ROOSTING BEHAVIOR OF NATURALIZED PARROTS IN THE SAN GABRIEL VALLEY, CALIFORNIA

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In recent decades, southern California has seen changes, both increases and decreases, in the population status of many species of birds (Jehl and Johnson 1994). Among the increasing populations are some introduced species, particularly many parrots (Johnston and Garrett 1994). Parrots have been observed in southern California for over thirty years with reports of Red-crowned (= Green-cheeked) Parrots (*Amazona viridigenalis*), Yellow-headed Parrots (*A. oratrix*), Red-lored Parrots (*A. autumnalis*), Black-hooded Parakeets (*Nandayus nenday*), and Rose-ringed Parakeets (*Psittacula krameri*) dating back to the 1960s and 1970s (Fisk and Crabtree 1974, Hardy 1964, 1973). Only one previous study of naturalized parrots in California, in the vicinity of Arcadia (Froke 1981), and a study of parrots in Costa Rica (Chapman et al. 1989) provide information on roosting behavior.

Currently, many species of parrots are found regularly in the Los Angeles area (Garrett 1997), many occurring in large numbers and assembling in large roosting associations. I present here my observations of one such roosting assemblage from 17 May 1995 to 16 August 1997, involving a total of 74 days during this period. My observations emphasized the number and species identity of birds using the roost, roost location, and tree species occupied.

MATERIALS AND METHODS

I made my observations in Temple City and Arcadia, in the San Gabriel Valley of Los Angeles County, California. I noted where parrots roosted and mapped the general roosting area (see Figure 1 in Garrett 1977) as well as more localized clusters on a street map. I used 7 × 35 binoculars, a 22× wide-angle spotting scope, and the unaided eye and ear to determine which species were present.

I initially located parrots by conducting counts on foot, following flying groups of parrots visually, and by listening for their vocalizations. Once I located a roost site, I monitored it until birds no longer roosted there. When parrots change their roost site, they tend to visit the old site to forage before flying to the new site (pers. obs.); thus, I discovered the location of the new site by waiting at, and following birds from, the old site. I conducted observations from late afternoon until sunset. I determined the number of parrots by estimating the number of parrots in each occupied tree, estimating the number of parrots flying into the roost, counting the parrots perched on power lines and utility poles, and subtracting an estimate of parrots flying away from the roost. I did not include parrots circling the roost with the estimate of ones leaving the roost. I noted which species were present, but included Red-crowned and Lilac-crowned parrots as "*Amazona* spp."

because of the difficulty in distinguishing between the two when they perch in shady trees in poor pre-sunset lighting. I noted the tree species used for roosting on each occasion, and seasonal changes in tree type selected. I determined the time of roosting to be the time when the majority of parrots were silent, discounting unsettling by disturbance. Sources of disturbance included humans and American Crows (*Corvus brachyrhynchos*); crows tended to roost after the parrots and occasionally harassed parrots already settled down at roosts.

RESULTS

The roosting flocks consist mainly of Red-crowned and Lilac-crowned (*Amazona finschi*) parrots (Figure 1), which occur in ratios of up to 8 to 1, respectively. I regularly observed Rose-ringed Parakeets in the entire study area and frequently observed Mitred Parakeets (*Aratinga mitrata*) and Red-masked Parakeets (*Aratinga erythrogenys*) in the eastern portion of the study area (Table 1). I also made occasional observations of the following: White-fronted Parrot (*A. albifrons*), Red-lored Parrot (*A. autumnalis*), Blue-fronted Parrot (*A. aestiva*), Yellow-headed Parrot, Blue-crowned Parakeet (*Aratinga acuticaudata*), and Black-hooded Parakeet (Table 1). I observed a Gray Parrot (*Psittacus erithacus*), a Cockatiel (*Nymphicus hollandicus*), and an unidentified parrotlet (*Forpus* sp.) on single occasions (Table 1). The overall monthly average number of parrots was lowest in the spring and early summer; an average of only 40 individuals was present in May 1995,

Figure 1. Pre-roosting aggregation of amazon parrots, mostly *Amazona viridigenalis*, in Temple City, Los Angeles County, November 1996.

Photo by Kimball L. Garrett

Table 1 Abundance and Occurrence of Parrots at Temple City/Arcadia roosts, 1995–1997

Species	Number of individuals seen (range)	Number of times species seen (%)	Number of observation visits to roost[a]
Amazona viridigenalis/finschi	20–750	74 (100%)	74
Amazona autumnalis	0–2	15 (21%)	72
Amazona aestiva	0–2	12 (17%)	70
Amazona albifrons	0–1	2 (6%)	31
Amazona oratrix	0–1	4 (7%)	58
Aratinga mitrata	0–100	15 (21%)	72
Aratinga erythrogenys	0–25	9 (50%)	18
Aratinga spp.	0–1	4 (6%)	72
Aratinga acuticaudata	1	1 (7%)	14
Forpus spp.	1	1 (4%)	23
Nymphicus hollandicus	1	1 (4%)	23
Nandayus nenday	0–3	2 (14%)	14
Psittacula krameri	0–15	56 (76%)	74
Psittacus erithacus	1	1 (7%)	14

[a]Number of observation visits to localized roost areas within the general roost area; not all localized roosts checked in each visit.

52 in July 1995, 50 in April 1997, and 50 in May 1997 (Table 2). There was also a low monthly average number, 75, in December 1995. Parrot populations were highest in the fall and winter, reaching monthly averages of 500 individuals in November 1995 and November 1996, 400 in February 1996, and 542 in January 1997 (Table 2). There was also a high monthly average number, 625, in August 1997.

Roost sites were in suburban neighborhoods, developed in the 1940s. Individual trees used were usually those lining streets with single-family dwellings, with the exception of a period between 17 December 1996 and 21 February 1997 when on seven days up to 750 parrots roosted in fig trees (*Ficus microcarpa*) in a brightly lit parking lot of a busy supermarket. It was not possible to determine an exact time when parrots first entered the roost area, as parrots also forage in and around the trees they roost in until just prior to settling down to roost. On some occasions, they made numerous trips to and from the roost area and foraging sites in groups of two to 20 individuals. On other days, they flew directly into the roost area shortly before sunset in large groups of up to hundreds of individuals. In the summer, parrots tended to frequent the roost area approximately 30–60 minutes before sunset. In the winter, parrots tended to arrive at their roost location only 5–20 minutes before sunset. Even so, there was considerable variability in their arrival time, and I could not discern a set pattern. Parrots entered the roost area sporadically until all had roosted. Many times, small flocks of parrots continued to straggle in after the majority of the roosting assemblage was perched and quiet. Roosting parrots are highly vocal until shortly before total darkness, when they become abruptly silent. Often, approximately five

Table 2 Average Numbers and Roost Trees of Parrots Roosting in Temple City and Arcadia, 1995–1997

Month	Average number of parrots: All Psittacidae	Average number of parrots: Red-crowned and Lilac-crowned Parrots	Tree species[a]	Tree type[b]
May 1995	40	40	Euc/SG	E/D
June	—	—	—	—
July	52	52	Syc/SG	D
August	292	290	Syc/SG	D
September	377	375	SG	D
October	380	375	SG	D
November	501	500	CW	E
December	86	75	CW	E
January 1996	407	343	Euc/LO	E
February	417	400	Euc	E
March	366	350	Euc/Syc	E/D
April	276	272	SG/Syc/LO	D
May	102	100	Syc/SM	D
June	349	347	SG/Syc/LO	D/E
July	—	—	—	—
August	380	325	Syc	D
September	356	350	Syc	D
October	—	—	—	—
November	511	500	Syc	D
December	252	250	LO/Fig	E
January 1997	542	538	Fig/Euc	E
February	296	279	Fig/Euc/Syc	E/D
March	179	175	Syc/SM	D
April	50	50	SM	D
May	50	50	SM	D
June	131	107	Syc/LO	D/E
July	337	330	Syc	D
August	629	625	Syc	D

[a]CW, Carrotwood (*Cupanopsis anacardiodes*); Euc, *Eucalyptus* spp. Fig, fig (*Ficus microcarpa*); LO, live oak hybrid (*Quercus* spp.); SG, Sweet Gum (*Liquidambar styracifolia*); SM, Silver (= Soft) Maple (*Acer saccharinum*); Syc, Western Sycamore (*Platanus racemosa*).

[b]E, evergreen; D, deciduous.

minutes before roosting, there was an increase in activity, with parrots calling, flying between branches or trees, and circling within and around the roost area. In the breeding season, fledglings can be heard begging for food well after all of the other parrots are silent.

From approximately 30 minutes before sunset until the time of roosting parrots engage in various social behaviors on power lines and trees near the roost site. These groups numbered from 20 to 100 or more individuals. They spent most of this time preening and allopreening. They engaged in a variety of displays including hanging upside down, tail-fanning, nape-raising,

wing-spreading, pupil dilation, feigned attacks with bills agape, bill wiping on perches, and head-bowing (Copsey 1995, Levinson 1980). On 15 August 1995, a lone White-fronted Parrot was observed engaging in head-bowing, neck-craning, and tail-fanning displays in the presence of 20 Red-crowned and Lilac-crowned parrots. In the late summer and early fall, dependent juveniles are present and identified by their begging posture and head-bobbing, while fluttering wings held away from the body. This was accompanied by a distinctive "*uk*" call, which often stimulated adults to feed them by regurgitation.

Parrots in the study area tend to prefer deciduous trees, specifically Sweet Gum (*Liquidambar styracifolia*) and Western Sycamore (*Plantanus racemosa*), during the summer and fall months (Table 2). When those trees lost their leaves in the winter and spring, parrots preferred broadleaf evergreens, such as Carrotwood (*Cupanopsis anacardiodes*), *Eucalyptus* spp., and live oak (*Quercus* spp.).

DISCUSSION

Roost sites and other sites visited prior to roosting tended to have fresh leaf litter beneath them. The branches had marks suggestive of being chewed off by a parrot's bill, rather than being broken or frayed from the weight of a bird or blown off by the wind. The litter beneath roost trees being greater than under other trees suggested this litter was not due to simple shedding by the trees. In areas where parrots roost in Sweet Gum trees, seed pods are often abundantly scattered over streets below. Parrots also tend to strip bark off roost trees. The area under the roost trees is also littered with molted feathers from July to October. Feather lice (Insecta: Mallophaga, Philopteridae) and mites (Arachnida: Acarina) were present on some of the feathers found below the roosts.

It is difficult to ascertain with precision how many parrots used roost sites and to document movements among roosting areas in the absence of banding, marking, and telemetry techniques necessary to distinguish among individuals; experimentation with such techniques has recently been conducted with native Red-crowned (Enkerlin-Hoeflich 1995, Enkerlin-Hoeflich et al. in press) and Puerto Rican (*Amazona vittata*) parrots (Meyers 1995). Estimates of population numbers are rough, at best, and may reflect my ability to detect parrots and an increasing familiarity with parrot habits. Although roost trees camouflage parrots well, parrot numbers can be estimated roughly by counting parrots flying into and out of trees and counting parrots in plain sight, such as when they are on power lines and trees that lack dense foliage.

Mortality among these parrots is not well documented. I found a single Red-crowned Parrot whose death appeared to be caused by being either struck by a car or attacked by a domestic cat. On 8 October 1995, I observed two American Kestrels (*Falco sparverius*) in the vicinity of a roosting assemblage, circling just above the treetops, causing the parrots in those trees to become excited and leave the vicinity. Although the parrots vocalized loudly, I did not observe any direct hostile behaviors by either the

kestrels or the parrots. An unidentified *Accipiter* hawk attacked a flock of ten *Amazona* spp. flying to a foraging area on 4 February 1996, attempting to grasp a parrot. The parrots responded by shifting their flight position from below to above the hawk. They flew close to the hawk, came into physical contact with it, and called loudly. The hawk then flew away, unsuccessful, and did not attempt any further capture.

Night flights of the Red-crowned Parrot are mentioned briefly by Forshaw (1989). I have heard large flocks flying distances of at least a kilometer on several occasions at night. On 3 December 1996, I heard 50–100 *Amazona* parrots flying at 0230 PST. The next day, I heard a small flock (<20) of *Amazona* parrots continuously flying around at 2300–2320 PST. On 5 January 1997, 50–200 *Amazona* parrots were flying at 0149–0152 PST. The reasons for these flights are unknown. I presume that the birds were spooked from their roost by human activity, such as car traffic and passing aircraft, or by nocturnal animals. Fireworks appear to have caused roosting parrots to take flight on 2 July 1997 at 2330–2342 PDT, 4 July 1997 at 2330–2340 PDT, and 5 July 1997 at 0150-0205 PDT.

The rapid increase in parrot populations strongly suggests reproductive recruitment. In the late summer, presumably just after the peak of breeding, at least five to ten percent of the roosting flock consists of juveniles, reinforcing the assumption that the flocks are increasing through recruitment of young and indirectly substantiates their breeding under natural conditions outside of captivity (Mabb 1997).

SUMMARY

Naturalized parrots roost communally in Temple City and adjacent Arcadia, in the San Gabriel Valley of Los Angeles County, California. Parrots visiting the seasonal roost sites from May 1995 to August 1997 numbered as high as 750 on a single day and averaged as high as 625 a month. The parrots tended to use deciduous trees for summer roosting and evergreen trees for winter roosting. Red-crowned Parrots (*Amazona viridigenalis*) dominated the roosting aggregations, but Lilac-crowned Parrots (*A. finschi*) and Rose-ringed Parakeets (*Psittacula krameri*) were also frequently observed. Eleven other parrot species were also observed.

ACKNOWLEDGMENTS

I thank Charles T. Collins for reviewing this paper, Kimball L. Garrett for aiding in field identification and data, Phillip H. Baker for plant identification, Ernesto Enkerlin-Hoeflich for sending helpful information, and John Chavez, James Collins, Matthew Friend, Jared Rourman, Mason Rourman, Thomas P. Ryan, and John Young for their assistance. And to my father—I'm sorry I didn't finish this in time for you to read it.

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Accepted 5 September 1997