Distribution of Bats of the California Channel Islands

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INTRODUCTION

The power of flight has preadapted bats for island colonization. This accounts for their disproportionately high representation in the terrestrial mammalian fauna of the California Islands. Of the eighteen species of native mammals found on the islands (excluding man and marine mammals), eleven, or 61 per cent, are bats. Some bat species are better dispersers than others, but not only must a bat be capable of crossing the water barrier, it must find suitable food and habitat upon its arrival. Bats have voracious appetites and may consume up to 25 per cent of their body weight in insects daily. Some are specific in their food requirements, while others are generalists and opportunists, snatching up any insect within a certain size class. Needless to say, generalists are better island colonizers since the specialist may not find its favorite food item present on the island. Bats with specific roost preferences, such as trees or rock crevices, may find a barren sandy island a difficult place on which to live and reproduce. In this paper, I will attempt to summarize what is known about the distribution of bats on the islands and provide new data resulting from my own field work.

DISTRIBUTION AND SPECIES ACCOUNTS

Figure 1 summarizes the known distribution of bats on the California Islands. It is not surprising that 82 per cent of the species should occur on Santa Cruz Island, the largest and most ecologically diverse of the group. Santa Catalina is second with 45 per cent of the known species, while larger Santa Rosa has but a single species. The distribution of the bat records may also reflect the amount of time spent by mammalogists in pursuit of specimens—the more accessible islands have been more thoroughly sampled. Due to bats' nocturnal activity and secretive diurnal retreats, bat collectors in the past have had to rely on the shotgun technique or random discovery of day roosts. Mist-netting over water sources has been employed in this survey, yielding valuable species data with a minimum of disturbance to the bats. Unfortunately, only Santa Catalina and Santa Cruz Islands have been sampled using this technique. On Santa Cruz, the netting of *Lasionycteris noctivagans* established a range extension as well as a new record for the islands. Less than half (36 per cent) of the bat species found on the Channel Islands are known to breed there (*Myotis californicus* and *M. yumanensis*, *Plecotus townsendii*, and *Antrozous pallidus*), with the remaining seven bat species represented by only a few specimens, often captured during migratory periods. In discussing the species found on the islands, I will begin with the most common.

California Myotis (*Myotis californicus caurinus*)

Myotis californicus is the most widespread of the bats, occurring on the five largest islands (Santa Rosa, Santa Cruz, Santa Catalina, San Nicolas, and San Clemente). Reports of small, dark bats flying over Santa Barbara, Anacapa, and San Miguel are probably attributable to this species as well. They can be identified by their small size, dark, dull brown pelage, and very tiny feet. They roost in crevices which are often in manmade structures such as barns. I have found California myotis (including lactating females in June) under the roof supports in the horse barn at the Stanton Ranch and in the attic of the chapel on Santa Cruz Island, and have mist-netted several more over both the stream and swimming pool by the ranch. A maternity

BATS OF THE CALIFORNIA CHANNEL ISLANDS

	Antrozous pallidus Pallid bat	*Myotis evotis* Big-eared Myotis	*Myotis thysanodes* Fringed Myotis	*Myotis californicus* California Myotis	*Myotis yumanensis* Yuma Myotis	*Eptesicus fuscus* Big Brown bat	*Plecotus townsendii* Lump-nosed bat	*Lasiurus cinereus* Hoary bat	*Lasionycteris noctivagans* Silver-haired bat	*Tadarida brasiliensis* Free-tailed bat
San Miguel				?						
Santa Rosa				O						
Santa Cruz	XO	O		XO		O	XO	X	X	O
Anacapa										
Santa Barbara								X		
Santa Catalina	O	O		XO	XO		O			
San Nicolas				O			O			
San Clemente			O	O			O			O

X Present Study
O Past Records

FIGURE 1. *Records of occurrence of bats on the California Channel Islands.*

roost of approximately fifty bats uses the attic of the bunkhouse at Christi Ranch on the west end of Santa Cruz. Traces of small guano adhering to the stucco walls of the ranch buildings are probably attributable to night-roosting California myotis. Fresh guano, deposited around the chapel on Santa Cruz during a cold February evening, suggests that these bats may be active even during winter nights.

On Santa Catalina Island, I found 20 of these bats under the roof peak of a wooden building at Gallagher's Camp on August 17, 1976. They also roost under the tarpaper on the sides of old frame buildings at Camp Cactus on Santa Catalina, and can be seen flying after dark in the barn at Middle Ranch. They feed on a variety of small aerial insects. This wide food tolerance may have preadapted them for island colonization. It is expected that mist-netting will yield records of this bat from San Miguel, if not from all of the islands. Existing museum specimens include 43 from Santa Cruz Island (Prisoners Harbor, Frys Harbor, and the Stanton Ranch); five from Santa Rosa (taken near the ranch buildings at Beecher's Bay); seven from Santa Catalina (White's Landing, Avalon, and Middle Ranch); five from San Clemente; and one from San Nicolas (von Bloeker 1967).

Big-eared Myotis (*Myotis evotis*)

This small, yellowish-brown bat is easily distinguished from other *Myotis* by its relatively large, black, pointed ears that extend 7 to 10 mm beyond the base when laid forward. On the mainland, this bat inhabits wooded areas and is more common farther north or at higher elevations in the south (Barbour and Davis 1969). It is not surprising that the three records for *Myotis evotis* are from the most densely vegetated islands. One male was taken from a crevice in a building at Prisoners Harbor on Santa Cruz Island, while another was procured by von Bloeker from the rafters of the winery in Cañada del Medio. A third bat was taken from under a corrugated iron roof at White's Landing on Santa Catalina (von Bloeker 1967). Little is known of the movements or habits of these bats.

Fringed Myotis (*Myotis thysanodes*)

Like the long-eared myotis, not much is known of the movements of this bat in California, except that it is found only in summer roosts and is assumed to be migratory. It has a wide but irregular distribution, being locally common in the southwestern deserts, where it often forms large roosts in caves, although in California it is usually found roosting alone in buildings. This small bat can be distinguished from other *Myotis* by the fringe of short, stiff hairs along the posterior border of the interfemoral membrane. An adult female was hand-netted by von Bloeker (1967) outside the buildings at Wilson's Cove on San Clemente Island in 1943. This is the only record for the islands.

Yuma Myotis (*Myotis yumanensis*)

Von Bloeker (1967) predicted that the Yuma myotis would eventually be discovered on the California Islands. In fact, Bancroft had already collected a male in Avalon on Santa Catalina on August 1, 1893 (Los Angeles County Museum of Natural History [LACM]). In the past three years, I have banded 163 *Myotis yumanensis* on Santa Catalina, with a recapture rate of 10 per cent. In the late spring, pregnant females can be found roosting under the tarpaper at Camp Cactus. A large night roost is present in the deserted army bunker above Ben Weston beach. Late in the evening, the barn at Middle Ranch is often alive with bats swooping and darting after insects.

This bat is slightly larger than *Myotis californicus*, but its feet are more than twice as large. On the mainland, it has a wide geographical and ecological range, but always roosts near fresh water, even in desert situations. In parts of California it apparently hybridizes with *Myotis lucifugus* and the two are easily confused. *M. lucifugus* could also occur on the Northern Channel Islands, as could the small-footed myotis (*Myotis leibii*) or the long-legged myotis (*Myotis volans*).

Lump-nosed Bat (*Plecotus townsendii*)

This light brown bat is readily identified by the extremely long ears which may equal almost half its body length. When the bat is torpid, these ears are tightly curled and resemble a ram's horns. There are two lumps on either side of and above each nostril to further distinguish it. This species is recorded from four islands: Santa Catalina (two from Middle Ranch, one from Johnson Harbor, and three from White's Landing); Santa Cruz (two from Christi Ranch and 246 from Prisoners Harbor); San Clemente (one); and San Nicolas (one).

Lump-nosed bats forage late in the evening and often can be seen hovering as they glean insects from vegetation. They are locally common on the mainland, the females sometimes forming maternity roosts of about a hundred individuals, while the males roost singly. They are very susceptible to disturbance and will abandon a roost that is too frequently visited by people. On the mainland they change roosts, but on islands these possibilities are limited. When *Plecotus* was first discovered roosting in the second story of the old building at Prisoners Harbor on Santa Cruz Island, the colony was estimated at 300, mostly females. Within the next eight days, 111 bats were collected from this colony (von Bloeker 1967). In 1948, Pearson estimated the roost to contain 200 bats, including young (Pearson *et al.* 1952)—or 315 acres/lump-nosed bat on the island. He, in turn, collected more bats. In 1964, more bat specimens were removed from the island by collectors from the University of California at Santa Barbara. In 1974, I observed four *Plecotus* roosting at the roof peak in the brick building at Prisoners Harbor, then mist-netted another male over the stream and released him. Since then, on subsequent visits I have not observed any *Plecotus townsendii*. They perhaps have moved to a less accessible roost. It is hoped that the population density has not dropped too low for recovery.

Big Brown Bat (*Eptesicus fuscus*)

The big brown bat resembles a large *Myotis* with a more rounded muzzle. It is common on the mainland and has a wide geographical distribution. It feeds on a variety of insects, but appears to prefer beetles, and regularly roosts in buildings. Von Bloeker (1967) discovered a torpid *Eptesicus* in December 1943 in the attic of the old building at Prisoners Harbor. This is the only record for the California Islands. Mainland populations of these bats are sedentary and do not often move between roosts. Possibly the twenty miles of ocean has been an effective barrier against island colonization, although if any did arrive they could probably become established on the larger islands.

Pallid Bat (*Antrozous pallidus pacificus*)

This long-eared, large-eyed, golden-brown bat is larger than the big brown bat. The pallid bat is a social animal, with an array of audible communication sounds (Brown 1976), and forms large roosts in ranch buildings in grassland habitats on the mainland. It forages on the ground for large, ground-dwelling arthropods such as Jerusalem crickets (*Stenopelmatus fuscus*). Since these insects are common in the grassland areas of Santa Cruz Island, it is not surprising that pallid bats have established a breeding colony there.

Between spring and fall 1978, individual pallid bats were radiotelemetered in order to determine their roost sites and foraging areas. Pallid bats spend the day in the barns and the old winery building at the Stanton Ranch. Within an hour after sunset, they begin to fly low over the adjacent pastures in search of prey. After one to two hours of foraging, they return to a central night roost in the barn for the remainder of the night, often departing for a brief predawn feeding bout before returning to their diurnal retreat. I have banded 240 of these bats on Santa Cruz Island over the past four years, with a 25 per cent recapture rate. This population appears to be resident on the island since none of the bats banded here turn up in mainland roosts, nor do any of the more than one thousand banded pallid bats from the mainland ever appear in the island colony. The bats are not present in the ranch buildings during the winter months and probably hibernate in rock crevices. Possibly because of their isolation from the mainland population, the island pallid bats are developing a distinct dialect in their communication sounds ("directives"). The desert subspecies of the pallid bat, *Antrozous pallidus pallidus*, also communicates with a dialect distinct from the coastal subspecies *pacificus* (Brown 1973).

One specimen of pallid bat was collected on Santa Catalina Island roosting under the eaves of a house. This was in addition to the 127 specimens collected on Santa Cruz (von Bloeker 1967).

Silver-haired Bat (*Lasionycteris noctivagans*)

This bat has black, silver-tipped fur and short, round ears and is common in northern forests, where it roosts in trees. Since its normal range begins two hundred miles to the north, its appearance in a mist net on June 14, 1974 over the stream in Cañada del Medio on Santa Cruz Island was unexpected (the specimen is a male—LACM #46231). *Lasionycteris* is a migratory bat and this specimen may possibly have wandered off course during spring migration. Two other specimens have recently been taken at Agua Caliente Spring in San Diego County (T. McDonnell, pers. comm.). Other vagrants of this species may be expected.

Hoary Bat (*Lasiurus cinereus*)

Like its relative, the silver-haired bat, the silver and gray hoary bat is solitary and undertakes long migrations of over a thousand miles in the spring and fall. Hoary bats roost in trees and Tenaza (1966) has taken them in the three trees on the Farallon Islands. He noted that in August and September sometimes as many as 21 per day pass through in migratory waves. The hoary bat has colonized both the Hawaiian and Galapagos Islands. Hoary bats are widespread, occurring in all fifty states, although they are most abundant in the southwestern U.S. With the coniferous forests on Santa Cruz and Santa Rosa, it is possible that suitable habitat exists for this species. They are certainly capable of making the over-water flight. Two sightings have been made of this bat and one specimen has been collected (Santa Barbara Museum of Natural History [SBMNH]). In the spring of 1974, Dr. Carey Stanton found a hoary bat lying in the dust near the ranch buildings on Santa Cruz Island. Fearing that it was rabid, he killed the animal, which was later identified by Dr. Lyndal Laughrin. The bat was sent to Public Health for rabies testing (the results were negative), but unfortunately the specimen was lost. On September 25, 1978, I mist-netted a solitary male over the stream in Cañada del Medio on Santa Cruz.

At noon on October 11, 1974, Dr. H. Lee Jones and fifteen ornithologists located a hoary bat on the ground in the ice plants (*Mesembryanthemum*) on Santa Barbara Island. Several pictures were taken before the animal was aroused and flew away, landing again in some ice plants. It is possible that more hoary bats will be found on the island, especially during times of migration.

Red Bat (*Lasiurus borealis*)

This smaller version of the hoary bat is distinguished by its coppery red fur, which covers most of the wing and tail membranes. The red bat is more common to the north and east, with only occasional records from southern California. Like the hoary and silver-haired bats, it is migratory and solitary, usually roosting in trees. A single male was mist-netted over the swimming pool at the Stanton Ranch on September 23, 1978 (specimen in SBMNH). This was during a period when warm Santa Ana winds were blowing off the mainland. The single male hoary bat mentioned earlier and four free-tailed bats were also collected during this time, possibly having been blown off course during their fall migrations.

Free-tailed Bat (*Tadarida brasiliensis*)

The free-tailed bat is so named because half of its tail extends beyond the interfemoral membrane. It has broad, rounded ears and long, narrow wings. This enables rapid flight over long distances during nightly foraging. In Texas, they have been known to fly over fifty miles between their day roosts and feeding areas, often ascending to 10,000 feet before they spread out to feed (Davis *et al.* 1962). They undertake long, seasonal migrations often of more than a thousand miles over the Gulf of Mexico to winter in southern Mexico. All this should certainly preadapt them for over-water dispersal and island colonization. The surprising thing is that they have not colonized the California Islands. Only ten records exist for the islands. A single female was captured at the Marine Corps Training Center on San Clemente Island in 1943. I mist-netted a single male over the stream in Cañada del Medio on Santa Cruz Island on September 22, 1978. Four mummified and one live free-tailed bat were found by von Bloeker (1967) on Santa Cruz Island in a pallid bat roost. On September 28, 1978, I discovered three additional males in the same barn on the Stanton Ranch. Free-tailed bats are commonly associated with pallid bats in mainland roosts. They are fairly common in the California coastal ranges, where they form large colonies in buildings. Their appearance on the islands is therefore to be anticipated, as is that of other members of their family (Molossidae), such as the mastiff bat (*Eumops perotis*).

SUMMARY

The power of flight has preadapted bats for island colonization. Bats compose 61 per cent of the mammalian species found on the California Islands. It is likely that this number will be increased with modern collecting techniques such as mist-netting. Since von Bloeker's summary in 1967, four bat species—*Myotis yumanensis*, *Lasionycteris noctivagans*, and *Lasiurus cinereus* and *L. borealis*—have been added to the faunal list. The known distribution of bats on the California Islands is summarized in this paper.

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