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Yellow-billed Cuckoo Surveys at Petrified Forest National Park

Final Report for the 2023 Field Season

Yellow-billed Cuckoo.

Yellow-billed cuckoo surveys at Petrified Forest National Park: Final report for the 2023 field season

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Contents

Figures and Tables

Abstract

Petrified Forest National Park is planning on removing invasive vegetation and restoring native plants along the Rio Puerco. Prior to removal, we conducted surveys for the federally Threatened Yellow-billed Cuckoo, following established survey protocols. Over the course of four surveys, we encountered two Yellow-billed cuckoos in each of two survey periods (four total detections, though possibly representing fewer than four birds). We did not detect any evidence of breeding behavior. We recommend continued monitoring for this species in the park, and proceeding with riparian restoration in accordance with methods that avoid negative impacts to Yellow-billed Cuckoos.

Acknowledgments

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Introduction

The Rio Puerco, which runs for more than 20 miles through Petrified Forest National Park (Figure 1), provides a rare native cottonwood-willow riparian oasis in semi-arid northeastern Arizona. Desert riparian areas, though relatively small in area, provide more wildlife habitat per acre than the surrounding uplands and support higher biodiversity (Soykan et al. 2012). Many riparian areas in the desert Southwest have become degraded due to encroachment by non-native plants such as saltcedar (*Tamarix* spp.), Russian olive (*Elaeagnus angustifolia*), and other species that out-compete native riparian plants, often forming dense monocultures. In general, stands of non-native vegetation have been found to provide less value to native wildlife than stands of native vegetation (Soykan et al. 2012), and have been cited as factors in the precipitous decline in two federally listed bird species, the Endangered Southwestern Willow Flycatcher (*Empidonax traillii extimus*; Sogge et al. 2010) and the Threatened Western population of Yellow-billed Cuckoo (*Coccyzus americanus*; Johnson et al. 2012).

Though the Rio Puerco has retained significant stands of cottonwood and cottonwood-willow, saltcedar and Russian olive, along with other invasive species such as Russian knapweed (*Leuzea repens*) and cheatgrass (*Bromus tectorum*), are prevalent along the entire reach of the river within the park (Figure 2).

In 2023 Petrified Forest National Park received funding to plan the removal of invasive species and to restore a more natural plant community along the Rio Puerco. In 2024 and 2025, the park will begin receiving funding through the Inflation Reduction Act of 2023 (HR 812) to initiate restoration work. The park has engaged The Institute for Bird Populations to search for Yellow-billed Cuckoos and document their abundance and areas of use along Rio Puerco, so that short-term negative impacts to this species may be avoided during restoration.

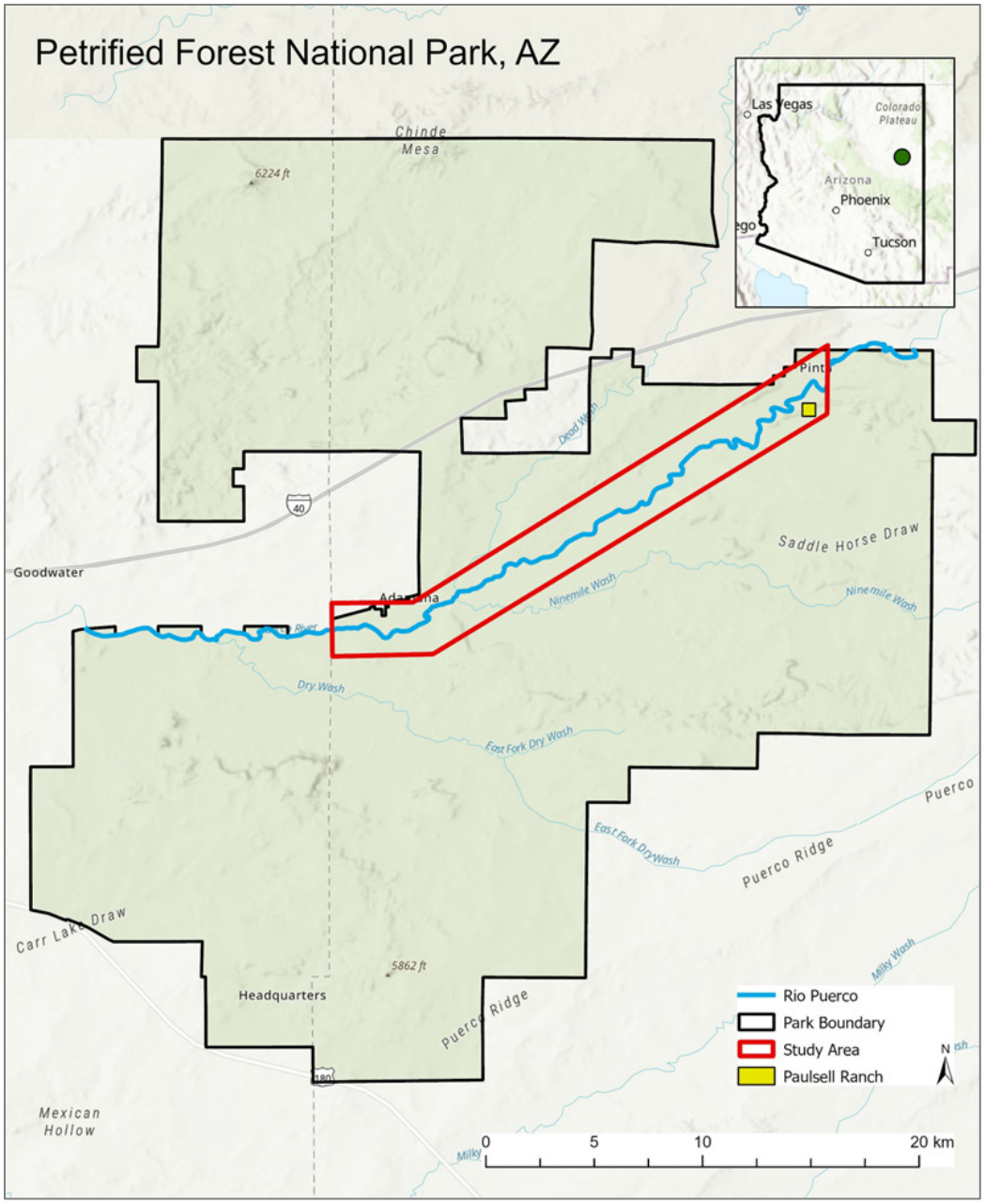

Figure 1. Petrified Forest National Park boundary and study area.

Figure 2. Stands of saltcedar (left, in the foreground, with cottonwood in the background) and saltcedar and Russian olive (right) are prevalent along the Rio Puerco in Petrified Forest National Park.

Yellow-billed Cuckoo Natural History and Records at Petrified Forest National Park

The Yellow-billed Cuckoo is a large songbird that breeds from southern Canada through most of the United States and northern Mexico, albeit in low numbers and often in widely separated areas. During the breeding season, the species inhabits deciduous riparian woodlands along streams and rivers where it hunts for cicadas, katydids, grasshoppers, caterpillars, small lizards, frogs, spiders, and other prey. Yellow-billed Cuckoos are long-distance migrants, spending most of the non-breeding season in northern and central South America.

Few trails or roads within the park are located in or near this habitat, and very few birders, biologists, or others enter the riparian zone away from the major road crossings to look for birds. There is one record of this species breeding at Petrified Forest National Park, in a report by Van Riper III (2005), though it is unclear if this record is from Van Riper III's work or a previous record. No formal surveys for Yellow-billed Cuckoo had been conducted in the park prior to our study.

Western populations of Yellow-billed Cuckoos have been declining for many years, primarily due to riparian habitat loss and degradation due to increases in saltcedar, Russian olive, and other non-native plants (Halterman et al 2016), changes that are the result of diverse and interacting factors such as the creation of dams and stream diversions, groundwater pumping, unsustainable agricultural practices, development, and climate change.

Though conditions differ widely across the west, breeding habitat for the Yellow-billed Cuckoo is generally described as "riparian woodlands with mixed willow-cottonwood vegetation…in a contiguous or nearly contiguous patches that are greater than 100 meters (325 feet) in width and 81 hectares (200 acres) or more in extent. These habitat patches…are generally willow-dominated, have above average canopy closure (greater than 70 percent), and have cooler, more humid environment than the surrounding riparian and upland habitats" (U.S. Fish and Wildlife Service 2014). While few of the riparian vegetation patches at Petrified Forest National Park meet all of these criteria, many do meet some in terms of size or width. It is also worth noting that, while early descriptions of suitable

breeding habitat normally centered around large gallery cottonwood forests, Yellow-billed Cuckoos are increasingly being detected in younger stands of cottonwood than previously documented (Haltermann et al. 2016). In addition, during pre- and post-breeding dispersal or migration the species uses a much wider variety of habitats than are used for breeding.

Study Area and Methods

The Rio Puerco is a major tributary of the Little Colorado River, which drains west and north to the Colorado River. The Study Area encompassed approximately 25 river miles of the Rio Puerco and its associated riparian zone from the Paulsell Ranch homestead in the east, to the privately-owned land within the park in the west (Figure 2). Although the river drains a fairly large watershed and was probably a perennial stream at one time, for at least several decades it has been intermittent, with surface flow only during winter and spring runoff and during larger summer monsoon events. In the reach through Petrified Forest National Park, the river is relatively sinuous and un-incised, with an active channel that, during higher flows, reshapes the stream morphology, eroding cut banks and aggrading point bars while moving a considerable amount of sediment (this is important for Yellow-billed Cuckoo habitat dynamics, as described in the Discussion, below). Notably, the 2022 monsoon season was among the wettest in recent decades (USGS 2023), resulting in extended periods of relatively high flow rates and significant changes to the streambed. The riparian habitat of the Rio Puerco through the park is a mix of Fremont cottonwood (*Populus fremontii*) overstory and willow and more mesic shrub understory with occasionally large patches of non-native trees and shrubs. Work was completed under Petrified Forest National Park research permit 801421.

All surveyors were trained in accordance to protocol standards, and were expert birders. The lead biologist on the crew has conducted dozens of protocol Yellow-billed Cuckoo surveys and has been US Fish and Wildlife Service-permitted for 15 years. On December 13, 2022, we examined the entire project area by Utility Terrain Vehicle and on foot, stopping at the largest and most extensive areas of riparian habitat, and establishing Yellow-billed Cuckoo survey points at 47 locations that appeared to provide the best habitat for this species (Figure 2). Between June 21 and August 4, we visited each call point four times on foot and conducted surveys following the protocol established by Haltermann et al. (2016). Briefly, this protocol consists of hiking to each survey point, quietly listening and watching for one minute, and then playing a recording of the Yellow-billed Cuckoo's "*kowp*" call five times at one-minute intervals, followed by a final minute of quiet observation. If a Yellow-billed Cuckoo was detected visually or aurally, playback calling was stopped, and information was gathered on the location and behavior of the bird. Data on weather and noise conditions were recorded at every point. If a bird was detected, the surveyor moved at least 300m to the next point so as to not stress the detected bird, and to differentiate it from any potential other birds in the area.

For this project, we also recorded all other birds seen or heard at each point.

Protocol survey dates for this late-breeding species were allocated into the three recommended periods during which a suggested minimum number of visits were conducted:

- Survey Period 1, June 15–June 30: one visit
- Survey Period 2, July 1–July 31: two visits
- Survey Period 3: August 1–August 15: one visit

Surveyors were instructed to begin surveys at sunrise and continue until the points were completed, until 11:00am, or until the temperature reached 100 °F, at which point Yellow-billed Cuckoo activity and detectability diminishes. Survey start and end points were rotated as much as possible to minimize temporal bias, though this was not possible in all cases.

Results

All sites were visited four times during the 2023 breeding season, according to the following schedule:

- Period 1, Survey Visit 1 (June 21 and 22)
- Period 2, Survey Visit 2 (July 4, 5, 6) and Visit 3 (July 25)
- Period 3, Survey Visit 4: August 4

For Survey Visit 1 and 2, two people conducted the surveys; for Visit 3 and 4, three people conducted the work. Surveys started at or close to local sunrise and were completed before 11:00 am (usually well before), except on one occasion, when one survey continued until 11:30 am. The temperature never exceeded 93 °F during the surveys.

We did not detect any Yellow-billed Cuckoos during survey Periods 1 and 4I. During Periods 2 and 3, we detected two Yellow-billed Cuckoos. On July 6, we detected one bird each at points 11 and 12 (Figure 3). Though consecutively numbered, these points are approximately 800 meters apart, and we are very confident that these were two different birds. On July 25, we detected two birds at points 2 and 21 (Figure 3). It is possible that these were the same two birds detected on July 6.

All birds were confirmed sightings based on photographs or very close sightings and/or obvious and distinctive calls. We were able to photograph three of the four birds seen though we were unsuccessful in determining their precise age, beyond being adults (i.e., no age-specific molt patterns or other diagnostic characteristics were visible from the field or in the photographs). Males and females have identical plumage, though calls can differ somewhat by sex; for example, the "*coo*" call may have sexually specific variations (M. Haltermann, pers. comm.). However, during surveys, we detected only the "*kowp*" call, which is made by both sexes. We did not detect any evidence of breeding behavior, such as two birds together, a bird carrying nesting material or food, or making contact calls to another bird.

In addition to Yellow-billed Cuckoos, we documented 41 other species of birds during the four surveys (Appendix A).

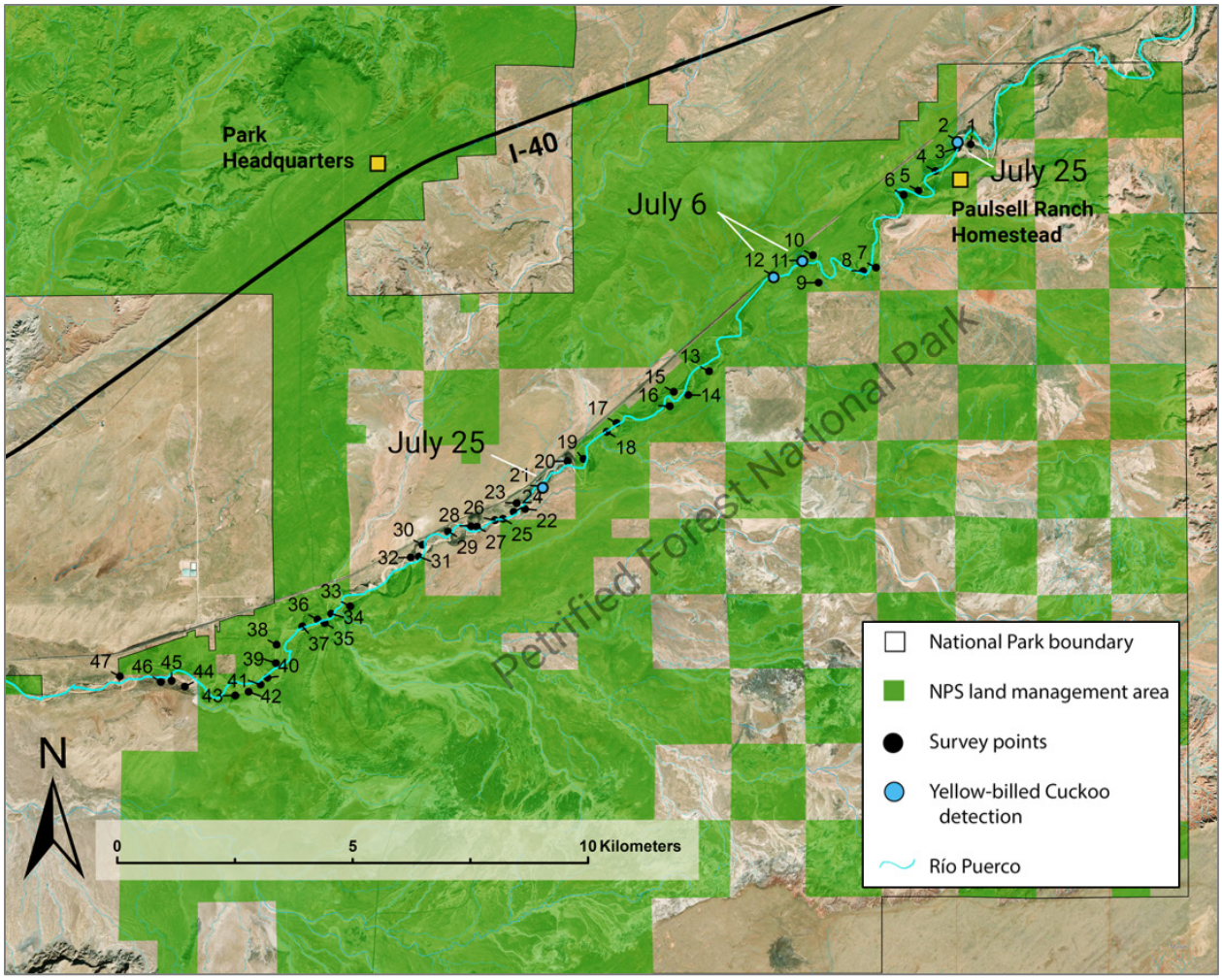

Figure 3. Yellow-billed Cuckoo survey points and detection locations (blue dots) from survey Period 2 (July 6) and Period 3 (July 25), 2023. Survey point 28 was originally established, but eliminated and not surveyed because it was subsequently deemed to be unsuitable habitat.

Discussion and Management Recommendations

The Yellow-billed Cuckoos detected in 2023 did not appear to be nesting. This is not entirely surprising as the relatively narrow riparian fringe along the Rio Puerco does not meet many of the characteristics described as “typical” for this species’ nesting habitat, mainly in the density, structure, and extent of riparian woodlands. Several studies have shown that a key feature in Yellow-billed Cuckoo nesting success is relatively high vertical structure, especially from 1-5 meters above the ground (Wohner et al. 2021), and this is largely absent from most areas along the Rio Puerco in the park. Nevertheless, the Rio Puerco remains a dynamic river system, albeit with lower flows than were present historically. One result of the high and relatively extended flows of 2022-23 was that water persisted until much later into the spring than in recent years, stimulating the new growth of a considerable amount of riparian vegetation (Figure 4).

Figure 4. Sandbars full of young willow were a common sight during Yellow-billed Cuckoo surveys. Some studies have shown the need for cuckoo habitat to maintain a dynamic feature of habitat succession and different age and size classes of native riparian vegetation.

Based on our findings, we recommend the following:

1. Continued surveys during the nesting season for Yellow-billed Cuckoo. Additional surveys can help determine which areas are most important for this species and whether birds using the Puerco Wash are transient individuals or local breeders.
2. Continued avian point counts for other species, especially in areas that will undergo management interventions. Documenting the pre- and post-restoration avian community would provide useful information for researchers and land managers on the results of habitat restoration. This might be easily done by incorporating several riparian transects into the existing avian monitoring program conducted by the Southern Colorado Plateau Monitoring Network and The Institute for Bird Populations.
3. When beginning restoration practices, do not work in areas of documented Yellow-billed Cuckoo presence during the nesting season (July 1–August 30). Begin restoration in areas not known to currently support cuckoos, such as the western end of park.
4. As much as possible, use restoration techniques that work to encourage natural succession and the creation of new habitat. Wohner et al. (2021) found that naturally-regenerated riparian systems tend to have higher biodiversity than planted ones.
5. During restoration, pay particular attention to fostering vegetation in the mid-story, which has been shown to be an important element of Yellow-billed Cuckoo nesting habitat.

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Appendix A

Table 1 describes bird species detected incidentally during surveys.

Table 1. Bird species detected incidentally during Yellow-billed Cuckoo surveys, 2023. An x indicates a detection during that visit, dashes indicate no detection.

Common Name	***Scientific Name***	**Visit 1**	**Visit 2**	**Visit 3**	**Visit 4**
Scaled Quail	*Callipepla squamata*	–	x	x	–
Mourning Dove	*Zenaida macroura*	x	x	x	x
Turkey Vulture	*Cathartes aura*	x	x	x	x
Cooper's Hawk	*Accipiter cooperii*	x	x	x	x
Red-tailed Hawk	*Buteo jamaicensis*	–	x	x	x
Swainson's Hawk	*Buteo swainsoni*	–	x	–	x
American Kestrel	*Falco sparverius*	x	x	x	x
Barn Owl	*Tyto alba*	–	–	–	x
Yellow-billed Cuckoo	*Coccyzus americanus*	–	x	x	–
Greater Roadrunner	*Geococcyx californianus*	–	x	–	–
Common Nighthawk	*Chordeiles minor*	–	x	–	–
Broad-tailed Hummingbird	*Selasphorus platycercus*	–	x	x	–
Northern Flicker	*Colaptes auratus*	x	x	x	x
Western Wood-Pewee	*Contopus sordidulus*	x	–	–	–
Dusky Flycatcher	*Empidonax oberholseri*	–	–	–	x
Western Flycatcher	*Empidonax occidentalis*	–	–	–	x
Say's Phoebe	*Sayornis saya*	x	x	x	x
Ash-throated Flycatcher	*Myiarchus cinerascens*	x	x	x	x
Cassin's Kingbird	*Tyrannus vociferans*	x	x	x	x
Western Kingbird	*Tyrannus verticalis*	x	x	–	–
Loggerhead Shrike	*Lanius ludovicianus*	x	–	x	–
Warbling Vireo	*Vireo gilvus*	–	–	x	x
Woodhouse's Scrub Jay	*Aphelocoma woodhouseii*	–	x	–	–
Common Raven	*Corvus corax*	x	x	x	x
Tree Swallow	*Tachycineta bicolor*	x	–	–	–
Horned Lark	*Eremophilia alpestris*	x	–	–	x
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	–	x	–	–
Cliff Swallow	*Petrocheildon pyrrhonota*	x	x	x	x
Bushtit	*Psaltriparus minimus*	–	x	x	–
House Wren	*Troglodytes aedon*	x	–	–	–
Blue-gray Gnatcatcher	*Polioptila caerulea*	–	–	–	x

Table 1 (continued). Bird species detected incidentally during Yellow-billed Cuckoo surveys, 2023. An x indicates a detection during that visit, dashes indicate no detection.

Common Name	***Scientific Name***	**Visit 1**	**Visit 2**	**Visit 3**	**Visit 4**
Northern Mockingbird	*Mimus polyglottos*	x	x	x	–
Crissal Thrasher	*Toxostoma crissale*	x	x	x	x
Lucy's Warbler	*Leiothlypis luciae*	–	–	–	x
Black-throated Gray Warbler	*Setophaga nigrescens*	–	–	–	x
Yellow-breasted Chat	*Icteria virens*	–	–	x	–
Western Tanager	*Piranga ludoviciana*	–	–	x	x
Spotted Towhee	*Pipilo maculatus*	x	–	–	x
Brewer's Sparrow	*Spizella breweri*	–	x	–	x
Lark Sparrow	*Chondestes grammacus*	x	x	x	x
Black-throated Sparrow	*Amphispiza bilineata*	x	x	x	x
Black-headed Grosbeak	*Pheucticus melanocephalus*	–	x	–	x
Blue Grosbeak	*Passerina caerulea*	x	x	x	x
Lazuli Bunting	*Calamospiza melanocorys*	–	–	–	x
Western Meadowlark	*Sturnella neglecta*	x	x	–	–
Brown-headed Cowbird	*Molothrus ater*	x	x	x	–
Bullock's Oriole	*Icterus bullockii*	x	x	x	x
House Finch	*Haemorhous mexicanus*	x	x	x	x
Lesser Goldfinch	*Spinus psaltria*	–	–	–	x

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