

SWAINSON'S HAWK NESTING IN PINAL COUNTY, ARIZONA

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In the spring and summer of 2020, I monitored the first known successful nesting of Swainson's Hawk (*Buteo swainsonii*) at the Santa Cruz Flats in Pinal County, Arizona. Two nests fledged young at this agricultural area near Eloy between Tucson and Casa Grande.

The Swainson's Hawk is a long-distance migrant that moves through Arizona in the spring and fall, often in large flocks. It breeds primarily in the Great Plains of south-central Canada south through central and western United States into northern Mexico (Bechard et al. 2020) and winters in northern Argentina. In Arizona, it breeds mainly in the southeastern grasslands west to the Altar Valley with scattered nesting in grasslands in northern parts of the state (Glinski and Hall 1998, Gervais-Wise 2005). In 1975 and 1976, during surveys for Mississippi Kite, a pair of Swainson's Hawks was discovered nesting in a Fremont's cottonwood (*Populus fremontii*) near the San Pedro River between Mammoth and San Manuel (R. Glinski pers. comm.). From then until 2018 no nesting of Swainson's Hawks was documented in Pinal County. Breeding bird Atlas surveyors, 1993-2001, noted possible nesting along the lower San Pedro River, where the nest in the 1970s was found; the Picacho Reservoir area near Coolidge; and the semidesert grasslands near Oracle (Gervais-Wise 2005). Since those surveys, adult Swainson's Hawks have been reported during breeding season in all 3 areas, most regularly along the lower San Pedro River between San Manuel and Winkelman (eBird 2020).

Since the Atlas surveys, I also observed adult Swainson's Hawks at the Santa Cruz Flats during June and July, suggesting possible nesting. This is an agricultural area mixed with Sonoran Desert scrub. Prior to the late nineteenth century, the Santa Cruz Flats was part of an ecosystem known as the Sonoran savanna grassland that once covered portions of lowland southern Arizona below elevations of 1,000 m. Cattle grazing and cultivation wiped out much of the grassland; the surrounding Sonoran Desert swallowed up most of the rest. Only a few remnants of Sonoran savanna grassland remain at the Santa Cruz Flats (Brown 2014).

Beginning in 2017, I conducted a 3-year survey of Swainson's Hawks at the Santa Cruz Flats between 1 June and 15 July, assuming migrants were unlikely to pass through at that time (Table 1). Not all locations were visited on every trip. I included sightings from other observers if details of their location were reported (eBird 2020).

The survey confirmed that adult Swainson's Hawks were present during the nesting season at the Santa Cruz Flats, and some were observed regularly at or near the same location, suggesting nests nearby. Six locations were identified ranging from 4.3 to 9.8 km apart (Table 1). Location 1, with the most regular sightings, included a large area of desert scrub dominated by velvet mesquite (*Prosopis velutina*) and palo verde (*Parkinsonia* spp.) adjacent to a 65-ha fallow field with grasses and perennials where Swainson's Hawks were sometimes seen hunting on the ground. A few immature birds were also reported during the survey period. The only 3 immatures documented with descriptions and photographs were after-hatch-year birds. Swainson's Hawks typically do not breed until 3 years old (Bechard et al. 2020), so these were nonbreeding floaters, possibly fledged at the Santa Cruz Flats 1 or 2 years before. Wheeler (2003) suggests that, unlike many other raptors, younger Swainson's Hawks may not return to their natal areas. Woodbridge et al. (1995) corroborated this but found an instance in California of a subadult helping an adult pair feed nestlings. The presence and activity of nonbreeding floaters at the Santa Cruz Flats during the breeding season deserves more study.

Even though migrant flocks of Swainson's Hawks were not expected in the 6-week survey period, 8 were reported 2 June 2017 (Corman and DeBrosse 2017) soaring with Turkey Vultures. Given the date, number, and behavior they were likely late migrants. Migrant stragglers are occasionally reported in Arizona in early June (Gervais-Wise 2005).

However, I observed a flock of 34 adult and immature birds in a flooded alfalfa field on 29 June 2019 and 2 flocks on 13 July 2019—one of 53 and another of 23. Typically, Swainson's Hawk migration in Arizona occurs in August and September with a few small groups occasionally moving through in mid-July (Gervais-Wise 2005). The late June group was particularly unusual and may have been a premigratory aggregation. Such groups were reported in June 1985 in southern Saskatchewan and Idaho in areas of grasshopper outbreaks that may have impacted prey availability (Johnson et al. 1987).

MARICOPA NEST

During the summer of 2018, an active Swainson's Hawk nest was reported from south of the town of Maricopa (N. Benner pers. comm.). The nest was in a major agricultural area of Pinal County about 30 km northwest of the Santa Cruz Flats. Benner discovered the nest 17 June 2018 and observed an adult sitting low on the nest in incubation posture. During the next visit on 21 June, an adult was standing on the edge of the nest, and on 23 June the same adult was sitting low on the nest (Figure 1). On 27 June a different adult was perched near the nest and flew to a telephone wire; no adult was on the nest. However, on 4 July no adults or nestlings were seen, and Swainson's Hawks were absent from this site on Benner's 6 subsequent visits between 7 and 29 July. Her photographs on 10 July show that the nest had begun to topple. Apparently, eggs had been laid and were being incubated, but it is not certain whether nestlings had yet hatched when the nest failed. Visits by both Benner and me in the subsequent 2 years detected no return of the pair to this nest site, and the nest has disintegrated.

The Maricopa nest was in a Gooding's willow (*Salix goodingii*) 9.4 m above the ground (measured with Arboreal Tree Height app). This was higher than nests measured during the Atlas surveys, which had a median nest height of 3.3 m and a range of 2.5-5.7 m (Gervais-Wise 2005). However, Swainson's Hawk nests of comparable height to the Maricopa nest have been observed in the San Rafael Valley in Cochise County (R. Glinski pers. comm.). The nest, a bulky mass of sticks, was about 75 cm in diameter and 60 cm deep. The nest tree was in a 160-m row of tall willows and tamarisks (*Tamarisk* spp.) along a dirt farm road. The nest was at 400 m elevation and had a northern exposure overlooking a cultivated field. The nearest human habitation was 1.8 km away.

Table 1. Swainson's Hawk Survey 1 June-15 2017-19

Location: 1: Desert scrub/ grassy, fallow field

Location 2: Near farmyard/ tall trees

Location 3: Sod farm/desert scrub

Location 4: Cotton, hay/ desert scrub

Location 5: Cotton, hay/ desert scrub

Location 6: Cotton, hay/ desert scrub

Date	Location					
	1	2	3	4	5	6
6/8/17		1				
6/16/17		1			5	
6/23/17	2	2				
6/29/17	9					
7/5/17	3			1		
7/11/17	2		2			
7/12/17	9			2		
6/1/18	1					
6/6/18		1				
6/9/18	2	1				
6/15/18		2				
6/16/18		1				1
6/19/18	2					
6/25/18					1	
6/29/18	9					
7/6/18		4		1		
7/11/18	8		7			
6/1/19	2		2			
6/3/19		1	1	1		
6/12/19	1					
6/18/19	2	1				
6/29/19	2					
7/13/19	5					



Figure 1. Adult Swainson's Hawk on nest near city of Maricopa, 23 June 2018. Photo by Nancy Benner

SANTA CRUZ FLATS NESTS

In the spring of 2020, I confirmed the presence of 2 Swainson's Hawk nests at Santa Cruz Flats south of the town of Eloy. The first nest was discovered in April and the second in May. I monitored both nests until the young successfully fledged in early July. My visits ranged from 10-40 minutes, and all my observations were with 8X binoculars from inside my vehicle at least 100 m away to avoid disturbance.

Nest 1

I found the first nest 13 April. During the 30 minutes I was there, one adult remained perched on a nearby telephone pole the entire time while its mate made several trips to the nest bringing nesting materials. Neither bird sat on the nest, suggesting that eggs had not yet been laid. On my second visit, 4 days later, one of the adults, presumably the female, remained sitting on the nest during the 40 minutes I watched. The mate was not present. Females do most of the incubation, and the male provides her with food (Bechard et al. 2020). Eggs were possibly laid in the 4-day period between visits. This is earlier than most observations of Swainson's Hawk eggs during the Atlas surveys when the earliest were recorded on 28 April (Gervais-Wise 2005).

When I returned on 20 April, both adults were perched on separate telephone poles near the nest. One of them was eating a Round-tailed ground squirrel (*Xerospermophilus tereticaudus*). Within 5 minutes, the bird with the prey, presumably the male, carried it to his mate, deposited it on her telephone pole and returned to his perch. During food transfers, males sometimes bring food directly to the nest. More often females fly to intercept prey from the male, and then consume it away from the nest (Bechard et al. 2020). I left shortly after and was unable to determine how long the nest was left unoccupied. On 6 subsequent visits between 27 April and 25 May, the female was sitting low on the nest when I arrived and remained there during the entirety of my visits. The male was present, usually perched nearby, on most visits. On 7 May, the male was on the ground when I arrived and soon flew to the nest with an unidentified food morsel. He stood on the edge of the nest for one minute before flying off. On 20 May the male was perched on a nearby telephone pole consuming a ground squirrel.

Although nestlings were not observed on my 1 June visit, both adults were standing on the edge of the nest. One kept poking its head into the nest as if feeding chicks. Based on the behavior of the adults, I estimate that the eggs were laid between 14 and 17 April. Because incubation is 34-35 days (Bechard et al. 2020), the estimated hatching would be

between 21 and 26 May. On 7 June an adult was seen feeding 2 downy chicks an unidentified prey item. Ten days later 2 downy young about 3 weeks old were easily seen in the nest (Figure 2). Initially no adults were present; then one flew into the nest with a ground squirrel. At first the young appeared to be feeding themselves while the adult mantled them from the hot sun. Then, the adult tore pieces of meat off the rodent and fed them to the nestlings. On the next 2 visits, 25 and 28 June, the nestlings were hard to see as an adult was mantling them. On 7 July, the nearly 6-week-old nestlings, were both in the nest. One was darker and slightly larger than the other, suggesting an age difference between the 2 birds (Figures 3a and 3b).

The young were still at the nest 12 and 18 July, usually sitting low. By then they were old enough that they had likely perched on branches of the nest tree and launched their first flights, but I didn't witness this. First flights for Swainson's



Figure 2. Two hatchlings about 3 weeks old at nest in velvet mesquite, Santa Cruz Flats, 17 June 2020. Photo by Doug Jenness



Figures 3a and 3b. Two nestlings nearly 6 weeks old at mesquite nest. The darker, larger one (l) is likely older, 7 July 2020. Photo by Doug Jenness

Hawks typically occur around 6 weeks of age (Bechard et al. 2020). For 7–10 days after their first flight, fledglings stay near the nest and fly only to chase adults carrying prey. By 10 days after fledging, young can be as far as 1 km from nest (Bechard et al. 2020). On 23 and 28 July no adults or young were present at or near the nest. However, an adult was perched in the nest tree 10 August.

This nest was in a solitary velvet mesquite, the most common tree used by Swainson's Hawks in southern Arizona (Gervais-Wise 2005). It was amid low-vegetation desert scrub set back 15 m from a dirt road. The surrounding vegetation was mostly grasses, scattered small mesquites, and wolfberry (*Lycium* spp.). A cotton (*Gossypium* spp.) field was 50 m in one direction, and diagonally across the road a Bermuda grass (*Cynodon dactylon*) hayfield was planted. The nearest human habitation was 0.47 km. The nest was at 510 m elevation and opened to the north. It was 4.9 m above ground (measured with Arboreal Tree Height app) and was about 90 cm in diameter and 60 cm deep. The nest tree was 6.1 m tall. Judging from the size of the scraggly nest and the freshly cut mesquite twigs near the top, contrasting with older twigs below, the nest had likely been used in previous years. Swainson's Hawks often return to previously used nests and refurbish them for a new season (Bechard et al. 2020). Swainson's Hawk plumages range from light to dark; both adults at this nest were light variants.

A pair of Western Kingbirds (*Tyrannus verticalis*) nested in the same tree, and repeatedly chased the adult Swainson's Hawks when they left or returned to the nest. Once, I observed a kingbird land for a few seconds on one hawk's back. Kingbirds and other birds often nest in the same trees as Swainson's Hawks, and the piggy-back behavior of kingbirds has been noted before (Bechard et al. 2020).

Nest 2

I found the second nest 7 May 2020 in a pecan tree (*Carya illinoensis*) 4.5 km from the first nest. The tree was in a single row of pecan trees along a dirt road. On my first visit, one adult was sitting low on the nest and the other was perched across the road on a telephone pole. Presumably, given the behavior and the date, the female was incubating eggs. On 5 subsequent visits 9 May to 1 June, the female sat the entire time in the nest. Usually the male was perched nearby. On 7 and 8 June, the female was sitting higher in the nest as if chicks were in the nest. On 4 visits between 10 June and 28 June, although I could not see any nestlings, they were certainly present as the female was mantling.



Figure 4. Single nestling about 6 weeks old at pecan tree nest, 7 July 2020. Photo by Doug Jenness

On 7 July one nestling 5-6 weeks old was observed standing on the edge of the nest (Figure 4). Both adults were perched on telephone poles across the road. Five days later the young bird was not in or near the nest, although an adult was perched across the road. Given its estimated age, it likely had made its first flight and was hidden on a branch in the nest tree or a nearby tree. No adults or young were seen on 12 July and 18 July visits. On the latter date, I discovered that a windstorm a couple of nights earlier had blown the nest from its unsteady moorings and dropped it 3 m below on a lower branch. On the ground under the nest I found an intact egg (Figure 5). Likely the unhatched egg had been buried in the nest by the adults and shook loose when the nest fell. The off-white egg was 53 mm long and 42 mm wide, well within the expected range (length 51.5-60 mm and breadth 41.2-46.7 mm; Bechard et al. 2020). The chronology of the nestling in the second nest indicates that it fledged around the same time as the young birds in the first nest and that the eggs were also laid in mid-to-late April.



Figure 5. Unhatched egg from pecan tree nest. Discovered on ground after nest blown down, 18 July 2020. Photo by Doug Jenness

The Atlas includes no examples of Swainson's Hawks nesting in pecan trees in Arizona (Gervais-Wise 2005). However, this hawk is known to nest in shelterbelts of cottonwoods (*Populus fremontii*), elms (*Ulmus* spp.), and willows (*Salix* spp.) in agricultural areas in southeastern Arizona (Nishida et al. 2013). The single rows of pecan trees found alongside some farm roads resemble shelterbelts. The nearest human habitation was 1.5 km. The nest opened to the southeast and was 5.8 m above the ground. The nest tree was 7.0 m tall (measured with Arboreal Tree Height app). The nest was about 75 cm in diameter and 45 cm deep. It was smaller than the first nest and was likely newly built. Constructed from pecan branches and twigs, the nest was typically scraggly. The elevation was 518 m. As with the first nest, both adults were light variants.

DISCUSSION

The successful fledging of Swainson's Hawks in the agricultural area at the Santa Cruz Flats confirms this raptor's capacity to adapt to conditions other than its expected breeding territories in Arizona's higher elevation Sonoran Desert grasslands. Of the 165 nests reported during the Atlas surveys, only 7% were from agricultural areas (Gervais-Wise 2005). Moreover, all the nests located during the Atlas period were found at an elevation range of 580 -2,800 m (Gervais-Wise 2005). Those at the Flats were both lower (510 m and 518 m), as was the Maricopa nest (400 m). At these lower elevations, mean temperatures were higher, and earlier nesting would provide an advantage for successful fledging. At Eloy, the largest town at the Santa Cruz Flats, the mean daily high temperatures in 2020 were: April—30° C, May—36.9° C, June—40.1° C, and July—42.6° C (Time and Date 2020). Incubating eggs and caring for small nestlings in April and May when it is cooler, as both pair did at the Santa Cruz Flats, would be less stressful than a month later. Excessive heat may reduce prey animals, decrease available water, and put undue physiological stress on nestlings. The adult females at Santa Cruz Flats mantled nestlings up to 4-5 weeks to protect them from the hot sun.

The first successful nesting of Swainson's Hawk in Maricopa County occurred in a comparable setting as at the Santa Cruz Flats and faced similar conditions, if not more severe. In 2011 the first 2 nests were discovered—one near Buckeye, the other near Surprise. Both locations are about 120 km northwest of the Santa Cruz Flats, and at lower elevations—290 m and 365 m, respectively. That year, the Surprise nest failed, and the Buckeye nest's fate was unknown. However, in 2012 the Surprise nest produced 2 nestlings, one of which successfully fledged in early August. This was the first known successful fledging in the county. The following year 2 nestlings from the Surprise nest perished late June/early July before fledging, likely due in part to excessive heat reaching nearly 48° C. In 2014, 2

hatchlings successfully fledged in mid-July, and in 2015 one hatchling fledged in late July. In the next 5 years the nest failed in 2016 and fledged 1-3 young in the other 4 years. In 2016 the estimated hatching date was 3 June, which is late. Excessive heat was likely related to the demise of the single chick (AZFO seasonal reports 2007-16, C. Kirscher pers. comm.).

In agricultural settings, another major challenge confronting nesting Swainson's Hawks is finding adequate prey to feed their young. Where cultivated row crops grow much higher than native grasses, the vegetation cover can make it difficult for the hawks to find rodents and other prey (Bechard 1982). Although the Santa Cruz Flats nest in the mesquite was adjacent to a densely vegetated cotton field, extensive open desert scrub surrounded it in other directions. Round-tailed ground squirrels (Figure 6) were plentiful in the desert scrub, likely the most numerous diurnal rodent in the area. They are particularly well adapted to the high temperatures of Arizona's Sonoran Desert and obtain most of their water from the vegetation they eat (Walsberg 2000). This ground squirrel was the only prey animal I witnessed the Swainson's Hawks eat at that nest, although they likely captured other small rodents and reptiles, which also are found in the desert scrub.

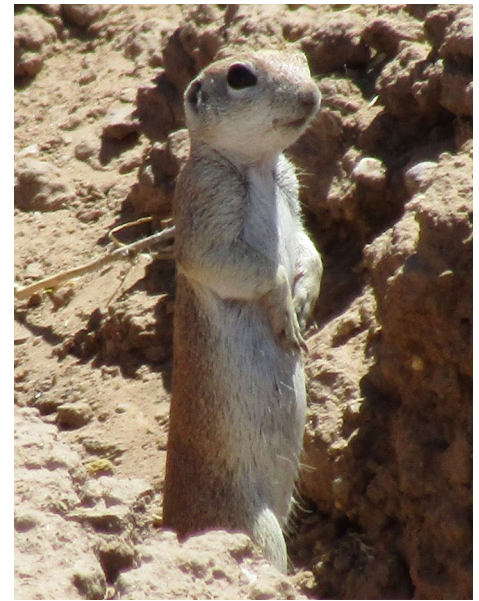


Figure 6. Round-tailed ground squirrels are plentiful in the desert scrub at Santa Cruz Flats and are source of food for nestling Swainson's Hawks, 7 June 2020. Photo by Doug Jenness

At the nest in the pecan tree, extensive alfalfa (*Medicago sativa*) fields were on both sides of the road. When these fields were disturbed by cutting, baling, and flooding approximately every 30 days, prey animals were exposed. Ground squirrels also had burrows in the berms along the irrigation ditches next to the road. Grasses and perennials grew under the pecan trees, which also provided food and cover for potential prey animals. About 0.7 km away, extensive open desert scrub provided habitat with rodents, rabbits, and lizards. However, because I neither observed prey brought to that nest nor found remains under the nest, I am unsure of what the adults fed their nestling.

The data from my 2017-20 surveys suggest that additional Swainson's Hawk pairs nested at the Santa Cruz Flats. Adults were also present in 2020 at locations where adults were seen regularly during those surveys. The established nesting records and the potential for additional nesting pairs at the Santa Cruz Flats, the attempted nesting near Maricopa in Pinal County, and the relatively recent discovery of nesting in Maricopa County suggest that Swainson's Hawks are expanding their nesting habitats in Arizona. The advantage of early hatching and food availability to nest success under the severe conditions in these areas merits further study.

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