

COMMUNAL ROOSTING OF THE CRESTED CARACARA IN ARIZONA

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ABSTRACT: Between 2014 and 2024, we identified 5 Crested Caracara (*Caracara plancus*) communal roosts in the vicinity of the Santa Cruz Flats, an agricultural area located between Phoenix and Tucson, in Pinal County, Arizona. Monthly counts at 2 of these roosts from December 2014 through December 2017 documented greater use of the roosts during the period of November through March (mean=39.6), compared to April through October (mean=5.1). Future work could assess whether the observed communal roosting reflects social information use (e.g., local enhancement) or enhanced resource discovery in human-modified environments, and consequently heightened vulnerability to ongoing landscape change.

Communal roosting is common among species of raptors including vultures (Rabenold 1987, Buckley 1996, Jones 2005), eagles (Curnutt 1992, Moleón et al. 2011), kites (Hiraldo et al. 1993, Mazumdar et al. 2017), and caracaras (Lasley 1982, Johnson and Gilardi 1996, Josens et al. 2013). Several possible explanations have been proposed for the existence of those communal roosts. They may serve as central places where uninformed individuals benefit from following informed individuals to previously visited food resources (Ward and Zahavi 1973, Bijleveld et al. 2010, Harel et al. 2017); places from which to search for a breeding territory or find mates (Blanco and Tella 1999); locations that provide thermoregulatory benefits (Lambertucci and Ruggiero 2013); or as social refuges where juvenile individuals avoid aggression from territorial adults (Dwyer et al. 2018).

The Crested Caracara (*Caracara plancus*, hereafter 'caracara') is a nonmigratory raptor distributed throughout Central and South America and Mexico. It is the only caracara with a distribution that extends into the southern United States, where it has populations centered in southern Arizona, Texas, and central Florida (Morrison and Dwyer 2023). Communal roosting by caracaras has been documented in Texas (Lasley 1982), Guatemala (Johnson and Gilardi 1996), Argentina (Travaini et al. 2001), and Florida (Dwyer et al. 2018).

In Arizona, caracaras are resident throughout the south-central part of the state in an area $\pm 6,500$ km² (Jenness 2015). The state's caracaras represent the northern extension of a larger population that ranges far southward into Mexico (Howell and Webb 1995, Russell and Monson 1998). Limited studies in Arizona have focused on the species' statewide status (Levy 1988) and its nesting phenology (Ellis et al. 1988, Levy 1988). Between the 1980s and early 2000s, little additional information was available on Arizona's caracaras. In the early 2000s, observers began reporting groups of caracaras, sometimes of more than 100 individuals, foraging in the winter at the Santa Cruz Flats (the Flats), an area of intensive agriculture in the central part of the state (Jenness 2015). These reports prompted us, in 2013, to begin making regular observations at the Flats to document these raptors and their behaviors. Based on documented communal roosting of caracaras in Florida, Texas, and elsewhere, we considered the possibility that caracaras, foraging together in the winter in Arizona, might be using communal roosts. Here, we report on previously unreported communal roosting of caracaras in Arizona.

METHODS

The Flats, which is located in Arizona's known caracara breeding range (Jenness 2015, 2025), is an agricultural area approximately 777 km in size located west of Picacho Peak in Pinal County, Arizona. The area is mostly flat with an elevation that ranges from 442 to 564 m. It is characterized by an arid Sonoran Desert climate with hot days and cool night temperatures. The mean temperatures in the town of Eloy (located in the Flats) during the winter months of



Figure 1. Caracara communal roosts were identified by finding saguaros topped with whitewash, Roost 4, 24 March 2021. Photo by Doug Jenness

November through March are 20.2°C (high) and 5.3°C (low) while mean temperatures during the summer months of April through October are 34.4°C (high) and 18.1°C (low) (NOAA 2025).

Agricultural uses of this area intensified after World War II (Brown et al. 2017), especially with the introduction of Central Arizona Project water from the Colorado River into the Flats in the 1990s (Water Resources Center 2025). Intensive irrigation has allowed for large acreages of row crops, primarily cotton (*Gossypium* sp.) and alfalfa (*Medicago sativa*). Other crops grown in the area include grass hay, maize (*Zea mays*), and sorghum (*Sorghum bicolor*). Smaller acreages are in sod farms and pecan (*Carya illinoensis*) groves, a cattle feedlot, a dairy farm, and sheep and cattle pastures (D. Jenness pers. obs.).

When we began studying caracaras at the Flats in 2013, we suspected that large groups of caracaras feeding in the fields during daylight hours in the winter could be roosting communally at night. We first checked trees — mostly pecan and native velvet mesquite (*Neltuma velutina*) —surrounding fields where caracaras were feeding at dusk but did not detect any roosting there. We then observed caracaras foraging in fields and watched where they flew at dusk and searched the nearest areas with tall vegetation in the direction they went. We especially looked for vegetation with whitewash (for example, saguaros, *Carnegiea gigantea*) that could indicate perch sites and therefore, nocturnal roosts (Figure 1).

We located 5 roosts over 10 years: the first in December 2014, the second in November 2015 (Figure 2), the third in December 2017, the fourth in March 2021, and the fifth in March 2024.



Figure 2. Caracaras at Roost 2, 11 December 2015. Photo by Richard Glinski

During the 127 counts at all of the roosts, 2 observers counted on the same night with 1 observer at each of the 2 roosts, or with 1 observer who counted at 1 roost in the evening and often a second roost the following morning. An observer at each roost used a spotting scope positioned at locations where the entire roost could be visible. These observation points were far enough from the roost to avoid disturbing the roosting birds (between 300 m and 550 m) depending on terrain, but that still allowed a clear view of the roost. We began evening counts 1 to 2 hours before sunset and morning counts 0.5 to 1 hours before sunrise, before birds began leaving the roost. Due to the topography of surrounding mountains, we defined sunset by the complete disappearance of the sun in relation to the horizon and sunrise by the first appearance of the sun above the horizon. These were earlier and later, respectively, than official sunset and sunrise times of the U. S. Naval Observatory, which assume a flat horizon at sea level. All times were Mountain Standard Time.

During the 99 evening counts, we watched caracaras arrive at the roosts, noted their arrival times and direction of arrival, and recorded a final count of caracaras perched at the roost, just before low ambient light precluded identifying birds, which typically was 0.5 hour after sundown. During the 28 morning counts, we recorded the total number of caracaras at the roost when light was sufficient to observe individuals and noted their direction and timing of departure. On 2 evenings, we arrived at the observation points when wind speeds were greater than 30 km/hour, and because some birds perched on the ground or on low vegetation, we could not see and count them accurately. We did not include those counts in our data. Lighting and distance made it difficult to view birds well enough to determine the age of all the caracaras, but we were able to establish the age of many based on plumage, with first-year immature birds being overall brownish with streaked breasts, second-year immatures with overall darker brown plumage and breasts with a mix of streaking and barring, and adults overall black with barred breasts (Clark 2001, Wheeler 2010). Vultures are known to roost communally and often with caracaras (Johnson and Gilardi 1996, Dwyer et al. 2018), so during every roost count, we also recorded the number of Black Vultures (*Coragyps atratus*) and Turkey Vultures (*Cathartes aura*) occupying the roosts.

We documented vegetation, elevation, slope, aspect, and roost size during daylight hours, when caracaras were not present, by (1) measuring the distance in meters between the outermost saguaros with whitewash, assuming they were at the periphery of the roost, and (2) calculating the area of 3 to 4 irregular polygons by triangulation using Heron's formula $A = \sqrt{s(s-a)(s-b)(s-c)}$, where A =area, s =semiperimeter, and a , b , and c are sides of each triangle and then adding the area of the triangles for each roost (Sangwin 2024). Whitewash may remain on saguaros for over a year (D. Jenness pers. obs.), so we assumed that saguaros with tips of arms covered with whitewash were included in the roost. Using Google Earth Pro, we also measured the distances between the roosts and between the nearest agricultural fields and each roost.

We separated our data into 2 annual time periods based on mean temperature: the cooler period (November through March) and the warmer period (April through October). We conducted 80 counts in the winter period and 47 in the warmer period (Table 1). We conducted a total of 127 counts at the 5 roosts. Fifteen of the 16 counts at the 3 last discovered roosts were all conducted after 2017, and the counts at the first 2 roosts were irregular after 2017, so we used only our data from Roosts 1 and 2 between December 2014 and December 2017 to make seasonal statistical comparisons. Between December 2014 and December 2017, we did 75 counts — 47 in winter and 28 in summer.

Table 1. Counts by roost, Dec 2014-Dec 2024

Roost	Nov-Mar		Apr-Oct		Total
	AM	PM	AM	PM	
1	13	42	12	4	71
2	2	13	0	25	40
3	0	8	1	5	14
4	0	1	0	0	1
5	0	2	0	0	2
Total	15	65	13	34	127

Statistical Analysis: During the period of December 2014 through December 2017, we completed a total of 52 evening counts and 23 morning counts at Roosts 1 and 2. We used a simple t-test to determine if the difference in the mean number of caracaras at the roosts was statistically significant ($p \leq 0.05$) during the periods of November through March vs. April through October (combining morning and evening counts for each roost, and all years).

RESULTS

All 5 roosts were located in stands of saguaros on sloping volcanic bajadas of Upland Sonoran Desert vegetation (Brown 1982) surrounding the Flats agricultural area. Many saguaros within each roost had multiple arms suitable for perching by large raptors. In addition to saguaros, principal vegetation at the roosts included creosote bush (*Larrea tridentata*) and yellow palo verde (*Cercidium microphyllum*). Other plants present at some, but not all, roosts were triangle bursage (*Ambrosia deltoidea*), range ratany (*Krameria parvifolia*), barrel cactus (*Ferocactus wislizenii*), catclaw acacia (*Acacia greggii*), cholla (*Cylindropuntia* spp.), ocotillo (*Fouquieria splendens*), and Engelmann's hedgehog cactus (*Echinocereus engelmannii*).

All roosts were on public land – 3 on the Ironwood National Monument and 2 on Arizona State Trust land. The roosts were within a 490 km² area extending from 32° 42'N to 32° 30'N and from 111° 24'W to 111° 47'W. Roost elevations ranged from 496 to 570 m; slope at the roosts ranged from 0.9% to 2.2%. Roost size ranged from 0.1 to 0.8 km². Distance of the roosts from the nearest cultivated fields or pastures ranged from 0.71 to 5.4 km. Distance between the 5 roosts ranged from 7 km to 32 km (Table 2).

Table 2. Physical characteristics of 5 Arizona communal roosts

Roost	Area (km ²)	High elev.(m)	Slope	Aspect	Dist./fields ¹	Near. Roost ¹
1	0.25	560	0.90%	SE	2.21	10
2	0.31	566	1.77%	NE	4	8
3	0.22	514	2.22%	East	0.71	7
4	0.11	570	1.10%	NE	1.75	10
5	0.5	496	1.30%	North	2.6	7
Mean	0.28	541	1.46%		2.25	8.4

¹Distances in kilometers

The highest observed number of caracaras was at Roost 3 (n=164) on 9 December 2023. A total of 7 counts involving at least 2 roosts on the same night yielded total caracara numbers greater than 100 with 167 caracaras representing the combined maximum number at 2 roosts. At least 90.3% of caracaras observed roosting communally arrived or departed in the direction of agricultural fields, livestock pastures, or carcass dumps at the Flats. We were unable to determine direction for the other 9.7% as they were already on the roost when we arrived in the evening or still on the roost when we departed in the morning. Typically, when large numbers of caracaras roosted, they came in sporadically at first but streamed in at dusk. We were able to determine the ages of roosting caracaras that were closest to our observation points and when light was better. We identified both first- and second-year immature birds, as well as adult-plumaged birds. The presence of these age groups was true for all seasons. We were unable to conclude whether adult-plumaged birds were nonbreeding floaters or breeding.

The number of roosting caracaras at Roosts 1 and 2 combined between December 2014 and December 2017 was higher between November through March (mean 39.6 ± 24.3 SE, range 0 to 104 caracaras) and lower during April through October (mean 5.1 ± 11.6 SE, range 0 to 6 caracaras, $t = 6.4$, $df=50$, $P < 0.0001$). The t test displayed a statistically significant seasonal difference (Figure 3). Nesting activity typically occurs between early February and late June (Jenness 2025), which overlaps with both the November to March and April to October periods.

All the communal roosts used by caracaras at the Flats were also used by Black Vultures. We observed no Turkey Vultures at the roosts. Of the 127 counts, both caracaras and Black Vultures were present on 95 counts (75%) and neither species was present on 6 counts (4.7%). On 12 counts only caracaras were present (9.4%) and on 14 only vultures were present (11%). At Roost 1, which was the first discovered and where the most counts were made, vultures were present at all 71 counts (100%) and caracaras at 64 (90%). Typically, most of the vultures arrived earlier than the caracaras and remained longer in the morning. Usually, the 2 species congregated separately at the roost, but occasionally, caracaras perched among the vultures. As the birds settled for the night, both intra- and interspecific jostling occurred for roost positions. Often up to 8 to 10 caracaras or vultures perched on multiple arms of the same saguaro. Ng and Jasperson (1984) reported caracaras and Black Vultures allopreening before flying to roosts, but we did not observe allopreening between these species when they were feeding together at the same carcass dumps or in pastures or when they were at the roosts.

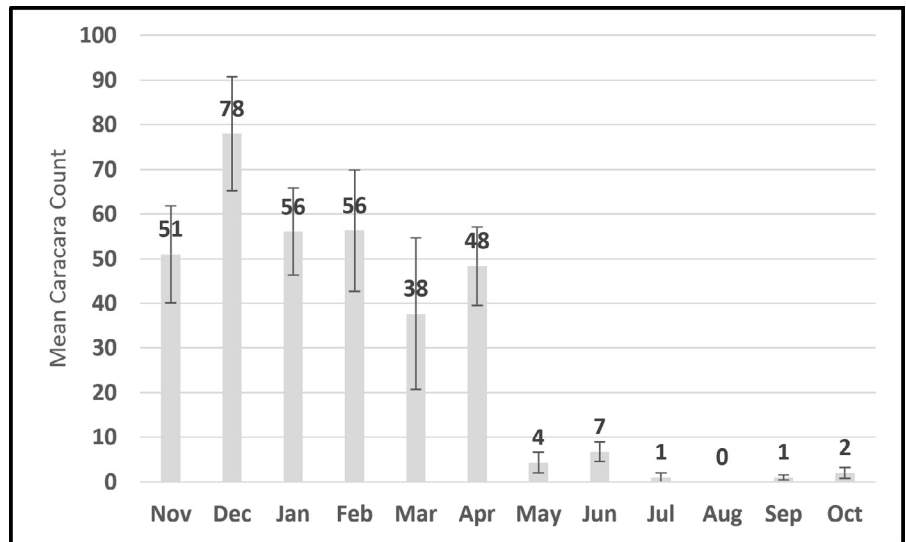


Figure 3. The monthly mean number of caracaras at 2 communal roosts at Santa Cruz Flats, Dec. 2014-Dec. 2017. The vertical bars show the Standard Error of the Mean for each month. Note the sharp drop in the number of observed caracaras during the period of May through October.

DISCUSSION

Our study is the first to document communal roosting by caracaras and a seasonal difference in the number of caracaras at the roosts in Arizona. Josens et al. (2013) and Harrington et al. (2018) suggested that seasonal shifts in food resource availability may drive seasonal movements and communal roosting of Chimango Caracaras (*Milvago chimango*) and Striated Caracaras (*Phalco boenus australis*), respectively. Our observations suggest that during winter, many caracaras in Arizona may rely on food sources associated with agricultural activities, which in turn may drive an increase in local communal roost sizes during this period. The wide range of agricultural activities occurring at the Flats in the winter has the potential for generating abundant food resources for caracaras. In addition to flooded hay fields and freshly cut alfalfa and grass hay, which are year-round, harvested sorghum fields, freshly disked cotton fields, and burned grass hayfields are present at the Flats primarily in November through March. These wet or disturbed fields likely offer both invertebrate and vertebrate prey, all of which are used by caracaras (Morrison and Pias 2006). Levy (1988) and Rodríguez-Estrella and Rivera-Rodríguez (1997) found that the most common invertebrates consumed by caracaras were from the insect orders Coleoptera and Orthoptera. Similarly, 17 caracara pellets we collected at Roost 3 in December, several kilometers from where scores of caracaras foraged in flooded fields the day before, revealed the remains of 527 insects from 3 orders – Coleoptera, Orthoptera, and Dermaptera.

Sheep are only pastured at the Flats from November into early spring, and lambing occurs during this period. We observed caracaras foraging in the pastures on afterbirth and dead lambs and for invertebrates in the dung. A carcass dump (dead ewes and lambs) maintained in the winter months attracted many caracaras that fed on the carcasses. Cattle are often pastured at the Flats during winter months as well, both in irrigated fields and in harvested cotton fields, where they feed on stubble. Caracaras likely feed on invertebrates and other prey disturbed by the grazing cattle.

Our observations of communal roosting can serve as a baseline for future monitoring as threats materialize. An immediate potential threat to the Flats is the substantial reduction of irrigation water to Pinal County farmers. Under Arizona's mandated Drought Contingency Plan, Colorado River water provided to farmers has been reduced since January 2022 (CAP 2021, Migoya 2023). Accordingly, farmers have reduced cultivated acreage, which could diminish food resources for caracaras. Some of this reduced acreage is being converted to other uses that may take land out of agricultural production, which could also affect prey abundance or availability (e.g., Fleming 2025). This includes solar farms, as well as the proposed construction of a data center, preliminarily approved by the Pinal County Board of Supervisors (Pinal County 2025). An additional threat is a proposed Interstate highway (I-11) projected to run from Las Vegas, NV to Nogales, AZ, across farmlands including the Flats (ADOT and NDOT 2021).

We did not observe any noticeable change in caracara numbers at the Flats after our 2014-2017 surveys of 2 roosts. However, the threats described above underline the importance future research of seasonal movements and foraging at the Flats could have in evaluating whether the observed communally roosting caracaras exhibit social information use (e.g., local enhancement) and enhanced resource discovery in human-altered environments. Caracaras have adapted to using human-altered environments, such as cattle pastures and irrigated crops, but continuing landscape alteration, particularly, urban and industrial development, threatens availability of concentrated prey, which has been shown in Florida (Morrison and Humphrey 2001) and Argentina (Bellocq et al. 2008). Social information use by caracaras would increase their vulnerability to increased landscape change.

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