Lower Colorado River Multi-Species Conservation Program

Balancing Resource Use and Conservation

Techniques for Locating, Capturing, and Monitoring Gilded Flickers

2015 Annual Report

May 2018

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Lower Colorado River Multi-Species Conservation Program

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ACRONYMS AND ABBREVIATIONS

g	gram(s)
GPS	Global Positioning System
LCR MSCP	Lower Colorado River Multi-Species Conservation Program
m	meter(s)
mm	millimeters(s)
VHF	very high frequency

Symbols

°C	degrees Celsius
<	less than
#	number
%	percent

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INTRODUCTION

The gilded flicker (*Colaptes chrysoides*) is a desert species most often associated with saguaro cacti (*Carnegiea gigantea*) in the Sonoran Desert of the Southwest. It has been studied relatively little and is considered a species of concern under the Lower Colorado River Multi-Species Conservation Program (LCR MSCP) (LCR MSCP 2004), is listed as a species of conservation concern in 2002 by the U.S. Fish and Wildlife Service, and was listed as endangered by the State of California in 1988 (California Department of Fish and Game 1988).

Gilded flickers were studied from 2013 to 2015. Work included locating, capturing, and telemetry monitoring of active nests. The association of this cavity nester with saguaro cacti and open desert scrub habitats presents its own set of challenges for capturing and monitoring. Some guidelines and lessons learned from these activities were developed to assist researchers with similar study objectives.

METHODOLOGY

Study Area

The desert vegetation overstory complex within the study area was dominated by saguaro cacti, palo verde (*Parkinsonia* spp.), ocotillo (*Fouquieria splendens*), and ironwood (*Olneya tesota*), with understory vegetation such as creosote (*Larrea tridentata*) and cholla cacti (*Opuntia* spp.) also common. The vegetation permitted good visibility for biologists when locating or tracking gilded flickers.

The study site was bordered on the north by Interstate 10; on the east by the boundary of the Kofa National Wildlife Refuge, which is managed by the U.S. Fish and Wildlife Service (La Paz County, Arizona); on the west by the boundary of Colorado River Indian Tribes' property (La Paz County, Arizona); and on the south by the U.S. Army Yuma Proving Grounds boundary (La Paz County, Arizona) (figure 1).

Locating Gilded Flickers

Call-playback of various gilded flicker calls were used to locate the birds during all seasons of the year (Best et al. 2015, 2017). The techniques were to aid in efficiently determining the presence/absence of gilded flickers to be targeted for capture and were not designed for density estimates. Gilded flicker call recordings were provided by the Macaulay Library (Cornell University Laboratory of Ornithology, Ithaca, New York) and Xeno-Canto (www.xeno-canto.org). Gilded flicker "peah," "long call," and "wicka" vocalizations were played on an electronic hand-held game caller

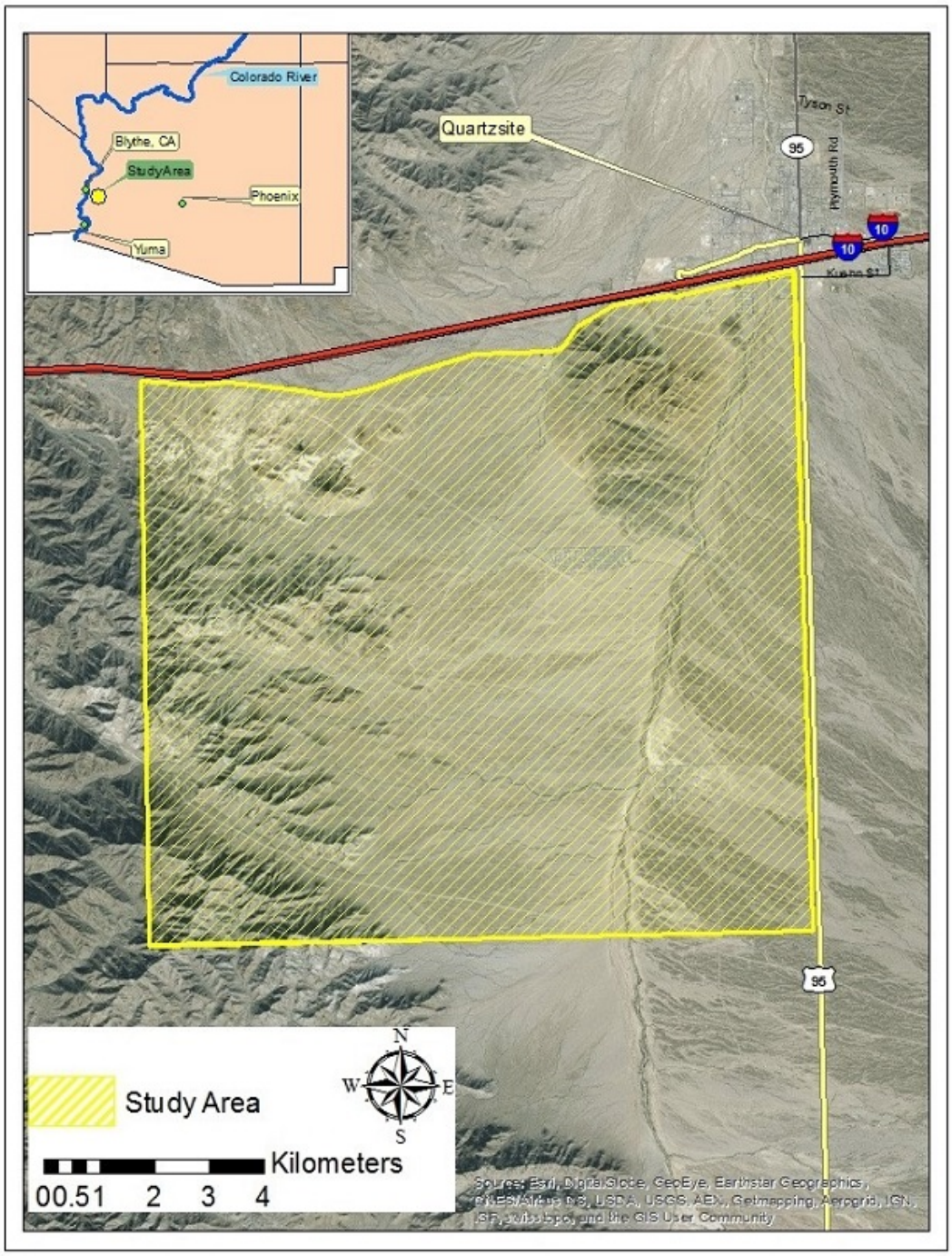

Figure 1.—Study area near Quartzsite, Arizona.

(FOXPRO, Inc., Lewistown, Pennsylvania) to elicit a call response and/or draw gilded flickers into view. Surveys were most productive during mornings and evenings on calm days. Biologists would walk or drive (when roads were accessible) roughly every 500 meters (m) and play a call sequence atop a hill or rise to allow for the call to carry and to provide a good vantage point. A sequence would usually start with several "peah" calls played followed by a listening period of 10 to 15 seconds. If there was no response, a long call was played followed by another listening period. If there was still no response, a "wicka" call was sometimes played. Due to the "wicka" call not being as loud and carrying as far as the previous calls, it was not used during every sequence. During listening periods, biologists would scan the tops of distant saguaro cacti, looking for gilded flickers that may be curious about the calls but not responsive. Immediately following a vocal response, biologists made visual contact and tracked the bird using a combination of binoculars and spotting scopes until positive visual species identification was verified (i.e., to distinguish from northern flickers [*Colaptes auratus*], a species with very similar vocalizations, migrating through the area during the winter months). Adult gilded flickers were most likely to respond to calls from February until April, encompassing the pair formation and courtship periods prior to nesting. Post-fledgling juveniles were noted to have a high rate of "peah" calls into late summer and were more likely to answer call-playback from May to August. While the majority of calls could be heard year round, it was found that the "peah" call was the most frequently heard.

Locating Roosts

Efforts to locate roosting cavities were conducted in the evening in known gilded flicker territories. It was noted that birds would enter a roosting cavity between sunset and dark (Best et al. 2015). Locating roosts was generally a 2-day effort, with the first evening narrowing down the area within a territory to a couple hundred meters while the second evening would provide time for a survey of possible cavities and allow an observer to set up where the most cavities could be monitored at a time. Male gilded flickers were often found before females, as they were more vocal in the evening and would attract the attention of biologists keying in on calls. On several occasions, a pair was observed together, but biologists would lose track of the females and therefore focused on the more vocal males. It is suspected that males would roost a little later than females, and they would "put females to bed" before flying to their own cavity. Pairs were observed roosting in the same cactus on occasion but never in the same cavity.

Biologists were equipped with binoculars and spotting scopes. Binoculars allowed for fast detection of flying birds. Spotting scopes allowed biologists to verify species and monitor an occupied cavity to gain information on sex and color bands if the birds had been previously marked. Birds would sometimes enter a cavity and then extend their head out and call until closer to dusk, which

allowed for occupied cavity confirmation and sexing of the bird when a specific sex was preferred for study objectives. When possible, multiple observers with radios in a territory would communicate bird locations, making the process more efficient. If more observers were available, then a second territory would be observed in order to increase the probability that a roost would be found, allowing for less "down time" on mornings when there were no birds to capture. Nest cavities are easier to locate when young are present due to frequent visits from adults, and they can be located at all times of the day.

Monitoring Nests

Monitoring of nest cavities was initiated in late April and early May. Observations of birds entering a cavity for prolonged periods during the day would cue biologists to begin nest monitoring. Nest cavities were monitored opportunistically, and cavity checks were carried out as time and resources allowed until a nest had fledged or was thought to have failed. It was observed and documented that if a nest failed or was predated, a renest attempt was made at the same or a different cavity for some birds. Visual inspection of a cavity was completed by using a heavy-duty rubberband to attach a mini camcorder with infrared lights (1080P HD Mini Camcorder, FoxOffer Ltd., Shenzhen, China) to a paint roller that had the roller removed. The roller handle was then screwed on to the end of a telescoping paint pole, and the camera (pointing down) was placed into the cavity (figure 2). A short (< 20 second) video of the nest contents was recorded (figure 3). Video contents were reviewed on a computer, and the presence/absence of eggs, number of eggs, and the number of nestlings was recorded. As nestlings aged to the point of being observed in the cavity entrance, the camera technique would be abandoned and a spotting scope used instead to observe chicks in order to minimize disturbance and reduce the chance of fledging young forcefully.

Capture and Handling

Two techniques for capturing gilded flickers are recommended: one for adults and one for fledglings. Adults were captured with a hoop net as they exited their roost cavity. A modified hoop-type net attached to a telescoping paint pole (TelePlus Modular Telescopic Pole, length 6–30 feet, Detroit Sponge & Chamois Co., Inc. Wixom, Michigan) was used to directly cover the opening of an occupied cavity until the bird emerged (figure 4). A hoop net frame of about 12 inches in diameter was constructed of 12-gauge galvanized wire and affixed to a paint roller handle. The roller and metal rod were removed from the handle and replaced with the galvanized net frame. The roller handle allowed for easy attachment to the telescoping pole. A 1-m length of 60-millimeter (mm) mesh

Figure 2.—Mini camcorder (1080P HD Mini Camcorder, FoxOffer Ltd., Shenzhen, China) used to monitor cavity nest chronology of gilded flickers.

Figure 3.—Still frames taken from a mini camcorder video used to monitor gilded flicker nesting cavities.
Left frame shows five gilded flicker eggs, and the right frame shows two gilded flicker chicks.

Figure 4.—A modified hoop net, attached to a telescoping painter's pole, being raised to cover a gilded flicker cavity.

mist net was sewn into a cone shape, and the opening was affixed to the galvanized wire frame with small zip ties. The mist netting would contain and entangle the bird once it emerged.

Once a roosting cavity was identified and confirmed to be occupied, biologists would arrive to the site roughly an hour before sunrise. The telescoping pole was then extended to the estimated cavity height before approaching the roost cactus. Biologists would approach quietly, as some birds were very wary and exited the cavity before it could be covered with the net. Breezy mornings were observed to be good, as they muffled the sounds of approaching biologists. Two biologists with headlamps would quietly approach the roost cactus, and one would cover the cavity opening with the net. The second biologist would act as a spotter with binoculars and inform the netter if the hoop net needed to be adjusted to better cover the cavity. The hoop net generally created enough of a stimulus (noise, physical contact to saguaro cacti, etc.) to generate a flushing response, but in some instances, the bird would emerge on its own, closer to sunrise.

If two holes were in close proximity, both could be netted (with an additional net) or one blocked if unsure which cavity was occupied. A painter's pole was modified with a cotton rag that was rolled into a ball and taped to the end for blocking cavities. There was also concern that cavities were connected, allowing for a "back door" escape. Once the bird was flushed into the net and was fully entangled, the net pole was lowered to the side to a waiting biologist.

The bird was then immediately untangled, with special care taken to ensure there were no net strands restricting the airway around its throat. If the bird was heavily entangled, the net was sacrificed and several strands cut to quickly remove the bird. If this was done, it was important to inspect that all netting material was removed from the bird. Gently blowing on its feathers allowed for visual inspection to ensure that all netting material had been removed.

Once a bird was removed from the net, it was placed in a cotton bird bag and tied off until biologists could prepare banding and tagging equipment. When biologists removed the bird from the bag for processing, a hood was placed over the bird's head; the hood was fashioned by cutting off the finger of a cotton work glove and cutting off the tip to allow the beak, but not the head, to protrude. The hood helped to calm the bird during processing.

Juvenile gilded flickers were captured in mist nets. No roosting cavities for juveniles could be located, and it is suspected that they roost in dense shrubs. It was observed that high-activity areas for fledgling gilded flickers were in or along vegetated washes within their parents' territory; therefore, mist netting arrays were placed in a wash that was located within the adults' territory. Standard 60-mm mesh mist nets were used in 9 or 12 m lengths (Avinet, Inc., Dryden, New York) and 2.6 m high. Typically, two nets of the same length were stacked and sewn together (e.g., two 9-m nets were sewn together, one on top of the other, to form an 8-shelf net 9 m long and 5.2 m high). The array would be placed near thick vegetation attractive to juveniles as an escape route. The vegetation served to make the netting array less conspicuous. Taking advantage of recently fledged juveniles' limited flight ability (usually making short flights), biologists would move toward the juvenile from at least two different directions in an attempt to "herd" it toward the wash and eventually into the net. Biologists would communicate with radios to keep track of the bird and coordinate movements. Once a juvenile was captured in the mist net, handling and processing were conducted using the same methods as were used on adults.

Measurements and Transmitter Attachment

While a bird was being processed, one individual handled it while a second took measurements and secured the transmitter and bands. Banding included a Federal metal band with a unique number (left tarsus) and a unique Darvic plastic color

combination (right tarsus, to aid in visual identification; figure 5). Bird weights were recorded in grams (g), and morphometric measurements were taken in millimeters (bill length, width and depth, tarsus length, rectrix length, and wing chord). In addition, roosting/nesting cavity location, cactus height, number of cactus arms, cavity height, and cavity orientation (bearing) information was collected and recorded.

Figure 5.—Federal (metallic) and Darvic (red and yellow) bands attached to an adult gilded flicker.

The primary transmitter and attachment type used to quantify home range and seasonal movement patterns was of the backpack design (Model Ag386; Lotek Wireless, Inc., Ontario, Canada; Biotrack, Ltd., Dorset, United Kingdom) fixed to adult gilded flickers using an elastic chord (figure 6) with a modified Rappole and Tipton (1991) leg-loop harness (Sechrist and Best 2012). Transmitters had an advertised weight of 2.44 g and did not exceed the 3% tag to body weight ratio deemed appropriate for avian instrumentation (United States Geological Survey's Bird Banding Laboratory permit requirements; Gustafson et al. 1997). In addition to using the elastic chord, a Teflon chord (0.075 inch Natural Tubular Teflon Tape, Bally Ribbon Mills, Bally, Pennsylvania) was also tested.

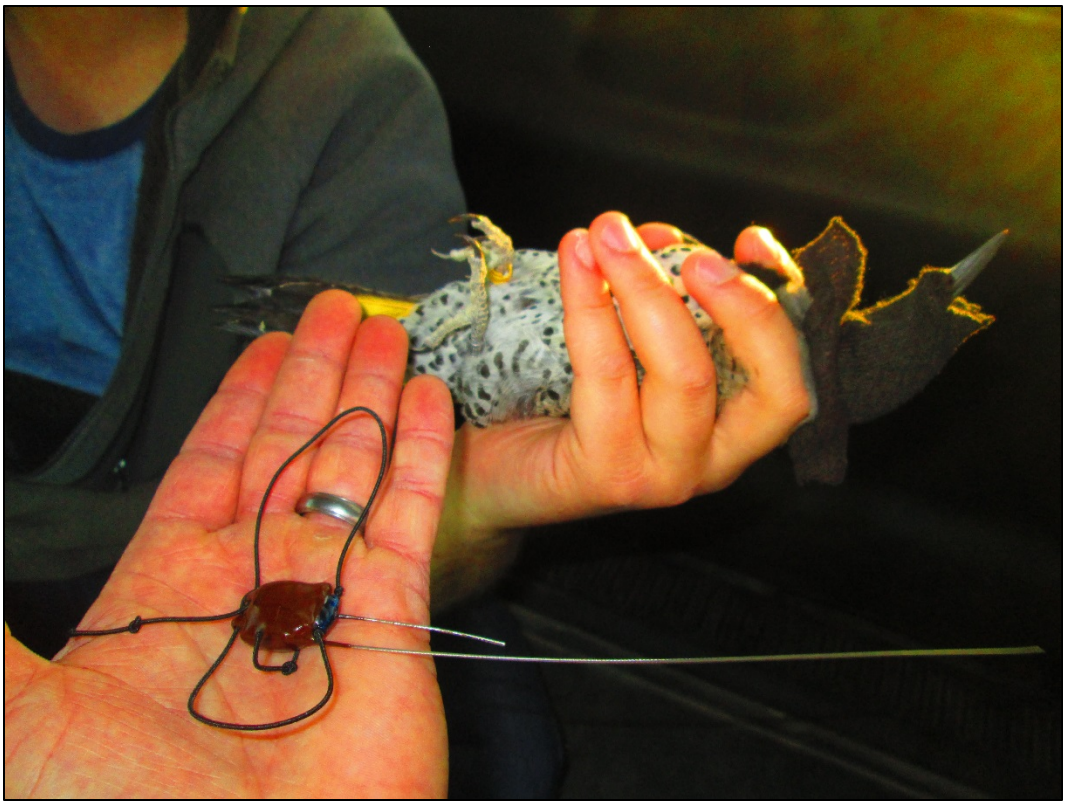

Figure 6.—PinPoint-50 GPS tag with very high frequency radio, including the leg-loop harness consisting of an elastic chord ready to be placed on a gilded flicker. Note the hood in place to calm the bird.

In an attempt to better understand late-summer movement patterns without intensive telemetry monitoring, a combination Global Positioning System (GPS) receiver/very high frequency (VHF) radio transmitter (PinPoint-50; Lotek Wireless, Inc., Ontario, Canada; Biotrack, Ltd., Dorset, United Kingdom) was attached to three adult male gilded flickers in 2014 using the same technique as described above for the backpack radio transmitter (figure 7). These units were programmed to store a waypoint every 3 days (50-point storage capacity) starting on July 1, 2014, and the internal VHF radio was programmed to emit a radio signal on December 1, 2014, for a period of 12–14 days (at 27 pulses per minute) to facilitate relocation and recovery of the tag for data download. As a result of the heavier tag weight (4.3 g), a 5% tag to body mass ratio exemption was obtained from the U.S. Geological Survey Bird Banding Laboratory prior to deployment.

To determine suitability of use, and in an attempt to monitor juvenile gilded flicker movements, smaller (1.04 g) radio transmitters (Model Ag392; Lotek Wireless, Inc., Ontario, Canada; Biotrack, Ltd., Dorset, United Kingdom), attached via glue and sutured to central rectrix feathers, were deployed on post-fledged gilded flickers (n = 2) (figure 7). The Ag392 rectrix transmitter mounts

Figure 7.—Model Ag392 VHF transmitter affixed to the rectrix feather of a juvenile gilded flicker.

were selected for use with juvenile birds because they do not inhibit growth and would be shed with rectrix feathers during the first molt. The transmitter was oriented with the transmitter body near the ventral insertion of the rachis of the central rectrix feathers. Actual attachment was accomplished using transmitters designed with a slot to accept a rectrix feather and two narrow tubes to tie suture material around the feather. The transmitter was glued to the central rectrix feather, and dental floss was wrapped through the tubes in the tag, around the feather and tied off with a square knot. Cyanoacrylate glue was used to glue the feather into the slot on the tag as well as to secure knots tied with suture material to prevent untying (as described by J. Sechrist 2012, personal communication).

Monitoring Movements

Initial monitoring included a video of release while another biologist observed to evaluate flight ability. Birds would usually make a short flight and land in a nearby shrub and recover from the rigors of processing and tag attachment. It was common to observe heavy pruning and picking at bands immediately after release. Welfare checks were carried out twice a day for the next 2 days to confirm that the bird had accepted the bands and tags.

Telemetry was useful in collecting information on movements, home range, and behavior. Portable receivers (Model R2100 and R410, Advanced Telemetry Systems, Isanti, Minnesota) were coupled with three-element Yagi antennas to receive signals from instrumented gilded flickers (figure 8). Once a signal was detected, gradual antenna movements in a back and forth semicircular pattern toward the target were completed until an audible signal strength suggested the instrumented bird was < 100 m in proximity. Instrumented birds deemed to be within 100 m were tracked with slower, directed movements, paired with consistent visual observation using binoculars until visual confirmation of the bird's precise location was achieved (or, in some instances, a signal direction change coupled with plumage verification from a flushed gilded flicker was used to confirm location). Although tracking gilded flickers with hand-held antennae required significant effort, this method provided more accurate home range data and allowed for direct observation that would have been lacking if triangulation would have been used. As anthropogenic-influenced behaviors/data are always a concern, the study plan implemented a 15-minute period between successive data collection efforts. This seemed to be appropriate, as it apparently did not affect instrumented gilded flicker behavior.

Figure 8.—Biologist determining a gilded flicker location utilizing a portable model R410 receiver coupled with a three-element Yagi antenna.

LESSONS LEARNED

Locating Gilded Flickers

Use of call-playback from February to April to locate gilded flicker territories proved to be an acceptable technique. Biologists were able to cover large areas of habitat efficiently. Electronic callers were mobile, easily used, and the volume from the speaker was sufficient for windy days. Early in the study, biologists would use call-playback frequently to keep tabs on gilded flickers when attempting to locate roost cacti. This proved to be counterproductive, as birds may be attracted to the call initially only to return to their "planned" roosting area as sunset approached. Gilded flickers showed fidelity to roost locations, which allowed biologists to "close in" on roosting areas over 2–3 evenings of observation. It was important when locating roosts that biologists resisted the urge to chase calls on the second evening of searches. These calls would lead biologists away from the previously documented territory only to find that the birds returned to the same vicinity each night to roost near sunset.

Capture of Adults

Given the relatively non-aggressive behavior of gilded flickers coupled with sparse cover that left mist net arrays conspicuous, mist netting with call-playback proved difficult for capturing adult gilded flickers. After attempting to capture adults with roughly a dozen net sets, only a single gilded flicker was captured using call-playback and mist nets. This capture method was very time consuming, and netting activities were only conducted in early mornings due to the sun shining on the nets, making them very visible to gilded flickers that had been called in. Evening sets were avoided, as by the time the sun set and provided lower light levels, there was not enough time to workup the birds (take their measurements; affix bands, tags, and transmitters; and release it before dark). It was common for birds to come close to the netting arrays, but they were quick to notice an array and were cautious as they flew in the vicinity of the net.

Adults were targeted prior to nesting and during pair bonding (February to early April). The capture efforts were focused during the pre-nesting cycle in February and March. Cooler temperatures in winter and spring were more favorable to handling gilded flickers. In addition to the heat of the summer months, resources were scarce, and birds may have a difficult time recovering after experiencing the rigors of capture and handling. The biologists' experience with netting birds at an active nesting cavity was limited, and the effects on nest success from capturing adults are not known. It is recommended that biologists proceed with caution and continue to monitor any nests where an adult was captured to evaluate the effects of the disturbance. It was noted that birds would usually exit their roost cavity

within a half hour of sunrise. Capturing gilded flickers in the evening was avoided because workup time for the bird would have required keeping it overnight so it could be released during daylight hours.

Banding

The characteristics of gilded flickers that include perching atop saguaro cacti, as well as often perching with legs extended, allowed for visual inspections of leg bands. The color Darvic bands were helpful in identifying birds, which was especially important, as sometimes tags were shed or antenna from tags were damaged, leaving the transmitter without a signal. It was possible to quickly deduce, through quality optics, a bird's origin and to determine the status of the tag (shed tag or broken antenna). In addition, life history notes were made in regard to changes in gilded flicker pairs or territory shifts easily.

Tag Attachment Using a Harness

The primary material used for transmitter attachment was a 1-mm elastic chord. Use of an elastic chord as a harness material yielded varied results. Gilded flickers would sometimes pick at the material and abrade it until it broke. In 2015, a different harness material was used on several birds in an attempt to improve attachment duration. Four transmitters were attached to gilded flickers with a 0.075-inch Teflon chord similar to that used for telemetry studies with raptors (except with smaller diameter). In addition, three gilded flickers were tagged with the standard elastic chord for comparison. Attempts to check birds monthly were carried out, but not all birds were contacted each month, so the exact durations of attachment were not known. Table 1 shows a range of attachment durations.

Table 1.—Comparison of Teflon and elastic cords for transmitter attachment using a harness

Harness material	Date tagged	Date tag recovered	Days tagged minimum	Days tagged maximum
#1 Teflon	12/3/2014	1/12/2015	2	40
#2 Teflon	12/3/2014	6/16/2015	139	195
#3 Teflon	12/8/2014	5/18/2015	136	161
#4 Teflon	2/17/2015	4/21/2015	2	63
#1 Elastic	1/9/2015	5/18/2015	104	129
#2 Elastic	1/10/2015	5/18/2015	101	128
#3 Elastic	1/10/2015	4/21/2015	38	101

Minimum attachment times lasted from 2 to 139 days for Teflon chord and 38 to 104 days for elastic chord (see table 1). Gilded flickers were still able to abrade Teflon material until it broke, but the Teflon chord attachment did have the greatest attachment duration. Due to the relative lack of a long-term attachment technique, it is recommended to use smaller tags with a less-advertised battery life (approximately 6 months). A smaller size and weight may cause less discomfort and lead to a longer attachment duration.

Tag Design

Under ideal conditions (clear line of sight), radio tags could be detected nearly a kilometer away and operated within parameters as indicated by the manufacturer. Several transmitters suffered broken antennae, which greatly reduced the signal detection range. It may be a function of frequent confinement within a cavity that causes repeated bending of the antenna until it weakens and breaks. The last round of tags were ordered with a thicker gauge of antenna. These tags were deployed on seven birds, and there were no antenna failures out to 139 days after deployment.

Problems with transmitters arose as temperatures increased during summer. The advertised maximum operating temperature of tags (40 degrees Celsius [°C]) was reached in July, as air temperatures exceeded 46 °C. The signal strength of the tags were found to fluctuate greatly or completely stop during such conditions. The tags would resume functionality as the temperatures decreased in the evenings. However, given the climate, and the desire to collect accurate year-round positional data, future data collection efforts should incorporate the use of tags from a manufacturer that advertises the maximum available operating temperature and discusses antenna design considerations such as utilizing a more robust antenna for cavity-dwelling birds prior to development.

Bird Welfare

It was observed that 3 of 22 tagged gilded flickers responded poorly to handling and/or tag attachment and became flightless roughly 24 hours after release. Although the exact cause is unknown for this reaction, it is suspected that amino acid buildup from struggling or the general condition of the bird may have been contributing factors. In the winter and spring seasons, prior to floral blooming, resources may be scarce, and birds may already be in a distressed state. While removal of tags did not lead to immediate recovery, two of three birds were observed at later dates and appeared to have recovered after tag removal. One bird was held overnight in a cotton bird bag and was able to fly off the following morning. It was observed during later surveys. Another bird was released, flightless and never resighted, and a third was placed in a palo verde near evening

and was later resighted (confirmed by color bands) during subsequent surveys and noted to be behaving normally. Though not employed, the idea of attempting to rehydrate the birds after tagging with either water or a mixture of sugar water similar to what is used in hummingbird feeder mixtures may be considered to provide birds with electrolytes to aid in recovery.

Inspection of gilded flickers that had been recaptured and that had tags replaced due to transmitter failure were noted to be healthy and did not display any external negative reaction to the transmitter harness or tag. Regardless, it is recommended that attempts to recapture birds near the end of transmitter life be made in order to remove the device due to unknown long-term impacts.

Tag Attachment Using a Rectrix Mount

Two juvenile gilded flickers were outfitted with a rectrix-mounted VHF transmitter during the study in an attempt to test this attachment technique and gain insight into juvenile movements and dispersal. The first juvenile carried the tag for 12 days before the tag was shed. The second juvenile carried the tag for approximately 6 days before the signal was lost. The second juvenile was observed a week later but was without a transmitter. Based on the limited success of these two tagged juveniles, a different attachment technique should be investigated if juveniles are to be tracked.

Use of GPS Tags

PinPoint-50 GPS tags required a permitting exemption to allow for a 5% body weight tag to be attached. The PinPoint-50 tags would log location data at pre-programmed times, and a VHF transmitter embedded in the GPS tag would turn on after logging had been completed to assist with tag retrieval. The additional weight of the tags was partially justified due to the reported non-migratory life history of gilded flickers (Hunter 1984; Rosenberg et al. 1991) coupled with the biologists' ability to recapture a bird and remove a tag once the VHF transmitter had turned on. Three tags were successfully deployed, and results of followup welfare checks on tagged birds were favorable. However, only a VHF signal on a single bird was detected despite utilizing aerial surveys within the study site to locate the transmitters. The remaining VHF transmitter worked successfully; a bird was captured, and the tag was removed for data download. Unfortunately, the GPS logging device was faulty and provided no location data. Field testing of these tags prior to deployment gave favorable results. The technology is relatively new for tags this small, but researchers should not be hesitant to try them in the future.

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