

# FIRST REPORTED HYBRIDIZATION OF FEMALE CANYON TOWHEE AND MALE ABERT'S TOWHEE; FIRST REPORTED PLACEMENT OF TOWHEE NEST IN BOX; FIRST REPORTED HELPER AT TOWHEE NEST

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**ABSTRACT:** During the 2015 breeding season in southern Arizona, I observed and documented with photographs the pairing and nesting of a female Canyon Towhee (*Melospiza fusca*) and a male Abert's Towhee (*Melospiza aberti*). The female built her first nest in a commercial finch nest box attached to a fence post and laid two eggs; one hatchling survived for 12 days before it died in the nest box. With their second nesting, the female laid three eggs in a nest built in a Catclaw Acacia tree (*Senegalia greggii*); the nestlings disappeared, presumably taken by a predator. During the pair's third nesting attempt, in a nest placed high in a netleaf hackberry tree (*Celtis reticulata*), the pair fed at least two nestlings, and another Canyon Towhee also brought food to the nestlings, which eventually fledged. The trio of adult towhees foraged together during the fall and winter. In the 2016 breeding season, the helper Canyon Towhee paired with the female Canyon Towhee, and the male Abert's Towhee paired with another Abert's Towhee. Although hybridization of these two towhee species has been previously reported between a female Abert's Towhee and a male Canyon Towhee (Johnson and Hopp 2010), this is the first report of a female Canyon Towhee breeding with a male Abert's Towhee.

Hybridization among "brown towhees" was first reported for a female Abert's Towhee with a male Canyon Towhee near Tucson, Arizona. This pair successfully raised three broods during the 1999-2000 breeding seasons, while a second, similar mixed pair in another Tucson neighborhood nested unsuccessfully in 2007-2009 (Johnson and Hopp 2010). These two towhee species occur sympatrically across much of the range of Abert's Towhee in southern and central Arizona, but Abert's Towhee is more commonly found in mesic riparian bottoms, while Canyon Towhee typically occurs in adjacent riparian lands or drier uplands. The hybridization of these two pairs of towhees was thought to be facilitated by changing habitats in the Tucson area, with suburban, mesic neighborhoods creeping into desert landscapes.

In southern Arizona, Canyon and Abert's towhees co-occur in habitats that have riparian and mesic vegetation with connecting floodplains or open areas. Where the two species actually share territories, they are as nonreactive to each other as they are to other passerine species (Marshall 1960). Family members keep contact with each other by vocalizations given by both sexes. Both towhee species are socially communal during winter, with families remaining together until breeding behavior (i.e., singing by males) starts and pairs form on separate territories. Generally, a territory is retained by the pair from the previous year, and young depart to find new territories (Johnson and Haight 1996, Tweit and Finch 1994).

The habitat of my 7 ha property (TimBuckTwo) in southern Arizona, at lat 31.64637N, long 111.23331W, about 17.5 km east of Arivaca, Pima County, is suitable for both towhee species. At an elevation of 1073 m, the habitat is characterized as Upper Sonoran Desert grassland, with scattered mesquites and riparian vegetation along two ephemeral washes—Papalote Wash and Swashbuckler Wash—that flow through and converge at the northeast side of the property. The washes are lined with a high diversity of flowering plants and shrubs (e.g., *Anisacanthus thurberi*, *Baccharis salicifolia*), with a few large, clumped trees—Arizona walnut (*Juglans major*), Arizona ash (*Fraxinus velutina*), netleaf hackberry (*Celtis reticulata*), and velvet mesquite (*Prosopis velutina*). The surrounding flat floodplain with silty soil and hillsides of rocky soil supports a variety of native grasses and shrub species (e.g., *Aristida ternipes*, *Bouteloua aristoides*, *B. eriopoda*, *B. glandulosa*, *B. rothrockii*, *Setaria macrostachya*, *Sporobolus airoides*, *S. contractus*, *Acacia greggii*, *Gutierrezia sarothrae*, *Sporobolus airoides*). Thus, there are openings and edges for Canyon Towhees and closed riparian areas for Abert's Towhees (Marshall 1960).

Since moving to TimBuckTwo in winter 2003, I have kept records of all my bird observations in a journal, and it wasn't until 2008 that I observed an Abert's Towhee here (Table 1). Once I realized that a female Canyon Towhee and a male Abert's Towhee were paired in 2015, I watched them closely with Swarovski 8x20 binoculars as the season progressed, looking for signs of nesting, and took photographs with a Nikon camera with a Zoom-Nikkor 70-300mm f/4-5.6D ED AF lens. After a nest was located, I kept my distance to minimize disturbance. Therefore, I did not count provisioning trips. After her first nesting attempt, I could identify the female Canyon Towhee by the unique shape of her crown feathers, which appeared to have been damaged, making a "crease" shape in the crown, which is most evident in a lateral view (Figure 1).



Figure 1. Female Canyon Towhee. TimBuckTwo, Pima County, Arizona. Careful inspection reveals a "crease" in the crown feathers. 23 August 2015. Photo by Kathleen Groschupf

Year	Day/Month	Comments
<b>2003-2007</b>		0
<b>2008</b>	25 Mar	1 male
<b>2009</b>		0
<b>2010</b>	25 Sep-29 Nov	1 male
<b>2011</b>	Jan-12 May	1 male
	Nov-21 Nov	1 male
	30 Dec	1 male
<b>2012</b>	Jan, Feb, Mar	1 male
	6 Aug-30 Sep	1 male, singing
<b>2013</b>	10 Jul	Tape recording of squeal duet of female Canyon Towhee and male Abert's Towhee
<b>2014</b>	9-27 Aug	1 male
	6 Oct	1 male
	18 Oct	1 male
	9 Nov	1 male
<b>2015</b>	9 Feb-present	1 male
	18 Mar	Canyon Towhee presents cloaca to Abert's Towhee
<b>2016</b>	spring, summer, fall	2 pairs Abert's Towhees

Table 1. Record of Observations of Abert's Towhee at TimBuckTwo, Pima County, AZ

## OBSERVATIONS

### First Nesting in Nest Box

During February 2015, I observed towhees coming to the seed feeder located 6 m from our house. It soon became apparent that a male Abert's Towhee, which had been singing nearby, always accompanied a female Canyon Towhee at the feeder and when foraging on the ground among surrounding shrubs. On 18 March, the pair performed precopulatory displays of wing quivering and squabbling, and the female presented her cloaca to the male. The male Abert's Towhee frequently sang and engaged in "territorial duels" with his image reflected from the mirror of our vehicle parked near the house until I covered the mirror.

On 30 March, I observed a Canyon Towhee with nest material, and on 31 March, I watched as a Canyon Towhee brought pieces of gray-colored grass stems to a finch nest box that was mounted 1.5 m above ground on top of a wooden fence post at the edge of the riparian vegetation along Papalote Wash (Figure 2). The outside dimensions of the wooden nest box are 12.7 cm height x 12.7 cm length x 12.7 cm width. The inside dimensions are 11.23 cm height x 11.43 cm length x 11.43 cm width, and the top is covered with a similar-sized piece of wood that lifts upward, hinged loosely in the back with two brads. The circular entrance hole, facing east, is 5.08 cm in diameter, 5.08 cm from the bottom of the box. The Canyon Towhee finished nest building and began incubation (Figure 3).



Figure 2. Nest box on fence post, near Papalote Wash. TimBuckTwo, Pima County, Arizona. 4 April 2015. Photo by Kathleen Groschupf



Figure 3. Female Canyon Towhee sitting on nest in nest box, near Papalote Wash. TimBuckTwo, Pima County, Arizona. 4 April 2015. Photo by Kathleen Groschupf

Often the male Abert's Towhee came to the feeder by himself, but when the female Canyon Towhee was present, he was there too, presumably mate guarding (Figure 4). Also, when I approached the nest box, I heard the Abert's Towhee give an alarm "pipping call" from a nearby hackberry tree. The pair kept in contact with each other by contact notes, and they also performed a squeal duet as they came together after being separated (Marshall 1964).

On 8 April, I noticed sunshine on the incubating female's head, and when she left the box, I checked it and the cover had come off. I felt inside the nest and found two warm eggs. I replaced the cover but didn't secure it. The female returned to the nest box, climbing through the hole, and continued to incubate. On 11 April, the cover came off again, and again I replaced it. The female's tail became very ragged from being in the nest box, and the box's ceiling may have damaged her crown feathers.



Figure 4. Foraging mixed pair of Canyon and Abert's towhees, near feeder. TimBuckTwo, Pima County, Arizona. 10 August 2015. Photo by Kathleen Groschupf

On 19 April, I saw the female Canyon Towhee bring food to the nest box. She entered the nest box through the hole, and after she departed through the hole, I looked inside and saw a begging nestling and an unhatched egg. On 22 April, I saw the male Abert's Towhee bringing food to the nest box for the first time, and I observed both adults bringing food in subsequent days.

On 27 April, a different pair of Canyon Towhees at the other end of our property had young fledge from their nest, so I checked the mixed-pair's nest box and found a dead nestling and an unhatched egg with a tiny hole and a small amount of dried yolk in it. Counting days from the estimated hatching date and from the nestling's plumage, it appeared to be near fledging. I photographed the nestling, collected it, and later deposited it in the University of Arizona Bird Collection (Figure 5), where it is available for genetic testing to confirm hybridization.



Figure 5. Dead nestling from nest box, dorsal view: Canyon x Abert's Towhee. TimBuckTwo, Pima County, Arizona. 27 April 2015. Photo by Kathleen Groschupf

## Second Nesting

The mixed pair of towhees remained together, and I discovered their second nest on 9 May, about 1.83 m up in a large catclaw acacia tree (Figures 6 and 7). The pair silently approached me as I looked inside the nest with a mirror and saw one towhee egg. On 11 May and 22 May, two towhee eggs were present, and on 24 May, there were two recently hatched nestlings. I stayed away from the nest, and on 5 June, I heard the male Abert's Towhee resume singing. As I still had not seen the pair feeding any nestlings or fledglings, even though the pair still came to the feeder and foraged together within their territory, I concluded that the nesting had failed.



Figure 6. Habitat and small catclaw acacia, *Senegalia greggii* (center), where Canyon Towhee built second nest. Confluence of Swashbuckler and Papalote washes. TimBuckTwo, Pima County, Arizona. 22 July 2015. Photo by Kathleen Groschupf



Figure 7. Canyon Towhee's second nest on branch of catclaw acacia, *Senegalia greggii*, at the confluence of Swashbuckler and Papalote washes. TimBuckTwo, Pima County, Arizona. 22 July 2015. Photo by Kathleen Groschupf

### Third Nesting and Helper at Nest

On 19 July, I found the third nest of the mixed pair by following a Canyon Towhee that was carrying food. The nest was about 6 m up in a large netleaf hackberry tree near the confluence of Papalote and Swashbuckler washes (Figures 8 and 9). I watched the nest from the opposite hillside and saw another Canyon Towhee bring food to the nest. A short time later, an Abert's Towhee brought food to the nest. These Canyon Towhees represented two different individuals because the female Canyon Towhee had distinctive crown feathers, and the time gap between food deliveries was too short for one bird to have delivered food and then collected more food for a second delivery. Through binoculars, it appeared that the additional Canyon Towhee had an enlarged cloacal protuberance, characteristic of a male.



Figure 8. Habitat and large netleaf hackberry (*Celtis reticulata*) tree (center), where Canyon Towhee built third nest adjacent to Papalote Wash. TimBuckTwo, Pima County, Arizona. 20 July 2015. Photo by Kathleen Groschupf



Figure 9. Canyon Towhee's third nest on branch, center, within netleaf hackberry, *Celtis reticulata*, adjacent to Papalote Wash. TimBuckTwo, Pima County, Arizona. 22 July 2015. Photo by Kathleen Groschupf

On 22 July at 0758, a Canyon Towhee went to the nest, where I observed at least two nestlings. At 0801, I watched as an Abert's Towhee came to feed the nestlings. At 0824, two Canyon Towhees were at the nest feeding nestlings; then three minutes later, an Abert's Towhee brought food to the nest. I was unable to document this with photographs.

On 9 August, I found the mixed pair on its territory and took pictures of the empty nest, not knowing if the young had fledged. On 10 August, the pair continued to eat at the bird feeder and around its territory. Near the confluence of the two washes, I saw the Abert's Towhee pick up a couple of light green grasshoppers. I lost sight of him so I don't know if he fed them to young or ate them himself.

On 19 August, I noted that three adult towhees were at the feeder, and I saw them together around the property over the next couple of days. On 21 August, I saw a large towhee fledgling with an Abert's Towhee behind one of the workshops. With binoculars, I saw that it had a face pattern like a Canyon Towhee, no black mask, and a finely streaked breast with dark streaks against a grayish background. I was unable to get a good picture of it before I lost sight of the birds.

On 29 August, the mixed pair brought a fledgling to the feeder area, and I photographed the large fledgling (Figure 10). Although the photo doesn't clearly show many identifiable characteristics, this fledgling doesn't appear to have the black in its face characteristic of Abert's Towhees. It looks more like a Canyon Towhee. The female and the fledgling exchanged call notes, and the male Abert's Towhee was silent. The three birds flew away together.



Figure 10. Mixed Canyon x Abert's towhees' large fledgling. Near seed feeder. TimBuckTwo, Pima County, Arizona. 29 August 2015. Photo by Kathleen Groschupf

However, when I observed the family group at the feeder on 3 September, I noted in my journal that “one of the babies has dark feathers on its forehead,” suggesting some Abert’s Towhee lineage. After they flew to the shed area, I reported: “The baby bird with black feathers in its forehead did a squeal sound like a Canyon Towhee female.”

On 11 October, I noted that the family of towhees was still together—there were at least two juveniles with the female Canyon Towhee and the male Abert’s Towhee. The family flew around the territory, going to many different areas including the edge of an agility field, where they bathed in a dog watering bowl. I could see that the young were replacing their rectrices. I snapped photos, getting one of a fledgling in the bowl with the adult Abert’s Towhee nearby (Figure 11). The fledgling appears to have black forehead feathers like the one observed in September. The evidence appears to show that one fledgling resembled a Canyon Towhee and its sibling looked more like an Abert’s Towhee.



Figure 11. Juvenile towhee hybrid bathing in dog water dish near edge of agility field. Adult male Abert’s Towhee is to the right. TimBuckTwo, Pima County, Arizona. 11 October 2015. Photo by Kathleen Groschupf

On 20 November, I saw two adult Abert’s Towhees and one adult Canyon Towhee feeding together. These towhees continued to forage together during the winter months. On 1 March 2016, I heard singing by Abert’s and Canyon towhees within the towhee territory from the past summer, and by mid-March, both singing males had mates of their respective species. The Abert’s Towhee’s territory appeared to be mostly in the riparian zone and edges of Papalote Wash, while the Canyon Towhee’s territory was in the more open area adjacent to the wash with mesquite trees and understory, including the surfaces of human-built structures (e.g., house roof, debris behind workshop, rowboat).

## DISCUSSION

My observations at TimBuckTwo are similar to those noted by Johnson and Hopp (2010) in that two brown towhee species hybridized and had young, and the mating lasted throughout an entire breeding season. They attributed the hybridization to the habitat at Tanque Verde Wash, Tucson, Pima County changing from mesic to more riparian, which brought Abert’s Towhees in contact with Canyon Towhees. Change of habitat also occurred during my years of observation. The previous property owners kept the fields, floodplains, and some of the hillsides (about 1.6 ha) mowed of grasses and shrubs, leaving them open with little understory. In 2003, we began changing the vegetation in the fields and near the washes at TimBuckTwo. We allowed native grasses and shrubs to grow, and we aggressively removed nonnative Russian thistle (*Salsola* sp.) from those areas. I also planted Blue Grama Grass (*Bouteloua gracilis*) and buffalo grass (*Buchloe dactyloides*) seed in a barren, abandoned corral near Papalote Wash to create a 30.5 m x 30.5 m dog agility area. These actions may have made the area more hospitable to Abert’s Towhees and less so for Canyon Towhees. The observations of Abert’s Towhees, from a progression of none to one during the nonbreeding season, and then the continued presence of Abert’s Towhees year-round in recent years (Table 1) support the conclusion that the habitat has become favorable for Abert’s Towhees.

During the nonbreeding season, there is movement of unmated towhees—referred to as supernumeraries—which float among territories and may take the place of deceased members of a pair (Marshall 1960). My observations of single Abert’s Towhees may be of supernumeraries looking for territory and a mate because they appeared on the property during spring and fall (Table 1). The male that stayed through the fall of 2014 into the spring of 2015 may be the male that paired with the female Canyon Towhee during the 2015 breeding season.

Female towhees usually perform all nesting duties such as building the nest, incubating eggs, brooding, and feeding young. Males start to participate in feeding nestlings when they are several days old. Nests are typically placed in trees, shrubs, or vines, and are supported by strong branches and well hidden by foliage (Marshall and Johnson 1968). It is not known which member of a pair selects the nest site, and in this case it is not known why a nest box was chosen as a site. There is only one previous record of a Canyon Towhee crawling through a hole to gain access to its nest: A towhee in New Mexico was observed using a knothole as an entrance to a nest inside a building, where the nest was placed on a cross timber a foot to one side of the entrance hole (Jensen 1923). This April observation was a very early nesting record for a New Mexico towhee (three newly hatched young were in the nest), and my observation was also of a first nesting attempt of the season.

Nest helpers are individuals that assist with reproductive duties such as feeding nestlings, and they may or may not be related to the parents (Skutch 1935). Helpers occur in bird species where either territory is limited by size, nest sites are limited, or food is limited. Studies have shown that it is beneficial for helpers to assist in feeding young, either related or not related to themselves, when any of the above factors apply.

There is one early record of a Canyon Towhee helping feed young fledglings, but of a different species (Antevs 1947). The male towhee's own fledglings recently had become independent, and he was observed feeding three Northern Cardinal (*Cardinalis cardinalis*) fledglings, bringing them food and assisting both cardinal parents. He continued to feed the fledglings for another three weeks, "in harmony" with the parents, until he re-nested with his mate and raised another towhee brood.

Both species of brown towhees inhabit permanent territories and retain their mates through a breeding season (Marshall 1960). My observations support the idea that the female Canyon Towhee and the male Abert's Towhee remained together as a pair throughout all three nestings, and that the Abert's Towhee raised the young. At the onset of the breeding season and prior to the other two nestings, the Abert's Towhee resumed singing on territory where the nests were then built, and he quit singing sometime during the nesting period, possibly during incubation. Throughout the breeding season, during a rendezvous with each other, the Abert's Towhee and the female Canyon Towhee performed squeal duets, vocalizations that reaffirm a pair bond (Marshall 1964). Prior to discovering the third nest in the territory of the Abert's Towhee, I never heard the song of a Canyon Towhee in that area, and I never heard the Canyon Towhee helper join in a squeal duet with the female Canyon Towhee. The first time I saw a fledgling, it was with the Abert's Towhee, and my later observations in October of the hybrid pair with two juveniles confirm the cohesiveness of the family.

My towhee hybridization observations differ from those of Johnson and Hopp (2010) because 1) a female Canyon Towhee hybridized with a male Abert's Towhee; 2) the female Canyon Towhee built her first nest in a nest box, not in vegetation; 3) another adult Canyon Towhee helped feed the young in the third nest; and 4) the hybrid pair separated and bred with their respective species the following breeding season.


It is unknown why the female Canyon Towhee made atypical choices of a mate and nest site, and why she accepted a nest helper. To understand how often hybridization occurs between the two towhee species, studies of color-marked birds and regular population censuses should be performed at TimBuckTwo and in other areas where the two species are known to co-occur.

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