

Survival and Movements of Band-tailed Pigeons in New Mexico, 2013

David J. Griffin, Graduate Student, New Mexico State University, Department of Fish, Wildlife, and Conservation Ecology, 2980 S Espina, Knox Hall 132, Las Cruces, NM 88003.

Scott Carleton, Assistant Unit Leader, U.S. Geological Survey, New Mexico Cooperative Fish and Wildlife Research Unit, New Mexico State University, Department of Fish, Wildlife, and Conservation Ecology, 2980 S Espina, Knox Hall 132, Las Cruces, NM 88003, 575-646-7196, carleton@nmsu.edu

Dan Collins, Regional Migratory Game Bird Coordinator, U.S. Fish and Wildlife Service, Region 2, Migratory Bird Office, P.O. Box 1306, Albuquerque, NM, 505-248-6881, dan_collins@fws.gov



Introduction

Band-tailed pigeons (*Patagioenas fasciata*) are distributed from higher elevations of South America, through Middle America, and into North America (Figure 1). It inhabits forested areas across its range and there are 3 subspecies in North America: *P.f. monilis* (“Pacific Coast”), *P.f. vioscae* (“Baja”), and *P.f. fasciata* (“Interior”). Studies were conducted from the 1960’s through 1980’s that described the movement, demographics, and natural history of “Interior” Band-tailed pigeons (Gutiérrez et al. 1975, Stabler et al. 1977, White and Braun 1978, Curtis and Braun 1983, Kautz and Braun 1981, White and Braun 1990, Keppie and Braun 2000). The data gathered from that period is the only data available to guide conservation and management of the species in New Mexico.

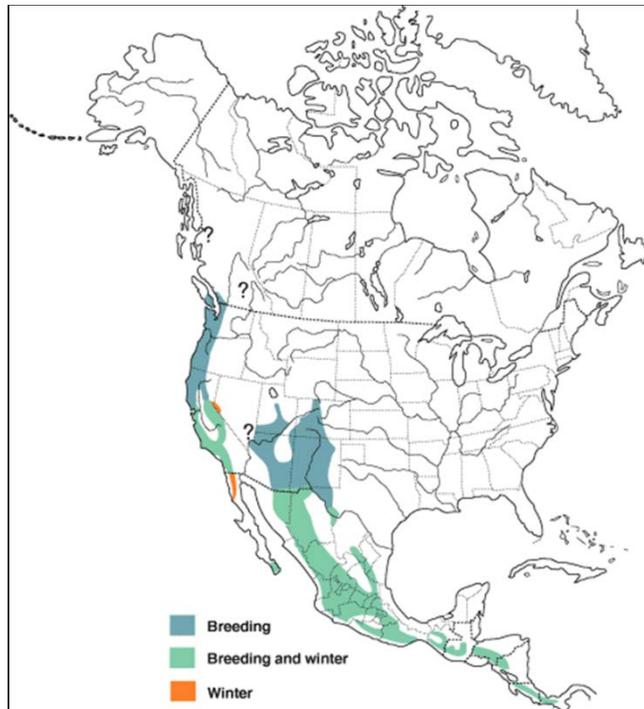


Figure 1. Distribution of Band-tailed pigeon in North and Middle America, showing detail between populations. Map from Keppie, D.M. and C.E. Braun (2000).

Since the 1990’s, research on Band-tailed pigeons primarily has focused on the “Pacific Coast” population (Keppie and Braun 2000, Sanders and Jarvis 2000, Sanders and Jarvis 2003, Cassaza et al. 2005), where use of mineral sites and banding programs led to improved population estimates and comparisons with hunter harvest data (Sanders 2012). Along with the use of modern tracking technology our understanding of population dynamics and movement

patterns greatly improved for that population (Leonard 1998, Sanders 2012). To better inform conservation and management decisions for the “Interior” population in New Mexico, efforts describing current population status, demography, and movement patterns were needed to enhance our knowledge of Band-tailed pigeons (Braun 1994).

To meet these research needs, in 2013 we initiated a capture, marking, and movement project at a site at Silver City, New Mexico. Using leg bands, Passive Integrated Transponder or PIT tags, geolocators and radio telemetry, the goal of this project is to provide more reliable demographic estimates and information about movement patterns for Band-tailed pigeons in New Mexico. Our main objectives in 2013 were to: 1) Gather demographic data on Band-tailed pigeons via seasonal capture, banding, and PIT tagging, and 2) Determine seasonal movement patterns of Band-tailed pigeons and investigate the use of low cost light level geocator devices.

Study Area

We studied Band-tailed pigeons from June 19 to September 28, 2013 at a private residence located 7.2 km north of Silver City, Grant County, New Mexico (Figure 2). The site is at an elevation of 2060 m, and vegetation is ecotonal between Dick-Peddie’s (2000) Mixed Woodland and Encinal Series and influenced by a mild winter-wet summer climate. Band-tailed pigeons have been coming to a feeding station at this site for >5 years during the breeding season (e.g., April to September).

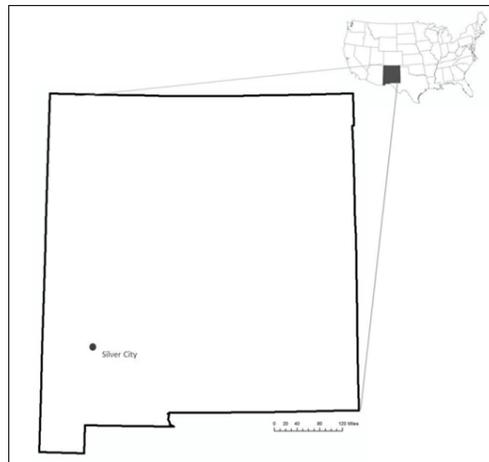


Figure 2. Sampling site for the initiation of a long-term demographic and seasonal movement study of Band-tailed pigeons (*Patagioenas fasciata*) in New Mexico. Capture/banding site was selected based on >5 years of consistent visitation by Band-tailed pigeons.

Materials and Methods

Capture and Marking

From June 19 to September 21, 2013 we captured Band-tailed pigeons for periods of 1-3 days at intervals of 10-14 days to avoid permanent avoidance of the site by the birds. We used a custom-built Whoosh net (3.0 m x 4.6 m) to capture pigeons. The Whoosh net was opened from sunrise to sunset when weather conditions permitted. Captured birds were individually marked with a USGS size 5 aluminum leg band and a PIT tag, which was injected subcutaneously below the nape. For all birds we recorded: age, sex, length of bill, tarsus and wing, body mass, and molt status. Age and sex of Band-tailed pigeons was based on plumage characteristics and other features. Adult pigeons were bluish-gray overall and had a white crescent and iridescent green-bronze on the nape of the neck, yellow legs and feet, and a yellow bill tipped with black (Braun 1994), while hatch year birds were paler gray, with gray feet and bills, lacked a white crescent on nape, and had buffy- or light-edged wing coverts and primaries (Silovsky et al. 1968, White and Braun 1978). Adult males were generally larger than females and had a vinaceous (i.e., purplish-pinkish) color to the breast, head and neck, while females were more brownish-gray and lacked the vinaceous color (Passmore and Jarvis 1979). We built and installed a remote PIT Tag reader system at the capture site that recorded date, time, and individual bird. The system was comprised of 1 to 3 detection antennae and associated tuner boxes, and a data logger. The system was powered by AC current via an extension cord to the residence. The PIT tag reader data was logged and stored onsite and retrieved periodically (about every 7-14 days, concurrent with capture sessions).

Movements – Geolocators

To record long-distance inter-seasonal movements, we used BioTrack's MK7490 geolocator, that incorporated a stalked light level tag to raise the sensor above the feathers, and loops that accepted harness material. These geolocators were 3.6 g, or approximately 1.1% of the average body mass for "Interior" Band-tailed pigeons (i.e., 352g males, 331g females, Keppie and Braun 2000), long-lasting (up to 24 months), and were attached using a leg loop harness system with the geolocator mounted on the lower back of the bird. The total mass of the geolocator and harness was < 2% of the average body mass of "Interior" pigeons. Geolocators measure the amount of daylight at dawn and dusk which can later be processed to derive an

approximation of latitude and longitude on a particular date, generating a geographic location. These points are then “connected” to form a buffered corridor of movement (i.e., migration path) and/or depict wintering locations (i.e., cluster of points over time).

Movements – Radio transmitters

To record shorter-distance intra-seasonal (i.e., breeding season) movements, we used VHF radio transmitters (Lotek model: PipAg392, 1.2 g, line of sight: 1.5 km to 5.0 km, above ground: 400 m to 1000m, and ground to ground: 150 m to 500m, life span range: 1.1 to 4.4 months). Transmitters were incorporated into the design of the geolocator and together the total weight of the transmitter, geolocator and harness system was approximately 5.33 g or < 2% of the average body mass for Band-tailed pigeons. We tracked radio-tagged birds at least once weekly from the capture site and several fixed telemetry points at high elevations in the study area up to 20 km away.

Other

We used a remote passive infrared trail camera at the capture site to monitor Band-tailed pigeon presence/absence and activity patterns. The camera was activated daily from pre-sunrise to post-sunset, and photographs were downloaded every 7-14 days (or concurrent with capture periods).

From August 24 to September 21, 2013 we collected mouth and throat swab samples from pigeons to test for the presence of *Trichomonas gallinae*. This effort was conducted in cooperation with Krysta Rogers, Avian Disease Biologist at the California Department of Fish & Wildlife’s Wildlife Investigations Laboratory. CDFW provided us with sampling kits and coordinated the processing of samples by Dr. Kirkwood Land, Associate Professor in the Department of Biological Sciences at the University of the Pacific at Stockton, California.

Results

Capture and Marking

We operated the Whoosh net on 10 capture days from June 19 to September 21, 2013. During this time we captured and marked 126 Band-tailed pigeons and had 13 recaptures of 11 individuals (Figure 3).

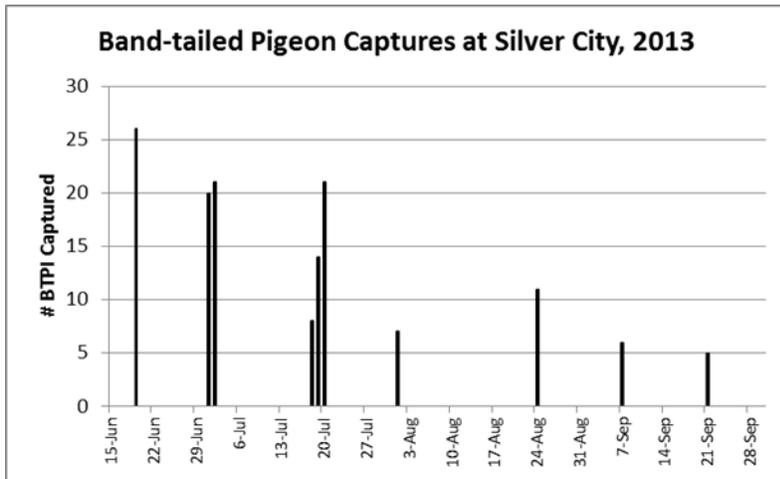


Figure 3. Band-tailed pigeon captures at Silver City, Grant County, New Mexico, 2013.

Of the total, 125 were after hatch year birds and 1 was a hatch year bird captured on September 7, 2013. Eighty-one pigeons (64.3%) were adult males and 44 (34.9%) were adult females; the sex of the hatch year bird was undetermined. Of the 13 recaptures, 11 (84.6%) were adult males and 2 (15.4%) were adult females. The PIT tag reader system was operational from July 14 to September 30, 2013. During that period a total of 37 individuals were detected visiting the site. The total number of detections (i.e., ‘hits’) made by the PIT tag reader peaked during the week of August 21 to August 31, 2013 (Figure 4) and came one week prior to the period of peak number of individuals detected (Figure 5; note these data are used as an index of activity at the site). The PIT tag data has not yet been analyzed to estimate survival of Band-tailed pigeons in 2013.

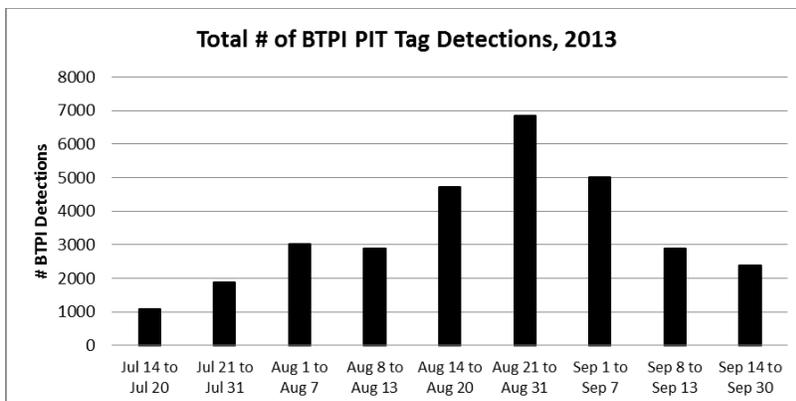


Figure 4. Total number of detections made by PIT tag reader system at Silver City, Grant County, New Mexico, 2013.

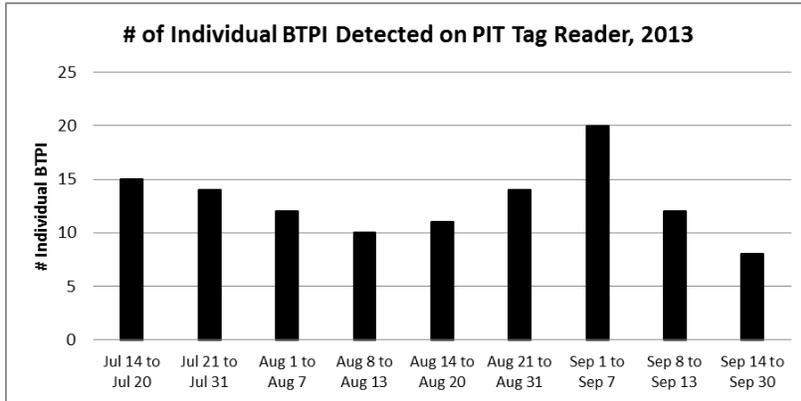


Figure 5. Number of individual Band-tailed pigeons detected by PIT tag reader system at Silver City, Grant County, New Mexico, 2013.

Movements – Geolocators

In 2013, we attached geolocators to 10 pigeons. One of those birds died within 1-3 weeks after capture and was later tracked via radio-telemetry. Light level data is continuously being recorded and stored on the remaining geolocators. These data will be retrieved as birds tagged in 2013 are recaptured in 2014 at the site. Band-tailed pigeons show high fidelity to established feeding sites and breeding locations, and we expect high levels of site fidelity at the Silver City capture site.

Movements – Radio transmitters

In 2013, we fitted radio transmitters to 9 pigeons. We conducted telemetry on foot and from vehicles at higher elevations in the region from up to 20 km away. Radio tracking of these powerful flyers proved difficult due to terrain that blocked or bounced signals, a lack of road system to high elevations in the immediate area, a mix of public and private land with closed roads or gates, and especially once birds began to disperse away from the capture site and surrounding area, which appeared to corresponded with the onset of seasonal “monsoon” rains. We had no radio telemetry detections after early August.

On July 31, 2013 we radio-tracked a male pigeon to a nest in the Pinos Altos Range about 15.2 km north of the capture site. The nest contained 1 egg that was being incubated by a female,

while the male perched 35 m away. The nest was 5.1 m up a 9.3 m tall, 27 cm dbh ponderosa pine tree (*Pinus ponderosa*) at 2,223 m elevation, and was oriented at 320 degrees. The area was a thinned ponderosa pine forest with a slope of 8° and aspect of 330°. The nest was monitored every 3-4 days until August 10, and then on August 25, when it was discovered that the nest failed. On that date, there was no evidence of either adult and egg shell fragments were found below the nest.

Other – Remote trail camera

A total of 2,843 photos were taken by the remote camera at the capture site and 1,285 of those (45.2%) included 1 or more Band-tailed pigeons. Photos of Band-tailed pigeons as a percent of the total taken during each period ranged from 61% in July to 0 in late September/October (Figure 6). Drawing conclusions from remote camera photos is problematic due to a number of confounding factors such as the presence of other wildlife that may have altered pigeon feeding behavior, the presence of homeowners going about their daily activities, and a non-uniform photo detection area due to movement of the camera by wildlife. Other wildlife detected in the photos included mammals (i.e., Cervidae, Ursidae, Sciuridae, Mephitidae, Leporidae) and birds (Class Aves). We were able to use the camera as a means to judge the departure dates for the majority of Band-tailed pigeons from the site.

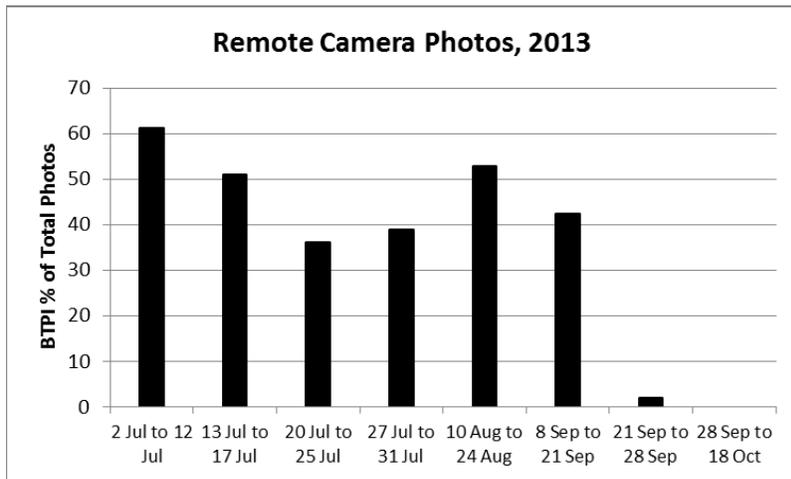


Figure 6. Results of remote trail camera from Band-tailed pigeon capture site at Silver City, Grant County, New Mexico, 2013.

Other – Trichomonas gallinae

From August 24 to September 21, 2013 we collected samples from 20 individual pigeons to test for the presence of *Trichomonas gallinae*. Samples were sent to the lab of Dr. Kirkwood Land at the University of the Pacific, who CDFW uses for all of their Band-tailed pigeon *T. gallinae* samples processed and cultured out-of-house. *T. gallinae* was not detected in any of the samples.

Conclusion

In 2013, we captured and marked 126 Band-tailed pigeons and attached 10 geolocators and 9 radio transmitters to birds. Despite the apparent high site fidelity to this location and large numbers, we scheduled captures for every 10-14 days in order to prevent the birds from avoiding the site and limiting future capture dates. We had fairly large numbers of pigeons at the site early in the season (e.g., up to 130 feeding at one time) and in 2013 pigeons frequented the site longer than is typical (K. Beckenbach, homeowner, pers. comm.). Pigeons may have delayed breeding until after the onset of summer rains (Figure 7), and they appeared to disperse from the capture site about 10-14 days following periods of regular rain. Only 1-3 pigeons were observed at the site after September 21, 2013. Radio-tagged pigeons also remained in the general area of the capture site until soon after regular rains, and then departed. We did not observe any hatch year birds until mid-to-late September, and then only 1 to 3 were noted.

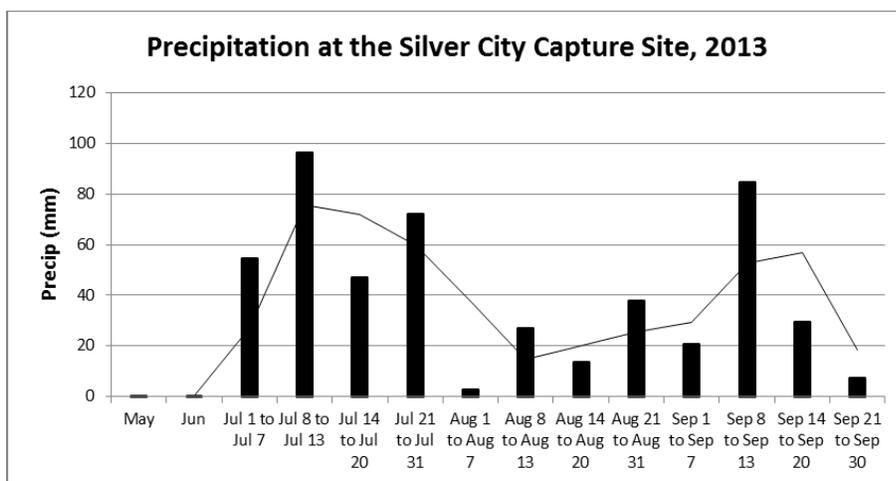


Figure 7. Precipitation at the Band-tailed pigeon capture site (with moving average trendline), Silver City, Grant County, New Mexico, 2013.

**Precipitation data recorded and provided by A. Beckenbach (homeowner).*

Band-tailed pigeons typically return to the capture site in late March to mid-April (K. Beckenbach, pers. comm.) and in the coming season we plan to reinstall the PIT tag reader system by April 1, 2014 in order to record the arrival of marked birds. Depending on presence and numbers of Band-tailed pigeons, captures will commence in April or May 2014 and continue until pigeons have vacated the site. The PIT tag reader system will remain activated onsite until no more pigeons are present during fall 2014. We anticipate the recapture of marked birds and when birds with geolocators and transmitters are recaptured, we'll remove the equipment and begin the post-processing and geo-referencing of light level data.

Our methods will be the same at the capture site and plan on initiating a second capture site in either Los Alamos or Alamogordo, New Mexico in June 2014.

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