. long by 75 ft. wide)

Previously Treated –Yes

Mechanical Treatment - Utilization of rubber tired grubbing equipment, tractor with
mower, weed eaters, chippers, and chain saws. Thin and limb mesquite and shrub
species, mow weed eat grasses adjacent to private land and structures.

Chemical Treatment - No chemical treatments identified for this firebreak.

Prescribed Fire Treatment - Pile burning can be implemented to treat slash in winter and
away from drainages and located at far edge of clearings away from the San Pedro River.
Piles would be stacked away from drainages and located at far edge of floodplain away
from nearby drainage, in areas away from structures with no canopy cover to avoid
impacts to surrounding vegetation due to direct flame contact, radiant heat, and
convective heat. An engine and crew would be onsite to conduct the burning. A burn
plan would be completed for each project site.
Slash and Bio-mass - Slash generated during thinning and maintenance can be hauled off site to be piled and burned, chipped/mulched with chips scattered on site, or utilized for erosion control. Vegetation permits cannot be issued for marketable wood products.

Annual Maintenance - This firebreak would be maintained annually between Oct 1st and March 15th. Weed eating and mowing of grasses (2”-4” stubble height, 4-6” in riparian locations), limbing of tree limb re-sprouts on large trees (up to 6’ above ground), and flush cutting new growth of mesquite. Maintenance also includes grubbing of new growth and re-sprouting and small mesquites as needed (approx. every 2-4 years), to maintain canopy spacing (20’) and reduce ladder fuels. River banks within riparian area would not be treated. Dead and down wood deposited by floods would be removed from fire break and placed in adjacent area downstream.

Winter Precipitation - During seasons of above normal winter precipitation (>7 inches per year), there can be enough growth of annual herbaceous vegetation (Red brome, Mediterranean grass) to carry fire. When this unusual condition occurs, the extra herbaceous vegetation production would require re-treatment of firebreaks from March 15th-May 15th, and would be completed using mowers, weed eaters, or other specialized vegetation mowing equipment (walk behind power mowers).

Time Required - One 8 hour day with 2-4 people.

Personnel - Annual maintenance may be completed by the BLM or by BLM co-operators/partners under the direction of BLM. A staff biologist would be on site during firebreak clearing activities.

Access - Access to the Fortner firebreak would be through adjacent private, with land owner permission or from the end of the West Escalante Firebreak south along right of way fence.

Special Measures - Slash would cure in place and then be piled and burned in the winter to avoid attracting and injuring Northern Mexican gartersnakes. Dead and down wood deposited by floods would be removed from fire break and placed in adjacent area downstream. Leave a stubble height of 4-6” to protect banks in the three riparian areas.

Species Potentially Affected and Concurrence Factors - yellow-billed cuckoo (CF1, CF2, CF3, CF6, CF7, CF8, CF12), southwestern willow flycatcher (CF1, CF2, CF3, CF6, CF7, CF8, CF12), jaguar (CF2, CF3, CF5, CF6, CF7, CF8, CF12), lesser long-nosed bat (CF2, CF3, CF4, CF5), northern Mexican gartersnake (no concurrence), ocelot (CF1, CF2, CF3, CF4, CF5, CF6, CF12), and Chiricahua leopard frog (CF2, CF4, CF6, CF7, CF8, CF12)

Proposed or Designated Critical Habitat Potentially Affected and Concurrence Factors - northern Mexican gartersnake (CF1, CF7, CF8) and yellow-billed cuckoo (CF1, CF6, CF7, CF8, CF12)
Potential Adverse Effects - Northern Mexican gartersnake; see effects analysis and incidental take statement under species-specific discussion below.

Highway 90

Acreage and Land Status - 3.23 acres of BLM land, including 1.15 acres of riparian (100 feet by 500 feet)

Previously Treated – Yes, also 200 ft. cleared to mineral earth by bridge construction work in 2014. The firebreak would be established in the footprint (within the right of way) of already disturbed ground adjacent to the new bridge

Mechanical Treatment - Utilization of tractor with mower, weed eaters, chippers, and chain saws. Thin and limb mesquite and shrub species, mow weed eat grasses along the right of way. Thin and limb mesquite and shrub species. Mow and weed eat grasses. Firebreak stays within the right of way of Hwy 90. Other riparian trees such as willow, ash, hackberry, and walnut found on site would not be removed but may be limbed up to reduce ladder fuels. However, young riparian trees that begin to infill open areas would be thinned periodically to maintain a canopy spacing of 30 feet between trees within the firebreak. Once they become large enough to be limbed up, then they would no longer need to be thinned.

Chemical Treatment - Herbicide treatments such as cut stump, spot spray and basal spray treatments (ground application) can be utilized to control re-sprouting and new growth of tree and shrub species (mesquites, grey thorn or Acacia sp). Herbicides that may be utilized during treatments include:

- Upland areas- Triclopyr, Clopyralid, and Picloram.
- Riparian areas or near water sources- Aquatic formulations of Glyphosate and Imazapyr.

Prescribed Fire Treatment - Pile burning would be implemented to treat slash. Piles would be stacked away from drainages and located at far edge of floodplain away from nearby drainage, in areas away from structures with no canopy cover to avoid impacts to surrounding vegetation due to direct flame contact, radiant heat, and convective heat. An engine and crew would be onsite to conduct the burning. A burn plan would be completed for each project site.

Slash and Bio-mass - Slash generated during thinning and maintenance can be hauled off site to be piled and burned, chipped/mulched with chips scattered on site, lopped and scattered on site, or utilized for erosion control. Vegetation permits cannot be issued for marketable wood products.

Annual Maintenance - This firebreak would be maintained annually between Oct 1st and March 15st. Weed eating and mowing of grasses (2”-4” stubble height), limbing (up to 6’ above ground) of tree limb re-sprouts on large trees, and flush cutting new growth of
small mesquite (approx. every 2-4 years) to maintain canopy spacing (30’) and reduce ladder fuels and other tree and shrub species.

*Winter Precipitation* - During seasons of above normal winter precipitation (>7 inches per year), there can be enough growth of annual herbaceous vegetation (Red brome, Mediterranean grass) to carry fire. When this unusual condition occurs, the extra herbaceous vegetation production would require re-treatment of firebreaks from March 15th-May 15th, and would be completed using mowers, weed eaters, or other specialized vegetation mowing equipment (walk behind power mowers).

*Time Required* - Two 8 hour days with 2-4 people.

*Personnel* - Annual maintenance may be completed by the BLM or by BLM co-operators/partners under the direction of BLM. A staff biologist would be on site during firebreak clearing activities including activities in the riparian-mesquite areas.

*Special Measures* - Slash would cure in place and then be piled and burned in the winter to avoid attracting and injuring Northern Mexican gartersnakes. Dead and down wood deposited by floods would be removed from firebreak and placed in adjacent area downstream. Leave a stubble height of 4-6” to protect banks in the three riparian areas. Dead and down wood deposited by floods would be removed from firebreak and placed in adjacent area downstream. Leave a stubble height of 4-6” to protect banks in riparian area. The onsite biologist would be responsible for surveying the 100 feet of shoreline for Huachuca water-umbel and flagging it for avoidance by treatment crew.

*Species Potentially Affected and Concurrence Factors* - Huachuca water umbel (CF1, CF4, CF6, CF9, CF12), yellow-billed cuckoo (CF1, CF2, CF3, CF4, CF6, CF8, CF9, CF12), Gila topminnow (CF1, CF2, CF4, CF9, CF10), jaguar (CF1, CF2, CF3, CF5, CF7, CF8, CF12), lesser long-nosed bat (CF1, CF2, CF3, CF4, CF5, CF8, CF9, CF10, CF11, CF12), ocelot (CF1, CF2, CF3, CF5, CF7, CF8, CF12), northern Mexican gartersnake (CF1, CF2, CF3, CF8, CF9, CF10, CF12), and Chiricahua Leopard frog (CF1, CF2, CF3, CF8, CF9, CF10, CF12)

*Proposed or Designated Critical Habitat Potentially Affected and Concurrence Factors* - Huachuca water umbel (CF1, CF6, CF10, CF12), northern Mexican gartersnake (CF1, CF7, CF8, CF12), yellow-billed cuckoo (CF1, CF7, CF8, CF12)

*Potential Adverse Effects* - southwestern willow flycatcher; see effects analysis and incidental take statement under species-specific discussion below.

**West Escalante Road**

*Acreage and Land Status* - 9.44 ac of BLM land including 2.5 ac of riparian area (approx. 2,700 ft. long by 100 ft. wide)

*Previously Treated* – Yes
Mechanical Treatment - Utilization of rubber tired grubbing equipment, tractor with mower, weed eaters, chippers, and chain saws. Thin and limb mesquite, salt cedar and shrub species. Mow and weed eat grasses. Avoid area near gas pipeline on east side of Judd land between Hwy 80 and the cattle guard with ground disturbing activities (area blue staked and buffered by 75 ft. on both sides of pipeline), chainsaw operations only along pipeline.

Chemical Treatment - Herbicide treatments such as cut stump, spot spray and basal spray treatments (ground application) can be utilized to control re-sprouting and new growth of tree and shrub species (mesquites, grey thorn or Acacia sp). Herbicides that may be utilized during treatments include:

Upland areas- Triclopyr, Clopyralid, and Picloram.
Riparian areas or near water sources- Aquatic formulations of Glyphosate and Imazapyr.

Prescribed Fire Treatment - Pile burning would be implemented to treat slash. Piles would be stacked away from drainages and located at far edge of floodplain away from nearby drainage, in areas away from structures with no canopy cover to avoid impacts to surrounding vegetation due to direct flame contact, radiant heat, and convective heat. An engine and crew would be onsite to conduct the burning. A burn plan would be completed for each project site.

Slash and Bio-mass - Slash generated during thinning and maintenance can be hauled off site to be piled and burned, chipped/mulched with chips scattered on site, lopped and scattered on site, or utilized for erosion control. Vegetation permits cannot be issued for marketable wood products.

Annual Maintenance - This firebreak would be maintained annually between Oct 1st and March 15th. Weed eating and mowing of grasses (2”-4” stubble height), limbing of re-sprouts on large trees (up to 6’), and flush cutting new growth of mesquite and salt cedar. Maintenance every 2 to 4 years to maintain canopy spacing (30’) and reduce ladder fuels.

Winter Precipitation - During seasons of above normal winter precipitation (>7 inches per year), there can be enough growth of annual herbaceous vegetation (Red brome, Mediterranean grass) to carry fire. When this unusual condition occurs, the extra herbaceous vegetation production would require re-treatment of firebreaks from March 15th-May 15th, and would be completed using mowers, weed eaters, or other specialized vegetation mowing equipment (walk behind power mowers).

Time Required - Four 8 hour days with 2-4 people.

Personnel - Annual maintenance may be completed by the BLM or by BLM co-operators/partners under the direction of BLM.

Special Measures – Slash would cure in place and then be piled and burned in the winter
to avoid attracting and injuring Northern Mexican gartersnakes. Dead and down wood deposited by floods would be removed from firebreak and placed in adjacent area downstream. Leave a stubble height of 4-6” to protect banks in riparian areas.

Species Potentially Affected and Concurrence Factors - yellow-billed cuckoo (CF3, CF6, CF8, CF12), jaguar (CF2, CF3, CF5, CF7, CF8, CF12), lesser long-nosed bat (CF2, CF3, CF4, CF5, CF8, CF9, CF10, CF11, CF12), ocelot (CF2, CF3, CF5, CF8, CF12), northern Mexican gartersnake (no concurrence), and Chiricahua leopard frog (CF2, CF3, CF8, CF9, CF10, CF12)

Proposed or Designated Critical Habitat Potentially Affected and Concurrence Factors - northern Mexican gartersnake (CF7, CF8, CF10, CF12), yellow-billed cuckoo (CF7, CF8, CF12)

Potential Adverse Effects - southwestern willow flycatcher and northern Mexican gartersnake; see effects analysis and incidental take statement under species-specific discussion below.

LCNCA: Environmental Baseline

Cienega Creek is the major biogeophysical feature within the LCNCA, and part of its namesake. The Cienega Creek watershed is generally bounded by Interstate 10 on the north, Arizona State Highway 83 on the west, the Whetstone Mountains on the east, and the Canelo Hills on the south. The area includes five habitat types: cienegas, cottonwood-willow riparian areas, sacaton grasslands, mesquite bosques, and semidesert grasslands. The watershed condition is considered satisfactory with a stable trend. Agricultural development during the 1970s within the bottomlands of the LCNCA has resulted in long term erosion issues that continue to pose management challenges. Cienega Creek begins in the Canelo Hills at Papago Spring and runs northward to Pantano Wash, a tributary to the Rillito River in Tucson. Several major tributaries feed Cienega Creek from the Santa Rita Mountains to the west, including Gardner Canyon and Empire Gulch. Other major tributaries feed the creek from the Whetstone Mountains to the east. Located on the LCNCA are seven major springs, 14 wildlife ponds, and 10 wetland sites.

The dominance of desert grassland within the LCNCA heavily influences the area’s fire regime. March through July mark the most critical time for wildfires on the LCNCA due to the build-up and continuous stand of dry grass, threatening riparian trees and vegetation. Numerous private parcels in the immediate region of the LCNCA increase the likelihood of human-caused fire starts, which account for approximately one-half of all fire starts. Fuel types vary within the LCNCA. Fuels in riparian areas and bottomlands are dominated by tall grasses with mesquite, cottonwood, and other riparian trees. Fires in these fuels burn hotter than in the predominately short grass areas. Fuels in the uplands and canyons consist mainly of shrubs with a short grass understory along with scattered juniper trees and other desert shrubs. Pre-settlement, wildfire is believed to be the causative agent and ecological driver for much of the LCNCA, favoring grassland habitat and minimizing the influence or invasion of shrubs such as mesquite, etc. Subsequent to settlement however, livestock use and fire suppression have slowly led to an
increase in shrub density and distribution in the area.

The LCNCA contains both Sonoran Riparian Deciduous Woodland and Southern Arizona Warm-Temperate-Riverine Marshes; both sub-types of riparian and wetland habitat. Sonoran Riparian Deciduous Woodlands occur on the low stream terrace and stream banks of the wet reaches of Cienega Creek. Benefitting from a high water table and flood events, the climax plant community within this habitat type includes Freemont cottonwood (Populus fremontii), Goodding willow (Salix gooddingii), velvet ash (Fraxinus pensylvanica), Arizona walnut (Juglans major), netleaf hackberry (Celtis reticulata), and seep willow (Baccharis glutinosa). Southern Arizona Warm-Temperate-Riverine Marshes on the LCNCA occur where groundwater intersects with the soil surface forming pools of various depths. In this habitat, rushes (Eleocharis, Juncus, Carex spp), sedges (Carex and Cyperus spp), flat sedges (Cyperus spp), spike rushes (Eleocharis spp), deer grass (Muhlenbergia rigens), cattail (Typha latifolia, Typha domingensis), bulrushes (Scirpus), yerba mansa (Anemopsis californica), Goodding willow, water parsnip (Berula erecta), stonewort (Chara), horned pond-weed (Zannachellia palustris), penny-wort (Hydrocotyle verticillata), and speedwell (Veronica) occur, with penny wort (Hydrocotyle spp) and stonewort (Chara spp) living in pools. Drought and groundwater pumping are concerns for riparian habitat in the LCNCA; these threats have led to the loss of some mature trees which, in turn, has accelerated erosion and led to headcutting in some reaches.

Biodiversity within the LCNCA is generally considered high with four species of native fish, at least six species of amphibians, 33 species of reptiles, more than 230 bird species, and 60 species of mammals, including 8 species of bats.

The predominant human uses of the LCNCA include livestock grazing and various forms of human recreation including hiking, wildlife watching, off-road vehicle use, camping, hang gliding, picnicking, horseback riding, hunting, and training bird dogs. Several communities occur near the LCNCA: Vail, Sonoita, Elgin, Benson, and Patagonia, varying in population size between 417 and 6,000.

**LCNCA: Site by Site Description of Projects and Analysis of Effects**

**Airstrip Group Site**

*Acreage and Land Status* - 17.59 ac of BLM land.

*Previously Treated* – Yes

*Mechanical Treatment* - Utilization of tractor with mower and weed eaters.

*Chemical Treatment* - No chemical treatments are identified for this firebreak.

*Prescribed Fire Treatment* - No prescribed fire treatments are identified for this firebreak.

*Slash and Bio-mass* - Mowing treatment no slash generation or useable bio-mass
anticipated.

Annual Maintenance - This firebreak would be maintained annually between Oct 1st and March 15th. Mowing of grasses (2”-6” stubble height).

Winter Precipitation - During seasons of above normal winter precipitation (>7 inches per year), there can be enough growth of annual herbaceous vegetation (Red brome, Mediterranean grass) to carry fire. When this unusual condition occurs, the extra herbaceous vegetation production would require re-treatment of firebreaks from March 15th-May 15th, and would be completed using mowers, weed eaters, or other specialized vegetation mowing equipment (walk behind power mowers).

Proximity to Riparian-mesquite Bosque Complex - 0.15 miles from Empire Gulch Mesquite Bosque and 0.22 miles from cottonwood-willow riparian gallery.

Time Required - 15 minutes to one hour of work each time at pump house next to the riparian area. Two 8 hour days for mowing at group site with 1-2 people.

Personnel - Annual maintenance may be completed by the BLM or by BLM co-operators/partners under the direction of BLM

Species Potentially Affected and Concurrence Factors - yellow-billed cuckoo (CF2, CF3, CF4, CF7, CF9, CF10, CF11, CF12), southwestern willow flycatcher (CF2, CF3, CF4, CF7, CF9, CF10, CF11, CF12), Gila topminnow (CF2, CF4, CF6, CF9, CF10, CF11, CF12), lesser long-nosed bat (CF2, CF3, CF4, CF5, CF7, CF8, CF9, CF11, CF12), jaguar (CF2, CF3, CF4, CF5, CF7, CF8, CF9, CF10, CF11, CF12), Chiricahua leopard frog (CF2, CF3, CF4, CF6, CF9, CF10, CF11, CF12), northern Mexican gartersnake (CF2, CF3, CF4, CF6, CF9, CF10, CF11, CF12), and Gila chub (CF2, CF4, CF6, CF9, CF10, CF11, CF12)

Proposed or Designated Critical Habitat Potentially Affected and Concurrence Factors - Chiricahua leopard frog (CF6, CF7, CF8, CF11, CF12), northern Mexican gartersnake (CF6, CF7, CF8, CF11, CF12)

Potential Adverse Effects - None.

Cieneguita Camp Area

Acreage and Land Status - 2.08 ac of BLM Land.

Previously Treated – Yes

Mechanical Treatment - Utilization of tractor with mower and weed eaters. Mow grasses around primitive campsites.
**Proximity to Riparian-mesquite Bosque Complex** - Distance from nearest riparian areas and mesquite bosque complex at Gardner Canyon is 0.85 miles.

**Chemical Treatment** - No chemical treatments are identified for this firebreak.

**Prescribed Fire Treatment** - No prescribed fire treatments are identified for this firebreak.

**Slash and Bio-mass** - Mowing treatment no slash generation or useable bio-mass anticipated.

**Annual Maintenance** - This firebreak would be maintained annually between Oct 1st and May 30th. Mowing of grasses (2”-4” stubble height).

**Time Required** - One 8 hour day with 1-2 people.

**Personnel** - Annual maintenance may be completed by the BLM or by BLM co-operators/partners under the direction of BLM.

**Species Potentially Affected and Concurrence Factors** - lesser long-nosed bat (CF1, CF2, CF3, CF4, CF5, CF9, CF10), jaguar (CF1, CF2, CF3, CF4, CF5, CF9, CF10), Chiricahua leopard frog (CF1, CF2, CF3, CF4, CF9, CF10), northern Mexican gartersnake (CF1, CF2, CF3, CF4, CF9, CF10)

**Proposed or Designated Critical Habitat Potentially Affected and Concurrence Factors** - northern Mexican gartersnake (CF1, CF6, CF10), Chiricahua leopard frog (CF1, CF6, CF10)

**Potential Adverse Effects** - None

**Empire Ranch Headquarters**

**Acreage and Land Status** - 27.56 ac of BLM land (including 1.3 ac of riparian area)

**Mechanical Treatment** - Utilization of weed eaters, tractor with mower attachment, chain saws. Mow and weed eat grasses around Empire Ranch compound, parking areas, and BLM ware yard. Thin and limb mesquite and shrub species.

**Chemical Treatment** - No chemical treatments are identified for this firebreak.

**Prescribed Fire Treatment** - No prescribed fire treatments are identified for this firebreak.

**Slash and Bio-mass** - Slash can be lopped and scattered. Mowing treatment, no useable bio-mass anticipated.
Annual Maintenance - This firebreak would be maintained annually between Oct 1st and March 15th, with the riparian portion of the firebreak completed prior to March 15th. Weed eating and mowing of grasses (2”-4” stubble height), limbing of cottonwood and mesquite trees (up to 6’), flush cutting tree limb re-sprouts and new growth (approx. every 2-4 years) to maintain canopy spacing (20’) and reduce ladder fuels in and around the historic site and BLM facilities.

Winter Precipitation - During seasons of above normal winter precipitation (>7 inches per year), there can be enough growth of annual herbaceous vegetation (Red brome, Mediterranean grass) to carry fire. When this unusual condition occurs, the extra herbaceous vegetation production would require re-treatment of firebreaks from March 15th - May 15th, and would be completed using mowers, weed eaters, or other specialized vegetation mowing equipment (walk behind power mowers).

Time Required - Three 8 hour days with 2-4 people.

Personnel - Annual maintenance may be completed by the BLM or by BLM co-operators/partners under the direction of BLM.

Pre-treatment meeting - Prior to implementation of mowing and limbing within the Empire Ranch Headquarters polygon, a meeting would take place with the cultural and recreation staff and management to determine where mowing and limbing are appropriate.

Special Measures - Slash would cure in place and then be piled and burned in the winter to avoid attracting and injuring Northern Mexican gartersnakes. Dead and down wood deposited by floods would be removed from firebreak and placed in adjacent area downstream. Leave a stubble height of 4-6” to protect banks in the three riparian areas.

Species Potentially Affected and Concurrence Factors - yellow-billed cuckoo (CF3, CF7, CF9, CF11, CF12), Gila topminnow (CF2, CF4, CF6, CF9, CF10, CF12), lesser long-nosed bat (CF2, CF3, CF4, CF5, CF7, CF8, CF9, CF11, CF12), jaguar (CF2, CF3, CF4, CF5, CF7, CF8, CF9, CF10, CF11, CF12), Chiricahua leopard frog (CF2, CF3, CF9, CF10, CF11, CF12), and Gila chub (CF2, CF4, CF6, CF9, CF10, CF12).

Proposed or Designated Critical Habitat Potentially Affected and Concurrence Factors - Chiricahua leopard frog (CF6, CF7, CF8, CF11, CF12), yellow-billed cuckoo (CF6, CF7, CF8, CF12), northern Mexican gartersnake (CF6, CF7, CF8, CF11, CF12).

Potential Adverse Effects - southwestern willow flycatcher and northern Mexican gartersnake; see effects analysis and incidental take statements under species-specific discussion below.
Acreage and Land Status - 2.45 ac of BLM land

Previously Treated – Yes

Mechanical Treatment - Utilization of weed eaters, tractor with mower attachment, chain saws. Mow and weed eat grasses around Hummel House compound and corrals. Thin and limb mesquite and shrub species.

Proximity to Riparian-mesquite Complex - the firebreak is on the upland bench adjacent to a cluster of large mesquite trees on the periphery of sacaton grassland plant community type. The cottonwood gallery along Gardner Canyon is located 0.22 miles away.

Chemical Treatment - Herbicide treatments such as cut stump, spot spray and basal spray treatments (ground application) can be utilized to control re-sprouting and new growth of tree and shrub species (mesquite, acacia). Herbicides that may be utilized during treatments include:

- Upland areas- Triclopyr, Clopyralid, and Picloram.
- Riparian areas or near water sources- Aquatic formulations of Glyphosate and Imazapyr.

Prescribed Fire Treatment - Pile burning can be implemented to treat slash in winter. Piles would be stacked away from drainages and located at far edge of floodplain away from nearby drainage, in areas away from structures with no canopy cover to avoid impacts to surrounding vegetation due to direct flame contact, radiant heat, and convective heat. An engine and crew would be onsite to conduct the burning. A burn plan would be completed for each project site.

Slash and Bio-mass - Slash generated during thinning and maintenance can be piled and burned, chipped/mulched with chips scattered on site, lopped and scattered on site, or utilized for erosion control, or as ground cover for artifact protection. Vegetation permits cannot be issued for marketable wood products.

Annual Maintenance - This firebreak would be maintained annually between Oct 1st and March 15th. Weed eating and mowing of grasses (2”-4” stubble height, 4-6” in riparian locations), limbing (up to 6’ above ground) of tree limb re-sprouts on large trees (with basal diameters (four inch above ground level) greater than eight inches), and flush cutting new growth of small mesquite (with basal diameters (four inch stump height) less than eight inches) (approx. every 2-4 years) to maintain canopy spacing (20’) and reduce ladder fuels and other tree and shrub species. Riparian trees such as cottonwood, willow, ash, hackberry, walnut and large mesquite trees found on site would not be removed but may be limbed up to reduce ladder fuels.

Winter Precipitation - During seasons of above normal winter precipitation (>7 inches per year), there can be enough growth of annual herbaceous vegetation (Red brome, Mediterranean grass) to carry fire. When this unusual condition occurs, the extra
herbaceous vegetation production will require re-treatment of firebreaks from March 15th-May 15th, and is completed using mowers, weed eaters, or other specialized vegetation mowing equipment (walk behind power mowers).

**Time Required** - Four 8 hour days with 2-4 people.

**Personnel** - Annual maintenance may be completed by the BLM or by BLM co-operators/partners under the direction of BLM. A staff biologist would be on site during firebreak clearing activities.

**Special Measures** - Slash would cure in place and then be piled and burned in the winter to avoid attracting and injuring Northern Mexican gartersnakes.

**Species Potentially Affected and Concurrence Factors** - Chiricahua leopard frog (CF1, CF2, CF3, CF4, CF9, CF10), Gila chub (CF1, CF2, CF4, CF6, CF9, CF10, CF12), and northern Mexican gartersnake (CF1, CF2, CF3, CF4, CF9, CF10), southwestern willow flycatcher (CF1, CF2, CF3, CF4, CF7, CF9, CF10, CF12), yellow-billed cuckoo (CF1, CF2, CF3, CF4, CF7, CF9, CF10, CF12), Gila topminnow (CF1, CF2, CF4, CF6, CF9, CF10, CF12), jaguar (CF2, CF3, CF4, CF5, CF7, CF8, CF9, CF10, CF12), lesser long-nosed bat (CF1, CF2, CF3, CF4, CF5, CF7, CF8, CF9, CF11, CF12)

**Proposed or Designated Critical Habitat Potentially Affected and Concurrence Factors** - yellow-billed cuckoo (CF6, CF7, CF8, CF12), northern Mexican gartersnake (CF6, CF7, CF8, CF12)

**Potential Adverse Effects** - None

**Las Cienegas Access Routes**

**Acreage and Land Status** - 63.34 ac of BLM, State, and private land and including 1.13ac of riparian habitat.

**Previously Treated** - Yes

**Proximity to Riparian-mesquite Bosque Complex** - This break cuts through 35.23 acres of riparian-mesquite bosque complex type habitat at 3 stream crossings (approx. 10.11 acres at Gardner Canyon road crossing, 5.43 acres at Empire Gulch road crossing and 19.69 acres at Cienega Creek road crossing). The project also includes 6,150 ft. of mesquite bosque along roadways and additional acreage. In the vicinity of Empire Gulch (2000 ft.), 550 ft. near Cottonwood Wildlife Pond (500 ft. away) and along the western edge of a very large mesquite bosque near the Cienega Ranch creek crossing (3,600 ft.).

**Mechanical Treatment** - Utilization of tractor for grubbing mesquite, tractor with mower, weed eaters, chippers, and chain saws. In addition, a tractor would be used to grub several previously treated cottonwood and willow trees cut down to protect power lines in Empire Gulch crossing. At the fire breaks associated with Cienega Creek crossing and
Gardner Canyon crossing, adult riparian trees such as cottonwood, willow, ash, hackberry, and walnut found on site would not be removed but may be limbed up to reduce ladder fuels. Thin and limb mesquite and shrub species along roads, 10 feet on both sides of the road. Large mesquite trees (<20’ tall) will not be removed but re-growth of limbs may be limbed up periodically. Young riparian trees that begin to infill this opening at Empire Gulch crossing would be removed to protect the power line and keep the firebreak open. At the other two crossings, young riparian trees that begin to infill open areas would be thinned periodically to maintain a canopy spacing of 30 feet between trees within the firebreak. River banks (from the active channel to the floodplain, which is at bank full and is a level surface) within riparian areas would not be mowed. Mowing and weed eating would occur along the road and on the floodplain above the stream channel.

Chemical Treatment - Herbicide treatments such as cut stump, spot spray and basal spray treatments (ground application) can be utilized to control re-sprouting and new growth of tree and shrub species (mesquite, acacia,). Herbicides that may be utilized during treatments include:

- Upland areas- Triclopyr, Clopyralid, and Picloram.
- Riparian areas or near water sources- Aquatic formulations of Glyphosate and Imazapyr.

Prescribed Fire Treatment - Pile burning would be implemented to treat slash in winter and away from drainages leading into Cienega Creek, Empire Gulch and Gardner Canyon. Piles would be stacked away from drainages and located at far edge of floodplain away from nearby drainage, in areas away from structures with no canopy cover to avoid impacts to surrounding vegetation due to direct flame contact, radiant heat, and convective heat. An engine and crew would be onsite to conduct the burning. A burn plan would be completed for each project site.

Slash and Bio-mass - Slash generated during thinning and maintenance can be hauled off site to be piled and burned, chipped/mulched with chips scattered on site, lopped and scattered on site, or utilized for erosion control. Vegetation permits can be issued for marketable wood products in some areas.

Annual Maintenance - This firebreak would be maintained every 2-4 years between Oct 1st and March 15th, with the riparian portion of the firebreak completed prior to March 15th. Weed eating and mowing of grasses (2”-4” stubble height, 4-6” riparian locations), limbing (up to 6’ above ground) of tree limb re-sprouts on large trees, and flush cutting new growth of small trees and shrubs (approx. every 2-4 years) to maintain canopy spacing (20’) and reduce ladder fuels and other tree and shrub species. Riparian trees such as cottonwood, willow, ash, hackberry, walnut and large mesquite trees found on site would not be removed but may be limbed up to reduce ladder fuels. However, young riparian trees that begin to infill open areas would be thinned periodically to maintain a canopy spacing of 30 feet between trees within the 50 foot wide firebreaks. Once they become large enough to be limbed up, then they would no longer need to be thinned.
River banks (from the active channel to the floodplain, which is at bank full and is a level surface) within riparian area would not be treated. Dead and down wood deposited by floods would be removed from firebreak and placed in adjacent area downstream.

Winter Precipitation - During seasons of above normal winter precipitation (>7 inches per year), there can be enough growth of annual herbaceous vegetation to carry fire. When this unusual condition occurs, the extra herbaceous vegetation production would require re-treatment of riparian firebreaks from March 15th- May 15th, and would be completed using mowers, weed eaters, or other specialized vegetation mowing equipment (walk behind power mowers).

Time Required - Fourteen 8 hour days with 2-4 people; riparian firebreaks associated with roads would require 4 hours with 2-4 people at each site.

Personnel - Annual maintenance may be completed by the BLM or by BLM co-operators/partners under the direction of BLM. A staff biologist would be on site during firebreak clearing activities in riparian-mesquite areas.

Special Measures - Slash would cure in place and then be piled and burned in the winter to avoid attracting and injuring Northern Mexican gartersnakes. Dead and down wood deposited by floods would be removed from firebreak and placed in adjacent area downstream. Leave a stubble height of 4-6” to protect banks in the three riparian areas.

Species Potentially Affected and Concurrence Factors - Gila chub (CF6, CF7, CF12), yellow-billed cuckoo (CF2, CF3, CF6, CF7, CF8, CF12), Gila topminnow (CF6, CF7, CF12), Huachuca water umbel (CF6), jaguar (CF2, CF3, CF5, CF6, CF7, CF8, CF12), and lesser long-nosed bat (CF2, CF3, CF4, CF5, CF7, CF8, CF9, CF11, CF12)

Proposed or Designated Critical Habitat Potentially Affected and Concurrence Factors (Cienega Creek Crossing) - yellow-billed cuckoo (CF6, CF7, CF8, CF12), Chiricahua leopard frog (CF6, CF7, CF8, CF12), northern Mexican gartersnake (CF6, CF7, CF8, CF12), and Gila chub (CF6, CF7, CF8, CF12)

Proposed or Designated Critical Habitat Potentially Affected and Concurrence Factors (Empire Gulch Crossing) - yellow-billed cuckoo (CF6, CF7, CF8, CF12), northern Mexican gartersnake (CF6, CF7, CF8, CF12), and Chiricahua leopard frog (CF6, CF7, CF8, CF12)

Proposed or Designated Critical Habitat Potentially Affected and Concurrence Factors (Gardner Canyon Crossing) - yellow-billed cuckoo (CF6, CF7, CF8, CF12) and northern Mexican gartersnake (CF6, CF7, CF8, CF12)

Potential Adverse Effects - southwestern willow flycatcher, northern Mexican gartersnake, and Chiricahua leopard frog; see effects analysis and incidental take statements under species-specific discussion below.
Road Canyon Camp Area

_Acreage and Land Status_ - 5.80 ac of BLM land.

_Previously Treated_ – Yes

_Mechanical Treatment_ - Utilization of tractor with mower and weed eaters.

_Chemical Treatment_ - No chemical treatments are identified for this firebreak.

_Prescribed Fire Treatment_ - No prescribed fire treatments are identified for this firebreak.

_Slash and Bio-mass_ - Mowing treatment no slash generation or useable bio-mass anticipated.

_Annual Maintenance_ - This firebreak would be maintained annually between Oct 1st and May 30th. Mowing of grasses (2”-6” stubble height).

_Time Required_ - One 8 hour day 2-4 people.

_Personnel_ - Annual maintenance may be completed by the BLM or by BLM co-operators/partners under the direction of BLM. A staff biologist would be on site during firebreak clearing activities.

_Special Measures_ - Protect agave plants by avoidance in fuel reduction treatment area.

_Species Potentially Affected and Concurrence Factors_ - Chiricahua leopard frog (CF1, CF2, CF3, CF4, CF9, CF10), Gila chub (CF1, CF2, CF4, CF6, CF9, CF10, CF12), northern Mexican gartersnake (CF1, CF2, CF3, CF4, CF9, CF10), southwestern willow flycatcher (CF1, CF2, CF3, CF4, CF7, CF9, CF10, CF12), yellow-billed cuckoo (CF1, CF2, CF3, CF4, CF7, CF9, CF10, CF12), Gila topminnow (CF1, CF2, CF4, CF6, CF9, CF10, CF12)

_Proposed or Designated Critical Habitat Potentially Affected and Concurrence Factors_ - northern Mexican gartersnake (CF6, CF7, CF8, CF12)

_Potential Adverse Effects_ - None

**Middle Gila River and Upland: Environmental Baseline**

For this consultation we consider the middle Gila River to include the reach starting from the gauging station 0.4 miles below Coolidge Dam at the upstream point to a point 2 miles upstream of the town of Winkelman as the downstream point. This reach is 27.8 miles long, 24.9 miles of which are administered by the Bureau of Land Management. The Gila River is the boundary with
the San Carlos Indian Reservation for 19.0 miles along this reach.

This area contains upland vegetative communities ranging from Interior Chaparral and Semidesert Grasslands at the upper elevations to Sonoran Desertscrub at the lower elevations. The riparian vegetation varies but includes some patches of cottonwood-willow gallery forest, a few patches of velvet ash and walnut, extensive reaches with overhanging willow adjacent to mesquite/salt cedar stands within the flood plain and some areas dominated by salt cedar with scattered stands of willow. Some areas within this reach have no vegetation; rather, the river is confined by boulder slopes and cliff faces.

The upland habitats vary in condition from mid to late seral ecological condition, depending on the historic grazing activities on the individual allotments; grazing, although second to hydrological forces, is a primary force affecting vegetation communities along the river. The Interior Chaparral is confined to the north facing slopes along the top of the Dripping Springs and Pinal Mountains and consists mainly of browse species such as turbinella oak (*Quercus turbinella*), mountain mahogany (*Cercocarpus spp.*), *Ceanothus spp.*, and skunkbush (*Rhus trilobata*), with an understory of grama grasses (*Bouteloua spp.*), threeawns (*Aristida spp.*), and curly mesquite (*Hilaria belangeri*).

The Semidesert grasslands were dominated by perennial grasses such as the grama grasses and the three awns, but due to historic grazing activities have been degraded to mid seral ecological condition resulting in a shrubland dominated by mesquite and cactus species such as cholla’s and prickley pear, with some grasses such as three awns, plains bristlegrass (*Setaria leucopila*) and bush muhly (*Muhlenbergia porter*) remaining.

The upper Sonoran Desert scrub exists at lower elevations a, primarily around the Florence area and a narrow corridor along the Gila and San Pedro rivers away from the riparian areas. These areas are dominated by palo verde (*Cercidium floridum*), saguaro (*Carnegiea gigantean*), and mesquite (*Prosopis spp.*) with ironwood trees (*Olneya tesota*) along the drainages, with an understory of triangle leaf bursage (*Ambrosia deltoidea*), creosote (*Larrea tridentate*) and various cactus’s.

Water flow within this reach of the Gila River is regulated by releases from Coolidge Dam, administered by the San Carlos Irrigation District. Typically, water is stored through the fall and winter and released in the spring and summer for use irrigating farmland downstream, dependent upon demands for water for agriculture. Occasionally, unusually wet winters require the release of large amounts of water in the late winter and early spring. Significant flood events are a major factor determining the vegetative composition along the Gila River, scouring out vegetation and altering channel morphology. These events also open the canopy and deposit seeds providing for the regeneration of woody plant species such as cottonwood and willow establishment within the flood plain of the river.

**Middle Gila River: Site by Site Description of Projects and Analysis of Effects**

**Shores Recreation Sites (North and South)**
Acreage and Land Ownership (North) - 0.4 acres of BLM land.

Acreage and Land Ownership (South) - 0.8 acres of BLM land.

Previously Treated - Not previously treated, new treatment.

Mechanical Treatment - Utilize chainsaws to thin tree and shrubs species. Large mesquite trees would not be removed but re-growth of limbs may be limbed up periodically.

Chemical Treatment - Herbicide treatments such as cut stump, spot spray and basal spray treatments (ground application) can be utilized to treat salt cedar and small mesquites, grey thorn or *Acacia* sp. in the treatment area. Herbicides that may be utilized during treatments include:

- Upland areas- Triclopyr, Clopyralid, and Picloram.
- Riparian areas or near water sources- Aquatic formulations of Glyphosate and Imazapyr.

Prescribed Fire Treatment - No prescribed fire treatments identified for this site.

Slash and Bio-mass - Slash would be piled and hauled off site by local municipal partners, chipped/mulched with chips scattered on site, or lopped and scattered on site. Useable bio-mass (firewood) generated during thinning and maintenance treatments can be stacked at campgrounds and day use sites and utilized onsite.

Annual Maintenance - This firebreak would be maintained every 2-4 years between Oct 1st and March 15th. Maintenance includes limbing (up to 6’ from ground) of re-sprouts on large trees (>20’ tall), and flush cutting new growth of mesquite and other tree and shrub species. To achieve desired outcome for the fuel break there would be a maximum of 30 feet canopy cover spacing.

Winter Precipitation - During seasons of above normal winter precipitation (>7 inches per year), there can be enough growth of annual herbaceous vegetation (Red brome, Mediterranean grass) to carry fire. When this unusual condition occurs, the extra herbaceous vegetation production would require re-treatment of firebreaks from March 15th-May 15th, and would be completed using mowers, weed eaters, or other specialized vegetation mowing equipment (walk behind power mowers).

Time Required - One 8 hour day with 2-4 people

Personnel - Annual maintenance may be completed by the BLM or by BLM co-operators/partners under the direction of BLM.

Special Measures - Dead and down wood deposited by floods would be removed from firebreak and placed in adjacent area downstream. Leave a stubble height of 4-6” to protect banks in riparian area.
Species Potentially Affected and Concurrence Factors – yellow-billed cuckoo (CF1, CF2, CF3, CF6, CF7, CF8, CF11, CF12)

Proposed or Designated Critical Habitat Potentially Affected and Concurrence Factors - yellow-billed cuckoo (CF1, CF6, CF7, CF8, CF12)

Potential Adverse Effects - southwestern willow flycatcher; see effects analysis and incidental take statement under species-specific discussion below.

Christmas Recreation Sites (North and South)

Acreage and Land Ownership (North) - 0.7 acres of BLM land.

Acreage and Land Ownership (South) - 0.3 acres of BLM land.

Previously Treated - Not previously treated, new treatment.

Mechanical Treatment - Utilize chainsaws to thin tree and shrubs species. Large mesquite trees would not be removed but re-growth of limbs may be limbed up periodically.

Chemical Treatment - Herbicide treatments such as cut stump, spot spray and basal spray treatments (ground application) would be utilized to treat salt cedar and small mesquites, grey thorn or Acacia sp. in the treatment area. Herbicides that may be utilized during treatments include:

- Upland areas- Triclopyr, Clopyralid, and Picloram.
- Riparian areas or near water sources- Aquatic formulations of Glyphosate and Imazapyr.

Prescribed Fire Treatment - No prescribed fire treatments identified for this site.

Slash and Bio-mass - Slash would be piled and hauled off site by local municipal partners, chipped/mulched with chips scattered on site, or lopped and scattered on site. Useable bio-mass (firewood) generated during thinning and maintenance treatments can be stacked at campgrounds and day use sites and utilized onsite.

Annual Maintenance - This firebreak would be maintained every 2-4 years between Oct 1st and March 15th. Maintenance includes limbing (up to 6’ from ground) of re-sprouts on large trees (>20’ tall), and flush cutting new growth of mesquite and other tree and shrub species. To achieve desired outcome for the fuel break there would be a maximum of 30 feet canopy spacing.

Winter Precipitation - During seasons of above normal winter precipitation (>7 inches per year), there can be enough growth of annual herbaceous vegetation (Red brome, Mediterranean grass) to carry fire. When this unusual condition occurs, the extra
herbaceous vegetation production would require re-treatment of firebreaks from March 15th-May 15th, and would be completed using mowers, weed eaters, or other specialized vegetation mowing equipment (walk behind power mowers).

*Time Required* - One 8 hour day with 2-4 people.

*Personnel* - Annual maintenance may be completed by the BLM or by BLM co-operators/partners under the direction of BLM.

*Special Measures* - Dead and down wood deposited by floods would be removed from firebreak and placed in adjacent area downstream. Leave a stubble height of 4-6” to protect banks in the riparian area.

*Species Potentially Affected and Concurrence Factors* – yellow-billed cuckoo (CF1, CF2, CF3, CF6, CF7, CF8, CF11, CF12)

*Proposed or Designated Critical Habitat Potentially Affected and Concurrence Factors* - yellow-billed cuckoo (CF6, CF7, CF8, CF12)

*Potential Adverse Effects* - southwestern willow flycatcher; see effects analysis and incidental take statement under species-specific discussion below.

**Upland: Site Description of Project and Analysis of Effects**

Keystone Peak Communications Site

*Acreage and Land Status* - 6.53 ac of BLM land.

*Previously treated* - Yes.

*Mechanical Treatment* - Utilization of weed eaters, chippers, and chain saws. Thin pinyon and juniper trees to create 40 foot canopy spacing, thin oak brush (flush cut). Weed eat grasses.

*Chemical Treatment* - Cut stump, spot spray and basal spray treatments (ground application) can be utilized to control re-sprouting and new growth of tree and shrub species (oak species). Herbicides that may be utilized during treatments include:

Upland areas- Triclopyr, Clopyralid, and Picloram.

*Prescribed Fire Treatment* - Pile burning can be implemented to treat slash in winter. Burn piles would be stacked in areas far enough away from infrastructure and with no canopy cover to avoid impacts to surrounding vegetation due to direct flame contact, radiant heat, and convective heat. An engine and crew would be onsite to conduct the burning. A burn plan would be completed for each project site.
**Slash and Bio-mass** - Slash would be piled and burned, chipped/mulched with chips scattered on site, or lopped and scattered on site. No bio-mass utilization identified for this treatment.

**Annual Maintenance** - Weed eating of grasses, (2”-6” stubble height) limbing of re-sprouts on large trees (up to 6’), and flush cutting new growth of oak brush, juniper, and other tree and shrub species. This firebreak would be maintained annually between Oct 1st and May 30th.

**Time Required** - Twenty 8 hour days.

**Personnel** - Annual maintenance may be completed by the BLM or by BLM co-operators/partners under the direction of BLM.

**Special Measures** - Protect agave plants by avoidance in fuel reduction treatment area.

**Species Potentially Affected and Concurrence Factors** – jaguar (CF1, CF2, CF4, CF5, CF8, CF9, CF10, CF12)

**Proposed or Designated Critical Habitat Potentially Affected and Concurrence Factors** – None.

**Potential Adverse Effects** – None.
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Species-Specific Discussion

Rangewide Status of the Southwestern Willow Flycatcher and its Designated Critical Habitat

Description
The southwestern willow flycatcher is a small grayish-green passerine bird (Family Tyrannidae) measuring approximately 5.75 inches. The song is a sneezy “fitz-bew” or a “fit-a-bew”, the call is a repeated “whit.” It is one of four currently recognized willow flycatcher subspecies (Phillips 1948, Unitt 1987, Browning 1993). It is a neotropical migrant that breeds in the southwestern U.S. and migrates to Mexico, Central America, and possibly northern South America during the non-breeding season (Phillips 1948, Stiles and Skutch 1989, Peterson 1990, Ridgely and Tudor 1994, Howell and Webb 1995). The historical breeding range of the southwestern willow flycatcher included southern California, Arizona, New Mexico, western Texas, southwestern Colorado, southern Utah, extreme southern Nevada, and extreme northwestern Mexico (Sonora and Baja) (Unitt 1987).

Listing and critical habitat
The southwestern willow flycatcher was listed as endangered, without critical habitat on February 27, 1995 (USFWS 1995). Critical habitat was later designated on July 22, 1997 (USFWS 1997a). A correction notice was published in the Federal Register on August 20, 1997 to clarify the lateral extent of the designation (USFWS 1997b).

On May 11, 2001, the 10th Circuit Court of Appeals set aside designated critical habitat in those states under the 10th circuit’s jurisdiction (New Mexico). The FWS decided to set aside critical habitat designated for the southwestern willow flycatcher in all other states (California and Arizona) until it could re-assess the economic analysis.

On October 19, 2005, the FWS re-designated critical habitat for the southwestern willow flycatcher (USFWS 2005). A total of 737 river miles across southern California, Arizona, New Mexico, southern Nevada, and southern Utah were included in the final designation. The lateral extent of critical habitat includes areas within the 100-year floodplain.

On August 15, 2011, the FWS proposed a revision to the critical habitat designation, identifying stream segments in each of the 29 Management Units where there are recovery goals (USFWS 2011). These segments totaled 2,090 stream miles. Similar to the 2005 rule, the lateral extent of critical habitat includes only the riparian areas within the 100-year floodplain. About 790 stream miles were identified as areas we will consider for exclusion from the final designation under section 4(b)(2) of the Act.

On January 3, 2013, the FWS completed its flycatcher critical habitat revision by designating approximately 1,227 stream miles as critical habitat. These areas are designated as stream segments, with the lateral extent including the riparian areas and streams that occur within the 100-year floodplain or flood-prone areas encompassing a total area of approximately 208,973 acres. About 948 stream miles of proposed critical habitat were excluded from the final revised designation.
A final recovery plan for the southwestern willow flycatcher was signed by the FWS Region 2 Director and released to the public in March, 2003 (USFWS 2002). The Plan describes the reasons for endangerment, current status of the flycatcher, addresses important recovery actions, includes detailed issue papers on management issues, and provides recovery goals. Recovery is based on reaching numerical and habitat related goals for each specific Management Unit established throughout the subspecies range and establishing long-term conservation plans (USFWS 2002).

The five-year review for the flycatcher was completed in August 2014 by the Arizona Ecological Services Field Office and is posted on the Field Office’s web site (http://www.fws.gov/southwest/es/arizona/Southwes.htm).

Reasons for endangerment
Reasons for decline have been attributed to primarily loss, modification, and fragmentation of riparian breeding habitat, along with a host of other factors including loss of wintering habitat and brood parasitism by the brown-headed cowbird (Sogge et al. 1997, McCarthey et al. 1998). Habitat loss and degradation are caused by a variety of factors, including urban, recreational, and agricultural development, water diversion and groundwater pumping, channelization, dams, and excessive livestock grazing. Fire is an increasing threat to willow flycatcher habitat (Paxton et al. 1996), especially in monotypic saltcedar vegetation (DeLoach 1991) and where water diversions and/or groundwater pumping desiccates riparian vegetation (Sogge et al. 1997). Willow flycatcher nests can be parasitized by brown-headed cowbirds (Molothrus ater), which lay their eggs in the host’s nest. Feeding sites for cowbirds are enhanced by the presence of livestock and range improvements such as waters and corrals; agriculture; urban areas; golf courses; bird feeders; and trash areas. When these feeding areas are in close proximity to flycatcher breeding habitat, especially coupled with habitat fragmentation, cowbird parasitism of flycatcher nests may increase (Hanna 1928, Mayfield 1977a,b, Tibbitts et al. 1994).

Habitat
The southwestern willow flycatcher breeds in dense riparian habitats from sea level in California to approximately 8,500 feet in Arizona and southwestern Colorado. Historical egg/nest collections and species' descriptions throughout its range describe the southwestern willow flycatcher's widespread use of willow (Salix spp.) for nesting (Phillips 1948, Phillips et al. 1964, Hubbard 1987, Unitt 1987, San Diego Natural History Museum 1995). Currently, southwestern willow flycatchers primarily use Geyer willow (Salix geyeriana), coyote willow (Salix exigua), Goodeging’s willow (Salix goodegingii), boxelder (Acer negundo), saltcedar (Tamarix sp.), Russian olive (Elaeagnus angustifolfo), and live oak (Quercus agrifolia) for nesting. Other plant species less commonly used for nesting include: buttonbush (Cephalanthus sp.), black twinberry (Lonicera involucrata), cottonwood (Populus spp.), white alder (Alnus rhombifolia), blackberry (Rubus ursinus), and stinging nettle (Urtica spp.). Based on the diversity of plant species composition and complexity of habitat structure, four basic habitat types can be described for the southwestern willow flycatcher: monotypic willow, monotypic exotic, native broadleaf dominated, and mixed native/exotic (Sogge et al. 1997).

The flycatcher’s habitat is dynamic and can change rapidly: nesting habitat can grow out of
suitability; saltcedar habitat can develop from seeds to suitability in about four to five years; heavy runoff can remove/reduce habitat suitability in a day; or river channels, floodplain width, location, and vegetation density may change over time. The flycatcher’s use of habitat in different successional stages may also be dynamic. For example, over-mature or young habitat not suitable for nest placement can be occupied and used for foraging and shelter by migrating, breeding, dispersing, or non-territorial southwestern willow flycatchers (McLeod et al. 2005, Cardinal and Paxton 2005). Flycatcher habitat can quickly change and vary in suitability, location, use, and occupancy over time (Finch and Stoleson 2000).

Tamarisk is an important component of the flycatcher’s nesting and foraging habitat in the central part of the flycatcher’s breeding range in Arizona, southern Nevada and Utah, and western New Mexico. In 2001 in Arizona, 323 of the 404 (80 percent) known flycatcher nests (in 346 territories) were built in a tamarisk tree (Smith et al. 2002). Tamarisk had been believed by some to be a habitat type of lesser quality for the southwestern willow flycatcher, however comparisons of reproductive performance (USFWS 2002), prey populations (Durst 2004) and physiological conditions (Owen and Sogge 2002) of flycatchers breeding in native and exotic vegetation has revealed no difference (Sogge et al. 2005).

The introduced tamarisk leaf beetle was first detected affecting tamarisk within the range of the southwestern willow flycatcher in 2008 along the Virgin River in St. George, Utah. Initially, this insect was not believed to be able to move into or survive within the southwestern United States in the breeding range of the flycatcher. Along this Virgin River site in 2009, 13 of 15 flycatcher nests failed following vegetation defoliation (Paxton et al. 2010). As of 2012, the beetle has been found in southern Nevada/Utah and northern Arizona/New Mexico within the flycatcher’s breeding range. It was detected along the Colorado River below Hoover Dam in 2012. In 2016, the beetle was found further south on the lower Colorado River at Topock Marsh and the Bill Williams/Colorado River confluence. Also the more southern adapted beetle released in Texas was found at Elephant Butte Reservoir along the Rio Grande in New Mexico where the largest concentrations of nesting flycatchers is known to occur. Because tamarisk is a component of about 50 percent of all known flycatcher territories (Durst et al. 2008), continued spread of the beetle has the potential to significantly alter the distribution, abundance, and quality of flycatcher nesting habitat and impact breeding attempts.

Breeding biology
breeding cycle, from egg laying to fledging, is approximately 28 days.

Southwestern willow flycatcher nests are fairly small (3.2 inches tall and 3.2 inches wide) and its placement in a shrub or tree is highly variable (1.6 to 60 feet off the ground). Nests are open cup structures, and are typically placed in the fork of a branch. Nests have been found against the trunk of a shrub or tree (in monotypic saltcedar and mixed native broadleaf/saltcedar habitats) and on limbs as far away from the trunk as 10.8 feet (Spencer et al. 1996). Typical nest placement is in the fork of small-diameter (e.g., 0.4 in), vertical or nearly vertical branches (USFWS 2002). Occasionally, nests are placed in down-curving branches. Nest height varies considerably, from 1.6 to 60 feet, and may be related to height of nest plant, overall canopy height, and/or the height of the vegetation strata that contain small twigs and live growth (USFWS 2002). Most typically, nests are relatively low, 6.5 to 23 feet above ground (USFWS 2002). Nests built in habitat dominated by box elders are placed highest in the tree (to 60 feet) (USFWS 2002).

The southwestern willow flycatcher is an insectivore, foraging in dense shrub and tree vegetation along rivers, streams, and other wetlands. The bird typically perches on a branch and makes short direct flights, or sallies to capture flying insects. Drost et al. (1998) found that the major prey items of the southwestern willow flycatcher (in Arizona and Colorado), consisted of true flies (Diptera); ants, bees, and wasps (Hymenoptera); and true bugs (Hemiptera). Other insect prey taxa included leafhoppers (Homoptera: Cicadellidae); dragonflies and damselflies (Odonata); and caterpillars (Lepidoptera larvae). Non-insect prey included spiders (Araneae), sowbugs (Isopoda), and fragments of plant material.


 Territory and home range size
Southwestern willow flycatcher territory size likely fluctuates with population density, habitat quality, and nesting stage. Estimated territory sizes recorded at the Kern River were 0.59 to 3.21 acres for monogamous males and 2.72 to 5.68 acres for polygynous males (Whitfield and Enos 1996). Within a 2.22 acre patch on Colorado River, estimated territory sizes were 0.15 to 0.49 acres (Sogge 1995c), and in a 3.71 acre patch on the Verde River, 0.49 to 1.24 acres (Sogge 1995a). Territories are established within a larger patch of appropriate habitat sufficient to contain several nesting pairs of flycatchers.
Cardinal and Paxton (2005) found that the home ranges of telemetered flycatchers at Roosevelt Lake, Arizona, varied from 0.37 to 890 acres. Bird movements just prior to and following nesting were the greatest, while movements while incubating and with nestlings were the most limited. Movements following fledging of young indicated possible pre-migration staging and the targeting of local increases in insect prey populations. Birds were found using a variety of riparian habitat in a variety of conditions (open, young mature, exotic, mixed, etc.) and the distances moved indicate that birds can occupy a larger area and used more different types of habitat than previously believed (Cardinal and Paxton 2005).

**Movements**

The site and patch fidelity, dispersal, and movement behavior of adult, nestling, breeding, non-breeding, and migratory southwestern willow flycatchers are just beginning to be understood (Kenwood and Paxton 2001, Koronkiewicz and Sogge 2001). From 1997 through 2000, 66 to 78 percent of flycatchers known to have survived from one breeding season to the next returned to the same breeding site; conversely, 22 to 34 percent of returning birds moved to different sites (Luff et al. 2000). A large percentage (75%) of known surviving 2000 adults returned in 2001 to their same breeding site (Kenwood and Paxton 2001). Just considering Roosevelt Lake in its entirety, all but three surviving birds (n=28) banded at Roosevelt Lake returned to Roosevelt Lake (Kenwood and Paxton 2001). Although most southwestern willow flycatchers return to former breeding sites, flycatchers can regularly move among sites within and between years (Kenwood and Paxton 2001). Within-drainage movements are more common than between-drainage movements (Kenwood and Paxton 2001). Year-to-year movements of birds have been detected between the San Pedro/Gila river confluence and Roosevelt Lake, the Verde River near Camp Verde and Roosevelt Lake, and the Little Colorado River near Greer and Roosevelt Lake (Kenwood and Paxton 2001). Typical distances moved range from 1.2 to 18 miles. However, long-distance movements of up to 137 miles have been observed on the lower Colorado River and Virgin River (McKernan and Braden 2001). Breeding groups of southwestern willow flycatchers act as a meta-population (Busch et al. 2000).

<table>
<thead>
<tr>
<th>State</th>
<th>Number of sites with WIFL territories 1993-07</th>
<th>Percentage of sites with WIFL territories 1993-07</th>
<th>Number of territories</th>
<th>Percentage of total territories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona</td>
<td>124</td>
<td>43.1 %</td>
<td>459</td>
<td>35.3 %</td>
</tr>
<tr>
<td>State</td>
<td>Territories</td>
<td>Percentage</td>
<td>Total Territories</td>
<td>Percentage</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------</td>
<td>------------</td>
<td>-------------------</td>
<td>------------</td>
</tr>
<tr>
<td>California</td>
<td>96</td>
<td>33.3 %</td>
<td>172</td>
<td>13.2 %</td>
</tr>
<tr>
<td>Colorado</td>
<td>11</td>
<td>3.8 %</td>
<td>66</td>
<td>5.1 %</td>
</tr>
<tr>
<td>Nevada</td>
<td>13</td>
<td>4.5 %</td>
<td>76</td>
<td>5.9 %</td>
</tr>
<tr>
<td>New Mexico</td>
<td>41</td>
<td>14.2 %</td>
<td>519</td>
<td>40.0 %</td>
</tr>
<tr>
<td>Utah</td>
<td>3</td>
<td>1.0 %</td>
<td>7</td>
<td>0.5 %</td>
</tr>
<tr>
<td>Texas</td>
<td>?</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>288</strong></td>
<td><strong>100 %</strong></td>
<td><strong>1,299</strong></td>
<td><strong>100 %</strong></td>
</tr>
</tbody>
</table>

1Durst et al. 2008.
2Site boundaries are not defined uniformly throughout the bird’s range.
3Total territory numbers recorded are based upon the most recent years survey information from that site between 1993 and 2007.

Rangewide distribution and abundance
There are currently 288 known southwestern willow flycatcher breeding sites in California, Nevada, Arizona, Utah, New Mexico, and Colorado (all sites from 1993 to 2007 where a territorial flycatcher has been detected) holding an estimated 1,299 territories (Durst et al. 2008). It is difficult to arrive at a grand total of flycatcher territories since not all sites are surveyed annually. Numbers have increased since the bird was listed and some habitat remains unsurveyed; however, after nearly a decade of intense surveys, the existing numbers are just past the upper end of Unitt’s (1987) estimate of 20 years ago (500-1000 pairs). About 50 percent of the 1,299 estimated territories (Table 1) throughout the subspecies range are located at four general locations (Cliff/Gila Valley – New Mexico, Roosevelt Lake - Arizona, San Pedro River/Gila River confluence – Arizona, Middle Rio Grande, New Mexico).

Arizona distribution and abundance
While numbers have significantly increased in Arizona (145 to 459 territories from 1996 to 2007) (English et al. 2006, Durst et al. 2008), overall distribution of flycatchers throughout the state has not changed much. Currently, population stability in Arizona is believed to be largely dependent on the presence of three population centers (Roosevelt Lake, San Pedro/Gila River confluence, upper Gila River). Therefore, the result of catastrophic events or losses of significant populations either in size or location could greatly change the status and survival of the bird. Conversely, expansion into new habitats or discovery of other populations would improve the known stability and status of the flycatcher.

Fire
The evidence suggests that fire was not a primary disturbance factor in southwestern riparian areas near larger streams (U.S. Fish and Wildlife Service 2002). Yet, in recent time, fire size and frequency has increased on the lower Colorado, Gila, Bill Williams, and Rio Grande rivers. The
increase has been attributed to increasing dry, fine fuels as a result of the cessation of flood flows and human caused ignition sources. The spread of the highly flammable plant, tamarisk, and drying of river areas due to river flow regulation, water diversion, lowering of groundwater tables, and other land practices is largely responsible for these fuels. A catastrophic fire in June of 1996, destroyed approximately a half mile of occupied tamarisk flycatcher nesting habitat on the San Pedro River in Pinal County. That fire resulted in the forced dispersal or loss of up to eight pairs of flycatchers (Paxton et al. 1996). Smaller fires have occurred along the upper most portion of the San Pedro River closer to the Mexico Border and another large fire occurred on the lower San Pedro River at the Nature Conservancy’s San Pedro Preserve between Winkelman and Dudleyville in 2004. Recreationists cause over 95 percent of the fires on the lower Colorado River (U.S. Fish and Wildlife Service 2002). In California, Brothers (1984) attributed increased fire along the Owens River to more use of the riparian zones by campers and fishermen in the past 30 years.

Mortality and Survivorship
There are no extensive records for the actual causes of adult southwestern willow flycatcher mortality. Incidents associated with nest failures, human disturbance, and nestlings are typically the most often recorded due to the static location of nestlings, eggs, and nests. As a result, nestling predation and brood parasitism are the most commonly recorded causes of southwestern willow flycatcher mortality. Also, human destruction of nesting habitat through bulldozing, groundwater pumping, and aerial defoliants has been recorded in Arizona (T. McCarthey, AGFD, pers. comm.). Human collision with nests and spilling the eggs or young onto the ground have been documented near high use recreational areas (U.S. Fish and Wildlife Service 2002). A southwestern willow flycatcher from the Greer Town site along the Little Colorado River in eastern Arizona, was found dead after being hit by a vehicle along SR 373. This route is adjacent to the breeding site (T. McCarthey, AGFD, pers. comm.).

Band returns associated with the long-term banding and re-sighting effort occurring in central Arizona at Roosevelt Lake, determined for this location, the average return rate and survivorship of adult and nestling flycatchers. The average adult return rate from 1998 to 2004 was 60 percent with survivorship estimated at 65 percent (Newell et al. 2005). From 1998 to 2004, the average nestling return rate was 28 percent and survivorship estimated at 35 percent (Newell et al. 2005).

Reproductive success
In 2005, a total of 526 nesting attempts were documented in Arizona at 36 sites (English et al. 2005). The outcome from 434 nesting attempts was determined (not every nesting attempt was monitored). Of the 431 nests monitored, 53 percent (n=233) were successful, 42 percent failed (n=181), and 5 percent (n=23) had an outcome which could not be determined.

In 2005 in Arizona, known causes of nest failure were predation (n=141), nest desertion (n=18), brood parasitism (n=4), infertile clutches (n=8), and other unknown causes (n=10) (English et al. 2005). Cowbirds may have overall contributed to portions of nest failure in 29 nesting attempts. Seventeen of the total 29 parasitized nests were also depredated (English et al. 2005). In 2005, the Topock site along the Lower Colorado River had a cowbird parasitism rate of 47%, Big
Sandy River site had a parasitism rate of 29%, and Roosevelt Lake had a parasitism rate of 2%.

Intensive nest monitoring efforts in California, Arizona, and New Mexico have shown that cowbird parasitism and/or predation can result in the following: failure of the nest; reduced fecundity in subsequent nesting attempts; delayed fledging; and reduced survivorship of late-fledged young. Cowbirds have been documented at more than 90 percent of sites surveyed (Sogge and Tibbitts 1992, Sogge et al. 1993, Camp Pendleton 1994, Muiznieks et al. 1994, Sogge and Tibbitts 1994, Whitfield 1994, Tomlinson 1997, Griffith and Griffith 1995, Holmgren and Collins 1995, Kus 1995, Maynard 1995, McDonald et al. 1995, Sferra et al. 1995, Sogge 1995a, b, San Diego Natural History Museum 1995, Stransky 1995, Whitfield and Strong 1995, Griffith and Griffith 1996, Skaggs 1996, Spencer et al. 1996, Whitfield and Enos 1996, Sferra et al. 1997, McCarthey et al. 1998). The probability of a southwestern willow flycatcher successfully fledging its own young from a cowbird parasitized nest is low (i.e. <5%). Also, nest loss due to predation appears consistent from year to year and across sites, generally in the range of 30 to 50 percent. Documented predators of southwestern willow flycatcher nests identified to date include common kingsnake (*Lampropeltis getulus*), Sonoran gophersnake (*Pituophis melanoleucus affinis*), Cooper’s hawk (*Accipiter cooperii*), yellow-breasted chat (*Icteria virens*), and western screech owl (*Otus kennicottii*) (Paxton et al. 1997, McCarthey et al. 1998, Paradzick et al. 2000, Smith et al. 2002). These willow flycatcher predators were documented by video nest surveillance, as well as Clark’s spiny lizard (*Sceloporus clarkii*) and a spotted skunk (*Spilogale putorius*) on other nesting surrogate passerines. These limited, but thorough observations of nests, demonstrate a wide variety of willow flycatcher nest predators. It is expected that other common predators of passerines, such as grackles and cowbirds (Woodward and Stoleson 2002), also kill or eat flycatcher eggs and nestlings.

Cowbird trapping has been demonstrated to be an effective management strategy for increasing reproductive success for the southwestern willow flycatcher in certain areas as well as for other endangered passerines (e.g., least Bell's vireo (*Vireo bellii pusillus*), black-capped vireo (*V. atricapillus*), golden-cheeked warbler (*Dendroica chrysoparia*)). It may also benefit juvenile survivorship by increasing the probability that parents fledge birds early in the season. Expansion of cowbird management programs may have the potential to not only increase reproductive output and juvenile survivorship at source populations, but also to potentially convert small, sink populations into breeding groups that contribute to population growth and expansion.

**Status of the Southwestern Willow Flycatcher in the Middle Gila-San Pedro River Management Unit**

The Middle Gila-San Pedro River Management Unit represents the most densely-populated nesting area for the southwestern willow flycatcher in the Gila Recovery Unit. Located within the southeastern quadrant of Arizona, east of Phoenix and north of Tucson, this management unit is largely centered on the confluence of the San Pedro and Gila Rivers, where the vast majority of breeding pairs set up territories and nest annually, but also includes the entire length of the San Pedro River within Arizona, where in its upper reaches migrant flycatchers are occasionally reported but nesting is rare. We report the results of the last five years of survey effort within
this management unit in Table 2 below.

Table 2. Summary of southwestern willow flycatcher survey data from 2011-2015 within the Middle Gila-San Pedro River Management Unit.

<table>
<thead>
<tr>
<th>Metric</th>
<th>Totals</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
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<tbody>
<tr>
<td>Adults</td>
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<td>535</td>
<td>163</td>
<td>171</td>
<td>200</td>
<td>440</td>
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<td>29</td>
<td>45</td>
<td>94</td>
<td>196</td>
</tr>
<tr>
<td>Territories</td>
<td></td>
<td>305</td>
<td>122</td>
<td>115</td>
<td>121</td>
<td>255</td>
</tr>
<tr>
<td>Nests</td>
<td></td>
<td>365</td>
<td>4</td>
<td>0</td>
<td>28</td>
<td>106</td>
</tr>
<tr>
<td>Surveys</td>
<td></td>
<td>72</td>
<td>10</td>
<td>5</td>
<td>6</td>
<td>48</td>
</tr>
</tbody>
</table>

Critical habitat

The primary constituent elements of designated critical habitat are based on riparian plant species, structure and quality of habitat and insects for prey.

1. Primary Constituent Element 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, coyote willow, Geyer’s willow, arroyo willow, red willow, yewleaf willow, pacific willow, boxelder, tamarisk, Russian olive, buttonbush, cottonwood, stinging nettle, alder, velvet ash, poison hemlock, blackberry, seep willow, oak, rose, sycamore, false indigo, Pacific poison ivy, grape, Virginia creeper, Siberian elm, and walnut) 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 or 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 percent to 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 ac) or as large as 70 ha (175 ac).

2. Primary Constituent Element 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).

The physical and biological features of flycatcher critical habitat are the principal biological or physical elements essential to flycatcher conservation which may require special management considerations or protection (USFWS 2013). We primarily identified the features and functions of rivers that generate flycatcher habitat and its food such as low gradient/broad floodplains, water, saturated soil, hydrologic regimes, elevated groundwater, and fine sediments, etc. (USFWS 2013).

Middle Gila and San Pedro Management Unit, Arizona

This consultation addresses incidental take of southwestern willow flycatchers within the Middle Gila and San Pedro Management Unit. We identified a large flycatcher nesting population surrounding the Gila and San Pedro River confluence area within Cochise, Pima, Pinal, and Gila Counties, Arizona. Flycatchers were first detected nesting in this Management Unit in 1993, with abundant breeding sites occurring throughout this Management Unit. A high of 195 territories was detected in 2005 (Sogge and Durst 2008).

We designated as flycatcher critical habitat the lowest 126.2-km (78.4-mi) segment of the middle and lower San Pedro River across portions of Cochise, Pima, and Pinal Counties, Arizona, and a 80.6-km (50.1-mi) Gila River segment that extends from near Dripping Springs Wash downstream past the San Pedro and Gila River confluence to the Ashehurst Hayden Diversion Dam in Gila and Pinal Counties, Arizona. This area is within the geographical area known to be occupied by flycatchers at the time of listing, and contains the physical or biological features essential to the conservation of the species and may require special management considerations or protection.

The San Pedro and Gila Rivers were the only two rivers identified within this Management Unit as having substantial recovery value in the Recovery Plan (Service 2002). These river segments are thought to provide flycatcher habitat for metapopulation stability, gene connectivity through this portion of the flycatcher’s range, protection against catastrophic population loss, and population growth and colonization potential. As a result, these river segments and associated flycatcher habitat are anticipated to support the strategy, rationale, and science of flycatcher conservation in order to meet territory and habitat-related recovery goals.

Past Consultations

Since listing in 1995, at least 228 Federal agency actions have undergone (or are currently under) formal section 7 consultation throughout the flycatcher’s range. This list of consultations can be found in the administrative record for this consultation. We concluded in our biological opinion for the Southwestern Regional Land Resource Management Plan (LRMP) (USFWS 2005a, #2-22-03-F-366) that ongoing upland grazing associated with Management Area 6J (Code 1423) of Tonto Creek on the Tonto National Forest would cause a sub-lethal response (-2) to the flycatcher. The conclusion in the LRMP that continued grazing can facilitate decreased bank stabilization, increased run-off, increased sedimentation, increased erosion, and reduced capacity of soils to hold water. These factors would reduce the occurrence, longevity, and quality of the
habitat-based Primary Constituent Elements of flycatcher critical habitat. The LRMP was completed prior to the USFS adopting a policy of rangeland adaptive management in Chapter 90 of FSH 2209.13. Since flycatcher critical habitat was finalized in 2005, at least 33 formal opinions have been completed in Arizona (within and outside designated critical habitat). While many opinions were issued for the previous critical habitat designation, the stream reaches and constituent elements have changed.

Activities continue to adversely affect the distribution and extent of all stages of flycatcher habitat throughout its range (development, urbanization, grazing, recreation, native and non-native habitat removal, dam operations, river crossings, ground and surface water extraction, etc.). Introduced tamarisk eating leaf beetles were not anticipated to persist within the range of the southwestern willow flycatcher. However, they were detected within the breeding habitat (and designated critical habitat) of the flycatcher in 2008 along the Virgin River near the Town of St. George, Utah. In 2009, beetles were also known to have been detected defoliating habitat within the range of flycatcher habitat in southern Nevada, and along the Colorado River in the Grand Canyon and near Shiprock in Arizona. Stochastic events also continue to change the distribution, quality, and extent of flycatcher habitat.

Conservation measures associated with some consultations and Habitat Conservation Plans have helped to acquire lands specifically for flycatchers on the San Pedro, Verde, and Gila rivers in AZ and the Kern River in CA. Additionally, along the lower Colorado River, the U.S. Bureau of Reclamation is currently attempting to establish riparian vegetation to expand and improve the distribution and abundance of nesting flycatchers. A variety of Tribal Management Plans in CA, AZ, and NM have been established to guide conservation of the flycatchers. Additionally, during the development of the critical habitat rule, management plans were developed for some private lands along the Owens River in CA and Gila River in NM. These are a portion of the conservation actions that have been established across the subspecies’ range.

**Effects of the Action – Southwestern Willow Flycatcher**

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.

Proposed work in 17 individual treatment sites has the potential to directly or indirectly affect southwestern willow flycatchers. These sites include four within the Gila Box (Dry Canyon Recreation Site, Flying W Recreation Site, Serna Cabin, Spring Canyon Recreation Site), five sites on the SPRNCA (Boquillas Ranch and Access Route, Curtis Ranch, Fairbank Site, Fortner, Highway 90, West Escalante), four sites on the LCNCA (Empire Ranch Headquarters, Gardner Canyon Crossing, Cienega Creek Crossing, Empire Gulch Crossing), and four sites (north/south Christmas Recreation Sites, north/south Shores Recreation Sites) along the middle Gila River, upstream of the Gila River – San Pedro River confluence and downstream of the Needles Eye.
Wilderness Area. Proposed implementation of treatments within riparian habitat is planned to occur between October 15 and March 15 in most cases with the exception of above-average winter precipitation totaling 7 inches or more. In these cases, individual affected treatment sites could have mowing, weed-eating, or other specialized mechanical vegetation treatments applied through May 15th.

There are two primary factors which appreciably reduce the potential for adverse effects and therefore the likelihood of take of southwestern willow flycatchers: project timing and existing uses. When projects commence on or after October 15th at individual treatment sites and conclude on or before March 15th, there is little to no likelihood that southwestern willow flycatchers will be disturbed because this period of time is outside the window when the species is migrating through or nesting in Arizona. In other instances, project sites are located at existing, developed campgrounds and recreation sites where human disturbance is common and often occurs when southwestern willow flycatchers could be present. If such human activities occur within the immediate proximity to nest areas, it is unlikely that southwestern willow flycatchers would set-up territories because of the frequent disturbances associated with recreational uses. However, based on previous observations of the species nesting near roads, highways, heavy machinery, and other relatively noisy areas, southwestern willow flycatchers that have become behaviorally acclimated to such disturbances at these sites may be less affected.

In general, monitoring data suggest that southwestern willow flycatchers are largely transitory through reaches where proposed activities are to occur on the SPRNCA, LCNCA, and Gila Box, migrating through in accordance with their spring and fall behavioral patterns, but not establishing territories or nesting. Only on rare occasion has monitoring detected the presence of breeding pairs within affected reaches. On the SPRNCA, two flycatcher nests have been recorded: one in 1997 at Kingfisher Pond and the other in 2005 near the Hereford Bridge. In over a decade of monitoring on the LCNCA, one nest was confirmed along Cienega Creek at the confluence with Gardner Canyon in 2005. In 2012 and 2015, breeding pairs were documented in Empire Gulch but no nests were detected and breeding was not confirmed. No breeding pairs have been detected within the reach where projects are proposed within the Gila Box. In all three of these general areas, suitable breeding habitat appears to be the key limiting factor affecting flycatcher use of these areas, with exception to Empire Spring within Empire Gulch within the LCNCA; both these areas support dense stands of yew-leaf willow trees.

Fuel break treatments in and around migratory flycatcher riparian habitat may startle or surprise flycatchers during migration or foraging. These incidents are anticipated to be rare in occurrence and short in duration because treatment in riparian areas is not commonly anticipated to occur and use of migratory habitat by flycatchers is temporary. Additionally, migrant flycatchers are not nesting while using these temporary stopover locations, and while resource acquisition is important, habitat requirements are broad, and birds are not confined to a territory. Furthermore, the likelihood that a rare nesting event in either the SPRNCA, LCNCA, or Gila Box occurs the same spring following above-average winter precipitation (necessitating late spring mowing, and related disturbances, is slim and therefore discountable. Therefore, unlike in areas with breeding flycatchers, the effect from disturbance to migrant/foraging flycatchers caused by the proposed
fuel break treatments within these three areas will be insignificant.

However, the four sites proposed for treatment along the middle Gila River (Christmas Recreation Sites North/South and Shores Recreation Sites North/South) all occur within a reach of the Gila where southwestern willow flycatchers regularly breed in large numbers according to two decades of monitoring data. This reach boasts perennial water and dense stands of trees in the form of a mix of tamarisk, mesquite, willow and cottonwood. The four treatment sites along the middle Gila River could occur adjacent to nesting territories and proposed activities could occur when birds are present, notably following above-average winter precipitation as discussed above.

At sites where southwestern willow flycatchers are likely to co-occur with late spring fuel treatment activities, we expect birds to be disturbed from activities such as mowing, trimming, and the general use of powered equipment during project implementation. Some disturbed birds are expected to be migrants while others, could be breeding pairs. We anticipate disturbed migrants will be compelled to continue their migration upon disturbance, or less likely, to temporarily settle nearby. If breeding birds are disturbed, there is potential that courtship behaviors might be disrupted at a minimum, or at a maximum, abandonment of one or more territories that occur nearby proposed treatment sites.

Indirect effects are expected from modification of habitat within treatment sites. The purpose of creating and maintaining fuel breaks is to disrupt the potential movement of fire on the landscape through the removal of fuel. Therefore, tree removal and canopy thinning are critical parts of the project. This will remove or eliminate canopy cover and alter the overall character of southwestern willow flycatcher habitat, but only within the footprint of each individual treatment site. Most of the proposed treatment sites are already established where the proposed activities involve only maintenance of desired condition. In four sites (Christmas Recreation Sites North/South and Shores Recreation Sites North/South) along the middle Gila River, however, fuel breaks need to be created. Changes to flycatcher habitat characteristics are therefore expected to be more severe within these specific treatment sites. The overall character and function of riparian habitat within each larger area will remain unchanged as a result of the proposed activities and therefore will continue to provide potential opportunities for migrating, forging, and nesting of flycatchers. Creation and or maintenance of fuel breaks associated with recreation sites is not expected to change the level of recreation or visitation by the public.

Critical habitat for southwestern willow flycatcher has been designated in both the LCNCA and along the middle Gila River where fuel break treatment sites are proposed. Specifically, sites constituting 1.3 acres of critical habitat located on the LCNCA are included within the Santa Cruz Management Unit, whereas sites constituting 5.5 acres of critical habitat located along the middle Gila River are located within the Middle Gila and San Pedro Management Unit. Implementation of fuel break maintenance within existing fuel breaks on the LCNCA is expected to have a very modest effect on primary constituent element (PCE) 1 (riparian vegetation) due to vegetation reduction within each site’s 50-100 ft treatment zone. At all sites, stream banks will be protected and riparian trees will be left in place, but a total of up to 20 mature mesquites could be removed, collectively. New trees will be thinned as they fill in fire breaks over time. Given the small amount of critical habitat affected (totaling 6.8 acres), the overall value of the habitat
for migrating, foraging, nesting or riparian/river functions will not be appreciably changed in either management unit where fuel break treatment sites occur. Subsequently, we conclude that while these measurable impacts adversely affect critical habitat, they will not adversely modify critical habitat because the overall function of the system and the large amount of habitat is retained.

Indirectly, PCE 2 (insect prey populations) could be affected by site treatments but these effects are expected to be restricted to only terrestrial insect populations; aquatic insect populations are not expected to be affected due to the scope of the project and the various conservation measures and best management practices that will be implemented. Potential effects to terrestrial insect populations are expected to be minor in existing fuel break treatment sites in the LCNCA because those sites were treated previously and have largely maintained fuel break characteristics as compared to untreated habitat, reducing the overall effect of continued maintenance of these sites on terrestrial insect communities. Because the Christmas Recreation Site (north/south) and Shores Recreation Site (north/south) are new fuel break sites, project implementation is expected to have a larger effect on terrestrial insect populations. However, the collective size (5.5 acres) of the middle Gila River treatment sites is small, and in comparison to the overall amount of critical habitat designated for the southwestern willow flycatcher within this management unit, such effects are expected to be minor and not change the overall condition of PCE 2 for the unit itself.

**Cumulative Effects – Southwestern Willow Flycatcher**

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. 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 Act.

Perhaps the most obvious cumulative effect within occupied or potentially occupied southwestern willow flycatcher habitat in the action area is recreation. The LCNCA, SPRNCA, and middle Gila River all provide unique opportunities for several human forms of outdoor recreation such as camping, rafting (on the Gila River), bird-watching, fishing, picnicking, hunting, etc. We expect short-term disturbance of both migrant flycatchers and those with established territories when recreation occurs.

**Concurrence – Southwestern Willow Flycatcher**

We concur that implementation of this project as proposed may affect, but is not likely to adversely affect the southwestern willow flycatcher or its designated critical habitat at all sites discussed above in the this document with the exception of four new fuel break treatment sites: Christmas Recreation Site (North and South) and Shores Recreation Site (North and South). Our rationale for concurrence pertaining to all other sites is provided within each site by site description above (as applicable), and is based on factors outlined in our discussion entitled “Effects Analysis Framework,” also above.

**Conclusion – Southwestern Willow Flycatcher**
After reviewing the current status of the southwestern willow flycatcher and its critical habitat, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the southwestern willow flycatcher, and is not likely to destroy or adversely modify its designated critical habitat. We base this conclusion on the following, as it pertains to the Christmas Recreation Site (North and South) and Shores Recreation Site (North and South) fuel break sites:

1) Most of the proposed treatment sites occur in habitat that is mostly used by migrant southwestern willow flycatchers where potential effects are not expected to alter reproductive success or the use of territories by breeding pairs.

2) Project implementation is expected to be completed outside southwestern willow flycatchers nesting season with the uncommon exception where above-average winter rainfall totals require late spring mowing, etc., which can occur as late as May 15th.

3) Treatment sites are generally small, and collectively constitute an insignificant land area (and critical habitat) compared to the rangewide distribution of breeding and migratory habitat (and critical habitat), or the amount of intact migratory or breeding habitat (and critical habitat) within each drainage.

4) The reclassification criteria provided in the Southwestern Willow Flycatcher Recovery Plan states that a minimum of 150 territories in the Middle Gila/San Pedro River Management Unit and 625 territories in the Gila Recovery Unit, as a whole, is required to reclassify the flycatcher from Endangered to Threatened. Surveys of the Middle Gila/San Pedro River Management Unit in 2015 found 255 territories; well above the management units’ recovery target. Thus, project-related effects are expected to be minimal with respect to regional recovery goals and objectives for southwestern willow flycatcher.

5) Project objectives provide a long-term benefit to southwestern willow flycatcher habitat by diminishing the likelihood of future, severe wildfire in treated drainages, thus encouraging the development of habitat structure while preserving the role of riverine processes on riparian vegetation.

The conclusions of this biological opinion are based on full implementation of the project as described in the “Description of the Proposed Action” section of this document, including any Conservation Measures that were incorporated into the project design.

INCIDENTAL TAKE STATEMENT – Southwestern Willow Flycatcher

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act 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.

The measures described below are non-discretionary, and must be undertaken by the (agency) so that they become binding conditions of any grant or permit issued to the (applicant), as appropriate, for the exemption in section 7(o)(2) to apply. The (agency) has a continuing duty to regulate the activity covered by this incidental take statement. If the (agency) (1) fails to assume and implement the terms and conditions or (2) fails to require the (applicant) to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the (agency or applicant) must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement. [50 CFR § 402.14(i)(3)]

**Amount or Extent of Take – Southwestern Willow Flycatcher**

We anticipate take of southwestern willow flycatchers as a result of this proposed action, specifically associated with the proposed new fuel break treatment sites Christmas Recreation Site (North and South) and Shores Recreation Site (North and South). Suitable nesting habitat does occur near the Christmas and Shore sites. Site-specific surveys for southwestern willow flycatchers have not been done but, based on regional survey results (see Table 2), we consider this river reach to be occupied and the treatment sites may be near nesting territories when the project is implemented next year or in future years. The unique abundance of territories in and around these sites, combined with the dynamic nature of riparian habitat growth, makes it likely that breeding flycatchers are relying on riparian vegetation within the fuel break project footprint for nest areas or as part of the overall territory. Although southwestern willow flycatchers are migratory and spend only part of the year in the action area, the area is still considered occupied also because of their high site fidelity that causes them to return to the same areas to nest (USFWS 2002).

Vegetation patch size and shape that southwestern willow flycatchers use for nesting can vary from 0.25 ac to 175 ac (USFWS 2002). Mean reported size of breeding patches was 21.2 ac (USFWS 2002). Mean patch size of breeding sites supporting 10 or more southwestern willow flycatcher territories was 62.2 ac (USFWS 2002). Based upon the number of southwestern willow flycatcher territories reported in each patch, it required an average 2.7 ac for each territory in a patch (USFWS 2002). To clarify, these are generalizations across the subspecies range, and because breeding patches include areas that are not actively defended as territories, these numbers do not equate to average territory size (USFWS 2002). Additionally,
southwestern willow flycatcher habitat modeling identified an 11 acre “neighborhood” of vegetation surrounding territories as important toward creating conditions to attract nesting southwestern willow flycatchers (USFWS 2002, SRP 2002).

These variations in the size of breeding patches used by southwestern willow flycatchers and the number of nesting southwestern willow flycatchers within a patch of habitat makes it impossible to predict exactly how many pairs of southwestern willow flycatchers will be nesting at these locations. The dynamic aspect of habitat conditions and the annual fluctuations in breeding bird numbers cause additional challenges. As a result, we cannot quantify exactly how many breeding southwestern willow flycatchers will be taken at the project location.

In order to meet project objectives for controlling the spread of potential future wildfire, all 2.2 acres of southwestern willow flycatcher habitat at these fuel treatment sites will be significantly and permanently altered, rendering it unsuitable for southwestern willow flycatcher breeding into the foreseeable future. Maintaining treatment site conditions after the initial treatment is expected to occur as needed, and the frequency of retreatments is contingent on precipitation amount and timing within any given year or series of years. We anticipate that all nesting flycatchers using the immediate “neighborhood” will be harmed or harassed by the initial treatment and subsequent but infrequent, maintenance-related retreatments that occur after March 15 any given year. While we are unable to quantify exactly the number of flycatchers and territories that could be adversely affected at these sites, based upon the typical density of territories and acreage used, we would expect between 1-3 territories to be affected.

Incidental take will be considered to have been exceeded if vegetation within the Christmas and Shores recreation sites (North/South) is ever allowed to regain suitability for nesting southwestern willow flycatchers, necessitating its significant alteration again.

**Effect of the Take – Southwestern Willow Flycatcher**

In this biological opinion, the FWS determines that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat for the reasons stated in the Conclusions section.

**Reasonable and Prudent Measures – Southwestern Willow Flycatcher**

The following reasonable and prudent measure(s) are necessary and appropriate to minimize take of (species #1):

1. The BLM shall ensure that an annual report is submitted detailing the progress made in project implementation for the corresponding calendar year and any information pertaining to incidental take of listed species, as appropriate.

**Terms and Conditions – Southwestern Willow Flycatcher**

The BLM has included in their proposed action, all measures that we believe are reasonable and prudent in order to reduce and minimize effects. Therefore, no additional reasonable and prudent
measures or terms and conditions are included in this incidental take statement for the southwestern willow flycatcher.
Rangewide Status of the Northern Mexican Gartersnake and its Proposed Critical Habitat

The Federal Register notice listing the northern Mexican gartersnake as threatened under the Act was published on July 8, 2014 (79 FR 38678). Please refer to this rule for more in-depth information on the ecology and threats to the species, including references. Critical habitat was proposed on July 10, 2013 (78 FR 41500) and has not yet been designated. We expect to publish a modified re-proposal for critical habitat and an accompanying Notice of Availability announcing the draft Environmental Assessment and draft Economic Analysis in 2016. Details on critical habitat are provided below. The final listing and proposed critical habitat rules are incorporated herein by reference.

The northern Mexican gartersnake, which reaches up to 44 inches total length, ranges in color from olive to olive-brown or olive-gray with three lighter-colored stripes that run the length of the body, the middle of which darkens towards the tail. It may occur with other native gartersnake species and can be difficult for people without specific expertise to identify because of its similarity of appearance to other native gartersnake species.

Throughout its rangewide distribution, the northern Mexican gartersnake occurs at elevations from 130 to 8,497 ft (Rossman et al. 1996) and is considered a “terrestrial-aquatic generalist” by Drummond and Marcías-García (1983). The northern Mexican gartersnake is often found in riparian habitat, but has also been found hiding under cover in grassland habitat up to a mile away from any surface water (Cogan 2015). The subspecies has historically been associated with three general habitat types: 1) source-area wetlands (e.g., Cienegas or stock tanks); 2) large-river riparian woodlands and forests; and 3) streamside gallery forests (Hendrickson and Minckley 1984, Rosen and Schwalbe 1988). Emmons and Nowak (2013) found this subspecies most commonly in protected backwaters, braided side channels and beaver ponds, isolated pools near the river mainstem, and edges of dense emergent vegetation that offered cover and foraging opportunities. In the northern-most part of its range, the northern Mexican gartersnake appears to be most active during July and August, followed by June and September. Surface movements can also be expected during the coldest months of the year when dormancy is generally expected. Telemetry research suggests that surface activity is most likely to occur when nighttime low temperatures exceed 32°F (Emmons 2016a), but such movements are not expected to be extensive.

The northern Mexican gartersnake is an active predator and is thought to heavily depend upon a native prey base (Rosen and Schwalbe 1988). Northern Mexican gartersnakes forage along vegetated streambanks, searching for prey in water and on land, using different strategies (Alfaro 2002). Primarily, its diet consists of amphibians and fishes, such as adult and larval (tadpoles) native leopard frogs, as well as juvenile and adult native fish (Rosen and Schwalbe 1988), but earthworms, leeches, lizards, and small mammals are also taken. In situations where native prey species are rare or absent, this snake’s diet may include nonnative species, including larval and juvenile bullfrogs, western mosquitofish (Holycross et al. 2006, Emmons and Nowak 2013), or other nonnative fishes. In northern Mexican gartersnake populations where the prey base is skewed heavily towards harmful nonnative species, recruitment of gartersnakes is often diminished or nearly absent.
Natural predators of the northern Mexican gartersnake may include birds of prey, other snakes, wading birds, mergansers, belted kingfishers, raccoons, skunks, and coyotes (Rosen and Schwalbe 1988, Brennan et al. 2009). Historically, large, highly predatory native fish species such as Colorado pikeminnow may have preyed upon northern Mexican gartersnakes where they co-occurred. Native chubs in their largest size class may also prey on neonatal gartersnakes, but has not been confirmed in the literature or through field observation.

Sexual maturity in northern Mexican gartersnakes occurs at two years of age in males and at two to three years of age in females (Rosen and Schwalbe 1988). Northern Mexican gartersnakes are viviparous (bringing forth living young rather than eggs). Mating has been documented in April and May followed by the live birth of between 7 and 38 newborns in July and August (Rosen and Schwalbe 1988, Nowak and Boyarski 2012).

The northern Mexican gartersnake historically occurred in every county and nearly every subbasin within Arizona, from several perennial or intermittent creeks, streams, and rivers as well as lentic wetlands such as Cienegas, ponds, or stock tanks (Rosen and Schwalbe 1988, Rosen et al. 2001; Holycross et al. 2006; see Figure NMGA-1). In New Mexico, the gartersnake had a limited distribution that consisted of scattered locations throughout the Upper Gila River watershed in Grant and western Hidalgo Counties (Price 1980, Fitzgerald 1986, Degenhardt et al. 1996, Holycross et al. 2006). Within Mexico, northern Mexican gartersnakes historically occurred within the Sierra Madre Occidental and the Mexican Plateau, comprising approximately 85 percent of the total rangewide distribution of the subspecies (Rossman et al. 1996).

The only viable northern Mexican gartersnake populations in the United States where the subspecies remains reliably detected are all in Arizona: 1) The Page Springs and Bubbling Ponds State Fish Hatcheries along Oak Creek; 2) lower Tonto Creek; 3) the upper Santa Cruz River in the San Rafael Valley; 4) the Bill Williams River; and, 5) the middle/upper Verde River. In New Mexico and elsewhere in Arizona, the northern Mexican gartersnake may occur in extremely low population densities within its historical distribution; limited survey effort is inconclusive to determine extirpation of this highly secretive species. The status of the northern Mexican gartersnake on tribal lands, such as those owned by the White Mountain or San Carlos Apache Tribes, is poorly understood. Less is known about the current distribution of the northern Mexican gartersnake in Mexico due to limited surveys and limited access to information on survey efforts and field data from Mexico.

We have concluded that in as many as 23 of 33 known localities in the United States (70 percent), the northern Mexican gartersnake population is likely not viable and may exist at low population densities that could be threatened with extirpation or may already be extirpated. Only five populations of northern Mexican gartersnakes in the United States are considered likely viable where the species remains reliably detected. Harmful nonnative species are a significant concern in almost every northern Mexican gartersnake locality in the United States and the most significant reason for their decline. We consider harmful nonnative species to include, but not be limited to, fish in the families Centrarchidae and Ictaluridae, American bullfrogs (Lithobates catesbeiana), and any species of crayfish. Harmful nonnative species can contribute to starvation of gartersnake populations through competitive mechanisms, and may reduce or
eliminate recruitment of young gartersnakes through predation. Other threats include alteration of rivers and streams from dams, diversions, flood-control projects, and groundwater pumping that change flow regimes, reduce or eliminate habitat, and favor harmful nonnative species; and effects from climate change and drought (79 FR 38678).

Table 3. Current population status for the northern Mexican gartersnake in the United States.

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<th>Location</th>
<th>Last Record</th>
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<td>Gila River (NM, AZ)</td>
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<td>Possible</td>
<td>Likely</td>
<td>Likely extirpated</td>
</tr>
<tr>
<td>3</td>
<td>Mule Creek (NM)</td>
<td>1983</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Likely low density</td>
</tr>
<tr>
<td>4</td>
<td>Mimbres River (NM)</td>
<td>Likely early 1900s</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Likely extirpated</td>
</tr>
<tr>
<td>5</td>
<td>Lower Colorado River (AZ)</td>
<td>2015</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Likely low density</td>
</tr>
<tr>
<td>6</td>
<td>Bill Williams River (AZ)</td>
<td>2012</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Likely viable</td>
</tr>
<tr>
<td>7</td>
<td>Big Sandy River (AZ)</td>
<td>2015</td>
<td>Yes</td>
<td>Yes</td>
<td>Likely</td>
<td>Likely low density</td>
</tr>
<tr>
<td>8</td>
<td>Santa Maria River (AZ)</td>
<td>2015</td>
<td>Yes</td>
<td>Yes</td>
<td>Likely</td>
<td>Likely low density</td>
</tr>
<tr>
<td>9</td>
<td>Agua Fria River (AZ)</td>
<td>1986</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Likely low density</td>
</tr>
<tr>
<td>10</td>
<td>Little Ash Creek (AZ)</td>
<td>1992</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Likely low density</td>
</tr>
<tr>
<td>11</td>
<td>Lower Salt River (AZ)</td>
<td>1964</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Likely extirpated</td>
</tr>
<tr>
<td>12</td>
<td>Black River (AZ)</td>
<td>1982</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Likely low density</td>
</tr>
<tr>
<td>13</td>
<td>Big Bonito Creek (AZ)</td>
<td>1986</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Likely low density</td>
</tr>
<tr>
<td>14</td>
<td>Tonto Creek (AZ)</td>
<td>2005</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Likely viable</td>
</tr>
<tr>
<td>15</td>
<td>Upper /Middle Verde River</td>
<td>2012</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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</tr>
<tr>
<td></td>
<td>(AZ)</td>
<td>Year</td>
<td>Found?</td>
<td>Present?</td>
<td>Abundance?</td>
<td></td>
</tr>
<tr>
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<td>----------</td>
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<td></td>
</tr>
<tr>
<td>16</td>
<td>Oak Creek (AZ) (Page Springs and Bubbling Ponds State Fish Hatcheries)</td>
<td>2015</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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</tr>
<tr>
<td>17</td>
<td>Spring Creek (AZ)</td>
<td>2014</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Likely low density</td>
</tr>
<tr>
<td>18</td>
<td>Sycamore Creek (Yavapai/Coonino Co., AZ)</td>
<td>1954</td>
<td>Yes</td>
<td>Possible</td>
<td>Yes</td>
<td>Likely extirpated</td>
</tr>
<tr>
<td>19</td>
<td>Upper Santa Cruz River/San Rafael Valley (AZ)</td>
<td>2015</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Likely viable</td>
</tr>
<tr>
<td>20</td>
<td>Redrock Canyon/Cott Drainage (AZ)</td>
<td>2008</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Likely low density</td>
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<tr>
<td>21</td>
<td>Sonoita Creek (AZ)</td>
<td>2013</td>
<td>Yes</td>
<td>Possible</td>
<td>Yes</td>
<td>Likely low density</td>
</tr>
<tr>
<td>22</td>
<td>Scotia Canyon (AZ)</td>
<td>2009</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Likely low density</td>
</tr>
<tr>
<td>23</td>
<td>Parker Canyon (AZ)</td>
<td>1986</td>
<td>Yes</td>
<td>Possible</td>
<td>Yes</td>
<td>Likely low density</td>
</tr>
<tr>
<td>24</td>
<td>Las Cienegas National Conservation Area and Cienega Creek Natural Preserve (AZ)</td>
<td>2015</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Likely low density</td>
</tr>
<tr>
<td>25</td>
<td>Lower Santa Cruz River (AZ)</td>
<td>1956</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Likely extirpated</td>
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<tr>
<td>26</td>
<td>Buenos Aires National Wildlife Refuge (AZ)</td>
<td>2000</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Likely low density</td>
</tr>
<tr>
<td>27</td>
<td>Brown Canyon (AZ)</td>
<td>2014</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Likely low density</td>
</tr>
<tr>
<td>28</td>
<td>Fort Huachuca (AZ)</td>
<td>1994</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Likely low density</td>
</tr>
<tr>
<td>29</td>
<td>Bear Creek (AZ)</td>
<td>1987</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Likely low density</td>
</tr>
<tr>
<td>30</td>
<td>San Pedro River (AZ)</td>
<td>2007</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Likely low density</td>
</tr>
<tr>
<td>31</td>
<td>Babocomari River and Cienega (AZ)</td>
<td>1986</td>
<td>Yes</td>
<td>Possible</td>
<td>Yes</td>
<td>Likely low density</td>
</tr>
<tr>
<td>32</td>
<td>Canelo Hills-Sonoita Grasslands Area (AZ)</td>
<td>2014</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Likely low density</td>
</tr>
<tr>
<td>33</td>
<td>San Bernardino National Wildlife Refuge (AZ)</td>
<td>2005</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Likely low density</td>
</tr>
</tbody>
</table>

Notes: “Possible” means there were no conclusive data found. “Likely extirpated” means the last record for an area pre-dated 1980, and existing threats suggest the species is likely extirpated. “Likely low density” means there is a post-1980 record for the species, it is not reliably found with minimal to moderate survey effort, and threats exist which suggest the population may be low density or could be extirpated, but there is insufficient evidence to support extirpation. “Likely viable” means that the species is reliably found with minimal to moderate survey effort, and the population is generally...
Critical Habitat

Critical habitat for the northern Mexican gartersnake has been proposed in 14 units in portions of Arizona and New Mexico totaling 421,423 acres. Within these areas, the primary constituent elements (PCEs) of the physical and biological features essential to northern Mexican gartersnake conservation are:

1. Aquatic or riparian habitat that includes:
   a. Perennial or spatially intermittent streams of low to moderate gradient that possess appropriate amounts of in-channel pools, off-channel pools, or backwater habitat, and that possess a natural, unregulated flow regime that allows for periodic flooding or, if flows are modified or regulated, a flow regime that allows for adequate river functions, such as flows capable of processing sediment loads; or
   b. Lentic wetlands such as livestock tanks, springs, and Cienegas; and
   c. Shoreline habitat with adequate organic and inorganic structural complexity to allow for thermoregulation, gestation, shelter, protection from predators, and foraging opportunities (e.g., boulders, rocks, organic debris such as downed trees or logs, debris jams, small mammal burrows, or leaf litter); and
   d. Aquatic habitat with characteristics that support a native amphibian prey base, such as salinities less than 5 parts per thousand, pH greater than or equal to 5.6, and pollutants absent or minimally present at levels that do not affect survival of any age class of the gartersnake or the maintenance of prey populations.

2. Adequate terrestrial space (600 ft lateral extent to either side of bankfull stage) adjacent to designated stream systems with sufficient structural characteristics to support life-history functions such as gestation, immigration, emigration, and brumation.

3. A prey base consisting of viable populations of native amphibian and native fish species.

4. An absence of nonnative fish species of the families Centrarchidae and Ictaluridae, bullfrogs, and/or crayfish (O. virilis, P. clarki, etc.), or occurrence of these nonnative species at low enough levels such that recruitment of northern Mexican gartersnakes and maintenance of viable native fish or soft-rayed, nonnative fish populations (prey) is still occurring.

Table 4: Land ownership for proposed critical habitat units for the northern Mexican gartersnake. [Area estimates reflect all land within critical habitat unit boundaries. County-owned lands are considered as private lands.]
<table>
<thead>
<tr>
<th>Subbasin</th>
<th>Unit Total</th>
<th>Unit Total</th>
<th>Unit Total</th>
<th>Unit Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Gila River</td>
<td>10,845 ac (4,389 ha)</td>
<td>467 ac (189 ha)</td>
<td>9,822 ac (3,975 ha)</td>
<td>21,135 ac (8,553 ha)</td>
</tr>
<tr>
<td>Mule Creek</td>
<td>1,327 ac (537 ha)</td>
<td>467 ac (189 ha)</td>
<td>1,253 ac (507 ha)</td>
<td>2,579 ac (1,044 ha)</td>
</tr>
<tr>
<td>Bill Williams River</td>
<td>3,820 ac (1,546 ha)</td>
<td>516 ac (209 ha)</td>
<td>1,076 ac (435 ha)</td>
<td>4,512 ac (1,920 ha)</td>
</tr>
<tr>
<td>Agua Fria River Subbasin</td>
<td>3,313 ac (1,341 ha)</td>
<td>918 ac (372 ha)</td>
<td>2,758 ac (1,116 ha)</td>
<td>6,989 ac (2,828 ha)</td>
</tr>
<tr>
<td>Little Ash Creek</td>
<td>877 ac (355 ha)</td>
<td>80 ac (32 ha)</td>
<td>1,170 ac (474 ha)</td>
<td>957 ac (387 ha)</td>
</tr>
<tr>
<td>Upper Salt River Subbasin</td>
<td>4,010 ac (1,696 ha)</td>
<td>918 ac (372 ha)</td>
<td>7,838 ac (3,148 ha)</td>
<td>7,946 ac (3,215 ha)</td>
</tr>
<tr>
<td>Black River</td>
<td>2,632 ac (1,065 ha)</td>
<td>13,760 ac (5,669 ha)</td>
<td>16,392 ac (6,634 ha)</td>
<td></td>
</tr>
<tr>
<td>Big Bonito Creek</td>
<td></td>
<td>5,826 ac (2,358 ha)</td>
<td>5,826 ac (2,358 ha)</td>
<td></td>
</tr>
<tr>
<td>Tonto Creek</td>
<td>7,766 ac (3,143 ha)</td>
<td>1,170 ac (474 ha)</td>
<td>8,936 ac (3,616 ha)</td>
<td></td>
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<tr>
<td>Verde River Subbasin</td>
<td>13,903 ac (5,620 ha)</td>
<td>1,209 ac (489 ha)</td>
<td>5,223 ac (2,114 ha)</td>
<td>20,526 ac (8,307 ha)</td>
</tr>
<tr>
<td>Oak Creek</td>
<td>1,873 ac (758 ha)</td>
<td>274 ac (111 ha)</td>
<td>3,386 ac (1,370 ha)</td>
<td>5,633 ac (2,239 ha)</td>
</tr>
<tr>
<td>Spring Creek</td>
<td>2,572 ac (1,041 ha)</td>
<td>188 ac (76 ha)</td>
<td>371 ac (150 ha)</td>
<td>3,131 ac (1,267 ha)</td>
</tr>
<tr>
<td>Upper Santa Cruz River Subbasin</td>
<td>18,348 ac (7,425 ha)</td>
<td>1,671 ac (676 ha)</td>
<td>8,980 ac (3,634 ha)</td>
<td>29,191 ac (11,813 ha)</td>
</tr>
<tr>
<td>Redrock Canyon</td>
<td>1,423 ac (576 ha)</td>
<td></td>
<td>549 ac (222 ha)</td>
<td>1,972 ac (798 ha)</td>
</tr>
<tr>
<td>Buenos Aires National Wildlife Refuge</td>
<td>117,313 ac (47,475 ha)</td>
<td></td>
<td>117,313 ac (47,475 ha)</td>
<td></td>
</tr>
<tr>
<td>Cienega Creek Subbasin</td>
<td>24 ac (10 ha)</td>
<td>1,078 ac (436 ha)</td>
<td>11 ac (4 ha)</td>
<td>1,113 ac (450 ha)</td>
</tr>
<tr>
<td>Area</td>
<td>Acres (Ha)</td>
<td>Acres (Ha)</td>
<td>Acres (Ha)</td>
<td>Acres (Ha)</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>------------------</td>
<td>------------</td>
<td>------------</td>
<td>------------</td>
</tr>
<tr>
<td><strong>Las Cienegas National Conservation Area</strong></td>
<td>39,913 (16,152)</td>
<td>5,105 (2,066)</td>
<td>1 (&lt;1)</td>
<td>45,020 (18,219)</td>
</tr>
<tr>
<td><strong>Cienega Creek Natural Preserve</strong></td>
<td>6,183 (2,502)</td>
<td></td>
<td>4,260 (1,724)</td>
<td>4,260 (1,724)</td>
</tr>
<tr>
<td><strong>Unit Total</strong></td>
<td>39,937 (16,162)</td>
<td>6,183 (2,502)</td>
<td>4,272 (1,728)</td>
<td>50,393 (20,393)</td>
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<tr>
<td><strong>San Pedro River Subbasin</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Pedro River</td>
<td>6,973 (2,822)</td>
<td>1,163 (470)</td>
<td>76 (31)</td>
<td>14,456 (5,850)</td>
</tr>
<tr>
<td>Bear Canyon Creek</td>
<td>639 (259)</td>
<td></td>
<td>383 (155)</td>
<td>1,022 (414)</td>
</tr>
<tr>
<td><strong>Unit Total</strong></td>
<td>7,612 (3,081)</td>
<td>1,163 (470)</td>
<td>76 (31)</td>
<td>14,839 (6,005)</td>
</tr>
<tr>
<td><strong>Babocomari River Subbasin</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Babocomari River/Cienega</td>
<td>625 (253)</td>
<td>56 (23)</td>
<td></td>
<td>2,773 (1,122)</td>
</tr>
<tr>
<td>Post Canyon</td>
<td>431 (175)</td>
<td></td>
<td>363 (147)</td>
<td>795 (322)</td>
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<tr>
<td>O’Donnell Canyon</td>
<td>124 (50)</td>
<td></td>
<td>274 (111)</td>
<td>398 (161)</td>
</tr>
<tr>
<td>Turkey Creek</td>
<td>888 (359)</td>
<td>2 (1)</td>
<td>788 (319)</td>
<td>1,678 (679)</td>
</tr>
<tr>
<td>Appleton-Whittell Research Ranch</td>
<td>5,283 (2,138)</td>
<td></td>
<td>2,515 (1,018)</td>
<td>7,798 (3,156)</td>
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<tr>
<td>Canelo Hills Cienega Preserve</td>
<td></td>
<td></td>
<td></td>
<td>213 (86)</td>
</tr>
<tr>
<td><strong>Unit Total</strong></td>
<td>7,351 (2,975)</td>
<td>58 (24)</td>
<td>6,926 (2,803)</td>
<td>14,334 (5,801)</td>
</tr>
<tr>
<td><strong>San Bernardino National Wildlife Refuge</strong></td>
<td>2,387 (966)</td>
<td></td>
<td></td>
<td>2,387 (966)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>302,338 (122,352)</td>
<td>14,966 (6,057)</td>
<td>19,855 (8,035)</td>
<td>84,263 (34,100)</td>
</tr>
</tbody>
</table>

Note: Numbers may not sum due to rounding.
Two proposed critical habitat units are included in the action area for this project, the Cienega Creek Subbasin Unit and the San Pedro River Subbasin Unit.

**Cienega Creek Subbasin Unit**

The Cienega Creek Subbasin Unit is generally located in southern Arizona, east of the Santa Rita Mountains, north of the Canelo Hills, and west of the Whetstone Mountains, in Pima and Santa Cruz Counties. This unit consists of springs, seeps, streams, stock tanks, and terrestrial space in between these features within a total of 50,393 acres (20,393 ha) of proposed critical habitat in the Las Cienegas National Conservation Area and Cienega Creek Natural Preserve. Also included in this unit is 7.1 stream mi (11.4 km) of Cienega Creek that occur outside of these specific ownership areas. The Cienega Creek Subbasin Unit occurs on lands primarily managed by the U.S. Bureau of Land Management and the Arizona State Land Department, with remaining lands under private ownership. All identified areas are considered as being within the geographical area currently occupied by the species. We are proposing the areas in this unit under section 3(5)(A)(i) of the Act because they are occupied by the species and because they contain essential physical or biological features that may require special management considerations or protection. The following narratives describe all of the subunits proposed as critical habitat in the Cienega Creek Subbasin Unit.

Cienega Creek Subunit. We are proposing to designate 1,113 acres (450 ha) of critical habitat along 7.1 stream mi (11.4 km) of Cienega Creek, from the northern boundary of the Las Cienegas National Conservation Area to the southern boundary of Cienega Creek Natural Preserve in Pima County, Arizona. The Cienega Creek Subunit occurs on lands managed by the
Arizona State Land Department in addition to a small amount of private land. Native fish and both Chiricahua and lowland leopard frog populations provide prey for northern Mexican gartersnakes, and recent, ongoing bullfrog eradication in the area reduces the threat of bullfrogs within this subunit. This subunit contains sufficient physical or biological features, including all PCEs. However, special management may be required to maintain or develop the physical or biological features, including preventing the invasion or reinvasion of bullfrogs.

Las Cienegas National Conservation Area Subunit. We are proposing to designate critical habitat for a total of 45,020 acres (18,219 ha) of springs, seeps, streams, stock tanks, and terrestrial space in between these features within the Las Cienegas National Conservation Area in Pima County, including portions of Cienega Creek and Empire Gulch that occur within the Las Cienegas National Conservation Area. The Las Cienegas National Conservation Area is managed by the U.S. Bureau of Land Management, although it includes some Arizona State Trust Lands. Native fish and both Chiricahua and lowland leopard frog populations provide prey for northern Mexican gartersnakes, and recent, ongoing bullfrog eradication in the area reduces the threat of bullfrogs within this subunit. This subunit contains sufficient physical or biological features, including all PCEs. However, special management may be required to maintain or develop the physical or biological features, including preventing the invasion or reinvasion of bullfrogs.

Cienega Creek Natural Preserve Subunit. We are proposing to designate critical habitat for a total of 4,260 acres (1,724 ha) of springs, seeps, streams, stock tanks, and terrestrial space in between these features within the Cienega Creek Natural Preserve in Pima County, Arizona, including the reach of Cienega Creek that occurs within the Cienega Creek Natural Preserve. The Cienega Creek Natural Preserve is owned and managed by Pima County. Native fish and lowland leopard frog populations provide prey for northern Mexican gartersnakes, and recent, ongoing bullfrog eradication in the area reduces the threat of bullfrogs within this subunit. This subunit contains sufficient physical or biological features, including all PCEs. However, special management may be required to maintain or develop the physical or biological features, including preventing the invasion or reinvasion of bullfrogs. This subunit is being considered for exclusion from the final rule for critical habitat under section 4(b)(2) of the Act (see Application of Section 4(b)(2) of the Act below).

The Cienega Creek Subbasin Unit is proposed as critical habitat for the northern Mexican gartersnake because it is occupied at the time of listing and contains sufficient physical or biological features to support life-history functions essential for the conservation of the species. The physical or biological features in this unit may require special management consideration due to ongoing and regional threat of bullfrogs.

San Pedro River Subbasin Unit

The San Pedro River Subbasin Unit is generally located in southeastern Arizona, east of Sierra Vista, Tucson, and Florence and west Douglas, Wilcox, and Safford, in Cochise, Pima, and Pinal Counties. This unit consists of a total of 23,690 acres (9,587 ha) along 165 stream mi (266 km) of proposed critical habitat along the San Pedro River and Bear Creek. Land ownership or land
management within this unit consists of lands managed by the U.S. Bureau of Land Management, Coronado National Forest, Arizona State Land Department, San Carlos Apache Tribe, and privately owned lands. All identified areas described in the San Pedro River Subbasin Unit have records for northern Mexican gartersnakes, and all identified areas are considered as being currently within the geographical area occupied by the species. Therefore, we are proposing the areas in this unit under section 3(5)(A)(i) of the Act because they are occupied by the species and because they contain sufficient amounts of the essential physical or biological features that may require special management considerations or protection. The following narratives describe all of the subunits proposed as critical habitat in the San Pedro River Subbasin Unit.

San Pedro River Subunit. We are proposing to designate 22,669 acres (9,174 ha) of critical habitat along 158.4 stream mi (254.9 km) of the San Pedro River from its confluence with the Gila River at Winkelman, upstream to the International Border, in Cochise, Pima, and Pinal Counties, Arizona. The San Pedro River Subunit occurs predominately on privately owned lands, with remaining lands managed by the U.S. Bureau of Land Management. Native fish and lowland leopard frogs occur throughout the San Pedro River and provide a prey base for northern Mexican gartersnakes, with prey population densities increasing in the downstream direction. Crayfish, bullfrogs, and nonnative, spiny-rayed fish occur predominately upstream of the Interstate 10 crossing. In general, this subunit contains sufficient physical or biological features, including PCEs 1 (aquatic habitat characteristics), 2 (terrestrial habitat characteristics), and 3 (prey base), but PCE 4 (absence or low level of harmful nonnative species) is deficient. Special management may be required to maintain or develop the physical or biological features, including the elimination or reduction of harmful nonnative species. Lands in this subunit that are owned or under conservation easement with The Nature Conservancy as conservation preserves, lands owned by the Salt River Project and managed under their Horseshoe-Bartlett and Roosevelt HCPs, as well as lands owned by the San Carlos Apache Tribe, are being considered for exclusion from the final rule for critical habitat under section 4(b)(2) of the Act (see Application of Section 4(b)(2) of the Act below).
Bear Canyon Creek Subunit. We are proposing to designate 1,022 acres (414 ha) of critical habitat along 7.1 stream mi (11.3 km) of Bear Canyon Creek, from the International Border, upstream to its origin south of Granite Peak in the Huachuca Mountains, in Cochise County, Arizona. The Bear Canyon Creek Subunit occurs predominately on lands managed by the Coronado National Forest with remaining land in private ownership. Native fish comprise the fishery of Bear Canyon Creek, and GIS analysis suggests that native leopard frogs may also occur in limited density. Crayfish are also present. This subunit contains sufficient physical or biological features, including PCEs 1 (aquatic habitat characteristics), 2 (terrestrial habitat characteristics), and 3 (prey base), but PCE 4 (absence or low level of harmful nonnative species) is deficient. Special management may be required to maintain or develop the physical or biological features, including the elimination or reduction of crayfish and the establishment of secure leopard frog populations.

The San Pedro River Subbasin Unit is proposed as critical habitat for the northern Mexican gartersnake because it is occupied at the time of listing and contains sufficient physical or biological features to support life-history functions essential for the conservation of the species. The physical or biological features in this unit may require special management consideration due to competition with, and predation by, harmful nonnative species that are present in this unit.

*Status of the Northern Mexican Gartersnake in the Action Area*
Las Cienegas National Conservation Area and Cienega Creek Natural Preserve—Several records for the northern Mexican gartersnake in the Las Cienegas National Conservation Area and Cienega Creek Natural Preserve have been documented in the literature, predominantly from Cienega Creek, the first dating to 1986 (Rosen and Schwalbe 1988, Appendix I). Cienega Creek maintains perennial surface flow in two reaches; from its headwaters to just downstream of “the Narrows;” and from the confluence with Mescal Wash to just downstream of the Colossal Cave Road crossing in Vail, Arizona. The upper portion of the creek has historically been occupied by bullfrogs, but continues to support a native fish community, as well as both Chiricahua and lowland leopard frogs (Rosen et al. 2001, Appendix I). The lower perennial portion of Cienega Creek runs through Pima County’s 3,979 ac (1,610 ha) Cienega Creek Natural Preserve for approximately 12 river miles (19.3 km). This reach supports a native fish community (Timmons et al. 2013, Table 1), including Gila chub and longfin dace as well as lowland leopard frogs (Caldwell 2014, entire), although there is a persistent threat of bullfrog invasion from a nearby house pond that continues to contribute immigrant bullfrogs to Cienega Creek. Despite this source, bullfrog numbers have remained somewhat low in recent years (Caldwell 2012, pers. comm.). In addition to Cienega Creek, the Las Cienegas National Conservation Area supports several tanks, springs, and wetlands that provide physically suitable northern Mexican gartersnake habitat and that may be used by northern Mexican gartersnakes sporadically as they emigrate from Cienega Creek and explore new foraging opportunities in the area. According to GIS analysis, Mattie Canyon, a tributary of Cienega Creek also supports suitable northern Mexican gartersnake habitat as a well as a native prey base.

In 2007 and 2008, more than 2,300 trap-hours were required per snake captured in this area (Caldwell 2008a, pers. comm.; 2008b, pers. comm.; Servoss et al. 2007, p. 1–12), compared with Rosen and Caldwell (2004, p. 21, Table 2) capture rates of 561 trap-hours per snake in this same area in 2002 and 2003; more than a four-fold increase in the effort needed to capture northern Mexican gartersnakes. In 2011, the capture rate was 3,167 trap-hours per capture (Hall 2012). These capture rate data point to increasing rarity over time which historically mirrored area declines in leopard frogs and may be exacerbated to some degree by continued bullfrog eradication efforts which may reduce the prey base for adult gartersnakes. As a recovery cooperator, the Arizona –Sonora Desert Museum (ASDM) has been successfully propagating northern Mexican gartersnakes in captivity since 2011 and releases of captively-bred snakes occurred in 2012, 2014, and 2015. Although no follow-up surveys have been conducted in areas where the releases occurred, there have been no recaptures reported thus far. Regardless, conservation and recovery efforts for native aquatic species in this area have reduced the influence of harmful nonnative species and provide a net-positive effect on the areas aquatic communities. Recent records and recovery efforts confirm the northern Mexican gartersnake still exists in within Cienega Creek and surrounding lands but likely as a low density population that appears to also still be in decline.
Table 5. History of records for the northern Mexican gartersnake in the LCNCA and Cienega Creek Natural Preserve.

<table>
<thead>
<tr>
<th>Record Year</th>
<th>Locality Descriptor</th>
<th>Reference</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986</td>
<td>At Cienega Ranch; 35 mi SE Tucson</td>
<td>Rosen and Schwalbe 1988, Appendix I</td>
<td>Two adults</td>
</tr>
<tr>
<td>1994</td>
<td>R17E, T19S</td>
<td>Holycross et al. 2006; Appendix A</td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>Cienega Creek at main perennial headwater</td>
<td>Rosen et al. 2001; Appendix I</td>
<td>Juvenile; dead</td>
</tr>
<tr>
<td>1997</td>
<td>Cienega Creek County Preserve; Nad 83 535113/354197</td>
<td>Caldwell 2012</td>
<td></td>
</tr>
<tr>
<td>1999</td>
<td>UTM 536600, 3541200, S 1/2 Sec 28, T16S, R17E</td>
<td>Holycross et al. 2006; Appendix A</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>Cienega Creek at main perennial headwater</td>
<td>Rosen et al. 2001; Appendix I</td>
<td>Adult</td>
</tr>
<tr>
<td>2001</td>
<td>Cienega Creek County Preserve; Nad 83 535825/354952</td>
<td>Caldwell 2012</td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>LCNCA</td>
<td>Hall 2012</td>
<td>Five adults; two subadults</td>
</tr>
<tr>
<td>2012</td>
<td></td>
<td>USFWS Files</td>
<td>40 captive-bred juveniles from ASDM released; cautery-marked</td>
</tr>
<tr>
<td>2014</td>
<td></td>
<td></td>
<td>36 captive-bred animals from ASDM released; Empire Wildlife Pond (5 subadults/ 6 juveniles), the Maternity Wildlife Pond (2 subadults/ 6 juveniles), and upper Cienega Creek (2 subadults/ 15 juveniles)</td>
</tr>
<tr>
<td>2014</td>
<td>Cienega Creek County Preserve</td>
<td>Caldwell 2014, pp. 1-2</td>
<td>One adult; one juvenile</td>
</tr>
<tr>
<td>2015</td>
<td>LCNCA</td>
<td>Crawford 2015</td>
<td>19 captive-bred individuals from ASDM released; 12 near Cold Spring at the confluence with Mattie</td>
</tr>
</tbody>
</table>
San Pedro River— All known records for northern Mexican gartersnakes along the San Pedro River in the Arizona have occurred upstream of the I-10 crossing, largely as a direct result of minimal survey efforts downstream of I-10. Rosen et al. (2001, Appendix I) surveyed the upper San Pedro River in 1996, 1998, and 2000 at the Arizona State Highway 90 crossing, in 1998 at Lewis Springs, and 1996 at Curtis Flat, and documented crayfish, bullfrogs, nonnative, predatory fish, as well as two species of native fish, all occurring at various densities along their survey routes. However, they did not detect any northern Mexican gartersnakes. The most recent records for northern Mexican gartersnakes in the upper San Pedro River are from 2006 and 2007 from a site upstream of Fairbank (Miscione 2009). Kesner and Marsh (2010, Table 4) also found both native fish, as well as nonnative, predatory fish, in the upper San Pedro River, although native fish or nonnative, soft-rayed fish outnumbered harmful nonnative fish species significantly. Jakle (1992, pp. 3–5) and Minckley (1987, pp. 2, 16) also reported nonnative, predatory species such as channel catfish, flathead catfish, and smallmouth bass the San Pedro River. Stefferud et al. (2009, pp. 206–207, 209–211) report that at least 15 species of nonnative fish have been introduced into the San Pedro River which has had profoundly negative impacts on native fish populations. These survey efforts included approximately 12 cumulative person-search hours at Highway 90, five person-search hours at Lewis Springs, and three person-search hours at Curtis Flat (Rosen et al. 2001, Appendix I). Inman et al. (1998, Appendix B) reported crayfish from the San Pedro River.

The lower San Pedro River (downstream; north of I-10) was surveyed for northern Mexican gartersnakes from 1996–2000; an insignificant effort that equaled approximately eight person-search hours. Rosen et al. (2001, Appendix I) surveyed four locations along the lower San Pedro River: at Cascabel in 1996 (three person-search hours), at the San Manuel crossing in 1999 (45 minutes), at the Dudleyville crossing in 2000 (four person-search hours), and in the Bingham Cienega area, adjacent to and within the lower San Pedro River, in 1999 (20 minutes) and 2000 (three person-search hours). One bullfrog was seen at Cascabel and another at Bingham Cienega; one crayfish and one channel catfish were seen at the Dudleyville crossing (Rosen et al. 2001, Appendix I). Otherwise, robust populations of lowland leopard frogs and longfin dace were seen at nearly all survey locations (Rosen et al. 2001, Appendix I) which document a largely native prey species community for northern Mexican gartersnakes. Lowland leopard frogs and their tadpoles were also confirmed in a 2012 survey effort; also noted were beaver ponds and dense streamside vegetation along with perennial flow (Hall 2013, p. 10). Lowland leopard frogs longfin dace and desert suckers are considered common in numerous tributaries to the middle and lower San Pedro River as well as in its perennial reaches downstream of Interstate 10 (Cascabel Working Group 2010, p. 78). Kesner and Marsh (2010, Table 4) found native fish generally dominate over nonnative, predatory fish in the lower San Pedro River. In total, approximately 11 person-search hours have been invested in surveying for gartersnakes along the entire lower San Pedro River, a large and structurally complex system, since 1996. The northern Mexican gartersnake is likely extant in low density populations along the San Pedro River from the International Border to its confluence with the Gila River.
Table 6. History of records for the northern Mexican gartersnake along the San Pedro River.

<table>
<thead>
<tr>
<th>Year</th>
<th>Locality Descriptor</th>
<th>Reference</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1919</td>
<td>Lewis Spring</td>
<td>Rosen and Schwalbe 1988, Appendix I; Rosen et al. 2001, p. 21, Appendix I; Holycross et al. 2006, Appendix A</td>
<td>Single record</td>
</tr>
<tr>
<td>1920</td>
<td>Hereford</td>
<td></td>
<td>Five records</td>
</tr>
<tr>
<td>1959</td>
<td>“2 East” Palominas</td>
<td></td>
<td>Single individual</td>
</tr>
<tr>
<td>1965</td>
<td>Highway 90 crossing</td>
<td></td>
<td>Single individual</td>
</tr>
<tr>
<td>1986</td>
<td>Lewis Spring</td>
<td></td>
<td>Two individuals</td>
</tr>
<tr>
<td>1986</td>
<td>Highway 90 crossing</td>
<td></td>
<td>Two records</td>
</tr>
<tr>
<td>1987</td>
<td>Unspecified locations</td>
<td>Corman 1988, p. 88</td>
<td>12 individuals</td>
</tr>
<tr>
<td>1996</td>
<td>Lewis Spring</td>
<td>HDMS</td>
<td>Single individual; photo-vouchered</td>
</tr>
<tr>
<td>2006</td>
<td>“South of Fairbank”</td>
<td>Miscione 2009</td>
<td>Number of animals not disclosed</td>
</tr>
<tr>
<td>2007</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Predicted Population Status: Likely low density**

**Effects of the Action – Northern Mexican Gartersnake**

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.

Effects to northern Mexican gartersnakes are most likely to occur at project sites within the LCNCA and the SPRNCA. Within the LCNCA, we anticipate effects to northern Mexican gartersnakes are most likely to occur at the following sites: Empire Ranch Headquarters, Cienega Creek Crossing, Empire Gulch Crossing, and Gardner Canyon Crossing. On the SPRNCA, we anticipate effects to northern Mexican gartersnakes to occur at Boquillas Ranch/Access Road, Curtis Ranch, Fairbank, Fortner, and West Escalante sites.

Adverse effects to northern Mexican gartersnakes at these project sites can occur both when the species is active on or near the ground surface or potentially when the gartersnakes are otherwise dormant during the cold season. Northern Mexican gartersnakes may be on or near the surface, and therefore vulnerable to adverse effects from the proposed action, any day of the year when the nighttime low exceeds 32°F (Emmons 2016a). Northern Mexican gartersnakes may be exposed to physical injury or death from the use of heavy or specialized equipment (such as
grubbing, mulching, mowing, moving/collecting debris for pile burning etc.) and power tools (i.e. weed eaters, vegetation mowers, etc.). When debris that has been scattered and left to cure prior to piling and burning it may become a source of cover for resident gartersnakes. Gartersnakes may then be disturbed and forced to flee during the process of collecting the debris after it has cured and before it is piled and burned. When the collection process is done by hand for lighter-weight debris, it is less likely any gartersnake using it for cover would be injured or killed unless the object was accidentally dropped on the animal during the process. However, when heavy machinery is used to move larger, heavier debris over the ground surface or lift up debris for pile placement, injury or death to gartersnakes has a higher likelihood of occurring. Effects from the collection of debris are anticipated to occur within the 500-year floodplain.

Lastly, adverse effects to northern Mexican gartersnakes, such as injury or death, may also occur when slash piles are burned after being left in place for an extended period of time, such as a month or more. Snakes and their prey use virtually all forms of cover, whether artificial or natural in origin, for various purposes including foraging, gestation, thermoregulation, and for protective cover for various periods of time. When these slash piles are subsequently burned, resident gartersnakes are forced to flee or they succumb to the smoke, heat, and/or flames and perish. The distance of these slash piles from the most-likely occupied habitat (habitat that maintains aquatic and semi-aquatic prey species) is an important characteristic in assessing the relative risk for injury or death to gartersnakes which may use them; the farther away, the less chance for harm. Another important factor is the length of time these piles remain in place after their construction and before they’re burned. The longer they’re left in place before burning, the greater the chance that one or more gartersnakes may be harmed.

Several attributes of the proposed project reduce the chances that northern Mexican gartersnakes could be adversely affected. The first is the relatively short amount of time (generally a week or less) anticipated for the work to be completed at each project site. These relatively short work windows lessen the likelihood that one or more northern Mexican gartersnakes would be located on the project site, especially when similar beneficial habitat attributes are replicated adjacent to any of the given project sites. Secondly, the amount of acreage treated affects the likelihood one or more northern Mexican gartersnakes could be on site during a treatment. Many if not most of the treatment sites analyzed for this project are relatively small-sized, lessening the odds of gartersnake occupation. A third important project attribute that reduces the risk of adverse effects to northern Mexican gartersnakes is that, while northern Mexican gartersnakes have been documented one mile away from the nearest surface water, slash piles intended for burning will be constructed a considerable distance from the most-suitable gartersnake habitat (nearest to semi-aquatic or aquatic prey communities). The BLM has also committed to burning piles within 5 days of their construction which should minimize the likelihood that any given pile becomes used for cover by a northern Mexican gartersnake prior to its burning. The multitude of conservation measures and best management practices that are associated with the proposed action also help minimize effects to habitat and prey species. We also acknowledge the beneficial effect of the project’s purpose: reducing the threat of wildfire in riparian habitat, which has great value to the conservation and recovery of rare and listed species which depend on it.
Proposed Critical Habitat

Primary constituent elements 1 and 2 address, wholly or partially, attributes that are considered important biological features for maintenance of northern Mexican gartersnake populations. Those primary constituent elements that could be adversely affected by the proposed action include “…Shoreline habitat with adequate organic and inorganic structural complexity to allow for thermoregulation, gestation, shelter, protection from predators, and foraging opportunities (e.g., boulders, rocks, organic debris such as downed trees or logs, debris jams, small mammal burrows, or leaf litter)” and “Adequate terrestrial space (600 ft. (182.9 m)) lateral extent to either side of bankfull stage adjacent to designated stream systems with sufficient structural characteristics to support life-history functions such as gestation, immigration, emigration, and brumation (extended inactivity).” Proposed project activities that reduce, remove, or alter ground cover characteristics such as those identified immediately above which pertain to the use of heavy, specialized, or powered equipment are most likely to affect these primary constituent elements. However, we offered our concurrence that these potential effects are not likely to adversely affect proposed critical habitat for the northern Mexican gartersnake, largely because the area affected was relatively small and because affected habitat attributes are replicated adjacent to treatment sites and therefore not effectively removed from the habitat in any significant amount.

Cumulative Effects – Northern Mexican Gartersnake

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. 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 Act.

The most ubiquitous cumulative effects to northern Mexican gartersnakes in both the LCNCA and SPRNCA pertain to road use and management as well as various forms of human recreation. Roads are notorious sources of mortality in affected snake populations. Roads pose unique threats to herpetofauna, and specifically to snakes, their prey base, and in some cases, to their habitat. Roads may cumulatively impact snakes through the following mechanisms: (1) fragmentation, modification, and destruction of habitat; (2) increase in genetic isolation; (3) alteration of movement patterns and behaviors; (4) facilitation of the spread of nonnative species via human vectors (i.e. bait-bucket transfers); (5) an increase in recreational access and the likelihood of subsequent, decentralized urbanization; (6) interference with or inhibition of reproduction; (7) contributions of pollutants to riparian and aquatic communities; (8) reduction of prey communities; and (9) acting as population sinks (when population death rates from vehicle strikes exceed birth rates in a given area) (Rosen and Lowe 1994; Waters 1995; Foreman and Alexander 1998; Trombulak and Frissell 2000; Carr and Fahrig 2001; Hels and Buchwald 2001; Smith and Dodd 2003; Angermeier et al. 2004; Shine et al. 2004; Andrews and Gibbons 2005; Wheeler et al. 2005; Roe et al. 2006; Sacco 2007; Ouren et al. 2007; Jones et al. 2011; Hellekson 2012a, pers. comm.). Perhaps the most common factor in road mortality of snakes in particular is the propensity for drivers to unintentionally and intentionally run them over, both because people often dislike snakes (Rosen and Schwalbe 1988; Ernst and Zug 1996; Green 1997; Nowak and Santana-Bendix 2002) and because they can be difficult to avoid when
stretched-out, crossing roads at perpendicular angles (Klauber 1956; Langley et al. 1989; Shine et al. 2004).

Forms of human recreation such as hiking, hunting, fishing, bird watching, geocaching, off-roading, sight-seeing, etc. occur in public natural areas such as the LCNCA and SPRNCA, which is why dedicated recreation sites, roads, and various forms of primitive infrastructure are provided and maintained in such areas. Recreation can also bring people into direct contact with wildlife including northern Mexican gartersnakes. Unfortunately, a fear of snakes is generally and universally embedded in modern culture and is prevalent in the United States (Rosen and Schwalbe 1988; Ernst and Zug 1996; Green 1997; Nowak and Santana-Bendix 2002). “Adverse human interaction” refers to the act of humans directly injuring or killing snakes out of a sense of fear or anxiety (ophidiophobia), or for no apparent purpose. Several examples of adverse human interactions are provided in the species’ final listing rule (79 FR 38678). Any form of recreation that adversely affects habitat characteristics (i.e. severe off-roading) or prey communities (i.e. recreational fishing and factors directly associated) indirectly and adversely affects resident northern Mexican gartersnakes. Effects of cumulative actions that pertain specifically to aquatic habitat need not occur in the action area to affect a given species; they are connected biologically through the hydrology of the waterways themselves and terrestrially through affects to watershed function.

**Concurrence – Northern Mexican Gartersnake**

We concur that implementation of this project as proposed may affect, but is not likely to adversely affect the northern Mexican gartersnake or its proposed critical habitat at all sites discussed above in the this document with the exception of the following fuel break treatment sites: Empire Ranch Headquarters, Cienega Creek Crossing, Empire Gulch Crossing, and Gardner Canyon Crossing treatment sites on the LCNCA and the Boquillas Ranch/Access Road, Curtis Ranch, Fairbank, Fortner, and West Escalante treatment sites on the SPRNCA. Our rationale for concurrence pertaining to all other sites is provided within each site by site description above (as applicable), and is based on factors outlined in our discussion entitled “Effects Analysis Framework,” also above.

**Conclusion – Northern Mexican Gartersnake**

After reviewing the current status of the northern Mexican gartersnake and its proposed critical habitat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the northern Mexican gartersnake, and is not likely to destroy or adversely modify its proposed critical habitat at the Empire Ranch Headquarters, Cienega Creek Crossing, Empire Gulch Crossing, and Gardner Canyon Crossing treatment sites on the LCNCA and the Boquillas Ranch/Access Road, Curtis Ranch, Fairbank, Fortner, and West Escalante treatment sites on the SPRNCA. We base this conclusion on the following:

1) The cumulative size of all the proposed treatment sites where northern Mexican gartersnakes may be adversely affected is extremely small compared to the total acreage
of potentially occupied habitat throughout range of the species as well as the amount of proposed critical habitat.

2) Conservation measures and best management practices which are part of the proposed action reduce its effects on habitat as well as the northern Mexican gartersnakes’ prey community, which reduces, overall, the projects’ indirect effects to the species to a negligible level.

The conclusions of this biological opinion are based on full implementation of the project as described in the “Description of the Proposed Action” section of this document, including any Conservation Measures that were incorporated into the project design.

**INCIDENTAL TAKE STATEMENT – Northern Mexican Gartersnake**

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act 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.

The measures described below are non-discretionary, and must be undertaken by the (agency) so that they become binding conditions of any grant or permit issued to the (applicant), as appropriate, for the exemption in section 7(o)(2) to apply. The (agency) has a continuing duty to regulate the activity covered by this incidental take statement. If the (agency) (1) fails to assume and implement the terms and conditions or (2) fails to require the (applicant) to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the (agency or applicant) must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement. [50 CFR § 402.14(i)(3)]

**Amount or Extent of Take – Northern Mexican Gartersnake**

We anticipate ten northern Mexican gartersnakes will be taken as a result of this proposed action over the life of the project. Incidental take is expected to be in the form of harm. We anticipate that incidental take will be difficult to detect because taken northern Mexican gartersnakes may
not be visible on the ground surface and by their nature are secretive, quick, silent, and very
difficult to detect even in moderately simple habitat. For these reasons, we anticipate that more
individual snakes are likely to be taken than will be visibly detected. Therefore, take of northern
Mexican gartersnakes will be considered exceeded if more than two (2) individuals confirmed as
northern Mexican gartersnakes, cumulatively across the Empire Ranch Headquarters, Cienega
Creek Crossing, Empire Gulch Crossing, and Gardner Canyon Crossing treatment sites on the
LCNCA and the Boquillas Ranch/Access Road, Curtis Ranch, Fairbank, Fortner, and West
Escalante treatment sites on the SPRNCA, are visibly detected within any of the treatment sites
during project implementation.

Effect of the Take – Northern Mexican Gartersnake

In this biological opinion, we determined this level of anticipated take at the Empire Ranch
Headquarters, Cienega Creek Crossing, Empire Gulch Crossing, and Gardner Canyon Crossing
treatment sites on the LCNCA and the Boquillas Ranch/Access Road, Curtis Ranch, Fairbank,
Fortner, and West Escalante treatment sites on the SPRNCA, is not likely to result in jeopardy to
the species nor likely to result in destruction or adverse modification of proposed critical habitat
for the reasons stated in the Conclusions section.

Reasonable and Prudent Measures – Northern Mexican Gartersnake

The following reasonable and prudent measure(s) are necessary and appropriate to minimize take
of northern Mexican gartersnakes:

1. The BLM shall ensure that an annual report is submitted detailing the progress made
   in project implementation for the corresponding calendar year and any information
   pertaining to incidental take of northern Mexican gartersnakes.

2. The BLM shall take precautions to minimize the risk of adverse effects to northern
   Mexican gartersnakes and their prey species associated with the burning of slash piles.

Terms and Conditions – Northern Mexican Gartersnake

In order to be exempt from the prohibitions of section 9 of the Act, the (agency) must comply
with the following term(s) and condition(s), which implement the reasonable and prudent
measure(s) described above and outline required reporting/monitoring requirements. This/these
term(s) and condition(s) is/are non-discretionary.

1a) The annual report submitted shall detail when work at treatment sites within the
   LCNCA and SPRNCA has been completed and what type of work is scheduled for
   treatment sites in these areas during the next calendar year.

1b) Any information pertaining to confirmed incidental take of a northern Mexican
   gartersnake must be accompanied by photo documentation which can confirm species
   identity.
2a) Slash piles at the Empire Ranch Headquarters, Cienega Creek Crossing, Empire Gulch Crossing, and Gardner Canyon Crossing treatment sites on the LCNCA and the Boquillas Ranch/Access Road, Curtis Ranch, Fairbank, Fortner, and West Escalante treatment sites on the SPRNCA. Following curing, mechanized equipment and hand piling will be used to build burn piles and piles for ignition the same week (5 days or less). A biologist must be on site during the collection and burning of material to ensure likely gartersnake cover is identified and care is taken when disturbing, moving, or piling such cover. A biologist experienced with snake identification should be in-place when likely cover is disturbed or moved, and be prepared to hand-capture any nonvenomous snakes discovered underneath for subsequent photo documentation if suspected to be a gartersnake (*Thamnophis* sp.). A close-range photo may also serve this purpose but only if hand-capture is ruled impossible. It is recognized that hand capture and positive identification may be difficult as snakes can be highly elusive.
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The Chiricahua leopard frog was listed as a threatened species without critical habitat in a Federal Register notice dated June 13, 2002. Included was a special rule to exempt operation and maintenance of livestock tanks on non-Federal lands from the section 9 take prohibitions of the Act. Final designation of critical habitat was made on March 20, 2012 (77 FR 16324) and included 39 sites in Arizona and New Mexico.

The frog is distinguished from other members of the *Lithobates pipiens* complex by a combination of characters, including a distinctive pattern on the rear of the thigh consisting of small, raised, cream-colored spots or tubercles on a dark background; dorsolateral folds that are interrupted and deflected medially; stocky body proportions; relatively rough skin on the back and sides; and often green coloration on the head and back (Platz and Mecham 1979). The species also has a distinctive call consisting of a relatively long snore of 1 to 2 seconds in duration (Platz and Mecham 1979, Davidson 1996). Snout-vent lengths of adults range from approximately 2.1 to 5.4 inches (Platz and Mecham 1979, Stebbins 2003). The Ramsey Canyon leopard frog (*Lithobates* “*subaquavocalis*”), found on the eastern slopes of the Huachuca Mountains, Cochise County, Arizona, has recently been subsumed into *Lithobates chiricahuensis* (Crother 2008) and recognized by the FWS as part of the listed entity (U.S. Fish and Wildlife Service [USFWS] 2009).

The range of the Chiricahua leopard frog includes central and southeastern Arizona; west-central and southwestern New Mexico; and, in Mexico, northeastern Sonora, the Sierra Madre Occidental of northwestern and west-central Chihuahua, and possibly as far south as northern Durango (Platz and Mecham 1984, Degenhardt *et al.* 1996, Lemos-Espinal and Smith 2007, Rorabaugh 2008). Reports of the species from the State of Aguascalientes (Diaz and Diaz 1997) are questionable. The distribution of the species in Mexico is unclear due to limited survey work and the presence of closely related taxa (especially *Lithobates lemosespinali*) in the southern part of the range of the Chiricahua leopard frog. Historically, the frog was an inhabitant of a wide variety of aquatic habitats, including cienegas, pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations of 3,281 to 8,890 feet. However, the species is now limited primarily to headwater streams, springs and cienegas, and cattle tanks into which nonnative predators (e.g. sportfishes, American bullfrogs, crayfish, and tiger salamanders) have not yet invaded or where their numbers are low (USFWS 2007). The large valley-bottom cienegas, rivers, and lakes where the species occurred historically are populated with nonnative predators at densities with which the species cannot coexist.

The primary threats to this species are predation by nonnative organisms and die offs caused by a fungal skin disease – chytridiomycosis (caused by the skin fungus, *Batrachochytrium dendrobatidis* (*Bd*)). Additional threats include drought, floods, degradation and loss of habitat as a result of water diversions and groundwater pumping, poor livestock management, altered fire regimes due to fire suppression and livestock grazing, mining, development, and other human activities; disruption of metapopulation dynamics, increased chance of extirpation or extinction resulting from small numbers of populations and individuals, and environmental contamination (USFWS 2007). Loss of Chiricahua leopard frog populations is part of a pattern of global amphibian decline, suggesting other regional or global causes of decline may be
important as well (Carey et al. 2001). Witte et al. (2008) analyzed risk factors associated with disappearances of ranid frogs in Arizona and found that population loss was more common at higher elevations and in areas where other ranid population disappearances occurred. Disappearances were also more likely where introduced crayfish occur, but were less likely in areas close to a source population of frogs.

Based on 2009 data, the species is still extant in the major drainage basins in Arizona and New Mexico where it occurred historically; with the exception of the Little Colorado River drainage in Arizona and possibly the Yaqui drainage in New Mexico. It has not been found recently in many rivers within those major drainage basins, valleys, and mountains ranges, including the following in Arizona: White River, West Clear Creek, Tonto Creek, Verde River mainstem, San Francisco River, San Carlos River, upper San Pedro River mainstem, Santa Cruz River mainstem, Aravaipa Creek, Babocomari River mainstem, and Sonoita Creek mainstem. In southeastern Arizona, no recent records (1995 to the present) exist for the Pinaleño Mountains or Sulphur Springs Valley. Once thought to be extirpated from the Chiricahua Mountains, the species now occurs in Cave Canyon, in the vicinity of the Southwestern Research Station operated by the Smithsonian Institution. The species is now absent from all but one of the southeastern Arizona valley bottom cienega complexes. In many of these regions Chiricahua leopard frog were not found for a decade or more despite repeated surveys.

As of 2009, there were 84 sites in Arizona at which Chiricahua leopard frog occur or are likely to occur in the wild, with an additional four captive or partially captive refugia sites. At least 33 of the wild sites support breeding. In New Mexico, 15-23 breeding sites were known in 2008; the frogs occur at additional dispersal sites. The species has been extirpated from about 80 percent of its historical localities in Arizona and New Mexico. Nineteen and eight localities are known from Sonora and Chihuahua, respectively. The species’ current status in Mexico is poorly understood; however, it has been found in recent years in western Chihuahua. Some threats, such as introduced nonnative predators and the threat of catastrophic wildfire, appear to be less important south of the border, particularly in the mountains where Chiricahua leopard frog have been found (Gingrich 2003, Rosen and Melendez 2006, Rorabaugh 2008).

The chytridiomycete skin fungus, *Batrachochytrium dendrobatidis* (*Bd*), the organism that causes chytridiomycosis, is responsible for global declines of frogs, toads, and salamanders (Berger et al. 1998, Longcore et al. 1999, Speare and Berger 2000, Hale 2001). Decline or extinction of about 200 amphibian species worldwide has been linked to the disease (Skerratt et al. 2007). In Arizona, *Bd* infections have been reported from numerous populations of Chiricahua leopard frog in southeastern Arizona and one population on the Tonto National Forest, as well as populations of several other frogs and toads in Arizona (Morell 1999, Davidson et al. 2000, Sredl and Caldwell 2000, Hale 2001, Bradley et al. 2002, USFWS 2007). In New Mexico, chytridiomycosis appears to be widespread in populations in west-central New Mexico, where it often leads to population extirpation. A threats assessment conducted for the species during the development of the recovery plan identified *Bd* as the most important threat to the frog in recovery units 7 and 8 in New Mexico. In recovery unit 6, which includes much of the mountainous region of west-central New Mexico, *Bd* and nonnative predators were together
identified as the most important threats. Die-offs from disease typically occur during the cooler months from October-February (USFWS 2007).

The role of the *Bd* fungus in the population dynamics of the Chiricahua leopard frog is as yet undefined. Some populations are driven to extinction soon after the animals become symptomatic; however, other Chiricahua leopard frog populations can exist with the pathogen for years (USFWS 2007). For instance, the frog has coexisted with *Bd* in Sycamore Canyon, Santa Cruz County, Arizona since at least 1972. That is the earliest record for *Bd* in the western United States, which roughly corresponds to the first observed mass die-offs of ranid frogs in Arizona. Even in cases where populations exist with the disease, it is an additional stressor, resulting in periodic die-offs that increase the likelihood of extirpation and extinction.

Epizootiological data from Central America and Australia (high mortality rates, wave-like spread of declines, wide host range) suggest introduction of the disease into previously uninfected populations and the disease subsequently becoming enzootic in some areas. Alternatively, the fungus may be a widespread organism that has emerged as a pathogen because of either higher virulence or an increased host susceptibility caused by other factors such as environmental changes (Berger *et al.* 1998), including changes in climate or microclimate, contaminant loads, increased UV-B radiation, or other factors that cause stress (Pounds and Crump 1994; Carey *et al.* 1999, 2001; Daszak 2000). Morehouse *et al.* (2003) found low genetic variability among 35 *Bd* strains from North America, Africa, and Australia, suggesting that the first hypothesis – that it is a recently emerged pathogen that has dispersed widely – is the correct hypothesis.

The infection intensity or lethal threshold of *Bd* is perhaps more important to control than the prevalence of infection (the proportion of infected hosts). Efforts to limit multiple exposures to the pathogen can prevent the host population from reaching the lethal threshold of zoospores per frog. In a nine to 13 year study by Vredenberg *et al.* (2010), a *Bd* infection took three years to spread until nearly all the 88 yellow-legged frog populations at a lake were infected. A lethal threshold of about 10,000 zoospores of the fungus per frog caused the collapse of these amphibian populations with *Bd*. Within a population, as the infection prevalence reached 100%, the infection intensity on individual frogs increased in parallel. Frog mass mortality began only when infection intensity reached a critical threshold and repeatedly led to extinction of populations. Our results indicate that the high growth rate and virulence of *Bd* allow the near-simultaneous infection and buildup of high infection intensities in all host individuals; subsequent host population crashes therefore occur before *Bd* is limited by density-dependent factors. Preventing infection intensities in host populations from reaching this threshold could provide an effective strategy to avoid the extinction of susceptible amphibian species in the wild. Because of a threshold of zoospores per frog must be reached before it results in mortality, there is a time lag between exposure to the pathogen and mortality. This time lag allows for the spread of the pathogen throughout the amphibian population before the population crashes. Unlike other pathogens that disappear as their hosts decline in numbers, this pathogen can cause the extirpation of its host population (Blaustein and Johnson 2010).

Because of this threshold, there is a time lag between exposure and mortality, so the pathogen can spread through much of the amphibian population before disease-driven reductions in host
density negatively affect the transmission of \textit{Bd}. Consequently, the pathogen can cause the loss and extinction of its host population, unlike the many other pathogens that disappear as their hosts decline in numbers (Blaustein and Johnson 2010).

Retrospective analysis revealed presence of chytridiomycosis in wild African clawed frogs (\textit{Xenopus laevis}) dating to 1938 (Weldon \textit{et al.} 2004). African clawed frogs were exported to many areas of the globe from Africa for use in human pregnancy testing beginning in the 1930s. Some of the test frogs escaped or were released and established populations in California, Arizona, and other areas. Although other explanations for the origin of the disease are viable, Weldon \textit{et al.} (2004) suggest that Africa is where the disease originated and that international trade in African clawed frogs was the means of disease dissemination.

If the disease was introduced to the Southwest via escaped or released clawed frogs, it may have spread across the landscape by human introductions or natural movements of secondarily-infected American bullfrogs, tiger salamanders, or leopard frogs. If this is the case, its rapid establishment and spread could be attributable to humans. \textit{Bd} does not have an airborne spore, so it must spread via other means. Amphibians in the international pet trade (Europe and USA), outdoor pond supplies (USA), zoo trade (Europe and USA), laboratory supply houses (USA), and species recently introduced (\textit{Rhinella marinus} in Australia and American bullfrog in the USA and Uruguay) have been found infected with \textit{Bd}, suggesting human-induced spread of the disease (Daszak 2000, Mazzoni \textit{et al.} 2003).

Free-ranging healthy bullfrogs with low-level \textit{Bd} infections have been found in southern Arizona (Bradley \textit{et al.} 2002). Tiger salamanders and bullfrogs can carry the disease without exhibiting clinically significant or lethal infections. When these animals move, or are moved by people, among aquatic sites, \textit{Bd} may be carried with them (Collins \textit{et al.} 2003, Picco and Collins 2008). Other native or nonnative frogs may serve as disease vectors or reservoirs of infection, as well (Bradley \textit{et al.} 2002). Green and Dodd (2007) found \textit{Bd} in bullfrogs at a fish hatchery in Georgia and suggested the disease could be moved with stocks of fish. Since that study, \textit{Bd} was confirmed from a bullfrog captured at the Bubbling Ponds Hatchery in Arizona (V. Boyarski, pers. comm.). \textit{Bd} could also be spread by tourists or fieldworkers sampling aquatic habitats (Halliday 1998). The fungus can exist in water or mud and thus could be spread by wet or muddy boots, vehicles, cattle, fishing gear, and other animals moving among aquatic sites, or during scientific sampling of fish, amphibians, or other aquatic organisms. The AESO and AGFD are employing preventative measures to ensure the disease is not spread by aquatic sampling.

Numerous studies indicate that declines and extirpations of Chiricahua leopard frog are at least in part caused by predation and possibly competition by nonnative organisms, including fishes in the family Centrarchidae (\textit{Micropterus} spp., \textit{Lepomis} spp.), bullfrogs, tiger salamanders (\textit{Ambystoma mavoritium mavoritium}), crayfish (\textit{Orconectes virilis} and possibly others), and several other species of fishes (Clarkson and Rorabaugh 1989; Sredl and Howland 1994; Fernandez and Bagnara 1995; Rosen \textit{et al.} 1996, 1994; Snyder \textit{et al.} 1996; Fernandez and Rosen 1996, 1998). For instance, in the Chiricahua region of southeastern Arizona, Rosen \textit{et al.} (1996) found that almost all perennial waters investigated that lacked introduced predatory vertebrates
supported Chiricahua leopard frogs. All waters except three that supported introduced vertebrate predators lacked Chiricahua leopard frogs. Sredl and Howland (1994) noted that Chiricahua leopard frogs were nearly always absent from sites supporting bullfrogs and nonnative predatory fish. Rosen et al. (1996) suggested further study was needed to evaluate the effects of mosquitofish, trout, and catfish on frog presence.

The effect of mosquitofish on Chiricahua leopard frog populations could be influenced by factors such as abundant escape cover, high adult frog survivorship, and high reproductive output in terms of numbers of frog egg masses produced. Examination of studies with other ranid frog species illustrates the likely effects of trout on Chiricahua leopard frog. The relationship between trout and amphibian decline has best been documented with the Mountain yellow-legged frog (Rana muscosa) in high lakes of the Sierra Nevada, California. Several authors have concluded that predation by introduced trout and charr (Salvelinus spp.) into these previously fishless lakes have eliminated many populations of this species (Bradford 1989, Bradford et al. 1993, Knapp and Mathews 2000, Vredenburg et al. 2005). One of the threats that lead to the listing of the southern California populations of the Mountain yellow-legged frog was predation by introduced trout. However, other factors, including chytridiomycosis and pesticides, are possible contributors to the decline of the species as well (Fellers et al. 2001, 2004; Vredenburg et al. 2005). Predation by trout has also been also implicated as a factor in decline or population loss in the Cascades frog (Rana cascadae, Fellers et al. 2007) and Columbia spotted frog (Rana luteiventris, Reaser and Pilliod 2005).

Disruption of metapopulation dynamics is likely an important factor in regional loss of populations (Sredl and Howland 1994, Sredl et al. 1997). Chiricahua leopard frog populations are often small and habitats are dynamic, resulting in a relatively low probability of long-term population persistence. Historically, populations were more numerous and closer together. If populations became extirpated due to drought, disease, or other causes, these sites could be re-colonized via immigration from nearby populations. However, as numbers of populations declined, populations became more isolated and were less likely to be re-colonized if extirpation occurred. Also, most of the larger source populations along major rivers and in cienega complexes have disappeared.

Wildfires have affected Chiricahua leopard frog habitat. On May 29, 2011, Arizona’s largest wildfire in recorded history started, known as the Wallow Fire. The Wallow Fire consumed 538,049 acres of montane conifer forest on the Apache-Sitgreaves National Forest and likely adversely affected proposed critical habitat in Unit 27, Campbell Blue and Coleman Creeks, although as of October 2010, little information is available on the post-fire status of potential Chiricahua leopard frog habitat within the fire footprint. Since many tanks and springs that are important for recovery of the species in this area occur in meadows, sediment flows may not affect them as they would habitat within canyon bottoms.

Waters at the Beatty’s Guest Ranch in the Huachuca Mountains, until recently, supported one of the most robust and dense populations of Chiricahua leopard frogs. On June 12, 2011, the Monument Fire started 4-miles east of Hereford, Arizona; ultimately consuming 30,526 acres and significantly affecting a portion of the Huachuca Mountains, including Miller Canyon and
the Beatty Guest Ranch. Subsequent monsoon precipitation in the region liberated significant amounts of top soil and sediment which scoured the canyon bottom and filled-in the majority of ponds and suitable habitat for the frog in lower Miller Canyon on the Ranch. The remaining population at the Ranch represents a small fraction of its former number.

The Greaterville Fire started on May 2, 2011, and may have affected dispersal habitat along the eastern bajada of the Santa Rita Mountains (proposed critical habitat Units 7 and 8), but that fire was less severe, comparatively small-sized, and of shorter duration.

Fire frequency and intensity in Southwestern forests are much altered from historical conditions (Dahms and Geils 1997). Before 1900, surface fires generally occurred at least once per decade in montane forests with a pine component. Beginning about 1870-1900, these frequent ground fires ceased to occur due to intensive livestock grazing that removed fine fuels, followed by effective fire suppression in the mid to late 20th century (Swetnam and Baisan 1996). Absence of ground fires allowed a buildup of woody fuels that precipitated infrequent but intense crown fires (Swetnam and Baisan 1996, Danzer et al. 1997). Absence of vegetation and forest litter following intense crown fires exposes soils to surface and rill erosion during storms, often causing high peak flows, sedimentation, and erosion in downstream drainages (DeBano and Neary 1996). These post-fire events have likely resulted in scouring or sedimentation of frog habitats (Wallace 2003).

An understanding of the dispersal abilities of Chiricahua leopard frogs is the key to determining the likelihood that suitable habitats will be colonized from a nearby extant population of frogs. As a group, leopard frogs are surprisingly good at dispersal. In Michigan, young northern leopard frogs (Lithobates pipiens) commonly move up to 0.5 mile from their place of metamorphosis, and three young males established residency up to 8.4 miles from their place of metamorphosis (Dole 1971). Both adults and juveniles wander widely during wet weather (Dole 1971). In the Cypress Hills, southern Alberta, young-of-the-year northern leopard frogs successfully dispersed to downstream ponds 3.4 miles from the source pond, upstream 0.6 mile, and overland 0.6 mile. At Cypress Hills, a young-of-the-year northern leopard frog moved 5 miles in one year (Seburn et al. 1997). The Rio Grande leopard frog (Lithobates berlandieri) in southwestern Arizona has been observed to disperse at least one mile from any known water source during the summer rainy season (Rorabaugh 2005). After the first rains in the Yucatan Peninsula, leopard frogs have been collected a few miles from water (Campbell 1998). In New Mexico, Jennings (1987) noted collections of Rio Grande leopard frogs from intermittent water sources and suggested these were frogs that had dispersed from permanent water during wet periods.

Dispersal of leopard frogs away from water in the arid Southwest may occur less commonly than in mesic environments in Alberta, Michigan, or the Yucatan Peninsula during the wet season. However, there is evidence of substantial movements even in Arizona. Movement may occur via locomotion of frogs or passive movement of tadpoles along stream courses. The maximum distance moved by a radio-telemetered Chiricahua leopard frog in New Mexico was 2.2 miles in one direction (R. Jennings, Western New Mexico University, C. Painter, NMDGF, pers. comm. 2004). In 1974, Frost and Bagnara (1977) noted passive or active movement of Chiricahua and Plains (Lithobates blairi) leopard frogs for 5 miles or more along East Turkey
Creek in the Chiricahua Mountains. In August, 1996, Rosen and Schwalbe (1998) found up to 25 young adult and subadult Chiricahua leopard frog at a roadside puddle in the San Bernardino Valley, Arizona. They believed that the only possible origin of these frogs was a stock tank located 3.4 miles away. Rosen et al. (1996) found small numbers of Chiricahua leopard frog at two locations in Arizona that supported large populations of nonnative predators. The authors suggested these frogs could not have originated at these locations because successful reproduction would have been precluded by predation. They found that the likely source of these animals were populations 1.2-4.3 miles distant. In September 2009, 15-20 Chiricahua leopard frog were found at Peña Blanca Lake west of Nogales. The nearest likely source population is Summit Tank, a straight line distance of 3.1 miles overland and approximately 4.1 miles along intermittent drainages.

Movements away from water do not appear to be random. Streams are important dispersal corridors for young northern leopard frogs (Seburn et al. 1997). Displaced northern leopard frogs will home, and apparently use olfactory and auditory cues, and possibly celestial orientation, as guides (Dole 1968, 1972). Rainfall or humidity may be an important factor in dispersal because odors carry well in moist air, making it easier for frogs to find other wetland sites (Sinsch 1991). Based on these studies, the Chiricahua leopard frog recovery plan (USFWS 2007) provides a general rule on dispersal capabilities. Chiricahua leopard frogs are assumed to be able to disperse one mile overland, three miles along ephemeral drainages, and five miles along perennial water courses.

A recovery plan has been completed (USFWS 2007), the goal of which is to improve the status of the species to the point that it no longer needs the protection of the Endangered Species Act. The recovery strategy calls for reducing threats to existing populations; maintaining, restoring, and creating habitat that will be managed in the long term; translocation of frogs to establish, reestablish, or augment populations; building support for the recovery effort through outreach and education; monitoring; conducting research needed to provide effective conservation and recovery; and application of research and monitoring through adaptive management. Recovery actions are recommended in each of eight recovery units throughout the range of the species. Management areas are also identified within recovery units where the potential for successful recovery actions is greatest.


**Critical Habitat**

The 2012 final rule includes 39 critical habitat units across the range of the species in Arizona and New Mexico. Based on the above needs and our current knowledge of the life history, biology, and ecology of the species, and the habitat requirements for sustaining the essential life-history functions of the species, we have determined the physical or biological features (the general habitat features upon which a species depends), as described by the primary constituent
elements (or PCEs)(the more specific habitat parameters defining the physical and biological features), essential to the conservation of the Chiricahua leopard frog are:

1. Aquatic breeding habitat and immediately adjacent uplands exhibiting the following characteristics:
   a. Standing bodies of fresh water (with salinities less than 5 parts per thousand, pH greater than or equal to 5.6, and pollutants absent or minimally present), including natural and manmade (e.g., stock) ponds, slow-moving streams or pools within streams, off-channel pools, and other ephemeral or permanent water bodies that typically hold water or rarely dry for more than a month. During periods of drought, or less than average rainfall, these breeding sites may not hold water long enough for individuals to complete metamorphosis, but they would still be considered essential breeding habitat in non-drought years.
   b. Emergent and or submerged vegetation, root masses, undercut banks, fractured rock substrates, or some combination thereof, but emergent vegetation does not completely cover the surface of water bodies.
   c. Nonnative predators (e.g., crayfish, bullfrogs, nonnative fish) absent or occurring at levels that do not preclude presence of the Chiricahua leopard frog.
   d. Absence of chytridiomycosis, or if present, then environmental, physiological, and genetic conditions are such that allow persistence of Chiricahua leopard frogs.
   e. Upland habitats that provide opportunities for foraging and basking that are immediately adjacent to or surrounding breeding aquatic and riparian habitat.

2. Dispersal and nonbreeding habitat, consisting of areas with ephemeral (present for only a short time), intermittent, or perennial water that are generally not suitable for breeding, and associated upland or riparian habitat that provides corridors (overland movement or along wetted drainages) for frogs among breeding sites in a metapopulation with the following characteristics:
   a. Are not more than 1.0 mile (1.6 kilometers) overland, 3.0 miles (4.8 kilometers) along ephemeral or intermittent drainages, 5.0 miles (8.0 kilometers) along perennial drainages, or some combination thereof not to exceed 5.0 miles (8.0 kilometers).
   b. In overland and nonwetted corridors, provide some vegetation cover or structural features (e.g., boulders, rocks, organic debris such as downed trees or logs, small mammal burrows, or leaf litter) for shelter, forage, and protection from predators; in wetted corridors, provide some ephemeral, intermittent, or perennial aquatic habitat.
   c. Are free of barriers that block movement by Chiricahua leopard frogs, including, but not limited to, urban, industrial, or agricultural development; reservoirs that are 50 acres (20 hectares) or more in size and contain nonnative predatory fish, bullfrogs, or crayfish; highways that do not include frog fencing and culverts; and walls, major dams, or other structures that physically block movement.

Status of the Chiricahua Leopard Frog in the Action Area

Empire Cienega Management Area – Due in large part to a ten-year effort intended to create, enhance, and protect habitat for at-risk species and remove the threat of harmful nonnative
species from within the Las Cienegas NCA, the Empire Cienega MA is now capable of supporting a functioning metapopulation of frogs within the action area, but for the effect of Bd (see below). The Las Cienegas NCA metapopulation has included 10 sites where breeding has occurred since at least 2012: Empire Spring in Empire Cienega, Headwaters Reach of Cienega Creek, Cold Spring Reach of Cienega Creek just upstream of the confluence with Mattie Canyon, and 7 wildlife ponds including Cinco Well, Cottonwood, Empire Well, Gaucho, Maternity Well, Spring Water Wetlands, and Road Canyon Tank.

Empire Spring, located about 4 miles upstream of Cienega Creek in Empire Gulch, is the most consistent source population for Chiricahua leopard frogs in this metapopulation. The Empire Spring population has persisted since at least the 1990s when records began in the area, and has increased in recent years from about 7 observed individuals to 100s of frogs detected in 2015 (Hall et al. 2015). Frogs were also documented at Cieneguita Wetlands throughout 2015, although breeding was not observed at this site.

Frogs have been known to disperse to numerous sites during the monsoon season, including 12 sites in 2015, three of which were new detection sites for the species (Rattlesnake Tank, Karen’s Tank, and Clyne Pond; Hall et al. 2015). As of April 2016, approximately 20 surveys have occurred in the Las Cienegas NCA (Hall 2016b). Hall (2016b) found that metamorphosed frogs at all surveyed lentic sites experienced 100 percent mortality over the 2015-2016 winter; tadpoles remain extant at these sites, but two lentic sites where Bd is absent, Hilton Tank and Cline Pond, still maintain metamorphosed frogs. There are three lotic sites where metamorphosed Chiricahua leopard frogs survived the 2015-2016 winter: Empire Spring, and both the Headwaters and Cold Spring reaches of Cienega Creek; these sites all tested positive for the presence of Bd (Hall 2016b). Currently unoccupied sites where releases may occur include Cinco Ponds, Frog Tank and eight other stock tanks within the action area; these are considered included as part of the baseline in this consultation.

As part of the larger conservation effort on Las Cienegas NCA, nonnative aquatic species removal followed by captive propagation-headstarting-release of Chiricahua leopard frogs took place from 2010-2012, resulting in recent recovery successes. Partners continue to monitor Chiricahua leopard frog populations, disease (Bd), and bullfrog presence (Rosen et al. 2013, Hall et al. 2015). The most significant threat in this area is Bd. Nearly all harmful nonnative species have been removed from the Las Cienegas NCA, but bullfrogs and crayfish are still present regionally and represent a potential, on-going threat on the larger landscape scale that includes other surrounding Chiricahua leopard frog MAs.

Chiricahua leopard frogs experience periodic die-offs from Bd in this MA. The most recent die-off was initially detected in the winter of 2014 and appears to continue presently since temperatures have dropped in 2015 (Hall et al 2015). The current die-off was documented at 7 of 10 sites sampled on Las Cienegas NCA in 2014 (Hall et al. 2015). These 7 sites are all wildlife ponds including Cinco Well, Cottonwood, Empire Well, Gaucho, Maternity Well, Spring Water Wetlands, and Road Canyon. Notably, die-offs were not detected at Empire Spring in Empire Gulch, nor in the Headwaters and Cold Spring reaches of Cienega Creek, although frogs sampled at Empire Spring carried zoospore loads of Bd considered to be below disease-level (Hall et al. 2015).
In spring 2015, surveys revealed that only tadpoles survived the winter in Cottonwood, Gaucho, and Road Canyon sites; Spring Water Wetlands and Maternity Well had no life stages present; and only a small number of adult frogs survived at Cinco Well and Empire Well sites, but adult survival appeared to be high at Empire Spring, Headwaters Reach, and Cold Spring Reach. In October and November 2015, dead and moribund frogs showing signs of Bd were again collected at all 5 remaining wildlife pond sites that experienced a die-off during the winter of 2014. The three lotic sites were also surveyed in November 2015 and no dead or moribund frogs were detected, but samples were collected to test for Bd (D. Hall, pers. comm. 2015). Both Cienega Creek and Empire Gulch are fed by springs which may provide a more thermally stable environment; this stable temperature environment is thought to prevent die-offs from the disease, although the mechanism is not clearly understood (Forrest and Schlaepfer 2011, Rowley and Alford 2013).

Potential, Bd-influenced population trends from 2015-2016 in both the Santa Rita and Empire MAs suggest a particular dynamic may be occurring. In simplified terms, sites that have supported Chiricahua leopard frogs in all age classes over successive years now may be behaving as “annual” sites where metamorphosed frogs succumb to Bd during their first winter, leaving only tadpoles present the following spring. These tadpoles may, in turn, metamorphose and even disperse to other sites where they might reproduce themselves, only to die from Bd in their first winter — again, leaving only tadpoles behind. We are uncertain what this trend, should it continue, may mean for these sites or these MAs as a whole, but are concerned that reproduction, and therefore recruitment, at affected sites may be significantly hampered at the least, or at worst, cease altogether. If this population dynamic persists, it would require active management through annual captive propagation-headstarting-release programs to keep metapopulations viable in these MAs.

**Effects of the Action – Chiricahua Leopard Frog**

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.

We anticipate that Chiricahua leopard frogs could be adversely affected at the Empire Gulch and Cienega Creek Crossing treatment sites on the LCNCA. Adverse effects to Chiricahua leopard frogs such as physical injury or death may occur from the use of heavy or specialized equipment (such as grubbing, mulching, mowing, etc.) or power tools (i.e. weed eaters, vegetation mowers, etc.). Generally, because the majority of the activities proposed at the project sites are scheduled to occur during the winter months or during the spring (up to but not exceeding May 15th), the likelihood of frogs being active and directly affected is lower – with precipitation patterns, amount, and timing, as well as the condition and extent of surface water at these crossings being important drivers of relative risk. Under normal circumstances, we expect resident Chiricahua
leopard frogs to be either dormant under extensive cover (during the coldest months) or tightly associated with waterbodies in the area (during the driest and hottest months). Therefore, under normal circumstances, Chiricahua leopard frogs will generally not be vulnerable to harm associated with the use of vegetation clearing equipment. However, frogs using Empire Spring are known to be surface active year round because it is a warm spring with remarkably stable water temperature year-around. We are aware of Chiricahua leopard frogs moving between Empire Gulch, Cienega Creek, and at least 12 different stock tanks but don't know when these movements are occurring.

The short work periods at these sites, the limited size of the treatment areas, and the array of conservation measures and best management practices further reduce the risk of indirect effects or injury or death to Chiricahua leopard frogs. However, because this consultation has no end date, circumstances could arise at some point in the future which could increase this risk. Such circumstances may include unseasonably wet weather during the spring which could drive frogs to more terrestrial surface activity, or changes in the size and permanency of the nearest waterbodies which could significantly increase the number of frogs in the immediate area and therefore the likelihood of exposure of any single frog to adverse effects of the action.

**Critical Habitat**

Primary constituent elements 1 and 2 for the Chiricahua leopard frog address important features pertaining to aquatic breeding habitat and terrestrial dispersal habitat, respectively. Aquatic habitat may be affected by potential increases to sediment inputs from activities proposed for these treatment sites. Terrestrial habitat may be affected by alterations to vegetation characteristics within potential dispersal corridors. We offered our concurrence above that potential adverse effects to Chiricahua leopard frog critical habitat are insignificant and discountable at these treatment sites generally because the area affected is small and because affected habitat attributes are replicated adjacent to treatment sites and therefore not effectively removed from the habitat in any significant amount. We also acknowledge that fuel break maintenance is critical to ensuring wildfire does not damage or destroy riparian and aquatic habitat and therefore minimizes the risk of potential frog extirpation in sites currently occupied by Chiricahua leopard frogs.

**Cumulative Effects – Chiricahua Leopard Frog**

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. 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 Act.

The BA describes cumulative effects which include potential fire risk from private property management in the surrounding area including greater Sonoita, as well as road use on the LCNCA by recreationists. We describe some of the general effects of recreation and road use in our discussion of effects to northern Mexican gartersnakes above, much of which is applicable here. Outside of these future non-federal activities, we could not identify additional cumulative
effects which are likely to significantly impact this analysis as it pertains to the Chiricahua leopard frog in this consultation.

**Concurrence – Chiricahua Leopard Frog**

We concur that implementation of this project as proposed may affect, but is not likely to adversely affect the Chiricahua leopard frog or its designated critical habitat at all sites discussed above in this document with the exception of the Empire Gulch and Cienega Creek Crossing treatment sites on the LCNCA. Our rationale for concurrence pertaining to all other sites is provided within each site by site description above (as applicable), and is based on factors outlined in our discussion entitled “Effects Analysis Framework,” also above.

**Conclusion – Chiricahua Leopard Frog**

After reviewing the current status of the Chiricahua leopard frog and its designated critical habitat, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Chiricahua leopard frog, and is not likely to destroy or adversely modify its designated critical habitat at the Empire Gulch and Cienega Creek Crossing treatment sites on the LCNCA. We base this conclusion on the following:

1) The cumulative size of the two proposed treatment sites where Chiricahua leopard frogs may be adversely affected is extremely small compared to the total acreage and number of sites within the overall range of the species.

2) Conservation measures and best management practices which are part of the proposed action reduce its effects on Chiricahua leopard frog habitat on a rangewide basis.

3) Periods of the year when work within these treatment sites is planned further reduce the likelihood that, in most years, Chiricahua leopard frogs would be exposed to potential adverse effects.

The conclusions of this biological opinion are based on full implementation of the project as described in the “Description of the Proposed Action” section of this document, including any Conservation Measures that were incorporated into the project design.

**INCIDENTAL TAKE STATEMENT – Chiricahua Leopard Frog**

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act 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.

The measures described below are non-discretionary, and must be undertaken by the (agency) so that they become binding conditions of any grant or permit issued to the (applicant), as appropriate, for the exemption in section 7(o)(2) to apply. The (agency) has a continuing duty to regulate the activity covered by this incidental take statement. If the (agency) (1) fails to assume and implement the terms and conditions or (2) fails to require the (applicant) to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the (agency or applicant) must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement. [50 CFR § 402.14(i)(3)]

Amount or Extent of Take – Chiricahua Leopard Frog

Due to the proximity of the Empire Gulch or Cienega Creek road crossing treatment sites to known, densely populated Chiricahua leopard frog sites on the LCNCA, we anticipate up to 40 Chiricahua leopard frogs will be taken as a result of this proposed action, over the life of the action. The incidental take is expected to be in the form of harm. We anticipate that incidental take will be difficult to detect because Chiricahua leopard frogs are small-sized and cryptic in nature, and because frogs may be subsurface when injured or killed. Therefore, take of Chiricahua leopard frogs will be considered exceeded if work in either the Empire Gulch or Cienega Creek road crossings occurs during conditions amenable to frog movement (actively raining) on more than four occasions over the life of the project.

Effect of the Take – Chiricahua Leopard Frog

In this biological opinion, the FWS determines that this level of anticipated take is not likely to result in jeopardy to the species nor destruction or adverse modification of critical habitat for the reasons stated in the Conclusions section.

Reasonable and Prudent Measures – Chiricahua Leopard Frog

The following reasonable and prudent measure(s) are necessary and appropriate to minimize take of Chiricahua leopard frogs:

1. The BLM shall ensure that an annual report is submitted detailing the progress made in project implementation for the corresponding calendar year and any information pertaining to incidental take of Chiricahua leopard frogs, as appropriate.
Terms and Conditions – Chiricahua Leopard Frog

In order to be exempt from the prohibitions of section 9 of the Act, the (agency) must comply with the following term(s) and condition(s), which implement the reasonable and prudent measure(s) described above and outline required reporting/monitoring requirements. This/these term(s) and condition(s) is/are non-discretionary.

1a) The annual report submitted shall detail when work at Empire Gulch Crossing and the Cienega Creek Crossing treatment sites within the LCNCA has been completed and what type of work is scheduled at these treatment sites during the next calendar year.

1b) Any information pertaining to confirmed incidental take of a Chiricahua leopard frog must be accompanied by photo documentation which can confirm species identity.

The reasonable and prudent measures, with their implementing terms and conditions, described above are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, the level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures provided. The BLM must immediately provide an explanation of the causes of the taking and review with the AESO the need for possible modification of the reasonable and prudent measures.

Disposition of Dead or Injured Listed Species

Upon locating a dead, injured, or sick listed species initial notification must be made to the FWS's Law Enforcement Office, 4901 Paseo del Norte NE, Suite D, Albuquerque, NM 87113; 505-248-7889) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve the biological material in the best possible state.

Reinitiation Notice

This concludes formal consultation on the action(s) outlined in the request. 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 retained (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 affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.
Certain project activities may also affect species protected under the Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 U.S.C. sec. 703-712) and/or bald and golden eagles protected under the Bald and Golden Eagle Protection Act (Eagle Act). The MBTA prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when authorized by the FWS. The Eagle Act prohibits anyone, without a FWS permit, from taking (including disturbing) eagles, and including their parts, nests, or eggs. If you think migratory birds and/or eagles will be affected by this project, we recommend seeking our Technical Assistance to identify available conservation measures that you may be able to incorporate into your project.

For more information regarding the MBTA and Eagle Act, please visit the following websites. More information on the MBTA and available permits can be retrieved from http://www.fws.gov/migratorybirds and http://www.fws.gov/migratorybirds/mbpermits.html. For information on protections for bald eagles, please refer to the FWS's National Bald Eagle Management Guidelines (72 FR 31156) and regulatory definition of the term "disturb" (72 FR 31132) published in the Federal Register on June 5, 2007 (http://www.fws.gov/southwest/es/arizona/BaldEagle.htm), as well at the Conservation Assessment and Strategy for the Bald Eagle in Arizona (SWBEMC.org).

Note that this also serves as a Conference Report for the proposed critical habitat for the western yellow-billed cuckoo and northern Mexican gartersnake. Given that the conference was informal and no additional recommendations were made, no future request for adoption of the Conference Report is necessary. No further section 7 consultation is required for this project at this time. Should project plans change, or if information on the distribution or abundance of listed species or critical habitat becomes available, our determinations may need to be reconsidered. In all future correspondence on this project, please refer to consultation number 02EAAZ00-2015-F-0431. We also encourage you to coordinate implementation of this project with the Arizona Game and Fish Department as appropriate and necessary.

Should you require further assistance or if you have any questions, please contact Jeff Servoss at (520) 670-6150 (x231) or Scott Richardson at (x242).

Steven L. Spangle

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cc (electronic copy):
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