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In reply refer to:

AESO/SE
02EAAZ00-2019-F-0046

July 17, 2019

Ms. Laura Jo West, Forest Supervisor
Coconino National Forest
1824 South Thompson Street
Flagstaff, Arizona 86001

RE: Oak Creek Canyon Fuels Reduction Project Biological Opinion

Dear Ms. West:

Thank you for your request for formal consultation with the U.S. Fish and Wildlife Service (FWS) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. § 1531-1544), as amended (Act). We received your letter dated September 20, 2018, via electronic mail on September 24, 2018. At issue are effects that may result from the proposed Oak Creek Canyon Fuels Reduction Project located in Coconino County, Arizona. The proposed action may affect the threatened narrow-headed gartersnake (*Thamnophis rufipunctatus*) and its proposed critical habitat.

In your letter, you requested our concurrence that the proposed action “may affect, but is not likely to adversely affect” the threatened Mexican spotted owl (*Strix occidentalis lucida*) and its critical habitat, and the threatened Gila trout (*Oncorhynchus gilae*). We concur with your determinations and include our rationales in Appendix A.

We based this biological opinion on information provided in the September 2018, biological assessment, telephone conversations, field investigations, and other sources of information. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, fuels reduction activities and their effects, or on other subjects considered in this opinion. A complete record of this consultation is on file at this office.

Consultation History

- September 24, 2018: The Forest Service initiated formal consultation.
- November 5, 2018: We sent the Forest Service a 30-day letter acknowledging our receipt of their consultation request and BA.

- December 21, 2018: Due to a lapse in appropriations, there was a partial government shutdown and we were unable to conduct any work for 35 days.
- January 28, 2019: The partial government shutdown ended, but we fell behind on deadlines for projects.
- July 12, 2018: We provided a draft biological opinion to Forest Service staff for review.
- July 17, 2018: The Forest Service reviewed the document and had no suggested edits.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The Oak Creek Canyon Fuels Reduction project is located in Oak Creek Canyon, located north of Sedona, Arizona. The project area begins at the north (upper) end of Oak Creek at the Sterling Springs Hatchery and continues downstream to the Grasshopper Day Use Recreation Site (Figure 1). The Forest Service signed the decision for the Environmental Assessment (EA) that authorized the fuels reduction project on November 11, 2007. This decision authorized fuels reduction to occur on 653 acres using mechanical hand cutting and thinning of vegetation; mechanical crushing; chipping, piling or removal of cut brush and trees; and, broadcast fire and pile burning of cut material. The intent of these fuels treatments is to decrease fuel accumulations and modify the vegetation composition to reduce fire intensity in treated areas, lessen the risk to firefighters during wildfire activity, and provide fuel breaks between private property and National Forest System (NFS) lands.

The Forest Service consulted on this project at the time under the 2001 Wildland Urban Interface (WUI) Regional Programmatic Consultation (#CL 04-005). This original consultation included the Mexican spotted owl, but did not address the Gila trout or narrow-headed gartersnake because the fish did not occur in the action area and we had not listed the gartersnake under the Act in 2001.

In October-November 2009, the Forest Service conducted mechanical hand cutting and piling on units 1-10, totaling 230 acres. Crews conducted prescribed fire in the fall/winter of 2010 on units 1-6, totaling 99 acres. In September-December 2011, crews conducted mechanical hand cutting and piling on units 8 and 11-15, totaling 285 acres. Crews conducted fire operations in fall/winter 2012 on units 8 and 11-15, totaling 275 acres treated.

In 2018, Forest Service staff conducted an interdisciplinary team (IDT) Section 18 review of the Oak Creek Fuels Reduction EA and staff recommended changes to the proposed action. Originally, there were 14 treatment polygons around private lands (the Forest Service numbered units from north to south); however, the IDT recommended removing treatment unit 10, reducing the size of treatment units 11 and 12, removing mechanical crushing of brush, and adding conservation measures to protect species listed since 2007.

More specifically, the Section 18 review authorized fuels reduction activities to occur on up to 400 acres of the Coconino National Forest, in Oak Creek Canyon. Fuels treatment activities that would occur are:

- Hand cutting and thinning of ponderosa pine up to nine inches diameter-at breast height (dbh) to 60 square foot/acre (sq. ft) of basal area (BA).
- Hand cutting to reduce juniper and pinyon pine to 40 sq. ft BA.
- Hand cutting of brush species.
- Chipping and/or pile burning to remove cut brush and trees.
- Broadcast burning (initial treatment as well as conducting maintenance burns over the project area. Burning in Oak Creek Canyon is difficult, so this activity is subject to

weather, containment lines, other safety considerations, as well as conservation/mitigation measures.

Because resource conditions critically affect the ability of resource managers to conduct this work in Oak Creek Canyon, managers did not set a number of acres to treat each year; however, they estimate that should conditions allow, approximately 100 acres of combined treatment could occur each year. The Forest Service removed most of the green trees identified for removal in units 1 to 9 (north end of project) in the initial entry; therefore, very managers will remove few green trees from here forward. Managers have identified many dead trees to remove. In units 8 to 15 (south end of project), crews will hand cut chaparral within 132 feet around private lands, the slash will be windrowed and later burned mid-winter with snow. Crews will park on designated roads and established pullouts only and will walk into treatment areas; therefore, the Forest Service will not authorize cross-country motorized travel for the project.

Conservation Measures

Managers and crews will implement the following conservation/mitigation measures to reduce effects to listed species:

- Crews will retain Gambel oak trees 12 inches or greater diameter-at-root crown (drc).
- Crews will limit removal of dead and down material in riparian areas. Large, downed woody materials (12 inches diameter or greater) and snags will be retained in riparian areas, unless snags present a work safety issue.
- Crews will locate slash piles non-rocky areas to avoid gartersnakes habitat.
- Crews will use hand thinning to remove material; they will not use mechanized equipment (e.g., Agra Ax).
- Crews will burn piles during wet conditions (snow or rain) to prevent the fire creeping from beyond the pile.
- Crews will limit understory burning from mid-October and the end of February.
- Crews will not conduct burning within 150 feet of Oak Creek or its main tributaries and will or within 50 feet of secondary drainages. Crews will move and pile vegetation outside of these areas to be burned.
- Crews will undergo training for gartersnake identification, verification methods (e.g., photos), and reporting requirements.

Action Area

The action area is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR § 402.02). In delineating the action area, we evaluated the farthest-reaching physical, chemical, and biotic effects of the action on the environment.

The action area occurs entirely on NFS lands managed by the Coconino National Forest in Oak Creek Canyon. The project area occurs in the Oak Creek watershed (a sub-watershed of the Verde River watershed) in north-central Arizona at the northern edge of the Transition physiographic zone between the Basin and Range Province and the Colorado Plateau Province.

The Oak Creek watershed is composed of sandstone cliffs and towers, and the bedrock by interbedded sandstone, shale, and limestone.

The northern portion of the project area consists of steep canyon topography and parallels both State Route 89A and Oak Creek through the narrow upper portion of Oak Creek Canyon. The total length of the action area is approximately 11.5 miles, but treatment units comprise much smaller, discrete patches within the drainage (Figure 1).

STATUS OF THE SPECIES AND CRITICAL HABITAT

The information in this section summarizes the rangewide status of each species that we considered in this BiOp. Further information on the status of these species can be found in the administrative record for this project, documents on our web page ([Arizona Ecological Services Office Documents by Species](#)), and in other references cited in each summary below.

Narrow-headed gartersnake

Legal Status

We published the Federal Register notice listing the narrow-headed gartersnake as threatened under the Act on July 8, 2014 (79 FR 3867) and the listing became effective on August 7, 2014. The Service proposed critical habitat on July 10, 2013 (78 FR 41550), but we have yet to designate critical habitat. Please refer to these rules for more in-depth information on the ecology and threats to the species, including references.

Physical Description

The narrow-headed gartersnake is a small to medium-sized gartersnake with a maximum total length of 44 inches (Painter and Hibbitts 1996). Its eyes are set high on its unusually elongated head that narrows to the snout; and it lacks striping on the dorsum (top) and sides, which distinguishes its appearance from other gartersnakes with which it could co-occur (Rosen and Schwalbe 1988).

Habitat and Natural History

The narrow-headed gartersnake is widely considered aquatic in nature (Drummond and Macias Garcia 1983, Rossman *et al.* 1996). It is strongly associated with clear, rocky streams, using predominantly pool and riffle habitat that includes cobbles and boulders (Rosen and Schwalbe 1988, Degenhardt *et al.* 1996, Rossman *et al.* 1996, Nowak and Santana-Bendix 2002, Ernst and Ernst 2003).

Terrestrial habitat is also important to gartersnake survival and includes the presence of cobbles, boulders, and bankside shrub vegetation for basking and foraging. The species will use rocks, logs or stumps, and debris jams as cover; while bankside vegetation composed of shrub- and sapling-sized plants such as Arizona alder (*Alnus oblongifolia*), velvet ash (*Fraxinus velutina*), and willows (*Salix spp.*) is used for thermoregulation at the water's edge. Narrow-headed gartersnakes also use terrestrial, upland habitat when hibernating, gestating, to escape floods, and during dispersal. Nowak (2006) found narrow-headed gartersnakes used upland habitat that was

328 feet from the nearest stream during early fall and spring months, and the species may strongly associate with boulders in the floodplain during summer months. When hibernating narrow-headed gartersnakes may use upland habitat up to 656 feet from the floodplain (Nowak 2006).

Narrow-headed gartersnakes primarily eat fish (Rosen and Schwalbe 1988, Degenhardt et al. 1996, Rossman et al. 1996, Nowak and Santana-Bendix 2002, Nowak 2006). The species is an underwater ambush hunter that is heavily dependent on visual cues when foraging (de Queiroz 2003, Hibbitts and Fitzgerald 2005); thus, sediment and turbidity levels may affect foraging success.

Sexual maturity in narrow-headed gartersnakes occurs at 2.5 years of age in males and at 2 years of age in females (Degenhardt *et al.* 1996). Narrow-headed gartersnakes are viviparous (live bearing) and breed annually. Females give birth from late July into early August, perhaps earlier at lower elevations (Rosen and Schwalbe 1988). Longevity in this species may be as long as 10 years in the wild (Rosen and Schwalbe 1988).

Current Distribution and Population Status

The narrow-headed gartersnake occurs across the Mogollon Rim of Arizona and New Mexico, at elevations from approximately 2,300 to 8,000 feet. The species inhabits Petran Montane Conifer Forest, Great Basin Conifer Woodland, Interior Chaparral, and Arizona Upland Sonoran Desertscrub communities (Rosen and Schwalbe 1988, Brennan and Holycross 2006).

Population densities have noticeably declined at many sites across the species' range (Holycross *et al.* 2006 a, b). As of 2016, as many as 41 of 51 known narrow-headed gartersnake populations rangewide (80 percent) may exist at low densities and could be threatened with extirpation (USFWS 2017). Extirpation may have already occurred for another four populations.

Threats

The occurrence of harmful nonnative aquatic species such as crayfish (*Orconectes virilis*, *Procambarus clarki*), numerous species of non-native fish, and to a lesser extent, American bullfrogs (*Lithobates catesbeianus*), is the primary cause of narrow-headed gartersnake population declines rangewide, and continues to be the most significant threat to the species (e.g., Rosen and Schwalbe 1988, Rinne 2004, Minckley and Marsh 2009). These nonnative species prey on gartersnakes and compete with snakes for a prey base of native fish, ultimately leading to reduced recruitment within gartersnake populations. Additional threats to the species and its habitat include water management actions that reduce stream flows or de-water gartersnake habitat (e.g., dam construction, water diversions, flood-control projects, and groundwater pumping) threaten gartersnake habitat persistence and quality (Ligon *et al.* 1995; Turner and List 2007, USGS 2013). Post-fire effects following high-severity, large-scale wildfires that remove habitat and prey species (sedimentation, ash flows, fish kills); we also consider a significant threat to the species (Rinne and Neary 1996, Goode and Parker 2015). Other threats include development and recreation within riparian corridors, environmental contaminants, mortality from entanglement hazards such as erosion control products, intentional or unintentional killing of snakes by humans, drought, and climate change (79 FR 38678).

Proposed Critical Habitat

Critical habitat for the narrow-headed gartersnake, totaling 210,189 ac, was proposed in six units in Arizona and New Mexico on July 10, 2013 (78 FR 41550), but has not yet been designated. Within these areas, the PCEs of the physical or biological features essential to the conservation of the narrow-headed gartersnake consist of the following four components:

1. Stream habitat, which includes:
 - a. Perennial or spatially intermittent streams with sand, cobble, and boulder substrate and low or moderate amounts of fine sediment and substrate embeddedness, and that possess appropriate amounts of pool, riffle, and run habitat to sustain native fish;
 - b. 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;
 - c. Shoreline habitat with adequate organic and inorganic structural complexity (e.g., boulders, cobble bars, vegetation, and organic debris such as downed trees or logs, debris jams), with appropriate amounts of shrub- and sapling-sized plants to allow for thermoregulation, gestation, shelter, protection from predators, and foraging opportunities; and,
 - d. Aquatic habitat with no pollutants or, if pollutants are present, levels that do not affect survival of any age class of the narrow-headed 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 fish species or soft-rayed nonnative fish species.
4. An absence of nonnative fish species of the families Centrarchidae and Ictaluridae, bullfrogs (*Lithobates catesbeianus*), and/or crayfish (*Orconectes virilis*, *Procambarus clarki*, etc.), or occurrence of these nonnative species at low enough levels such that recruitment of narrow-headed gartersnakes and maintenance of viable native fish or soft-rayed, nonnative fish populations (prey) is still occurring.

Previous Consultations

Given the wide-range of this species, several Federal actions affect this species every year. We post the biological opinion for the narrow-headed gartersnake in Arizona on our [Arizona Ecological Services Office website](#).

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present effects of all Federal, State, or private actions in the action area, the anticipated effects of all proposed Federal actions in the action area

that have undergone formal or early section 7 consultation, and the effect of State and private actions that are contemporaneous with the consultation process. The environmental baseline defines the status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the species and critical habitat within the action area

Oak Creek once supported what was perhaps the most robust gartersnake population in Arizona and continues to support the most well studied population (Holycross *et al.* 2006a, Nowak 2017). Gartersnake surveys along Oak Creek began in 1985 (Rosen and Schwalbe 1988) and have continued to the present day (Nowak and Santana-Bendix 2002, Nowak 2006, Brennan and Rosen 2009, and Nowak 2018). Unfortunately, study results show an apparent gartersnake population decline in Oak Creek over the last several decades. Detection rates during visual encounter surveys provide a relative, if rough, index of gartersnake numbers in Oak Creek since surveys began. Survey detection rates declined from 0.65 snake per person-search hour in 1985, to 0.05 snake per person-search hour in 2018 (Nowak 2017, 2018).

Gartersnakes apparently reach their highest densities in the upper-most reaches of Oak Creek Canyon, particularly at the confluence with the West Fork Oak Creek. From the West Fork/Oak Creek confluence, gartersnake numbers appear to decline along a downstream gradient. The species is rarely detected at Midgley Bridge, just north of Sedona (Nowak 2006, Brennan and Rosen 2009), and from Sedona downstream to the Oak Creek/Verde River confluence the gartersnake likely exists at very low densities. In contrast, comparatively high numbers of adults and juveniles continue to persist in the West Fork Oak Creek area, where monitoring has occurred nearly every year since 2001 (Nowak 2006, 2016, 2017).

The primary factor affecting the narrow-headed gartersnake throughout Arizona and in Oak Creek Canyon is the presence of introduced harmful non-native aquatic species that compete with and prey upon both the narrow-headed gartersnake and its native prey, including non-native fish, American bullfrogs (*Lithobates catesbeianus*), and crayfish (*Orconectes virilis*, *Procambarus clarki*) (Rosen and Schwalbe 2002, Nowak 2006). Arizona Game and Fish Department (AGFD) fish sampling along Oak Creek in 2007, from Pine Flat Campground to just above Indian Gardens, found that non-native fish, primarily brown trout (*Salmo trutta*), made up 51.4% of fish captured (Rinker 2007). American bullfrogs occur primarily in the lower reaches of Oak Creek below Midgley Bridge (Nowak 2006), and low to high crayfish densities occur generally downstream of Slide Rock State Park (Brennan and Rosen 2009). Thus, snake densities in Oak Creek appear to be inversely related the distribution of nonnative aquatic species (i.e., the highest snake densities occur in areas with the lowest concentrations of non-native species).

Recreation is also a factor that likely affects the gartersnake in Oak Creek Canyon. The Coconino National Forest reported on the Oak Creek Ambassadors program, created in 2013, in which volunteers educate visitors to Oak Creek and remove solid waste in the form of litter. From 2013-2015, encounters with >22,000 visitors were recorded and >12,000 pounds of solid waste was removed. The implications of human use of Oak Creek for gartersnakes include increased risk of injuries and fatalities from vehicle strikes, intentional killing, and effects to habitat, including reduced water quality and alteration and destruction of vegetation.

In 2014, the Slide Fire burned 21,227 acres within the Oak Creek and West Fork Oak Creek subbasins. Because narrow-headed gartersnakes in Oak Creek are important to the status of the species range-wide, in 2014 the FWS, AGFD, Forest Service, and Northern Arizona University (NAU) collected 11 snakes to preserve genetic representation of the Oak Creek population in the event that the fire resulted in significant effects to gartersnakes in Oak Creek (Nowak 2016). Researchers detected 42 individual gartersnakes. Although there was evidence of ash and increased sedimentation in Oak Creek and the West Fork, it was largely constrained to pools, whereas the runs and riffles in many areas appeared to be free of ash or heavy sedimentation. There were also no fish kills during the monsoon season following the fire (S. Hedwall, USFWS, personal communication. April 29, 2019) or obvious changes in captures per unit effort during annual fish surveys from May 2015 to May 2017 (Rinker and Rogers 2017). Although surveys have documented declines in this formerly robust gartersnake population over time, no significant effects to the snake's prey base or its habitat in Oak Creek appear to have resulted from the Slide Fire.

Proposed critical habitat

Proposed critical habitat for the narrow-headed gartersnake occurs within all of the treatment areas except for treatment unit 15 (Figure 2).

Oak Creek contains populations of native fish and nonnative trout that serve as a prey base for narrow-headed gartersnakes. However, there are also nonnative aquatic species, such as large brown trout, that may predate upon narrow-headed gartersnakes. Otherwise, this proposed critical habitat subunit contains sufficient physical or biological features, including PCE 1 (aquatic habitat characteristics), PCE 2 (terrestrial habitat characteristics), and PCE 3 (prey base). Although, the creek does contain nonnative fishes (PCE 4 - absence or low level of harmful nonnative species), the level of harmful nonnatives as described in the proposed critical habitat rule are relatively rare within the action area (these species do become more common below the action area boundary). The Forest Service, in partnership with many agency, state, and private partners, has implemented actions (e.g., signage, education programs, etc.) or is intending to implement additional actions (e.g., Oak Creek Watershed Restoration Project) to educate the public about narrow-headed gartersnakes, protect habitat, and improve water quality within the action area.

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action, which we add 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.

Direct effects

Direct effects that could occur to narrow-headed gartersnakes as part of this action include accidental crushing of snakes from crew walking through areas and conducting the hand cutting, chipping, and burning operations. In addition, broadcast burning within gartersnake habitat may result in death or injury to gartersnakes if they are within the unit at the time of burning.

A collection of mandatory conservation measures (see proposed action) will prevent, reduce, or minimize adverse effects to gartersnakes and its habitat. Preventing the use of mechanized equipment in gartersnake habitat and requiring all crews to undergo snake training will reduce the potential for crews to crush snakes and will help crews understand how handling snakes can also cause injury or stress. Other mandatory measures such as locating slash piles in less rocky areas to avoid creating areas that attract gartersnakes and delaying fall understory burning until mid-October (to give neonate gartersnakes all of September to forage and build up fat reserves for brumation) will reduce the potential for burning snakes. Additional mandatory measures, such as burning piles during wet conditions to prevent fire creeping out of piles, not burning within 150 feet and 50 feet of main and secondary drainages respectively, and retaining large downed woody material in riparian areas will reduce project activity effects to narrow-headed gartersnake habitat.

Indirect effects

The creation of slash piles in the treatment units may result in indirect effects to gartersnakes. Once crews pile the thinning/fuels reduction slash, it is likely that gartersnakes will locate these areas and use them for cover and/or other habitat requirements. Indirect effects to gartersnakes could occur when crews burn these slash piles, which could occur months after they crews created them, giving gartersnakes time to find and use these habitats. However, as stated above, mandatory measures regarding the location of slash piles and the timing of burning (see above in Direct Effects) will reduce the potential for harm to narrow-headed gartersnakes because of these activities.

Summary of effects to narrow-headed gartersnakes

Despite the conservation measures to reduce project effects, treatments in Oak Creek Canyon could still result in accidental crushing or burning of snakes. Crushing could occur from crews walking in on foot or from piling slash for later burning. Narrow-headed gartersnakes could die if they are using slash piles when crews burn the piles. Likewise, broadcast burning may also result in narrow-headed gartersnake death or injury (smoke inhalation, burns). However, narrow-headed gartersnakes are uncommon within Oak Creek; therefore, we expect that effects to individual snakes from these actions will be rare.

Proposed critical habitat

Treatments should have a minor adverse effect to PCE 1 relating to stream habitat and no effect to PCE 3 (prey base) and PCE 4 (harmful nonnative species). There will be no broadcast or pile burning in riparian habitat and no broadcast burning will occur within vegetative buffers of 150 feet from Oak Creek and its main tributaries and 50 feet of secondary drainages. These buffers will reduce the potential for runoff of ash and sediment into Oak Creek. In addition, burning piles during wet or snowy conditions will limit creep from the piles into potentially sensitive habitats. Crews will work to maintain downed woody material in riparian areas.

Within the uplands (PCE 2), including beyond the 600 feet, treatment activities may reduce structural characteristics needed to support narrow-headed gartersnake life history functions. Treatments will also reduce high volumes of fallen trees and other woody debris that otherwise would be used by gartersnakes for hiding, shedding, and brumation. However, as stated above, narrow-headed gartersnake habitat is not limited along Oak Creek; therefore, we expect these effects to result in minor adverse effects, spatially and temporally, to PCE 2 (upland habitat).

CUMULATIVE EFFECTS

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. We do not consider future Federal actions that are unrelated to the proposed action in this section because they require separate consultation pursuant to section 7 of the Act.

State (Slide Rock State Park) and private lands occur within the action area and activities on these lands could result in disturbance to gartersnakes and their habitat. Future non-federal actions within the action area that are reasonably certain to occur include the development and/or modification of private property in-holdings through new construction, tree removal, and alteration of streamside habitat. These activities may reduce the quality and amount of gartersnake habitat and may result in disturbance and/or injuries or fatalities (i.e., may cumulatively contribute to the effects of the proposed action). New developments may also increase sediment transport into gartersnake habitat and increase the potential for additional non-native aquatic species introductions. Residential home and commercial development on private lands will continue to effect the Oak Creek watershed, potentially resulting in increased water use and decreased water quality. We expect high levels of human recreation along Oak Creek to continue or increase into the future, which may result in a myriad of effects including death or injury of gartersnakes from intentional killing by humans or their pets, habitat destruction and modification, and adverse effects to water quality. However, recreation and water quality management actions the Forest Service is conducting (Oak Creek Watershed Restoration Project, 02EAAZ00-2018-F-1161) will reduce human effects to the riparian vegetation, water quality, and access to portions of the creek.

There are many efforts on private land within and adjacent to the action area that will have beneficial effects to narrow-headed gartersnakes and their habitat. These activities include water quality monitoring, installation of pet waste stations, stormwater protection projects (demonstrations of low effect development, green infrastructure, and best management practices for stormwater quality improvement), native plant propagation and riparian habitat restoration, partnerships to make recreation sustainable and protect natural resources, litter prevention programs, and property acquisition programs. Numerous private entities and local communities implement these efforts to improve water quality and the long-term sustainability of Oak Creek.

JEOPARDY AND ADVERSE MODIFICATION ANALYSIS

Section 7(a)(2) of the ESA requires that federal agencies ensure that any action they authorize,

fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat.

Jeopardy Analysis Framework

Our jeopardy analysis relies on the following: “Jeopardize the continued existence of” means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02). The following analysis relies on four components: (1) Status of the Species, which evaluates the range-wide condition of the listed species addressed, the factors responsible for that condition, and the species’ survival and recovery needs; (2) Environmental Baseline, which evaluates the condition of the species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the species; (3) Effects of the Action (including those from conservation measures), which determines the direct and indirect effects of the proposed federal action and the effects of any interrelated or interdependent activities on the species; and (4) Cumulative Effects, which evaluates the effects of future, non-federal activities in the action area on the species. The jeopardy analysis in this biological opinion emphasizes the range-wide survival and recovery needs of the listed species and the role of the action area in providing for those needs. We evaluate the significance of the proposed Federal action within this context, taken together with cumulative effects, for making the jeopardy determination.

Destruction/Adverse Modification Analysis Framework

The final rule revising the regulatory definition of “destruction or adverse modification of critical habitat” became effective on March 14, 2016 (81 FR 7214). The revised definition states: “Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features.”

Similar to our jeopardy analysis, our adverse modification analysis of critical habitat relies on the following four components: (1) the Status of Critical Habitat, which evaluates the range-wide condition of designated critical habitat in terms of PCEs, the factors responsible for that condition, and the intended recovery function of the critical habitat overall; (2) the Environmental Baseline, which evaluates the condition of the critical habitat in the action area, the factors responsible for that condition, and the recovery role of the critical habitat in the action area; (3) the Effects of the Action, which determine the direct and indirect effects of the proposed federal action and the effects of any interrelated or interdependent activities on the PCEs and how they will influence the recovery role of affected critical habitat units; and (4) Cumulative Effects, which evaluate the effects of future, non-federal activities in the action area on the PCEs and how they will influence the recovery role of affected critical habitat units.

Conclusion

After reviewing the current status of the narrow-headed gartersnake and its proposed critical habitat, the environmental baseline for the action area, the effects of project and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the narrow-headed gartersnake, and is not likely to destroy or adversely modify its proposed critical habitat. We base this conclusion on the following:

- The direct effects caused by this project will not jeopardize the gartersnakes continued existence due to the limited spatial extent of the project (400 acres total, divided into 15 treatment units within Oak Creek) and the limited amount of cutting and burning that is likely to occur in any given year (less than 100 acres).
- The proposed action will not affect the long-term suitability of narrow-headed gartersnake habitat or the gartersnakes ability to use Oak Creek. The action will reduce the potential for high-severity fire within the creek and protect the long-term persistence of gartersnake habitat.
- Proposed critical habitat will continue to serve the function and conservation role of critical habitat for the narrow-headed gartersnake.

We base the conclusions of this biological opinion on full implementation of the project as presented in the Description of the Proposed Action section of this document, including any Conservation Measures that the Forest Service incorporated into the project design.

INCIDENTAL TAKE STATEMENT

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 Forest Service so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (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 effect of incidental take, the Forest Service must report the progress of the action and its effect on the species to the FWS as specified in the incidental take statement [50 CFR § 402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE

We anticipate that the proposed action is reasonably certain to result in incidental take of narrow-headed gartersnakes. We expect this incidental take to be in the form of harassment of individual snakes and harm (injuries or fatalities) due directly to the proposed action. Injuries or fatalities could occur because of crushing (crews walking through habitat), the burning of slash piles, and broadcast burning in upland habitat near Oak Creek.

The FWS anticipates incidental take of narrow-headed gartersnakes will be difficult to detect for the following reason(s):

- The action area is relatively small compared to the amount of habitat available to narrow-headed gartersnakes within the action area;
- Finding a dead or impaired specimen is unlikely due to cryptic nature of the species and its ability to hide; and,
- The species occurs in complex above and belowground habitat that makes detection difficult.
- The total number of narrow-headed gartersnakes taken because of harassment and harm is difficult to predict because we have no reliable estimates of snake densities or abundance within the various reaches of Oak Creek where snakes occur, nor can we predict responses to disturbance by individual snakes.

We expect that gartersnakes injured or killed are unlikely to be detected (especially if they are in a slash pile or die away from where crews are lighting burn areas). We expect that the number of snakes harmed during the proposed action will be small because the action area supports a relatively small gartersnake population and will affect a small amount of gartersnake habitat, both spatially and temporally.

Therefore, we anticipate the incidental take of up to four narrow-headed gartersnakes in the form of direct fatality or injury. If more than that number of snakes are found dead or injured within the fuels reduction footprint over the life of the project, then as provided in 50 CFR Section 402.16, reinitiation of formal consultation would be required for exceeding the amount or extent of incidental take.

EFFECT OF THE TAKE

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 proposed critical habitat for the reasons stated in the Conclusions section.

REASONABLE AND PRUDENT MEASURES

The following reasonable and prudent measure(s) are necessary and appropriate to minimize take of the narrow-headed gartersnake:

1. The Forest Service shall monitor incidental take resulting from the proposed action and report to the FWS the findings of that monitoring.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measure, described above and outline required reporting/monitoring requirements. This term and conditions is non-discretionary.

The following terms and condition implements reasonable and prudent measure #1 for the narrow-headed gartersnake:

- 1.1 The Forest Service shall monitor the project area and other areas affected by the proposed action to ascertain incidental take of individuals of the species and/or loss of its habitat that causes harm or harassment to the species. Reports should include what work the Forest Service completed, the conservation measures they implemented, and any information regarding gartersnake detections.
- 1.2 The Forest Service shall submit annual monitoring reports to the Arizona Ecological Services Field Office by March 31 beginning in 2020. These reports shall briefly document for the previous calendar year the locations of narrow-headed gartersnakes observed, and, if any are found dead, suspected cause of fatality. The report shall also summarize tasks accomplished under the conservation measures and their effectiveness. The report shall make recommendations for modifying or refining the proposed action (if so determined) to enhance listed species protection.
- 1.3 The Forest Service shall immediately report any narrow-headed gartersnake fatality to Jeff Servoss (520-670-6150) and Shaula Hedwall (928-556-2118) within 48 hours of finding the snake(s).

Review requirement: The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the effect of incidental take that might otherwise result from the proposed action. If, during the course of the action, proposed action exceeds the level of incidental take, such incidental take would represent new information requiring review of the reasonable and prudent measures provided. The Forest Service 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. You must make written notification within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. Send the notification to the Law Enforcement Office with a copy to this office. Take care 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.

CONSERVATION RECOMMENDATIONS

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

1. We recommend that your agency participate in the development of the recovery plan for this species. We recommend that the Forest Service continue to work with NAU, AGFD and FWS to continue monitoring narrow-headed gartersnakes in the Oak Creek Watershed.

In order to keep us informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation for the Oak Creek Fuels Reduction Project. 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 project exceeds the amount or extent of incidental take, any operations causing such take must cease pending reinitiation.

In keeping with our trust responsibilities to American Indian Tribes, we encourage you to coordinate with the Bureau of Indian Affairs in the implementation of this consultation. By copy of this biological opinion, are notifying the Navajo Nation, Hopi Tribe, Zuni, Yavapai-

Apache Nation, and the Yavapai-Prescott Indian Tribe of its completion. We also encourage you to coordinate the review of this project with the Arizona Game and Fish Department.

We appreciate the Forest Service's efforts to identify and minimize effects to listed species from this project. Please refer to the consultation number, 02EAAZ00-2019-F-0046 in future correspondence concerning this project. Should you require further assistance or if you have any questions, please contact Shaula Hedwall (928-556-2118).

Sincerely,



Jeffrey A. Humphrey
Field Supervisor

cc (electronic):

Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ
Regional Supervisor, Arizona Game and Fish Department, Flagstaff, AZ
District Ranger, Red Rock Ranger District, Coconino National Forest, Sedona, AZ
District Biologist, Red Rock Ranger District, Coconino National Forest, Sedona, AZ
Stewardship Staff Officer, Coconino National Forest, Flagstaff, AZ
Forest Biologist, Coconino National Forest, Flagstaff, AZ
Forest Fish Biologist, Coconino National Forest, Flagstaff, AZ
Fish and Wildlife Biologists, U.S. Fish and Wildlife Service (Attn: Jeff Servoss, Mary Richardson)
Director, Hopi Cultural Preservation Office, Kykotsmovi, AZ
Director, Zuni Heritage and Historic Preservation Office, Zuni, NM
Director, Historic Preservation Department, Navajo Nation, Window Rock, AZ
Director, Apache Cultural Program, Yavapai-Apache Nation, Camp Verde, AZ
Director, Yavapai Cultural Program, Yavapai-Apache Nation, Camp Verde, AZ
Director, Cultural Research Program, Yavapai-Prescott Indian Tribe, Prescott, AZ
Executive Director, Inter-Tribal Council of Arizona, Inc., Phoenix, AZ
Environmental Protection Officer, Environmental Quality Services, Western Regional Office, Bureau of Indian Affairs, Phoenix, AZ

TABLES AND FIGURES

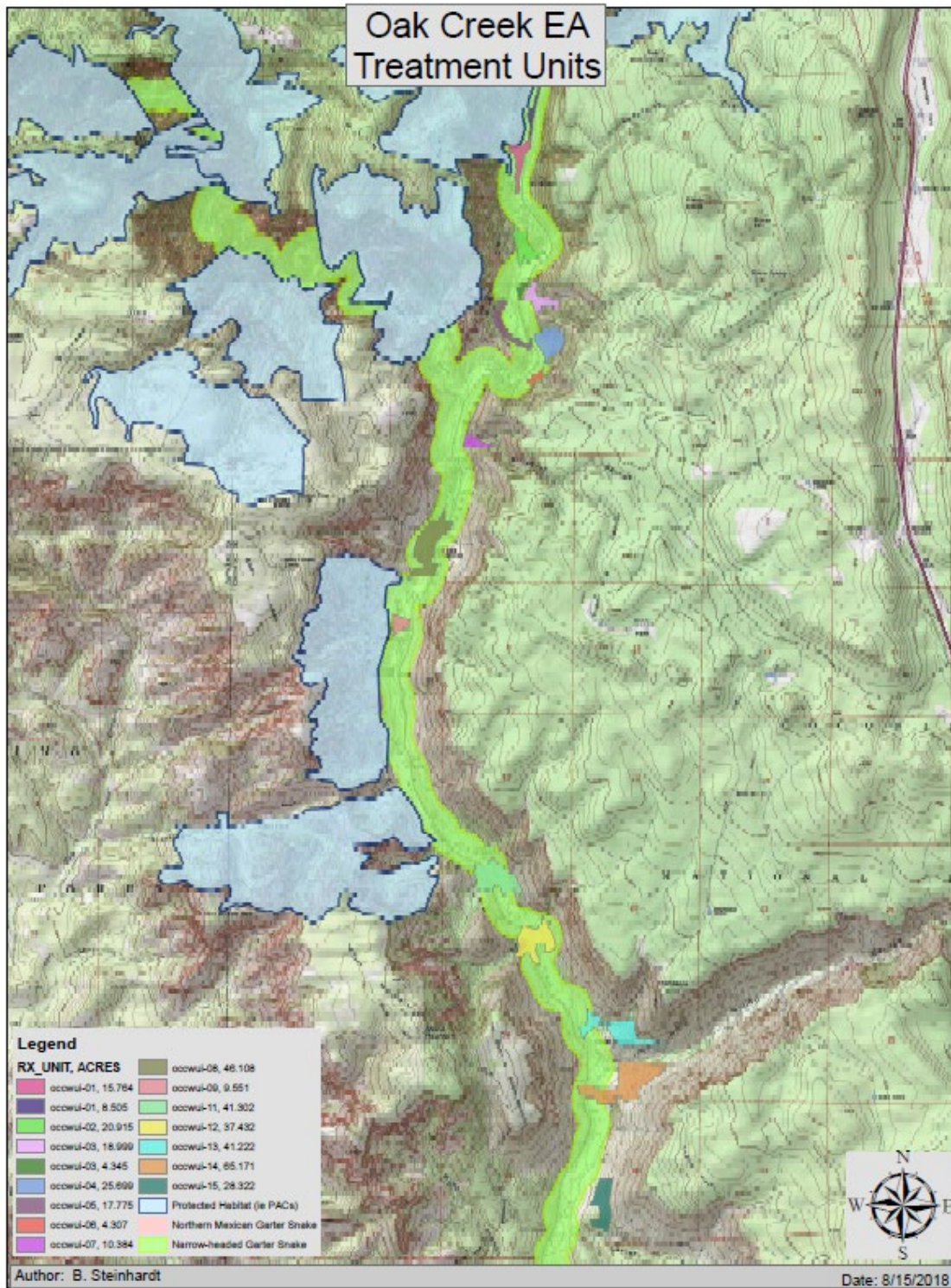


Figure 1. Locations of the 14 treatment unit polygons. Unit 1 is located adjacent to Sterling Hatchery at the north end of the canyon, and unit 15 occurs upstream of Grasshopper Day Use Recreation Site at the south end of the canyon.



Figure 2. Overlay of proposed narrow-headed gartersnake critical habitat and the treatment units. Treatment unit 15 does not overlap with critical habitat (southernmost treatment unit).

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APPENDIX A: CONCURRENCES

This appendix contains our concurrences with your “may affect, not likely to adversely affect” determinations for the threatened Mexican spotted owl (*Strix occidentalis lucida*) and its critical habitat and the threatened Gila trout (*Oncorhynchus gilae*).

Mexican spotted owl

Within the project area, there are five protected activity centers (PACs): Pumphouse, Sterling, Cave Springs, Banjo Bill, and Lost. Treatment units 1-9 and 11-14 occur in Mexican spotted owl recovery habitat and designated critical habitat. Treatment unit 15 occurs entirely in chaparral and is located outside of critical habitat. There are no treatment units within PACs; however, treatment units 1, 5, 8, and 9 occur near the Sterling, Cave Springs, and Banjo Bill PACs.

- No treatment activities will occur in PACs, but treatment activities could adjacent to three PACs (Sterling, Cave Springs, and Banjo Bill) during the owl-breeding season (March 1 through August 31). Topographic barriers will reduced the potential for activity noise within adjacent and nearby treatment units to disturb owls in these three PACs. Therefore, there will be insignificant and discountable noise disturbance to owls during the breeding season.
- Managers will thin small diameter trees in treatment units 1-9 and 11-14 and burning in these units will reduce the amount of coarse woody debris on the ground. However, these treatments will not preclude owl use the recovery or critical habitats as these areas will still contain key habitat components of owl recovery habitat and the primary constituent elements of designated critical habitat, post-treatment. Therefore, effects to recovery and critical habitats from the proposed action will be insignificant and discountable.

Gila trout

Gila trout occur in the lower portion of the West Fork of Oak Creek and upper mainstem Oak Creek. No project activities will occur within the West Fork of Oak Creek; therefore, there will be no effect to trout in that area. AGFD stocks Gila trout into West Fork and Oak Creek for recreational fishing opportunities under the 4(d) rule.

- The mandatory measures included in the project will greatly reduce the potential for runoff and sedimentation into Oak Creek and fuel reduction activities will result in an unmeasurable amount of sediment into Oak Creek. Therefore, we expect insignificant effects from these actions to Gila trout and their habitat within Oak Creek.
- Crews will not conduct burning within 150 feet of Oak Creek or its main tributaries or within 50 feet of secondary drainages and they will move and pile vegetation outside of these areas to be burned. Therefore, effects to stream and riparian habitat necessary to promote Gila trout habitat in Oak Creek will be insignificant and discountable.