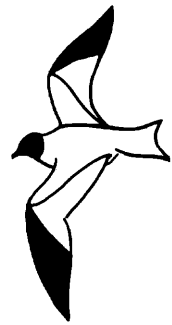


WESTERN BIRDS



Volume 28, Number 4, 1997

POPULATION STATUS AND DISTRIBUTION OF NATURALIZED PARROTS IN SOUTHERN CALIFORNIA

KIMBALL L. GARRETT, Section of Vertebrates, Natural History Museum of Los Angeles County, 900 Exposition Blvd., Los Angeles, California 90007

Data on the identity, population sizes, trends, geographical distributions, and ecological requirements of naturalized populations of non-native, non-game bird species in western North America are limited (see reviews by Hardy 1973, Johnston and Garrett 1994). At the same time, concerns about the actual and potential impacts of such populations on native biota and natural ecosystems are of increasing interest to ecologists (Temple 1992). The resulting "information gap" is perhaps nowhere as evident as with the populations of parrots in southern California. Flocks of parrots of several species are widespread in urban and suburban regions of southern California yet have remained virtually unstudied, with the few published crude population estimates (Hardy 1973, Froke 1981) now being sorely out of date. Even the species identity of parrots currently inhabiting southern California was largely uncommented upon until the brief review by Johnston and Garrett (1994). To date, no parrot species has been accepted for the California state bird list (California Bird Records Committee 1996), reflecting both the absence of good population data and a lack of agreement on what constitutes a naturalized or "established" population. Following Holmes and Stroud (1995), I use the term "naturalized" when referring to established, non-native parrots in southern California, avoiding the commonly misused term "feral," which implies former domestication.

In this era of increasing human modification of the ecological landscape, biologists can no longer reasonably exclude non-native taxa in the quest for basic descriptive data. Parrots are not adequately monitored by standard North American surveys; few Breeding Bird Survey routes (Droegge 1990) are located in urban regions, and naturalized species are only erratically reported on Christmas Bird Counts. The distinction between native ("indigenous") and non-native ("exotic") bird species is undeniably of paramount importance in the study of historical avian biogeography and evolutionary

biology, but such distinctions are increasingly blurred in human-manipulated landscapes.

The history of free-flying Psittacidae in southern California is sketchy, with much information on early establishment being anecdotal and unpublished. Early reports (including Hardy 1964 and 1973, Fisk and Crabtree 1974, and numerous unpublished or newspaper accounts summarized by Froke 1981) led to preliminary analyses (Dana et al. 1973, Shelgren et al. 1975) of parrots as potential agricultural pests in California. The legal and illegal importation of hundreds of thousands of parrots into the United States for the pet trade (Banks 1976, Froke 1981, Traffic 1987; Table 2) accelerated during the late 1960s and early 1970s, setting the stage for a vastly more diverse and abundant parrot fauna in California during and after the 1980s. The mechanisms of intentional and unintentional release of parrots into the wild in urban southern California are probably diverse and complex; some releases—e.g., from aviaries, pet stores, or smugglers' holdings—have been told and retold to the point of qualifying as entrenched "urban mythology!" This paper summarizes our current knowledge of the naturalized parrot fauna in the region in an era following this import "boom."

METHODS

From 1994 through June 1997 I solicited sightings of parrots from the greater Los Angeles region (Ventura, Los Angeles and Orange counties, inland to western San Bernardino and Riverside counties) through Audubon chapter newsletters, avicultural clubs, and various public media. I also distributed basic field-identification information through Audubon newsletters (Garrett 1995) and presentations. Target species were identified from existing literature and included additional species for which I or others had made multiple sightings during casual field work prior to 1994. Sightings of all free-flying parrots were requested, however, whether or not they were on the "target" list. I requested the following information: identity of the parrot(s) if known (with supporting documentation, especially if the identification was uncertain), exact location, date and time, and parrot behavior (flying, roosting, feeding, etc., with details).

I field-checked numerous sites, especially where parrots concentrated at roosting or regular foraging areas. Methods for estimating population sizes of parrots in the wild have been described and critically compared by Casagrande and Beissinger (1997); because my primary goal was to establish only the identity, distribution, and approximate sizes of the parrot populations of the region, and because contributing observers were generally untrained, I did not employ standardized census methods.

Field-identification problems have long plagued attempts to gather population data on non-native bird species in North America. Standard field guides treat most of southern California's free-flying parrot species inadequately, if at all. For example, the National Geographic Society field guide (Scott 1987) treats seven non-native parrot species, only four of which are relevant to southern California. Peterson (1990) briefly treats six exotic psittacids, five of which have populations in California (his reasons for attributing the Orange-fronted Parakeet, *Aratinga canicularia*, to southern

DISTRIBUTION OF NATURALIZED PARROTS IN SOUTHERN CALIFORNIA

California are unclear; it was not recorded during the present study). Robbins et al. (1983) treat twelve parrot species, five of which occur as naturalized populations in California. All of these guides, however, mention a taxon within the Canary-winged Parakeet (*Brotogeris versicolurus*) superspecies that is marginal in California but fail to address the more relevant taxon *B. [v.] chiriri*, now generally afforded full species status (American Ornithologists' Union 1997). Farrand (1983) treats only the Budgerigar (*Melopsittacus undulatus*) (with no established populations in California) and "Canary-winged Parakeet" (with a photograph of the "correct" form *chiriri* but a text account of *versicolurus*). Griggs (1997) covers four relevant taxa but, again, the "wrong" [= *versicolurus*] Canary-winged Parakeet. Finally, the photographic guide by Stokes and Stokes (1996) does not mention any parrot species. Thus only five of the ten or so naturalized parrot taxa in southern California are treated at all in North American field guides. The fact that our psittacids are derived from the avifaunas of Mexico, South America, and the Indian subcontinent ensures that no other single regional guide covers our entire species pool. The major monographic works on the Psittacidae (e.g. Forshaw 1989) contain much information on systematics and natural history but are not oriented to field identification. During the course of this project I prepared an informal guide to the field identification of those parrot species believed to be naturalized in California (Garrett 1995); excellent general information on the identification of Neotropical parrots is given by Whitney (1996).

In addition to identification problems, there exists a confounding variety of avicultural names for the parrot taxa noted in this survey. Throughout, I use those names adopted by the American Ornithologists' Union (1983, 1997) or extend the nomenclatural policies of that list to extralimital species; for example, I call all *Aratinga* (and closely related *Nandayus*) "parakeets" rather than "conures" and all *Amazona* "parrots" rather than "amazons."

For population estimates and analysis I divided the greater Los Angeles region into several subregions (Figure 1) as follows: North Coast communities (Malibu to Pacific Palisades and Brentwood); South Coast communities (Manhattan Beach south to Redondo Beach, the Palos Verdes Peninsula, and Long Beach); Los Angeles Basin (including the coast from Santa Monica to Westchester); San Fernando Valley (including Simi Valley, Ventura Co.); San Gabriel Valley (including Pasadena, San Marino, South Pasadena, and Highland Park; east to Glendora); and urban Orange County. I arrived at population estimates by summing high counts of what were presumed to be discrete flocks within each subregion; I assumed that there was no overlap of individuals between subregions. Our knowledge of the daily and seasonal movements and home ranges of parrots in the region is fragmentary and, therefore, population estimates are crude but likely to be conservative.

RESULTS

Some 1550 parrot sightings (not all independent) were reported to me between January 1994 and June 1997; these, supplemented with my own field observations, involved at least 33 species of parrots. These fit neatly into two groups: (a) 23 species observed only sporadically, with reports

DISTRIBUTION OF NATURALIZED PARROTS IN SOUTHERN CALIFORNIA

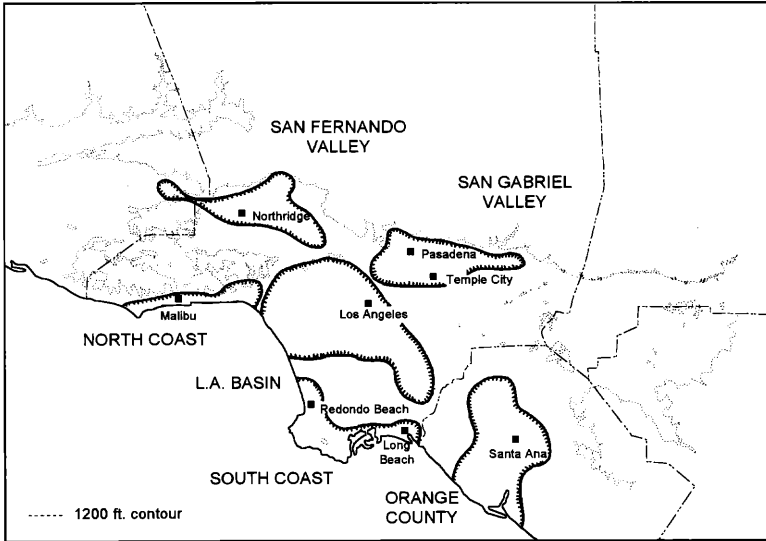


Figure 1. Areas of parrot concentrations in the greater Los Angeles area, showing regions used in Table 1.

rarely involving more than a single individual, and (b) ten “established” species observed frequently, and usually in pairs, small groups or large flocks. Although proof that some of the species in the latter group are maintaining or increasing populations through reproduction in the wild is lacking or equivocal, I treat them all in the discussions below because their numbers appear to be significant (>50 individuals in all but two cases). Reports from urbanized western San Bernardino and Riverside counties were too few to draw conclusions about parrots’ status there, so that area is not treated in the main discussion below.

Casually reported, non-established species (group “a” above) were *Agapornis personata* (Masked Lovebird), *A. roseicollis* (Peach-faced Lovebird), *Amazona amazonica* (Orange-winged Parrot), *A. aestiva* (Blue-fronted Parrot), *A. albifrons* (White-fronted Parrot), *A. autumnalis* (Red-ored Parrot), *A. pretrei* (Red-spectacled Parrot), *Ara araruana* (Blue-and-yellow Macaw), *A. chloroptera* (Red-and-green Macaw), *A. macao* (Scarlet Macaw), *A. militaris* (Military Macaw), *Brotopogon pyrrhopterus* (Gray-cheeked Parakeet), *Cacatua galerita* (Sulphur-crested Cockatoo), *Cyanoliseus patagonicus* (Burrowing Parrot), *Eos bornea* (Red Lory), *Melopsittacus undulatus* (Budgerigar), *Myiopsitta monachus* (Monk Parakeet), *Nymphicus hollandicus* (Cockatiel), *Platyercus elegans* (Crimson Rosella), *P. eximius* (Eastern Rosella), *Poicephalus crassus* (Niam-niam Parrot), *Psittacula alexandri* (Red-breasted [Moustached] Parakeet), and *Psittacus erithacus* (Gray Parrot). Two species in this group (Red-ored and Blue-fronted parrots) were often observed in pairs and are known to have bred at

DISTRIBUTION OF NATURALIZED PARROTS IN SOUTHERN CALIFORNIA

least once in the wild (Mabb 1997; pers. obs.). Some others (especially the Budgerigar and Cockatiel) were reported frequently, but individuals of these species, which are easily and abundantly bred in captivity, do not appear to survive long, and there is no indication of their breeding in the wild in southern California.

The more established species (group "b") are discussed individually in the accounts below.

SPECIES ACCOUNTS

The accounts below provide historical information and data gathered during this study on geographical distribution, habitat associations, population sizes (summarized in Table 1), and trends in the Greater Los Angeles region (including Orange County). All localities are within Los Angeles County unless otherwise indicated.

Rose-ringed Parakeet *Psittacula krameri*

This species is native to the Indian subcontinent and the Sudan belt of Africa; it is the only parrot established in southern California that does not originate from the Neotropics. Naturalized populations in Britain are thought to be of Indian/Asian origin (Morgan 1993); at least some Florida populations are referable to the Indian subspecies *manillensis*. The subspecific identity of southern California birds is uncertain, although bill coloration (and avicultural trends) suggest they too are of the Asian/Indian subspecies *manillensis* or *borealis*. Hardy (1964) documented nesting in a small population in Highland Park, 5 km northeast of downtown Los Angeles, but felt that this population had largely vanished by the early 1970s (Hardy 1973).

Populations of this species exist in coastal Los Angeles County, mainly in Malibu (especially lower Zuma Canyon), Playa del Rey, and Westchester. There is a small population in the San Gabriel Valley (Temple City) and scattered reports from other areas. Rose-ringed Parakeets appear to favor areas with numerous tall sycamores, either natural sycamore woodlands in canyon residential areas (e.g., lower Zuma Canyon) or sycamores planted as urban shade trees (Temple City, Westchester). The population in lower Zuma Canyon has diminished from thirty or more individuals to eleven or fewer since the mid-1980s, perhaps as a result of the establishment of the larger Mitred and Black-hooded parakeets in the area. The overall population in the greater Los Angeles area is estimated at ≥ 60 individuals.

Blue-crowned Parakeet *Aratinga acuticaudata*

The extensive blue coloration on the heads of free-flying individuals of this species observed in southern California suggests that the nominate subspecies, native to dry woodlands from central Brazil to northern Argentina, is the one occurring in the region. The occurrence of this species in California was not mentioned by Hardy (1973); it was considered "sporadically" reported in southern California by Johnston and Garrett (1994).

During this study flocks of up to 13 individuals were reported regularly from the west-central San Fernando Valley, especially in Northridge. Elsewhere, one small flock was in the Simi Valley, Ventura Co., a flock of up to 15 was in Redondo Beach, and a flock of up to eight was in Monrovia in the San Gabriel Valley. The overall population in the greater Los Angeles area probably does not exceed 50 individuals.

Table 1 Population Estimates for Southern California Parrots by Region^a

Species	Region ^b							Total
	SF	SG	NC	LA	SC	OR		
Rose-ringed Parakeet	2 [1]	11 [11]	11 [11]	38 [35]	2 [1]	0	64	
Blue-crowned Parakeet	23 [13]	8 [8]	0	2 [1]	16 [15]	0	49	
Mitred Parakeet	24 [14]	230 [100]	55 [55]	169 [48]	168 [60]	57 [25]	683	
Red-masked Parakeet	0	40 [40]	1 [1]	0	30 [30]	0	71	
Black-hooded Parakeet	0	24 [24]	87 [40]	50 [50]	0	20 [12]	181	
Canary-winged Parakeet	0	0	1 [1]	2 [1]	18 [10]	0	20	
Yellow-chevroned Parakeet	1 [1]	27 [25]	0	295 [106]	60 [30]	0	383	
Lilac-crowned Parrot	14 [10]	68 [36]	10 [10]	3 [3]	1 [1]	1 [1]	97	
Red-crowned Parrot	70 [50]	890 [750]	20 [20]	3 [2]	2 [2]	95 [70]	1080	
Yellow-headed Parrot	4 [3]	11 [6]	1 [1]	23 [12]	1 [1]	19 [9]	59	

^aThe first number given is the estimated population for the region; it is followed [in brackets] by the largest flock reported within the region.

^bSF, San Fernando Valley, Los Angeles Co. (including Simi Valley, Ventura Co.); SG, San Gabriel Valley, Los Angeles Co.; NC, north coast, from Malibu to Pacific Palisades, Los Angeles Co.; LA, Los Angeles Basin; SC, south coast, from Manhattan Beach to Palos Verdes Peninsula and Long Beach, Los Angeles Co.; OR, Orange Co. For delineation of these regions, see Figure 1.

Mitred Parakeet *Aratinga mitrata*

This large conure is native from east-central Peru to eastern Bolivia and northwestern Argentina. It belongs to a complex of primarily green species with red markings on the head, none of which is treated in any North American field guide, confounding our understanding of their local status. Its occurrence in California was not published upon until Garrett (1989) and Johnston and Garrett (1994; note corrected population estimate of "hundreds," not "hundreds of thousands"), although C. T. Collins (pers. comm.) reports that this species was present in Long Beach, Los Angeles County, by 1980. The extensive red markings on the heads of most individuals in the region suggest that the nominate subspecies is involved.

During this study flocks of Mitred Parakeets were found in Malibu (especially Zuma Canyon and Pt. Dume), West Los Angeles, Culver City, Venice, central Los Angeles, Manhattan Beach, Redondo Beach, San Pedro, Long Beach, Huntington Beach, Highland Park, Temple City, Arcadia, and El Monte. Maximum flock sizes were 100 in the San Gabriel Valley (Temple City and South San Gabriel), 60 in Palos Verdes Estates, 55 in Malibu (lower Zuma Canyon), 48 in Lakewood, and 47 in Exposition Park south of downtown Los Angeles. Seasonal status and foraging behavior in the Long Beach area are discussed by Collins and Kares (1997). The total population in the greater Los Angeles region was estimated at 680.

Red-masked Parakeet *Aratinga erythrogenys*

Closely related to the Mitred Parakeet, this species is endemic to the arid Tumbesian zone of southwestern Ecuador and northwestern Peru. Adults are best distinguished from *mitrata* by the more solid and extensive red on the head, more extensive red in the underwing coverts, and smaller overall size. This species is considered near-threatened within its native range (Collar 1996). It was not mentioned by Hardy (1973) and was mentioned as "sporadically seen" in southern California by Johnston and Garrett (1994).

The status of this species in southern California is obscured by its similarity to *A. mitrata*; although the two species are readily distinguished given reasonable views, southern California observers are understandably poorly aware of identification criteria. Single birds (at least one bearing a leg ring) were seen with Mitred Parakeet flocks in lower Zuma Canyon (Malibu), at Pt. Fermin (San Pedro), and at Rancho Los Alamitos (Long Beach). Subsequently, small flocks were found in Temple City and adjacent Monrovia, and in Redondo Beach. The greater Los Angeles population estimate of about 70 is tentative pending further field work by observers familiar with *Aratinga* identification.

Black-hooded Parakeet *Nandayus nenday*

Popularly known as the "Nanday Conure," this species occurs naturally in pantanal, savannas and settled areas from southwestern Brazil to northern Argentina. Hardy (1973) mentioned only a small population in Loma Linda, western San Bernardino Co. that became established in the late 1960s; nesting there was suspected by Fisk and Crabtree (1974).

A population of Black-hooded Parakeets has been observed in residential areas and adjacent sycamore-dominated canyon bottoms from the Brentwood district of western Los Angeles to Pacific Palisades, with additional populations farther up the coast from central Malibu to lower Zuma Canyon. Several active nests, usually in sycamores (*Platanus racemosa*), have been documented in the canyons of Brentwood (M. Marin A. pers. comm.; pers. obs.). Elsewhere, small numbers occur in Culver City and the Rancho Park district of West Los Angeles, in the San Gabriel Valley, and in Huntington Beach, Orange Co. An overall population estimate for the region is ≥ 180 birds.

Canary-winged (White-winged) Parakeet *Brotogeris versicolurus*
 Yellow-chevroned Parakeet *Brotogeris chiriri*

Considered conspecific by many authorities (e.g., Forshaw 1989), these taxa occur naturally in northern Amazonia (*versicolurus*) and from southern Amazonia to northern Argentina (*chiriri*). Plumage differences between the two forms are striking, and their status as full species has been argued by Pinto and Camargo (1957) and adopted by the American Ornithologists' Union (1997). "Canary-winged" Parakeets (subspecies not noted) had established populations in San Pedro and the adjacent Palos Verdes Peninsula, Los Angeles Co., and in western Riverside Co. by the early 1970s (Hardy 1973). Nesting of *B. versicolurus* was documented at Pt. Fermin, San Pedro, Los Angeles Co., in June 1973 (one of four nestlings preserved as a study skin; UCLA 37822); additional specimens (e.g. LACM 85923, 28 November 1972, Pt. Fermin) are also of *B. versicolurus*. Since the early 1980s flocks of "Canary-winged" Parakeets in the Los Angeles Basin have consisted mostly or exclusively of *B. chiriri*, the Yellow-chevroned Parakeet (Garrett 1993); United States importations of "Canary-winged Parakeets" shifted from *versicolurus* to *chiriri* during the 1970s (Arrowood 1981). The only specimen of *chiriri* from naturalized southern California populations was taken in Eagle Rock, 10 km north of the Los Angeles Civic Center, on 22 June 1997 (California State University Northridge Vertebrate Collections 1400).

Currently Yellow-chevroned Parakeets are widespread within the Los Angeles Basin, from downtown and south-central Los Angeles west to West Hollywood and Beverly Hills and north to Highland Park, Eagle Rock, South Pasadena, and San Marino. Although Yellow-chevroned Parakeets are frequently associated with fruiting Silk-floss Trees (*Chorisia speciosa*) in the region (Garrett et al. 1997), the distributions of the bird and the tree are currently not congruent (e.g., *Chorisia* is commonly planted in the San Gabriel Valley where the parakeet is largely absent). Flocks also occur from San Pedro and the Palos Verdes Peninsula north to Redondo Beach and Torrance. Curiously, this species is essentially absent from several areas of high parrot abundance such as the Temple City/Arcadia area of the San Gabriel Valley, the northern San Fernando Valley, the Malibu coast, and urban Orange County, perhaps reflecting a set of ecological requirements or physiological tolerances that differ greatly from those of larger psittacids.

Canary-winged Parakeets (*B. versicolurus*) are now scarce in the region. A flock of eight was found near Lunada Bay on the Palos Verdes Peninsula in December 1996, and up to one-fourth of a flock of 40+ *Brotogeris* in Redondo Beach was estimated to be of this "white-winged" form in winter 1996–97. Single Canary-wingeds have been noted with large flocks of Yellow-chevroned Parakeets in Exposition Park, 5 km southwest of downtown Los Angeles, on several occasions, and one was observed near (but not with) a small group of Yellow-chevroned Parakeets in Huntington Park in spring 1997.

The total population of Yellow-chevroned Parakeets in the region is at least 380; numbers of the Canary-winged currently may not exceed 20 individuals.

Red-crowned Parrot *Amazona viridigenalis*

This species is endemic to (and declining in) northeastern Mexico (Enkerlin-Hoeflich and Hogan 1997). This and the following species represent allopecies (Sibley and Monroe 1990), and difficulty in field identification (see below), especially in low light when parrots gather at roost sites, has hampered the determination of their status in southern California. The Red-crowned is now clearly the more abundant of the two. Hardy (1973) considered this species "very rare, and very local" in southern California, citing records back to 1963 but no confirmation of breeding. Froke (1981) recorded 50 *viridigenalis* and documented nesting in the San Gabriel

DISTRIBUTION OF NATURALIZED PARROTS IN SOUTHERN CALIFORNIA

Valley, Los Angeles Co., from 1973 to 1978, and an unspecified proportion of a flock of 36 *Amazona* parrots in West Los Angeles during that period were of this species. He did not determine the species identity of smaller groups of *Amazona* noted in Pomona (Los Angeles Co.), Orange Co., western San Bernardino Co., and San Diego Co. Red-crowned Parrots have been present and increasing in urban Orange County since the early 1970s (Gallagher 1997). This species is now the most abundant psittacid in the greater Los Angeles region.

The center of abundance of this species is the San Gabriel Valley, from Altadena, Pasadena and Highland Park east to Glendora; up to 750 individuals have been estimated attending pre-roosting aggregations in Temple City (Mabb 1997a; pers. obs.). Substantial populations also occur in the northern San Fernando Valley (Panorama City and Mission Hills west to Northridge and north to Sylmar), and at least 20 birds are found on the Malibu Coast in the vicinity of Pt. Dume and lower Zuma Canyon. In urban Orange County (Santa Ana, Orange, Tustin, Anaheim, and Fullerton), flocks of fifty to seventy were reported in this study and by Gallagher (1997). Confirmation of breeding, usually through sightings of dependent, begging juveniles, has been routine in the San Gabriel Valley (Mabb 1997b) and Orange County (Gallagher 1997), as well as at Pt. Dume, Malibu (this study). A total regional population estimate of 1080 is perhaps conservative.

Lilac-crowned Parrot *Amazona finschi*

This species is resident in western Mexico from southeastern Sonora to southern Oaxaca; criteria for separation in the field from the Red-crowned Parrot are given by Howell and Webb (1995) and Garrett (1995). Briefly, the Lilac-crowned has the red of the head restricted to a band of dull maroon across the forehead and has an extensive wash of lilac through the crown; the Red-crowned shows a bright red forehead and forecrown (extending in males to the center of the crown) and variable blue which is usually restricted to the sides of the crown. The cere of the Lilac-crowned is dusky or dark gray but pinkish-flesh in the Red-crowned. At rest and in flight the Lilac-crowned is noticeably longer-tailed. Finally, although many vocalizations of these two species are similar (and even appropriated from one another?), the distinctive squeaky upslurred whistle of the Lilac-crowned differs from the typical downslurred whistle of the Red-crowned. Hardy (1973) did not mention this species for southern California, but Froke (1981) recorded a minimum of 22 individuals in the San Gabriel Valley from 1976 to 1978, with nesting evidence.

In this study Lilac-crowned Parrots were usually found among larger numbers of Red-crowned Parrots, with the majority in the San Gabriel Valley and smaller populations in the northern San Fernando Valley and the Malibu coast. The population estimate of nearly 100 birds should be refined with more intensive study of *Amazona* flocks.

Yellow-headed Parrot *Amazona oratrix*

The allospecies *A. oratrix*, *A. auropalliata* (Yellow-naped Parrot), and *A. ochrocephala* (Yellow-crowned Parrot), occurring from eastern and southwestern Mexico south to Amazonian South America, are among the most popular parrots for aviculture. Largely because of the drain of wild populations for the pet bird trade, as well as habitat destruction, northern *oratrix* (native from southwestern and eastern Mexico south to northwestern Honduras) has declined severely within its native range, with the loss of up to 90% of its numbers since the mid-1970s (Collar 1996). Earlier workers in southern California did not distinguish among these taxa but reported "Yellow-headed" (Hardy 1973) and "Yellow-crowned" (Froke 1981) parrots widely in the western San Gabriel Valley, West Los Angeles, and elsewhere; the latter author documented one case of nesting. Flocks of ten to twenty Yellow-headed Parrots were

DISTRIBUTION OF NATURALIZED PARROTS IN SOUTHERN CALIFORNIA

seen routinely in West Los Angeles in the 1970s (pers. obs.), and this species' presence in urban Orange County dates to at least the early 1970s (Gallagher 1997).

The numbers of Yellow-headed Parrots in the greater Los Angeles region appear to have declined since the 1970s. The largest single flocks reported during this study were of twelve in Mar Vista (West Los Angeles) and nine in Costa Mesa; recent nestings have been documented in Garden Grove, Orange County (Gallagher 1997). The overall regional population is probably less than 60 birds.

DISCUSSION

Areas of parrot concentrations are evident in the San Gabriel Valley, the coastal regions from Malibu to Orange County, the northern and central San Fernando Valley, and urban Orange County. The larger parrots of the genus *Amazona* are most numerous in the San Gabriel Valley and, secondarily, in the San Fernando Valley and urban Orange County; however, they are scarce within the Los Angeles basin proper and in the coastal communities of Los Angeles County (except for small flocks in lower Zuma Canyon/Pt. Dume). Small *Brotogeris* are essentially limited to the Los Angeles basin, the South Coast communities (from San Pedro and Palos Verdes Peninsula north to Redondo Beach), and the southwestern San Gabriel Valley (San Marino). Intermediate-sized *Aratinga*, *Nandayus*, and *Psittacula* are primarily coastal, although significant flocks of *Aratinga mitrata* and smaller numbers of the other species occur in inland parts of the Los Angeles basin and the San Gabriel Valley.

The data presented here show important changes from the southern California situation in the 1960s and early 1970s as described by Hardy (1973); some of these changes are undoubtedly due to the more intensive effort of the present survey, but there can be little doubt that populations of many species have increased greatly in the past 25 years. These increases are probably explained by a combination of the following factors: (1) the massive importation of parrots, particularly from the Neotropics, into the United States from the late 1960s through mid-1980s, (2) the increasing human population in southern California, with its associated conversion of natural and agricultural landscapes to urban and suburban landscapes with a diverse exotic flora, and (3) continuing "urban succession," reflecting the maturation of exotic plantings to more complexly layered "woodlands." Hall (1988) found a mean canopy height of 24 m and canopy coverage of 30% at 15 sites occupied by *Amazona* parrots in southern California, and such exotic "woodlands" are undoubtedly increasing.

Currently, the use of natural habitats by parrots in the region is minor, and such habitats are exploited primarily for nest sites. Black-hooded Parakeets, in particular, nest in natural sycamore-dominated canyons in the West Los Angeles and Pacific Palisades areas, but their foraging is largely confined to exotic plantings in surrounding neighborhoods. A pair of Lilac-crowned Parrots occupied a probable nest cavity in a Big-cone Douglas-fir (*Pseudotsuga macrocarpa*) within native coniferous forest at about 1600 m elevation southeast of Mt. Wilson, San Gabriel Mountains, in the spring of 1995 (Los Angeles County Breeding Bird Atlas data), but parrot presence is still quite marginal in these native montane forests. Nesting sites documented by

DISTRIBUTION OF NATURALIZED PARROTS IN SOUTHERN CALIFORNIA

Mabb (1997b) were in planted shade trees in suburban residential areas; the use of various non-native palm species as nest sites was widely, though anecdotally, reported during the present study.

Foraging habits of naturalized parrots in the region have not received intensive study. Nearly all of the food items summarized by Garrett et al. (1997) represent non-native plant taxa, and essentially no foraging within natural woodland or scrub habitats has been reported. Roosting sites (Mabb 1997a) were in planted trees in residential areas; most identified roost trees were non-native, although native live oaks (*Quercus agrifolia*) and sycamores may be used.

Of potential interest to systematists is the artificial sympatry in southern California of naturalized populations of normally allopatric congeners, most notably the Yellow-chevroned and Canary-winged parakeets, Mitred and Red-masked parakeets, and Red-crowned and Lilac-crowned parrots. Given the difficulties of identifying hybrid offspring of these pairs under field conditions, little if any evidence exists for hybridization or introgression in our region. Mixed Red-crowned \times Lilac-crowned parrot pairs have been observed at nest sites in the San Gabriel Valley (Mabb 1997b), with unknown outcome. No mixed pairs or hybrid offspring of the Mitred and Red-masked have been observed, although the two species join together in mixed feeding and pre-roosting flocks in the San Gabriel Valley and Redondo Beach areas. Similarly, no mixed pairs or suspected hybrids between the Yellow-chevroned and Canary-winged parakeets have been reported. The pattern of Yellow-chevroned Parakeet populations essentially replacing those of the Canary-winged, a pattern also noted in southern Florida (Smith and Smith 1993), perhaps solidifies the biological-species status of these forms (whereas large scale assimilation and intergradation might argue otherwise). Possible interbreeding of parrot taxa in the "artificial" southern California species pool bears more thorough investigation.

Although trends of population increase in parrot populations of southern California are overwhelmingly evident, the future of such populations is unclear. The increase in southern California parrot populations in the 1970s and 1980s occurred during a period of large-scale psittacid importation (Table 2). Only continued monitoring will reveal whether recruitment through reproduction will balance the presumed decrease in immigration with cutbacks in legal importations (a confounding factor is the unknown degree of continued illegal importation). The impacts of potentially limiting resources (e.g. nest sites), predation, and exploitation of nestlings for pets will need to be investigated.

Naturalized parrots occur far more widely in California than the greater Los Angeles region. Reporting was insufficient during the present study to arrive at population estimates for other urban regions. At a minimum, parrot populations currently exist in the following areas: urban western San Bernardino and Riverside counties (Red-crowned Parrot, Yellow-headed Parrot; this study); Palm Springs, Riverside Co. (Red-crowned Parrot; this study); San Diego/El Cajon, San Diego Co. (Blue-crowned Parakeet, Mitred Parakeet?, Red-crowned Parrot, Lilac-crowned Parrot; this study, P. Unitt pers. comm.); Borrego Springs, San Diego Co. (Lilac-crowned Parrot; this

DISTRIBUTION OF NATURALIZED PARROTS IN SOUTHERN CALIFORNIA

Table 2 Importation Data for Selected Parrot Species^a

Species	1968-1972	1981-1985
Naturalized in southern California		
Rose-ringed Parakeet	8,726	not recorded
Blue-crowned Parakeet	200	54,866
Mitred Parakeet	0	41,549
Red-masked Parakeet	11	26,375
Black-hooded Parakeet	13,625	74,198
Canary-winged Parakeet ^b	262,755	21,184
Lilac-crowned Parrot	29	6,868
Red-crowned Parrot	7,733	1,714
Yellow-headed Parrot ^c	10,968	32,347
Not currently naturalized in southern California		
Orange-fronted Parakeet	75,587	6,059
Gray-cheeked Parakeet	10	50,186
Monk Parakeet	63,910	52,657
Blue-fronted Parrot	8,765	65,116
Orange-winged Parrot	3,586	49,283
Red-lore Parrot	2,022	18,817

^aFigures for 1968-1972 adapted from Banks (1970), Banks and Clapp (1972), Clapp and Banks (1973a, 1973b), and Clapp (1975); those from 1981-1985 from Traffic (1987). See text for discussion and caveats.

^bIncludes both Canary-winged and Yellow-chevroned parakeets.

^cIncludes Yellow-headed, Yellow-naped, and Yellow-crowned parrots.

study); Monterey Peninsula, Monterey Co. (Black-hooded Parakeet?, Red-crowned Parrot; Roberson and Tenney 1993); the San Francisco Bay area (Blue-crowned Parakeet, Mitred Parakeet, Red-masked Parakeet, Yellow-chevroned Parakeet, Canary-winged Parakeet; Arrowood 1980; S. Rottenborn, M. Bittner, L. Cole, M. Feighner pers. comm.); and Sacramento (Mitred Parakeet, Blue-crowned Parakeet?, Black-hooded Parakeet?, T. Manolis, D. Shaw pers. comm.).

The naturalized parrot populations in southern California should provide numerous opportunities for further investigation. More detailed censuses (see methods described and tested by Casagrande and Beissinger 1997) are appropriate now that the general framework of parrot distribution in southern California has been provided. Increasing observer awareness of identification criteria for similar species of *Aratinga* and *Amazona* should lead to refined population data for several species. The impacts of parrots on resources that sustain native species (e.g., seeds and fruits of native plants, nest cavities, etc.) will increasingly bear investigation. Finally (after Wiley et al. 1992), the conservation implications of established California populations of threatened parrot species should be investigated. For example, *Amazona viridigenalis* and *A. oratrix* are considered to be of "high" conservation and research priority by Stotz et al. (1996); southern California populations, if not genetically compromised, might constitute a source for

DISTRIBUTION OF NATURALIZED PARROTS IN SOUTHERN CALIFORNIA

reintroductions into native habitats, given that the use of captive-bred parrots in reintroduction schemes is fraught with difficulties (Derrickson and Snyder 1992).

SUMMARY

At least ten species of parrots currently appear to be naturalized in the greater Los Angeles region of southern California; population sizes of these species vary from approximately 20 (Canary-winged Parakeet) and 50 (Blue-crowned Parakeet) to over 1000 individuals (Red-crowned Parrot). Most of these species have undergone considerable population growth since the 1960s and early 1970s, although at least two (*Amazona oratrix* and *Brotogeris versicolurus*) appear to have decreased. Further population adjustments seem likely, given the continually changing landscape of urban (and urbanizing) southern California and adjustments to regulations governing importations of parrots from their native ranges. With few exceptions these naturalized parrots are limited to urban and suburban habitats dominated by an exotic flora that provides food sources throughout the year as well as nest sites. Our understanding of ecological interactions of parrots with native bird species is poor; although such interactions appear to be limited at present they should be carefully monitored in the future.

ACKNOWLEDGMENTS

Over one hundred persons submitted information about parrot sightings; I am extremely grateful to all of them and apologize for not being able to acknowledge them individually. The Los Angeles Audubon Society was invaluable in helping distribute data sheets and other information about my study; the Natural History Museum of Los Angeles County provided logistical support. For help in juggling over 1500 data sheets and other reports I thank Lena Lee, Nan Lillith, Annie Lin, and Colleen Rooney. Fritz Hertel provided specimen data from the Dickey Collection, University of California at Los Angeles, as did Jim Hogue from the Vertebrate Collections, California State University, Northridge; specimen data were also obtained from the Natural History Museum of Los Angeles County (LACM). Charles T. Collins, Kathy C. Molina, and Karen T. Mabb read and improved a draft of this paper, and Philip Unitt's editorial skills resulted in a greatly improved final version.

LITERATURE CITED

- American Ornithologists' Union. 1983. Check-list of North American Birds, 6th ed. Am. Ornithol. Union, Lawrence, KS.
- American Ornithologists' Union. 1997. Forty-first supplement to the American Ornithologists' Union *Check-list of North American birds*. Auk 114:542-552.
- Arrowood, P. C. 1980. Importation and status of Canary-winged Parakeets (*Brotogeris versicolorus* [sic] P. L. S. Muller) in California, in *Conservation of New World Parrots* (R. F. Pasquier, ed.), pp. 425-429. ICBP Tech. Publ. 1.
- Banks, R. C. 1976. Wildlife importation into the United States, 1900-1972. U.S. Fish and Wildlife Serv. Spec. Sci. Rep.—Wildlife 200.
- Banks, R. C. 1970. Birds imported into the United States in 1968. U.S. Dept. Interior Spec. Sci. Rep.—Wildlife 136.

DISTRIBUTION OF NATURALIZED PARROTS IN SOUTHERN CALIFORNIA

- Banks, R. C., and Clapp, R. B. 1972. Birds imported into the United States in 1969. U.S. Dept. Interior Spec. Sci. Rep.—Wildlife 148.
- California Bird Records Committee. 1996. Field checklist of the birds of California. W. Field Ornithol.
- Casagrande, D. G., and Beissinger, S. R. 1997. Evaluation of four methods for estimating parrot population size. *Condor* 99:445–457.
- Clapp, R. B. 1975. Birds imported into the United States in 1972. U.S. Dept. Interior Spec. Sci. Rep.—Wildlife 193.
- Clapp, R. B., and Banks, R. C. 1973a. Birds imported into the United States in 1970. U.S. Dept. Interior Spec. Sci. Rep.—Wildlife 164.
- Clapp, R. B., and Banks, R. C. 1973b. Birds imported into the United States in 1971. U.S. Dept. Interior Spec. Sci. Rep.—Wildlife 170.
- Collar, N. J. 1996. Priorities for parrot conservation in the New World. *Cotinga* 5:26–31.
- Collins, C. T., and Kares, L. 1997. Seasonal flock sizes of naturalized Mitred Parakeets (*Aratinga mitrata*) in Long Beach, California. *W. Birds* 28:218–222.
- Dana, R., Thompson, R., Bischoff, A., Clark, D., Davis, L., and Keffer, M. 1973. Pest evaluation—Monk Parakeet, *Myiopsitta monachus*. Calif. Dept. Agric., Sacramento.
- Derrickson, S. R., and Snyder, N. F. R. 1992. Potentials and limits of captive breeding in parrot conservation, in *New World Parrots in Crisis* (S. R. Beissinger and N. F. R. Snyder, eds.), pp. 133–163. Smithsonian Inst. Press, Washington D.C.
- Droege, S. 1990. The North American Breeding Bird Survey, in *Survey designs and statistical methods for the estimation of avian population trends* (J. R. Sauer and S. Droege, eds.), pp. 1–4. U.S. Fish and Wildlife Serv. Biol. Rep. 90(1).
- Enkerlin-Hoeflich, E. C., and Hogan, K. M. 1997. Red-crowned Parrot (*Amazona viridigenalis*), in *The Birds of North America*, No. 292 (A. Poole and F. Gill, eds.). Acad. Nat. Sci., Philadelphia.
- Farrand, J., Jr. ed. 1983. *Master Guide to Birding*, vol. 2, Gulls to Dippers. Knopf, New York.
- Fisk, L. H., and Crabtree, D. M. 1974. Black-hooded Parakeet: New feral breeding species in California? *Am. Birds* 28:11–13.
- Forshaw, J. M. 1989. *Parrots of the World*, 3rd ed. Landsdowne, Melbourne.
- Froke, J. B. 1981. Population, movements, foraging and nesting of feral *Amazona* parrots in southern California. M.S. thesis, Humboldt State University, Arcata, CA.
- Gallagher, S. R. 1997. *Atlas of Breeding Birds*, Orange County, California. Sea and Sage Audubon Press, Irvine, CA.
- Garrett, K. L. 1989. The urban cowbird: The citified birds of Exposition Park. *Terra* 28(1):10–16.
- Garrett, K. L. 1993. Canary-winged Parakeets: The southern California perspective. *Birding* 25:430–431.
- Garrett, K. L. 1995. The field identification of feral parrots in southern California. *W. Tanager* 61(8):1–6.
- Griggs, J. 1997. *All the Birds of North America*. HarperCollins, New York.
- Hall, L. A. 1988. Habitat variables which influence the dissemination and colonization of introduced psittacines in southern California. M.S. thesis, San Diego State Univ., San Diego.

DISTRIBUTION OF NATURALIZED PARROTS IN SOUTHERN CALIFORNIA

- Hardy, J. W. 1964. Ringed Parakeets nesting in Los Angeles, California. *Condor* 66:445-447.
- Hardy, J. W. 1973. Feral exotic birds in southern California. *Wilson Bull.* 85:506-512.
- Holmes, J. S., and Stroud, D. A. 1995. Letter: Naturalised birds: feral, exotic, introduced or alien? *Br. Birds* 88:602-603.
- Howell, S. N. G., and Webb, S. 1995. *A Guide to the Birds of Mexico and Northern Central America*. Oxford Univ. Press, Oxford, England.
- Johnston, R. F., and Garrett, K. L. 1994. Population trends of introduced birds in western North America, in *A century of avifaunal change in western North America* (J. R. Jehl, Jr., and N. K. Johnson, eds.). *Studies Avian Biol.* 15:221-231.
- Mabb, K. T. 1997a. Roosting behavior of naturalized parrots in the San Gabriel Valley, California. *W. Birds* 28:202-208.
- Mabb, K. T. 1997b. Nesting behavior of *Amazona* parrots and Rose-ringed Parakeets in the San Gabriel Valley, California. *W. Birds* 28:209-217.
- Morgan, D. H. W. 1993. Feral Rose-ringed Parakeets in Britain. *Br. Birds* 86:561-564.
- Pinto, O. M. de O., and Camargo, E. A. de. 1957. Sobre uma coleção de aves da região de Cachimbo (sul do Estado do Pará). *Papéis Avulsos Depto. Zool.* 13:51-69.
- Shelgren, J. H., Thompson, R. A., Palmer, T. K., Keffer, M. O., Clark, D. O., and Johnson, J. 1975. An evaluation of the pest potential of the Rose-ringed Parakeet, Nanday Conure, and the Canary-winged Parakeet in California. *Calif. Dept. Agric., Sacramento*.
- Sibley, C. G., and Monroe, B. L., Jr. 1990. *Distribution and Taxonomy of Birds of the World*. Yale Univ. Press, New Haven, CT.
- Smith, P. W., and Smith, S. A. 1993. An exotic dilemma for birders: The Canary-winged Parakeet. *Birding* 25:426-430.
- Stevenson, H. M., and Anderson, B. H. 1994. *The Birdlife of Florida*. Univ. Press of Fla., Gainesville.
- Stokes, D., and Stokes, L. 1996. *Stokes Field Guide to Birds. Western Region*. Little, Brown, Boston.
- Stotz, D. F., Fitzpatrick, J. W., Parker, T. A., III, and Moskovits, D. K. 1996. *Neotropical birds: Ecology and conservation*. Univ. of Chicago Press, Chicago.
- Temple, S. A. 1992. Exotic birds: A growing problem with no easy solution. *Auk* 109:395-397.
- Traffic (U.S.A.). 1987. U. S. imports of parrots from Latin America. *Traffic Bull.* 7(2-3):5-8.
- Whitney, B. M. 1996. Flight behaviour and other field characteristics of the genera of Neotropical parrots. *Cotinga* 5:32-42.
- Wiley, J. W., Snyder, N. F. R., and Gnam, R. S. 1992. Reintroduction as a conservation strategy for parrots, in *New World Parrots in Crisis* (S. R. Beissinger and N. R. F. Snyder, eds.), pp. 165-200. Smithsonian Inst. Press, Washington D.C.

Accepted 9 September 1997