2025 Western Yellow-billed Cuckoo Surveys on the Appleton-Whittell Research Ranch of the National Audubon Society

Audubon Southwest

Appleton-Whittell Research Ranch of the National Audubon Society

366 Research Ranch Road

Elgin, Arizona, 85611

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Front: Appleton-Whittell Research Ranch headquarters pond against the Huachuca Mountains during the summer of 2025. Photo: Steven Prager/Audubon Southwest.

Acknowledgements:

Audubon Southwest thanks Resolution Copper and RESOLVE for funding this year's surveys. Additionally, we thank volunteers Nick Fratello, Melissa Fratello, and Tony Leanordini for their past and ongoing contributions to this effort. Special thanks to our field surveyors, Benjamin Beal and Suzanne Wilcox, and to Cathy Wise for acquiring and managing this year's permits. Lastly, we thank Audubon Southwest volunteer Mike Deschane for helping us organize and enter all the data collected this season.

Executive Summary:

The U. S. Fish and Wildlife Service (USFWS) petitioned to list the Western Yellow-billed Cuckoo (Coccyzus americanus; hereafter cuckoo) as an endangered species in 1998, but the bird was precluded due to other priority species. In October 2013, the cuckoo population in the western portions of the United States, Canada, and Mexico was proposed to be listed as a threatened distinct vertebrate population segment (Federal Register, October 3, 2013). The final rule designating this population segment was published on October 3, 2014 and went into effect in November (Federal Register, October 3, 2014). Over five-hundred thousand acres of critical habitat were proposed for this population segment across Arizona, California, Colorado, Idaho, Nevada, New Mexico, Texas, Utah, and Wyoming (Federal Register, August 15, 2014), but a smaller designation of just under 300,000 acres was finalized in April 2021. Within this designation are over 4,000 acres of critical habitat along several drainages that meander across the Appleton-Whittell Research Ranch of the National Audubon Society (AWRR) and into the adjacent Canelo Hills (Federal Register, April 21, 2021).

Audubon Southwest staff and volunteers have conducted both formal and informal surveys on the AWRR since 2015, but to properly manage the species and its habitats on the property, more current information on their distribution and abundance is needed. So, this year, AWRR staff embarked on what will be a five-year effort to better document and understand cuckoo occurrence, abundance, and timing of occupancy on the AWRR. Results from the first year of this effort are summarized in this report.

Site Description: Established in 1968, the AWRR is an 8,000-acre field station, wildlife sanctuary, Audubon conservation action center, and former cattle ranch located 60 miles southeast of Tucson, Arizona. The AWRR is managed for its conservation, research, and educational values by Audubon Southwest through a series of agreements between Audubon and the Research Ranch Foundation, U.S. Forest Service, Bureau of Land Management, The Nature Conservancy, Resolution Copper, and private landowners.

The AWRR contains small amounts of "typical" cuckoo habitat (pockets of Cottonwood/Willow riparian forest at springs, artificial wetlands, and along drainages) as well as more significant amounts of "southwest" habitat (ribbons of Emory Oak woodlands that divide the property's vast grasslands). During

productive summers, lush vegetation and robust insect productivity brought on by the annual monsoon can make the AWRR valuable to both breeding and migrating cuckoos.

Survey Effort/Study Design: Using historical Yellow-billed Cuckoo observations on the AWRR as a starting place, six transects were chosen to be surveyed over the next five years. Transects to be surveyed include Vaughn Wash, Upper Post Canyon, Lower Post Canyon, O'Donnell Creek, Clark Wash, Lyle Canyon, and a collection of isolated springs, ponds, and other known-occupied sites collectively referred to as "AWRR Points". These transects will be surveyed every other year, and Vaughn Wash, Upper and Lower Post Canyon, and AWRR points were selected for this year's effort.

Yellow-billed cuckoo detections, distribution, and timing: Past data reveal that cuckoo detections are possible on the AWRR any time from the pre-survey period in early June through the end of the post-survey period into late September. Whether the birds stay to breed on the AWRR or simply migrate through depends on whether the monsoon has brought to the property the conditions they prefer – surface water or high humidity, moderated temperatures, dense canopies in which to nest, a healthy understory, robust populations of large insects, and productive habitat adjacent their breeding area.

This season, only two detections were made – an incidental, non-survey detection made on the Lower Post Creek transect during the latter half of survey period two on July 30, 2025 and an incidental, non-survey detection made on the AWRR Points transect during the post-survey period on September 5, 2025. Since occupancy is defined by detections made in the same area over multiple survey periods, no declaration of occupancy can be made this year.

Management Implications: On the AWRR, data collected between 2015 and 2024 should be considered alongside data from this five-year effort as baseline information against which to measure the effect of future land uses, land management, and climatic changes on Yellow-billed Cuckoo occupancy. Transects that yielded detections during previous years' efforts should continue to be surveyed and post-season efforts to gather data describing habitat used by the species should be undertaken.

This and previous years' data show that the AWRR has the potential to support both migratory and potentially breeding cuckoos. As such, historically occupied reaches should be considered priority conservation areas. In addition, the data show that cuckoo location, abundance, and timing on the AWRR can vary from year to year, likely in relation to the availability of monsoon moisture and resulting productivity across the property. For this reason, all suitable areas within the AWRR should be seen as potentially valuable for cuckoos.

Management activities and land uses that could directly alter or degrade cuckoo habitat on the AWRR should be avoided, and all activities with the potential to disturb breeding cuckoos should be avoided in potentially occupied areas from early June to late September, the period during which cuckoos have been observed. Priority should be given to management benefiting cuckoo breeding habitat, including watershed restoration projects, the continued exclusion of grazing, and limiting human disturbance.

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Introduction:

The U. S. Fish and Wildlife Service (USFWS) petitioned to list the Western Yellow-billed Cuckoo (Coccyzus americanus; hereafter cuckoo) as an endangered species in 1998, but the bird was precluded due to other priority species. In October 2013, the cuckoo population in the western portions of the United States, Canada, and Mexico was proposed to be listed as a threatened distinct vertebrate population segment (Federal Register, October 3, 2013). The final rule designating this population segment was published on October 3, 2014 and went into effect in November (Federal Register, October 3, 2014). The decline of cuckoo populations throughout the western United States has been largely attributed to habitat destruction (Franzreb 1987), inappropriate grazing, and lowered water tables (Milhous 1994) and although western populations have precipitously declined, Arizona still contains the largest remaining cuckoo population among the states west of the Rocky Mountains (Federal Register, October 3, 2013).

Over five-hundred thousand acres of critical habitat were proposed for this population segment across Arizona, California, Colorado, Idaho, Nevada, New Mexico, Texas, Utah, and Wyoming (Federal Register, August 15, 2014), but a smaller designation of just under 300,000 acres was finalized in April 2021. Within this designation are over 4,000 acres of critical habitat along several drainages that meander across the Appleton-Whittell Research Ranch (AWRR) and into the adjacent Canelo Hills (Federal Register, April 21, 2021). The AWRR contains small amounts of "typical" cuckoo habitat (pockets of Cottonwood/Willow riparian forest at springs, artificial wetlands, and along drainages) as well as more significant amounts of "southwest" habitat (ribbons of Emory Oak woodlands that divide the property's vast grasslands). During productive summers, lush vegetation and robust insect productivity brought on by the annual monsoon can make the AWRR valuable to both breeding and migrating cuckoos.

Audubon Southwest staff and volunteers have conducted both formal and informal surveys on the AWRR since 2015, and data from these efforts reveal that cuckoo detections are possible on the AWRR any time from the pre-survey period in early June through the end of the post-survey period into late September. Current information on the distribution and abundance of cuckoos is necessary for the proper management of the species on the AWRR, so this year AWRR staff embarked on what will be a five-year effort to better document and understand cuckoo occurrence, abundance, and timing of occupancy on the AWRR. Results from the first year of this effort are summarized in this report.

Natural History:

Two distinct populations of Yellow-billed cuckoos exist in North America, separated by the continental divide. The population in the west, including the cuckoos in Arizona, are known as the Western yellow-billed cuckoo (Federal Register, August 15, 2014). This population was formerly recognized as a subspecies by the American Ornithological Union (AOU, 1998) with a breeding range that included portions of Arizona, California, western New Mexico, western Texas, southern Utah, and the Mexican states of Sonora and Zacatecas (Russell and Monson 1998).

North of the Gila River in Arizona, cuckoos are riparian obligates found primarily in cottonwood-willow associations. In southern Arizona however, the birds have been found breeding in mesquite bosques and in areas dominated by non-native tamarisk (Corman and Magill 2000). In addition, cuckoos are known to use oak woodlands, oak/mesquite drainages within grasslands, and thorn scrub habitats (Federal Register, October 3, 2013). In riparian settings, cuckoos prefer breeding sites that contain a mix of both mature and young riparian woody species and benefit from the periodic clearing of mature riparian habitat,

often through scouring seasonal floods, and features and activities that promote the recruitment of younger habitat (Stanek et al., 2021). In Oak Woodland settings, cuckoo occupancy is tied closely to the summer "green-up" and associated productivity that follows the summer monsoon season (Beauregard et at., 2024).

Cuckoos arrive on their Arizona breeding grounds in mid-June, after most other neotropical migrants. As a result, cuckoos nest later than most other birds, typically from early July through early August (Hamilton and Hamilton 1965, Corman and Magill 2000, Corman 2005). Nesting activities can continue through August and into September, especially in southeastern Arizona.

Cuckoos have an accelerated breeding cycle, with young able to climb from the nest at one week of age and fledging within 12 days post hatch (Hamilton and Hamilton 1965). This trait makes nest-finding difficult, as the birds spend relatively little time in the natal area and tend to be secretive at the nest. Cuckoo surveyors must typically revisit study areas several times to verify the birds' presence.

Methods:

Using historical Yellow-billed Cuckoo observations on the AWRR as a starting place, six transects were chosen to be surveyed over the next five years. Transects to be surveyed include Vaughn Wash, Upper Post Canyon, Lower Post Canyon, O'Donnell Creek, Clark Wash, Lyle Canyon, and a collection of isolated springs, ponds, and other known-occupied sites collectively referred to as "AWRR Points". These transects will be surveyed every other year, and Vaughn Wash, Upper and Lower Post Canyon, and AWRR points were selected for this year's effort (Table 1). Surveys were conducted from June 25 to August 7, 2025.

Surveyors followed the protocol described by Halterman et al. and released by the USFWS in May of 2016 (Halterman et al., 2016). The protocol instructs surveyors to use taped playback calls to elicit responses. The protocol requires that playback calls are played at 100-meter intervals unless a detection is made. If a cuckoo is detected, surveyors travel 300 meters to avoid double-counting. The protocol also requires surveyors to make four visits to predetermined sites in three prescribed survey windows. The first window is from June 15 to June 30, the second, during which two surveys are conducted, is from July 1 to July 31, and the third is from August 1 to August 15. (Table 2). Surveys must be conducted at least 10 days apart. For a site to be designated "occupied", surveyors must detect cuckoos two or more times during two or more survey periods. Areas can be further designated as containing possible, probable, and confirmed breeding cuckoos (Table 3) (Halterman et al., 2015).

Results:

This season, only two detections were made – an incidental, non-survey detection made on the Lower Post Creek transect (Figure 1) during the latter half of survey period two on July 30, 2025 (Figure 2) and an incidental, non-survey detection made on the AWRR Points transect (Figure 1) during the post-survey period on September 5, 2025 (Figure 2). Since occupancy is defined by detections made in the same area over multiple survey periods, no declaration of occupancy can be made this year (Figure 3).

Table 1: 2025 Yellow-billed Cuckoo Transects on the Appleton-Whittell Research Ranch

ROUTE	UTM START	UTM END	DESCRIPTION	LENGTH
AWRR Points	12 R 546796 3497808 12 R 547964 3496880 12 R 548035 3495665 12 R 547521 3493586		4 points (Telles Tank, Finley Tank, Research Complex, and McDaniel Wetlands	4 points
Post Canyon (Upper)	12 R 544732 3493911	12 R 545881 3494310	Post Creek upstream from private inholding to boundary fence	1.5 kilometers
Post Canyon (Lower)	12 R 546825 3494989	12 R 546797 3494794	Post Creek downstream from private inholding to AWRR HQ	300 meters
Vaughn Wash	12 R 543916 3497050	12 R 544484 3497886	Fence to fence along main wash within Resolution parcel	1.2 kilometers

Table 2: Recommended number and timing of visits during each survey period for yellow-billed cuckoo surveys (Halterman et al, 2016)

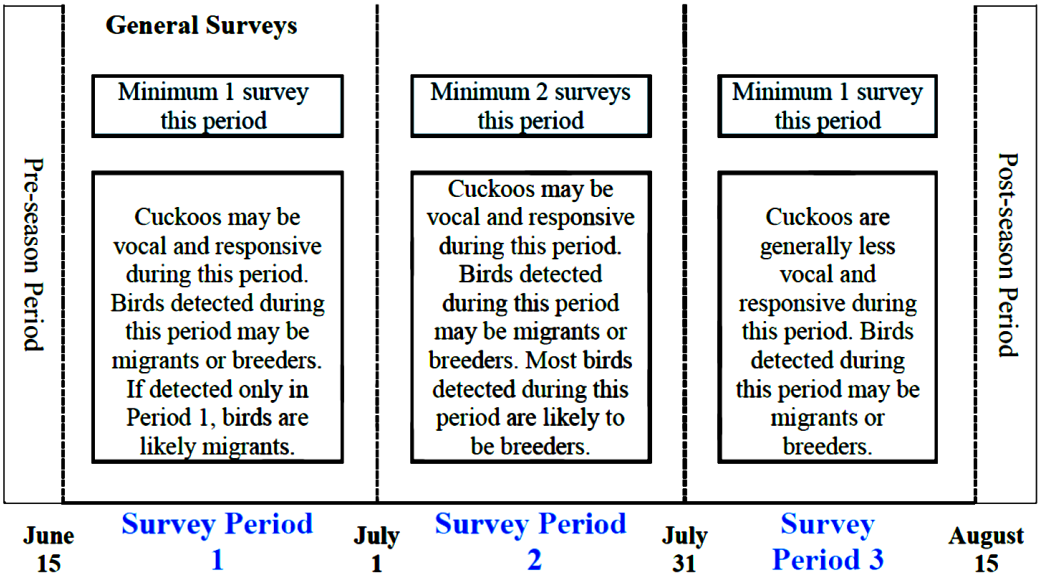


Table 3: Interpretation of results to estimate yellow-billed cuckoo breeding status (Halterman et al. 2015. Originally from Holmes et al. 2008 and McNeil et al. 2013)

Estimation Type	Term	Definition
Breeding Territory Estimation	Possible breeding territory (PO)	Two or more total detections in an area during two survey periods and at least 10 days apart. For example, within a certain area, one detection made during Survey Period 2 coupled with another cuckoo detection made 10 days later, also during Survey Period 2, warrants a PO territory designation.
	Probable breeding territory (PR)	Three or more total detections in an area during at least three survey periods and at least 10 days between each detection. PO territory plus YBCUs observed carrying food (single observation), carrying a stick (single observation), traveling as a pair, or exchanging vocalizations.
	Confirmed breeding territory (CO)	Observation of copulation, stick carry to nest, carrying food (multiple observations), distraction display, nest, or fledgling.
Population estimation	Minimum breeding territory	The observed number of confirmed breeding territories (CO).
Occupancy estimation	Site occupancy	Occupancy is based on two or more total survey detections during two or more survey periods and at least 10 days apart. Multiple detections in an area over an extended period of time suggest that the area may have been used for breeding.

Figure 1: Western Yellow-billed Cuckoo Detections on the Appleton-Whittell Research Ranch of the National Audubon Society by Year and Transect

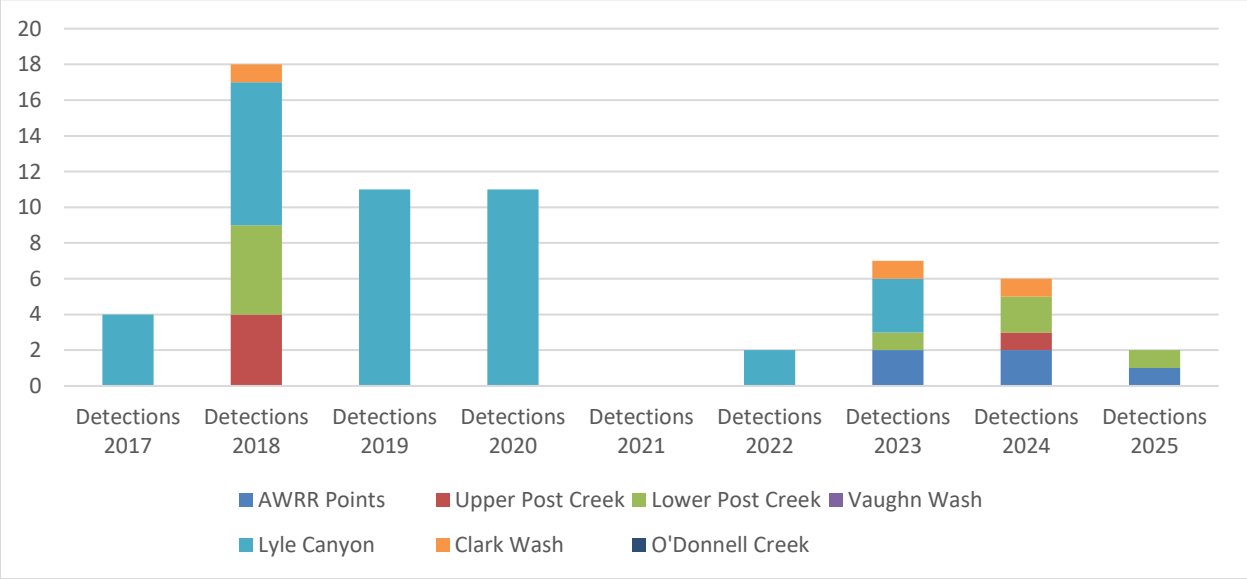


Figure 2: Western Yellow-billed Cuckoo Detections on the Appleton-Whittell Research Ranch of the National Audubon Society by Survey Period and Year

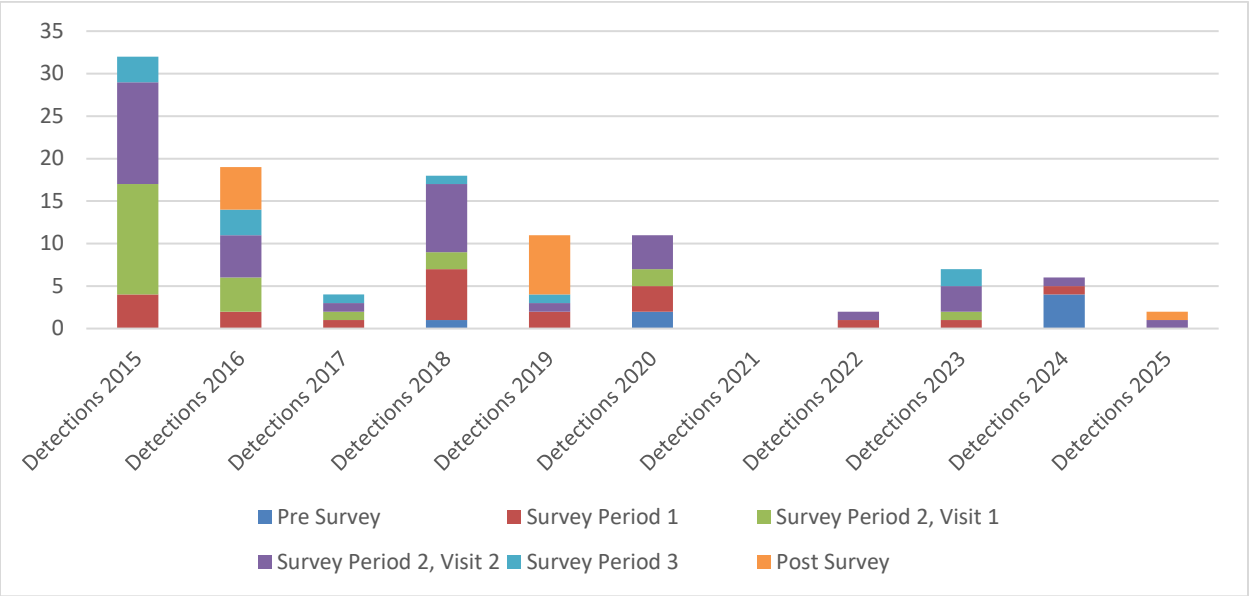
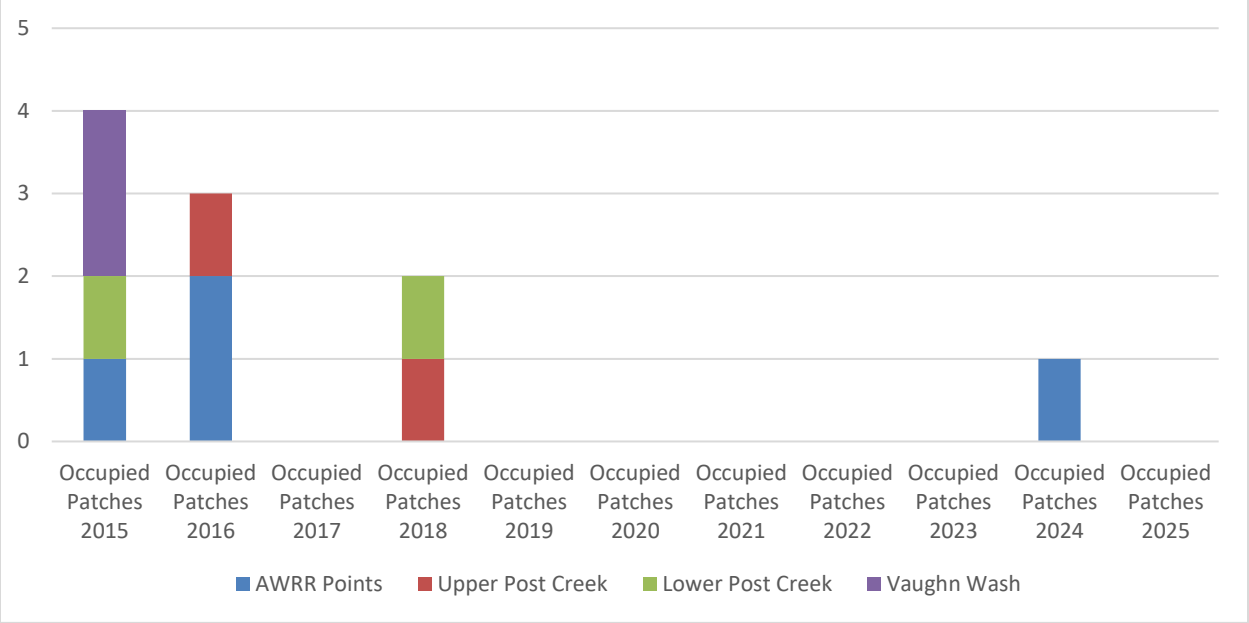


Figure 3: Patches Potentially Occupied by Western Yellow-billed Cuckoo on the Appleton-Whittell Research Ranch of the National Audubon Society by Transect and Year



Discussion:

During the 2025 season, only two detections were made – an incidental, non-survey detection made on the Lower Post Creek transect (Figure 1) during the latter half of survey period two on July 30, 2025 (Figure 2) and an incidental, non-survey detection made on the AWRR Points transect (Figure 1) during the post-survey period on September 5, 2025 (Figure 2). However, since the number of detections is a function of survey effort, timing, and luck, comparing the number of detections from year to year is not an advisable approach to determining cuckoo occupancy.

A more accurate approach to understanding cuckoo status on the AWRR is to estimate the number of areas occupied by breeding cuckoos and to compare this number from year to year. To do this, mapped past detections and included on these maps an indication of which survey periods yielded which detections. Through this exercise, we were able to deduce past occupancy (Figure 3). Since survey effort varied dramatically between 2015 and 2024, it is likely that these estimations of past occupancy harbor some inaccuracy, but since survey effort was consistently minimal and most detections were made incidentally during other work, it is likely that the error leans toward underestimating occupancy.

Areas or "patches" are considered occupied if two or more survey detections are made during separate survey periods at least ten days apart and with fewer than three hundred meters separating them (Table 3). The location and timing of detections along with observers' field notes are used to group detections into clusters that represent repeat detections of individual birds in an established patch. If clusters of detections are fewer than 300m apart, they are considered part of the same patch. This process only produces an approximation of cuckoo occupancy because without tagging birds in some way, it is impossible to know whether detections across survey periods are the same individual birds or if multiple migrants are using the same habitat patches.

Since occupancy is defined by detections made over multiple survey periods, no declaration of occupancy can be made this year (Figure 3). Lower Post Canyon, one of the transects on which a single detection was made this year (Figure 1), last yielded an occupied patch in 2018. The AWRR Points transect, the other route with a detection this season (Figure 1), yielded a single occupied patch in both 2024 and 2015 and two patches in 2015. The last determination of occupancy on Vaughn Wash was in 2015 when two patches were identified, and Lower Post Creek yielded a single occupied patch in both 2018 and 2015 (Figure 3).

While we were not able to confirm cuckoo occupancy on the AWRR this season, cuckoos were encountered both within the typical breeding window and within the typical migration period. This reaffirms past data, showing that cuckoo detections on the AWRR are possible at any time from the pre-survey period in early June through the end of the post-survey period into late September (Figure 2). For this reason, the AWRR should be considered of value to both breeding and migrating cuckoos, and a lack of occupancy in an area shouldn't be interpreted as that area being of no value to the species.

Frequently occupied transects on the AWRR share similar vegetative characteristics with Emory Oak (*Quercus emoryi*), Juniper (*Juniperus spp.*), and occasionally small amounts of Freemont Cottonwood (*Populus freemontii*) dominating the overstory, velvet mesquite (*Neltuma velutina)*, other thorny shubs, and native grasses and forbs dominating the understory, and dense, ungrazed native grasslands dominating the adjacent habitat. Whether cuckoos visit the AWRR and whether they stay to breed or simply migrate through depends on whether the monsoon has brought the conditions they prefer –

surface water or high humidity, moderated temperatures, dense canopies in which to nest, a healthy understory, robust populations of large insects, and productive habitat adjacent their breeding area. Unfortunately, the 2025 monsoon got off to a late start and was ultimately disappointing. While a slight green-up occurred, conditions conducive to cuckoo occupancy did not arrive until after the end of the typical season, and this likely played heavily into only producing a single detection this year. Since cuckoo occupancy is so closely tied to monsoon activity in this region, it may be beneficial in future seasons to push the season back, beginning with surveys in early July and continuing into September.

While both detections (Figure 1) and identified occupied patches (Figure 3) show a declining trend between 2015 and 2025, it is important to remember that these data, until 2025, were produced through inconsistent effort. It is likely that cuckoo occupancy on the AWRR is much more erratic, rising and falling from year to year in relation to precipitation and the resulting productivity of the landscape. However, as average temperatures rise across the region and precipitation becomes less reliable, it is worth paying close attention to this apparent downward trend. Through continued surveys over the next four years, we will be able to get a much better sense of when and how often cuckoos make use of the AWRR and if occupancy data reveal a positive, negative, or neutral trend.

Management Implications:

On the AWRR, data collected between 2015 and 2024 should be considered alongside data from this five-year effort as baseline information against which to measure the effect of future land uses, land management, and climatic changes on Yellow-billed Cuckoo occupancy. Transects that yielded detections during previous years' efforts should continue to be surveyed and post-season efforts to gather data describing habitat used by the species should be undertaken.

This and previous years' data show that the AWRR has the potential to support both migratory and potentially breeding cuckoos. As such, historically occupied reaches should be considered priority conservation areas. In addition, the data show that cuckoo location, abundance, and timing on the AWRR can vary from year to year, likely in relation to the availability of monsoon moisture and resulting productivity across the property. For this reason, all suitable areas within the AWRR should be seen as potentially valuable for cuckoos.

Management activities and land uses that could directly alter or degrade cuckoo habitat on the AWRR should be avoided, and all activities with the potential to disturb breeding cuckoos should be avoided in potentially occupied areas from early June to late September, the period during which cuckoos have been observed. Priority should be given to management benefiting cuckoo breeding habitat, including watershed restoration projects, the continued exclusion of grazing, and limiting human disturbance.

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Appendix A: Western Yellow-billed Cuckoo Survey Transects on the Appleton-Whittell Research Ranch of the National Audubon Society

Figure A1: AWRR Points

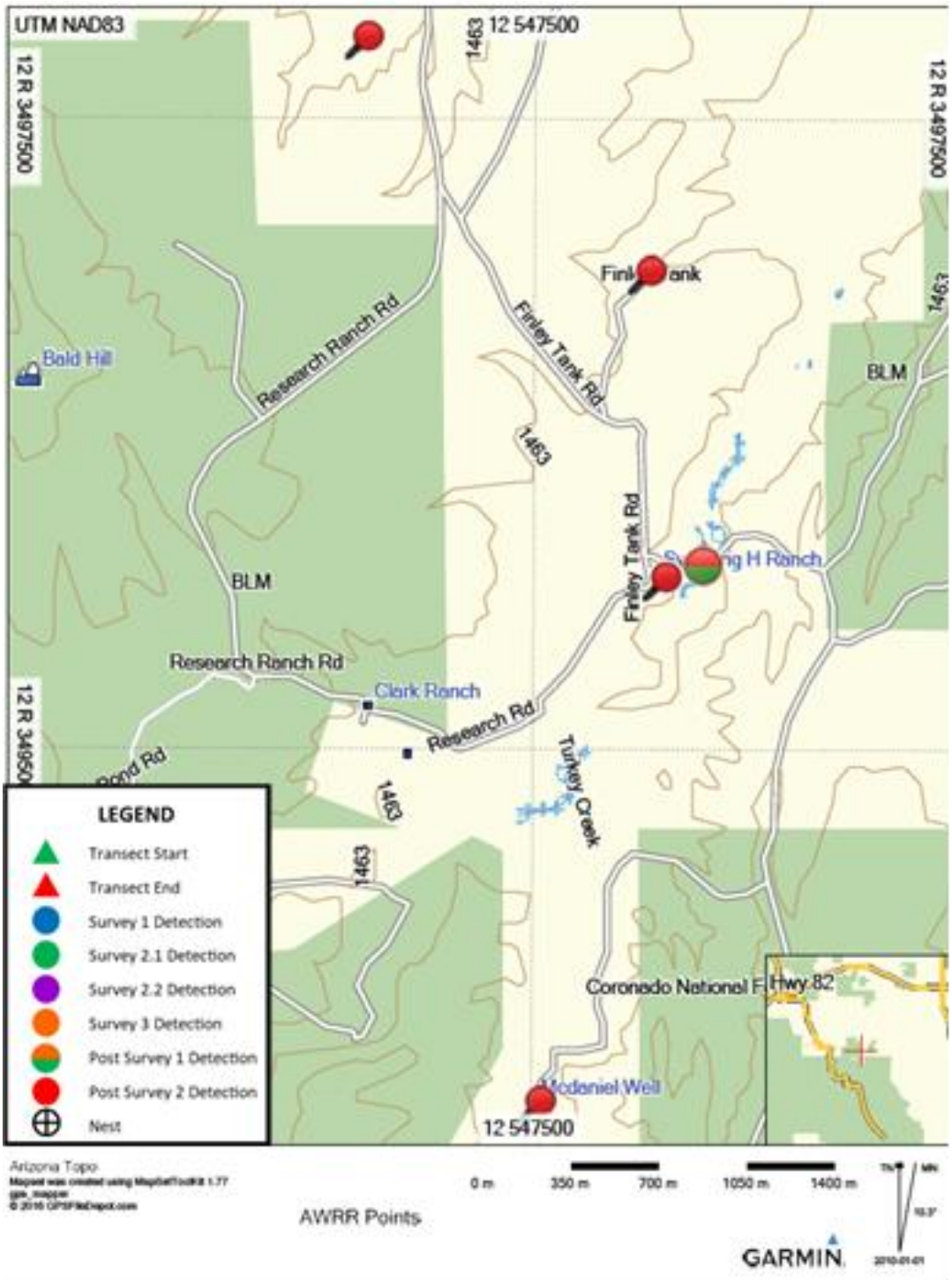

Figure A2: Lower Post Canyon

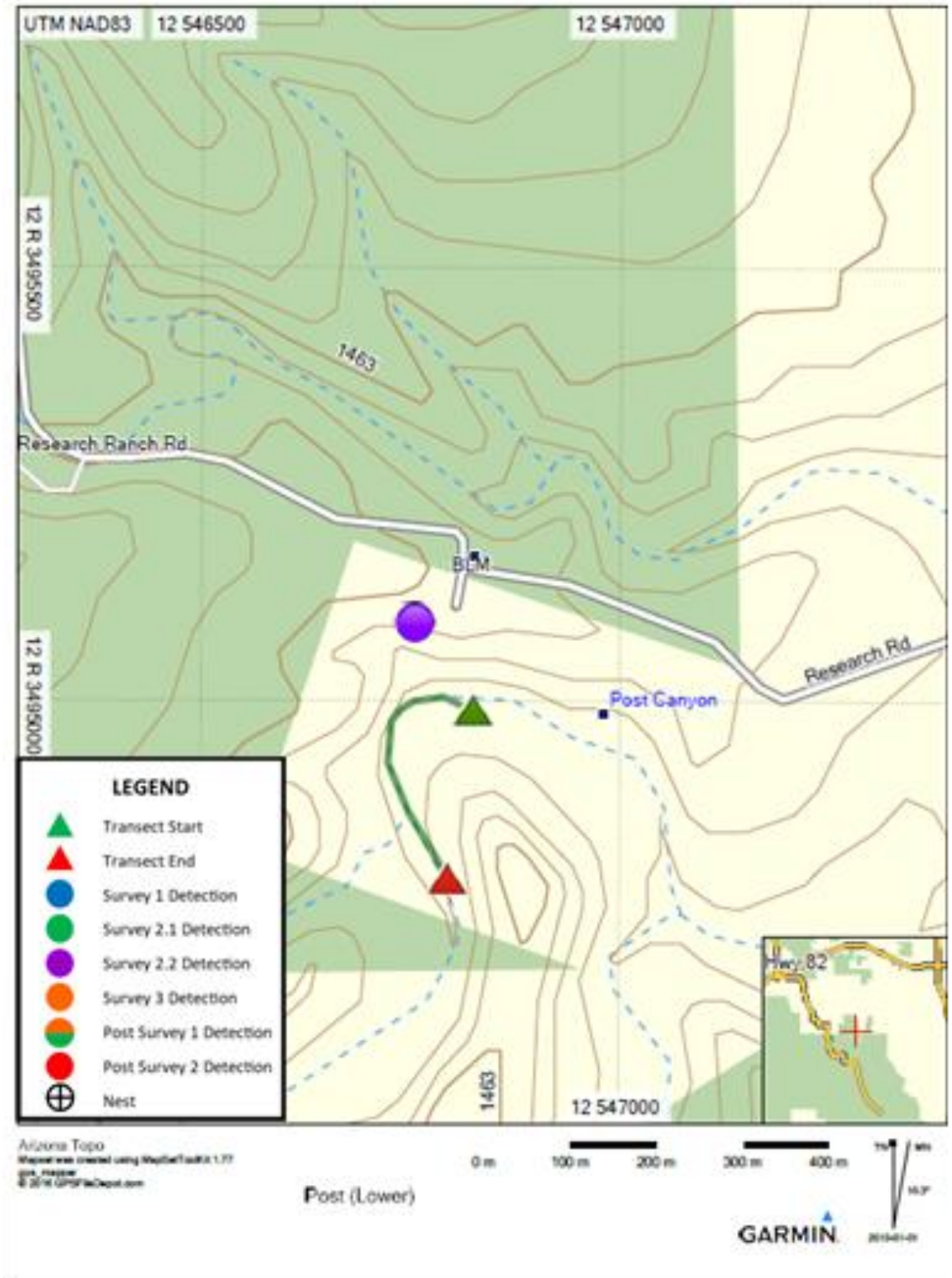

Figure A3: Upper Post Canyon

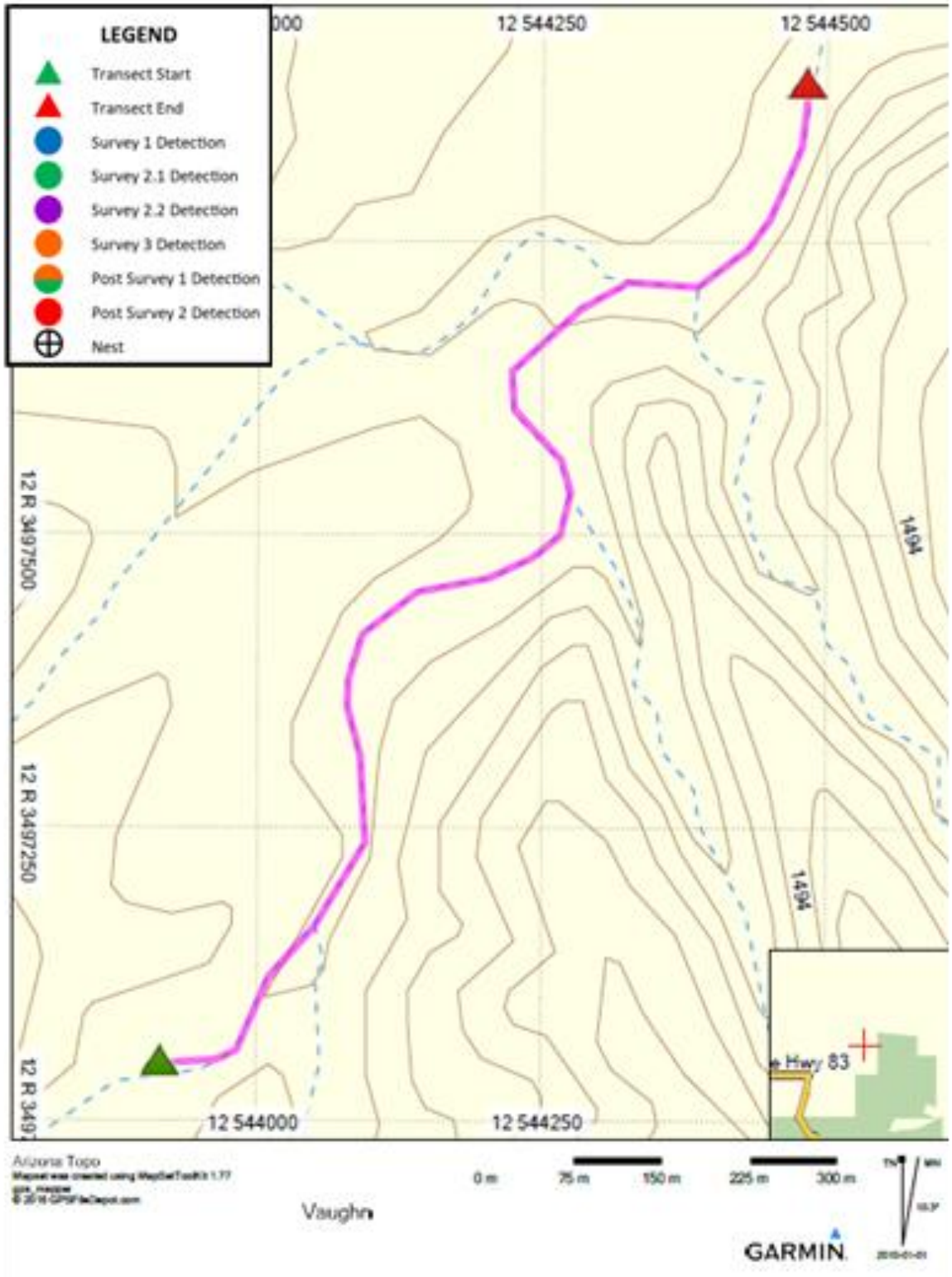

Figure A4: Vaughn Wash