

**Survey of Xantus' Murrelets (*Synthliboramphus hypoleucus*)
and other marine birds at Islas Los Coronados, Baja
California Norte, Mexico, on 23-25 April 1995**

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INTRODUCTION

The islands off the Pacific coast of northwestern Baja California, Mexico, host 14 species of breeding seabirds (see summary in Everett and Anderson 1991). This coastal area from the U.S.-Mexico border to Point Eugenia and out to Guadalupe Island occurs within the southern part of a major oceanographic transition zone on the west coast of North America between cold, northern waters of the California Current and warm, tropical waters from southern Mexico. The northern part of this same transition zone occurs in the Channel Islands and as far north as Point Conception, California. This transition zone is largely found within the "Southern California Bight" ecosystem which extends across the international border from Point Conception, California, to about Isla San Martin, Baja California (Anderson and Gress 1983). All islands in the transition zone are considered to be "California Islands" (Power 1980). All or much of the world breeding range of Xantus' Murrelets (*Synthliboramphus hypoleucus*), Ashy Storm-petrels (*Oceanodroma homochroa*), and Black-vented Shearwaters (*Puffinus opisthomelas*) occur in this transition zone. This region also has significant numbers or geographically-separated populations of several other seabird species. While extensive efforts have been expended documenting the status of seabird populations in the Channel Islands, few studies have been conducted in most of northwestern Baja California. An extensive survey to identify all breeding colonies of each breeding species has yet to be carried out. Information is particularly poor for species which visit their colonies nocturnally and nest in burrows and crevices (i.e. storm-petrels, shear-waters, and alcid).

Seabird populations at Islas Los Coronados are the best studied of any island group in northwestern Baja California. These islands are located just south of the U.S.-Mexico border and have offered easy access over the past century to naturalists and researchers primarily from California. In 1968, the Pacific Ocean Biological Survey Program (POBSP) of the Smithsonian Institution conducted several surveys of seabirds at Islas Los Coronados (Crossin 1968, 1974; DeLong 1968; DeLong and Crossin 1968; DeLong et al. 1968). Since then, researchers from the University of California Davis and other institutions have studied and monitored the population size and breeding success of nesting Brown Pelicans (*Pelecanus occidentalis*) and Double-crested Cormorants (*Phalacrocorax auritus*) (Gress et al. 1973, 1990; Jehl 1973; Anderson and Gress 1983; Anderson 1988; Gress 1995). While Islas Los Coronados occur within the Southern California Bight, they also exhibit more "desert-like" southern affinities in terms of vegetation and other island habitats. These islands also host a significant population of Black Storm-petrels (*Oceanodroma melania*) whose breeding range just reaches into the Channel Islands (Carter et al. 1992). Everett (1991) studied the breeding biology of Black Storm-petrels at Middle Rock from 1988 - 1990 and, along with R.L. Pitman (unpubl. data), provided the first concerted effort since 1968 to better assess the status of nocturnal crevice-nesting species at Islas Los Coronados.

Xantus' Murrelets were documented as breeding at Islas Los Coronados by several early workers in the early 1900s (e.g. Wright 1909; Howell 1910; Osburn 1910). Howell (1910) thought that this colony was the northernmost of the species although later efforts noted small numbers in the Channel Islands (Howell 1917; see summary in Drost and Lewis 1995). Numbers

in the Channel Islands apparently increased after the loss of nesting Peregrine Falcons (*Falco peregrinus*) from the islands and the eradication of feral cats at the largest known colony at Santa Barbara Island (Hunt et al. 1979). Since the 1960s, nesting at Islas Los Coronados has been noted but little detail has been published (DeLong and Crossin 1968; DeLong et al. 1968; Jehl and Bond 1975; Jehl 1977; D. Bleitz, unpubl. field notes; R.L. Pitman and W.T. Everett, unpubl. data). The overall population size and recent status of the colony has not been well documented, although feral cat predation has been shown to be a significant conservation problem (Drost and Lewis 1995; McChesney 1995; Pitman and Everett, unpubl. data).

In 1994-1995, the National Biological Service (NBS, California Science Center, Dixon Field Station) conducted specific surveys to better determine the status of the Xantus' Murrelet and Ashy Storm-petrel in the Southern California Bight, especially the Channel Islands, with primary funding from the U.S. Department of Defense (Legacy Resources Management Program and Naval Air Weapons Station [NAWS], Point Mugu). A large portion of the world breeding range of these two species occurs in the Channel Islands where the status of these species has been of concern due to reported declines at certain colonies, various conservation problems, small world population sizes, and restricted breeding distributions. The possible need for listing of the Xantus' Murrelet in the U.S. under the federal Endangered Species Act (ESA) and/or California State ESA has been suggested by the Pacific Seabird Group (Everett 1994). NBS has focused on conducting more surveys and utilizing new survey methodologies to more fully determine the abundance and distribution of these species in the Channel Islands. We were familiar with the limitations of previous surveys for Xantus' Murrelets in the Channel Islands that we had conducted in 1991 using standard techniques (Carter et al. 1992). To date, Xantus' Murrelets and Ashy Storm-petrels appear to be more abundant and more widely distributed than previously thought in the Channel Islands. Several new nesting areas have been discovered in various parts of the Channel Islands where birds appear to be using different nesting habitats than were previously known. Since the world breeding range of Xantus' Murrelets occurs only in the Channel Islands and northwestern Baja California (Fig. 1), we have become interested in the status of Xantus' Murrelets in northwestern Baja California where little information exists. In particular, Islas Los Coronados are the closest colonies to the Channel Islands and support an important breeding population which has been heavily impacted by predation from feral cats.

On 23-25 April 1995, we conducted a survey for Xantus' Murrelets and other marine birds at Islas Los Coronados. This survey focused primarily on providing additional information for a preliminary assessment of the status of Xantus' Murrelets at Islas Los Coronados. In addition, we hoped to demonstrate the utility of the nocturnal vocalization survey technique for assessing the current status of Xantus' Murrelets at other island colonies in northwestern Baja California. This technique would allow a rapid determination of the presence and relative abundance of Xantus' Murrelets at other islands where recent nesting documentation is lacking or murrelets either are not known to nest or have been extirpated. This technique has been useful in NBS's assessment of the status the Xantus' Murrelet in the Channel Islands. The raw data and results of this survey will be incorporated into NBS databases and an upcoming report on Channel Islands' populations of Xantus' Murrelets (Carter et al., in prep.)

METHODS

Study area and island access.

The Islas Los Coronados consist of 4 islands that lie 11 km (7 miles) off shore from the Mexican mainland near Tijuana, Baja California Norte, Mexico, and are about 24 km (15 miles) southwest of San Diego, California (Nelson 1922). These islands are at the north end of Baja California and are located near the geographic center of the range of the Xantus' Murrelet (Fig. 1). The island group extends over a distance of about 8 km and include two larger islands (North and South Coronado islands), one smaller island (Middle Coronado Island) and the even smaller Middle Rock (see Figs. 2-4). On all islands, the topography is steep and rugged with varying degrees of low vegetation. South Coronado Island is 3.2 km (2 miles) long, 0.8 km (0.5 miles) wide, reaches a summit of 205 m (672 feet) near the south end, and has a small military base and fishing camp at the north end. North Coronado Island is the second largest island in the group; it is 1.6 km (1 mile) long, 0.4 km (0.25 miles) wide, reaches an elevation of 140 m (460 feet), and has a landing area on the east side. The two middle islands are smaller, have less vegetation, and reach elevations of 30 m (100 feet) at Middle Rock and 76 m (250 feet) at Middle Island (Nelson 1922).

We traveled to Islas Los Coronados aboard the charter boat *Instinct* and anchored on the east side of South Coronado Island. The *Instinct* served as our accommodations and night-time working platform for conducting nocturnal vocalization surveys. Our 1995 research goals did not require landing and associated permits but we sent a letter to Mexican authorities to notify them of our intent to conduct surveys there. The *Instinct* carried a valid Mexican boat permit.

Xantus' Murrelet Nocturnal Vocalization Surveys.

Xantus' Murrelets are known to vocalize at night while sitting on the water off breeding colonies (Hunt et al. 1979; Murray et al. 1983; Carter et al. 1992; Drost and Lewis 1995). Murrelets are not found in nearshore waters by nesting colonies during the day. Thus, nocturnal presence and vocalizing probably is related to nesting activities including courtship, pairing, and staging prior to or after nest attendance. Carter et al. (in prep.) developed and implemented a standardized nocturnal vocalization survey technique which was designed to record all vocalizations heard during a 15 minute period. Surveys are conducted during good weather conditions with winds less than 10 kn. Higher winds can prevent detection of distant vocalizations. After vocalization surveys were completed, we scanned the waters 50-100 m around the boat in a single pass with a 100,000/200,000 candlepower Brinkman Q-Beam Spot/Foodlight and counted the numbers and flock sizes of murrelets on the water or flying. It is likely that higher numbers of vocalizations reflect larger numbers of murrelets on the water near the survey station, based on preliminary comparisons with spotlight counts at survey stations. Specific correlations between the numbers of birds present and calling and the numbers of vocalizations recorded over a period of time probably varies to some degree as a result of changes in behavior related to specific breeding colonies and times of the breeding season. Exact

nesting areas on adjacent islands used by birds calling on the water are not known. We presume that birds usually vocalize and attend nearshore waters off active or prospective nesting areas.

Xantus' Murrelet nocturnal vocalization surveys at Islas Los Coronados were conducted on the nights of 23-24 and 24-25 April 1995. On the night of 23-24 April, surveys were conducted by two person crews in two 4.25 m inflatable Zodiac boats powered by 25 hp Mariner outboard motors at 9 predetermined stations in near-shore waters (<200 m from shore) around the islands. An additional at-sea station (about 5 km east of South Coronado Island) was surveyed on the night of 24-25 April. A single 15-minute survey was conducted at each station between 00:09-03:11 hrs (PDT) on 24 April. Each vocalization heard was recorded along with the time, compass direction, and relative distance from the station. Observers recorded data onto data sheets with the aid of a compass, timer, and headlamp. On the night of 24-25 April, we conducted surveys at two stations on the east side of South Coronado once per hour from 23:32-04:43 hrs to document variation in vocalization activity levels over the night.

Storm-petrel Vocalization Broadcast

From 04:00-05:30 hrs on 24 April, we broadcast recordings of Ashy Storm-petrel vocalizations from the front deck of the *Instinct* on the east side of South Coronado Island using a Sony Sports radio cassette recorder. We began broadcasting vocalizations after storm-petrels were seen flying near bright deck lights on the *Instinct* and continued until dawn.

Daytime Boat Surveys

We conducted boat surveys on 24 April 1995 between 09:54-12:21 hrs from two inflatable boats. Diurnal seabirds attending breeding colonies and roosts as well as other marine birds and mammals were recorded during single circumnavigations of each island at 50-100 m from shore. South Coronado Island, Middle Rock, Middle Island and North Coronado Island were censused between 09:54-11:07, 10:00-10:37, 10:41-11:38, and 11:25-12:21 hrs, respectively. All birds and marine mammals were counted except for Western Gulls (*Larus occidentalis*) which nested on all islands; these gulls were omitted due to a shortage of time available for the survey and difficulty of counting gulls nesting high on hillsides.

RESULTS

Xantus' Murrelet Vocalization Surveys

On the night of 23-24 April 1995, Xantus' Murrelet vocalization activity levels at Islas Los Coronados were high, relative to colonies in the Channel Islands (Carter et al., in prep.). Activity levels were highest at the south end of South Coronado Island where more than 200 calls were recorded in 15 minutes (Fig. 5). All stations approached or exceeded 100 calls per survey. Between 0 and 16 birds (in singles and pairs) were observed with a spotlight near survey stations.

On the night of 24-25 April, similar levels of vocalization activity occurred through the night at the two stations off South Coronado Island (Fig. 6). Slight peaks in activity occurred between 00:00-02:00 hrs and a sharp drop near sunrise. Activity levels at the southeast station consistently approached or exceeded 200 calls per survey, except the 02:30 hrs survey which was suspended due to poor conditions. Activity levels at the northeast station were less than half that of the southeast station, but still approached or exceeded 100 calls per survey. Only two mm-relet calls were heard at the “at-sea station”, suggesting that birds were concentrated very near shore. Survey conditions were good on both nights with winds less than 10 kn and a relatively dark sky with no moon visible (i.e. since the new moon was due on 29 April). Some lighting was provided by mainland sources, especially on the east side of South Coronado Island. Air quality was poor during surveys due to polluted air from mainland sources.

Ashy Storm-petrels

From 04:00-05:30 hrs, storm-petrels constantly flew near the *Instinct* in apparent response to the bright deck lights and broadcast vocalizations. The largest number seen at one time was 5 individuals but many more may have been present. Based on their size, flight pattern and especially their vocalizations, all storm-petrels appeared to be Ashy Storm-petrels. Only one Ashy Storm-petrel flew onto the *Instinct*, was captured, and had a fully developed brood patch.

Daytime Boat Surveys

Three species of seabirds (not including large numbers of Western Gulls) were documented breeding at Islas Los Coronados during the boat survey on 24 April (Table 1). Totals of 597 Brown Pelican nests, 20 Brandt’s Cormorant (*Phalacrocorax penicillatus*) nests, and one Pelagic Cormorant (*P. pelagicus*) nest were found (see Tables 1 and 2 for island breakdowns). Nesting by Brown Pelicans was well advanced with many broods of chicks visible at Middle Island and Middle Rock (Table 2). Nests at North Coronado Island were high up on hill tops and more difficult to observe. However, fewer chicks were evident and birds appeared to be later nesters. Brandt’s Cormorants at Middle Rock had not yet laid eggs and adults were attending poorly-built nests whereas adults were incubating at North Coronado and Middle islands. The single Pelagic Cormorant nest on the NE side of North Coronado Island was attended by an adult in incubating posture. Weather conditions also were excellent for daytime boat surveys with winds between 0-10 kn.

Eight other bird species were recorded, including 26 Black Oystercatchers (*Haematopus bachmani*), a mixed flock of 300 phalaropes with a general ratio of 10: 1 Red-necked (*Phalaropus lobatus*) to Red (*P. fulicaria*), 10 Double-crested Cormorants, and one Peregrine Falcon, probably an adult female based on size. Many marine mammals also were noted hauled out on the islands’ shores, including 212 California Sea Lions (*Zalophus californianus*), 117 Harbor Seals (*Phoca vitulina*), and 42 Northern Elephant Seals (*Mirounga angustirostris*)(see Table 1 for locations).

DISCUSSION

Xantus' Murrelet

This survey indicated that Xantus' Murrelets currently are attending Islas Los Coronados in relatively large numbers. In fact, activity levels were higher than those noted anywhere in the Channel Islands in 1994-1995 (Carter et al., in prep.). Comparisons between islands probably are affected by variation in the time of the year and breeding season that different islands have been surveyed. However, we did survey Santa Barbara Island shortly after Islas Los Coronados on 26-29 April 1995 and found lower activity levels there. Santa Barbara Island hosts the largest colony in the Channel Islands, estimated at about 1,500 breeding birds in 1991 (Carter et al. 1992) and 2,000-10,000 birds in 1975-1977 (Hunt et al. 1979; Murray et al. 1983). We suspect that the breeding population of Xantus' Murrelets at Islas Los Coronados may be much larger than the approximately 750 breeding birds (or about 375 nests) estimated roughly in 1989-1990 (Drost and Lewis 1995; Pitman and Everett, unpubl. data; see below). No other previous estimates exist although DeLong et al. (1968) noted 150+ birds in nearby offshore waters on 16 May 1968. More intensive survey efforts would help to develop more reliable population estimates, based on nest counts and additional vocalization surveys.

At Santa Barbara Island where nesting phenology has been best studied, Xantus' Murrelets have been recorded to lay eggs as early as late February and as late as mid June, although peak egg laying occurs between late March and late April in most years (Hunt et al. 1979; Murray et al. 1983; Drost and Lewis 1995). However, in 1995, egg laying was reduced and delayed at Santa Barbara Island with eggs being laid in May and June (Point Reyes Bird Observatory, unpubl. data). Thus, our survey at Islas Los Coronados in late April 1995 probably documented vocalization activity levels during the pre-laying colony attendance period. Vocal activity may be higher at this time than later in the breeding season because more birds (including adults and subadults) are attending waters around the colony and courtship, pairing, and other behaviors are occurring. In 1995, we may have surveyed at an optimum time to document the large size of the colonies at Islas Los Coronados. In other years when nesting is not delayed, it is possible that a lower proportion of the population is on the water on any one night, if birds begin attendance of the colony asynchronously and/or if off-duty incubating birds do not attend the colony each night. We did not note distinct peaks in vocal activity as reported by Murray et al. (1983) and Drost and Lewis (1995), perhaps because nest attendance had not yet begun and social activities involved most birds throughout the night. However, we also have not noted distinct peaks on several other surveys in the Channel Islands that were conducted both early and late in the nesting season (Carter et al., in prep.).

Introduced predators may prevent birds heard calling offshore from nesting in certain habitats on certain islands at Islas Los Coronados (Drost and Lewis 1995; McChesney 1995). Howell (1917) considered murrelets to be abundant on all islands. Cats were introduced by either Mexican military personnel or fishermen living on South Coronado Island many years ago. Wright (1908) first noted cat predation on murrelets at South Coronado Island on 20 June 1908

when he found two cat-predated dead murrelets. On a visit to Islas Los Coronados on 30 June 1961, D. Bleitz (unpubl. field notes) noted many murrelet and storm-petrel carcasses on South Coronado Island which he attributed to cat predation. DeLong and Crossin (1968) thought that Xantus' Murrelets no longer nested on South Coronado Island due to cat predation. However, in 1989, Pitman and Everett (unpubl. data) found 7 nests and 2 dead chicks on South Coronado Island and estimated a maximum of 100 nests, based on a rough consideration that little nesting habitat was available.

DeLong and Crossin (1968) noted cats only on South Coronado Island. Sometime after 1968, cats also were introduced to North Coronado Island, probably by Mexican fishermen which temporarily camp on the island. In 1989-1990, 10 or less feral cats were estimated but 174 cat-predated murrelets were found by Pitman on five visits in 1989 and 30 predated murrelets were found on 3 visits in 1990. Successful nesting was noted in certain crevices around the island (based on hatched eggshells) but predated murrelets were found at nearly every possible nesting site. North Coronado Island had the largest amount of potential nesting habitat and 200 nests were estimated there by Pitman. He also thought that the island held only 10% of potential numbers of nesting birds due to cat predation. Pitman and Everett attempted to remove cats from North Coronado Island in 1989-1990 but were not completely successful. Removal efforts are currently being completed through the efforts of Mexican biologists and the University of California Santa Cruz (B. Tershy and D. Croll, pers. comm.). The last cat is expected to be removed by spring 1996.

Cats have not been recorded at the two smaller islands. At Middle Island, eight nests were found in 1989 and 50 nests estimated (Pitman and Everett, unpubl. data). At Middle Rock, Everett (pers. comm.) estimated about 35 nests from 1988-1990. Everett (pers. comm.) has estimated that the Islas Los Coronados, in the absence of cats, have the capacity for as many as 5,000 breeding birds (or 2,500 nests), based on numbers of nests found in 1988-1990 and overall habitat availability.

Our 1995 survey results suggest that large numbers of murrelets may have nested in habitats that have been inaccessible to cats and researchers at North and South Coronado islands. At present, birds appear to nest widely at all of the islands, based on the high vocalization activity levels found throughout the islands (Fig. 5). We suspect that many murrelets escaped cat predation by nesting on cliffs and steep slopes where cats rarely ventured. Similarly, Jehl and Everett (1985) found murrelet nests in caves on the east side of Isla de Guadalupe where birds apparently escaped cat predation. Also, Carter et al. (in prep.) found murrelet nests in sea caves at Anacapa Island where birds have apparently escaped predation by Black Rats (*Rattus rattus*). However, now that cats have been removed from North Coronado Island, numbers of murrelets probably will increase in the future. Unfortunately, a detailed survey (including extensive nest searches and repeated vocalization surveys) of murrelet populations was not possible at the time of cat removal to serve as a baseline for monitoring future population changes and to demonstrate the overall value of cat removal. In any case, our survey results indicate that large numbers of murrelets existed at Islas Los Coronados at the time of cat eradication. It is also evident that cats

and murrelets have both managed to survive at South Coronado Island over most of this century although the history of cat introductions and sizes of cat populations are not well known and the overall degree of impact on Xantus' Murrelets at this island has not been documented. Cats also may have died out and been replenished periodically. Impacts from other feral animals (e.g. goats) on South Coronado Island have not been well documented but may occur, such as through destruction of nesting habitat (McChesney 1995).

Ashy Storm-petrel

Leach's (*O. leucorhoa*) and Black (*O. melania*) storm-petrels have been recorded by several biologists and are thought to be the most abundant storm-petrels nesting at Islas Los Coronados (Jehl 1977, Everett 1991, Everett and Anderson 1991). Prior to the 1960s, the only documentation of Ashy Storm-petrels on Islas Los Coronados was one nest with an adult found on 20 April 1916 (Huey 1925; Everett and Anderson 1991). Extensive searches for storm-petrel nests had been conducted in the late 1800s and early 1900s without further discoveries of Ashy Storm-petrel nests (Anthony 1898, Grinnell and Daggett 1903, Osburn 1911). In 1968, POBSP personnel conducted mistnetting (without tape luring) and nest searches at North Coronado Island, South Coronado Island, and Middle Island and/or Middle Rock (Crossin 1968, 1974; DeLong 1968; DeLong and Crossin 1968, DeLong et al. 1968). About 100+ Leach's Storm-petrels were estimated to nest on Middle Island and/or Middle Rock while about 500+ Black Storm-petrels were estimated to nest on North Coronado Island and Middle Island and/or Middle Rock. Only 3-4 Ashy Storm-petrels were caught at Middle Island and/or Middle Rock in 1968 which led to an estimate of low nesting numbers, perhaps only 2-3 pairs (DeLong et al. 1968, Crossin 1974, Jehl 1977, Jehl and Everett 1985, Ainley 1995). Everett (1991, pers. con-m.) found only one nest during extensive nest searches and caught 1-2 birds during extensive mistnetting at Middle Rock in 1988-1990. However, large numbers of cat- or falcon-predated petrel wings (thought to be Ashy Storm-petrel) were found by Pitman on North Coronado Island in 1989-1990 (Everett and Anderson 1991; Pitman and Everett, unpubl. data; Everett, pers. comm.). These predated remains suggest that larger numbers may nest at the islands (Everett and Anderson 1991; Everett, pers. comm.).

While small numbers of nesting Ashy Storm-petrels could be expected at the southern end of the breeding range, much available crevice nesting habitat occurs at Islas Los Coronados, especially South Coronado Island where human access is limited due to steep terrain. These islands potentially could support large numbers (perhaps hundreds) of nesting Ashy Storm-petrels. Our brief observations during this survey support previous observations that indicate that larger numbers may nest there. However, if very large numbers of birds nested there, previous efforts probably would have captured more birds, even if none nested on certain islands. Our work in the Channel Islands has led to the discovery of Ashy Storm-petrels nesting in different habitats than were previously known (e.g. sea caves, cliff faces, etc.) (Carter et al. 1992, in prep.). It is possible that additional survey efforts would reveal that this species is more common on parts of North and South Coronado islands that were not examined previously and where birds may nest in small crevices in steep slopes and in cliffs. Few nest at Middle Rock, possibly due to

competition for larger crevice sites with the larger Black Storm-petrels, Xantus' Murrelets and Cassin's Auklets *Ptychoramphus aleuticus* (Everett 1991; pers. comm.). While these species also nest at other islands, there is much more habitat for nesting at North and South Coronado islands and such competition probably is much less there. Additional nocturnal mist-netting and nest searches on all four islands would be needed to better estimate the numbers of breeding Ashy Storm-petrels at Islas Los Coronados.

Brown Pelican

Our observation of 597 Brown Pelican nests, many with chicks, is consistent with the continued partial recovery of the Channel Islands population that has occurred over the past two decades (Jehl 1973; Anderson et al. 1975; Anderson 1988; Anderson and Gress 1983; Gress et al. 1990; see review in Gress 1995). Complete nesting failure of 375 nests was noted in 1969 primarily due to eggshell thinning resulting from high levels of DDT residues in the Southern California Bight. In the mid 1970s reproduction improved and numbers of nesting attempts increased. The North Coronado Island colony was abandoned in 1986 and has been active only sporadically since then, with little breeding success (Gress et al. 1990, Gress 1995). Colony abandonment was likely caused by human disturbance, especially egging (Anderson 1988, Everett and Anderson 1991; Gress, pers. comm.; Everett, pers. comm.). Whether successful reproduction occurred in 1995 was not determined. Occupation of the Middle Coronado Island colony occurred in 1986, presumably due to movement of birds from North Coronado Island. This colony still existed in 1995, despite reoccupation of North Coronado Island and recent nesting on Middle Rock. The small colony on Middle Rock was noted previously in 1989 and was censused using aerial photographs, as well as from a boat, in 1993 (Gress 1995; Carter et al., unpubl. data). This colony also was active in 1995. Previous research activities on Middle Rock (Everett 1991) may have precluded its use by nesting pelicans in 1988-1990 (Everett 1991). This colony also is susceptible to disturbance by boaters because the colony is located close to the water and is very accessible to landings.

Cormorants

Small numbers of nesting Double-crested, Brandt's and Pelagic cormorants at Islas Los Coronados have been reported previously (Gress et al. 1973, 1990; Jehl 1977; Everett and Anderson 1991). Pelagic Cormorants reach the southern limit of their breeding range at Islas Los Coronados and small numbers and irregular breeding are known. However, Brandt's Cormorants have nested in greater numbers in the past and large colonies occur both north and south of Islas Los Coronados. Abundant nesting habitat is currently available but human disturbance (mainly from fishermen and other boaters) and/or introduced predators may limit current nesting to small numbers on cliffs. In 1995, additional nests may have been initiated after our early survey, especially since larger numbers of birds (N=128) were noted than would be accounted for by the 20 nests found. However, Brandt's Cormorant nests occurred in small groups of 10, 4 and 1 nests at North Coronado Island, along with small groups of 2 and 3 nests at Middle Coronado Island and Middle Rock. These small groups of nests were quite inconspicuous and nesting in

small colonies may reduce human disturbance. More Pelagic Cormorant nests also may have been initiated after the survey since only one pair were incubating but 9 birds were noted.

We did not note any nesting Double-crested Cormorants on this survey although they nested at South and North Coronado islands in the late 1980s (Gress et al. 1990). In the early 1990s, nesting has occurred only at South Coronado Island, possibly due to human disturbance at North Coronado Island (Gress, pers. comm.). In 1993, this colony was censused with aerial photographs (as yet uncounted) and a boat survey (Carter et al., unpubl. data; Gress, et al., unpubl. data). Our 1995 survey was conducted early in the potential nesting season and it is quite likely that birds had not yet begun nest building by late April. The breeding phenology of Double-crested Cormorants also appeared delayed in 1995 at certain colonies (e.g. Santa Barbara Island) in the Channel Islands (Carter et al., in prep.). Double-crested Cormorants also have undergone partial recovery at Islas Los Coronados and in the Channel Islands from reproductive problems due to eggshell thinning from DDT contamination during in the late 1960s and early 1970s (Gress et al. 1973; Anderson and Gress 1983; Carter et al. 1992, 1995).

Black Oystercatcher

The large number of Black Oystercatchers seen probably represents a substantial breeding population. However, only one pair was observed attending a potential nest site although our survey was probably too early to document nests. No American Oystercatchers (*Haemotopus palliatus*) were seen although American and American/Black hybrids have been recorded breeding in the past (Grinnell and Daggett 1903, Kenyon 1949, DeLong 1968, Garrett and Dunn 1981) and hybrids have been reported recently in the Channel Islands (Abbott 1965, Hunt et al. 1979, Carter et al. 1992).

RECOMMENDATIONS

At Islas Los Coronados, significant colonies of Xantus' Murrelets and Ashy Storm-petrels currently exist but have not been completely documented. Further survey efforts are required to determine breeding population sizes of these species and other nocturnal burrow and crevice nesting species, including Leach's Storm-petrels, Black Storm-petrels, and Cassin's Auklets. A significant auklet colony once existed on North Coronado Island (e.g. Grinnell and Daggett 1903, Van Rossem 1915, Jehl 1977). Everett and Anderson (1991) suggested that Cassin's Auklet nests found in 1989 may have represented recolonization. However, they did not provide details of nest locations, although nests have been reported on Middle Rock (Everett 1991). Alternatively, small numbers may have continued to nest at some undiscovered location at Islas Los Coronados. Future survey efforts for nocturnal crevice-nesting species should include nest site searches and nocturnal mistnetting at several sites around the islands. Efforts should be repeatable and methods to monitor populations over time should be developed. For Xantus' Murrelets, nocturnal vocalization surveys are a useful technique for discovering nesting areas, determining relative activity levels, and, with sufficient effort and replication, for

monitoring activity levels over time. In addition, feral animals should be removed from South Coronado Island, after baseline population levels of all nesting species have been documented and all nesting areas have been identified on ground searches.

Capture and banding of Xantus' Murrelets at sea, as conducted in the Channel Islands in 1994-1995 (Whitworth *et al.* 1995; Carter *et al.*, in prep.), could help yield more accurate population estimates through summing the actual numbers captured as well as capture-recapture comparisons. In addition, bird captures could yield information on breeding status and subspecific identity. While birds breeding at Islas Los Coronados and in the Channel Islands belong mainly to the subspecies *S. h. scrippsi* (Jehl and Bond 1975), a nest of the Guadalupe subspecies *S. h. hypoleucus* has been documented at Santa Barbara Island (Winnett *et al.* 1979). The two subspecies are identifiable by plumage characteristics. Small numbers of the Guadalupe subspecies have been noted at Channel Islands' colonies during the late breeding season (Carter *et al.*, in prep.).

The low level of research and monitoring of seabirds throughout northwestern Mexico prevents an adequate assessment of the status of Xantus' Murrelet and Ashy Storm-petrel populations in the region. This situation is alarming, given numerous anthropogenic threats such as introduced predators, marine pollutants (e.g. oil spills and DDT pollution), habitat destruction, commercial fisheries, and various forms of human disturbance (Everett and Anderson 1991). Many colonies of seabirds have been reported to be extirpated on other islands in northwestern Baja California. For example, Xantus' Murrelets have been thought to be extirpated on Islas Todos Santos, San Geronimo and San Martin (Jehl and Bond 1975, Drost and Lewis 1995; see Fig. 1); Brown Pelicans have been extirpated from Islas Todos Santos and San Martin (Everett and Anderson 1991); and Double-crested Cormorants and Cassin's Auklets have been extirpated from Isla San Martin (Everett and Anderson 1991; Carter *et al.* 1995).

A survey of all known or suspected colonies of Xantus' Murrelets and Ashy Storm-petrels is needed throughout northwestern Mexico to better determine the overall status of these rare species. At minimum, islands where nesting has been confirmed or suspected should be further assessed, including: Los Coronados, Todos Santos, San Martin, San Geronimo, San Benitos, Cedros, Natividad, San Roque and Asuncion (Jehl and Bond 1975, Everett and Anderson 1991, Drost and Lewis 1995; see Fig. 1). The population at Isla de Guadalupe deserves special attention since the subspecies *S. h. hypoleucus* is thought to be nearly endemic to this island group, although small numbers may breed at Islas San Benito (Jehl and Bond 1975). The Guadalupe population probably has been reduced due to human impacts. It was assessed to some extent in 1968 (DeLong and Crossin 1968, Jehl and Everett 1985). However, a more recent assessment is necessary, considering changes in human use, predation by feral cats, habitat changes, and other impacts that have occurred at Isla de Guadalupe and at sea over the last 30 years. In addition, it is important to determine if Xantus' Murrelets still nest at other islands between population centers in the Channel Islands (including Islas Los Coronados) and Islas San Benito (where large numbers are still thought to nest) to help assess the geographic degree of separation and the potential for inter-colony movements (including immigration and

emigration) between U.S. and Mexican populations. By having better data on the status of these species, various conservation strategies can be developed to assist the recovery of these sensitive species, including predator removal, reduction of human disturbance, and other measures. Researchers also should assess the status of other seabird species in the process of future surveys of focal species of concern in northwestern Baja California to help build information on all seabirds over time in this understudied region.

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Table 1: Number of individuals and nests of all birds and marine mammals counted during daytime boat surveys at Islas Los Coronados, 24 April 1995.

Species	South Coronado		Mid. Coronado		Middle Rock		North Coronado		Totals	
	Indiv.	Nests	Indiv.	Nests	Indiv.	Nests	Indiv.	Nests	Indiv.	Nests
Seabirds										
Brown Pelican	36	0	386	251	115	61	318	293	855	605
Double-crested Cormorant	9	0	0	0	0	0	1	0	10	0
Brandt's cormorant	76	0	4	2	13	3	35	15	128	20
Pelagic Cormorant	0	0	3	0	3	0	3	1	9	1
Unidentified Cormorant	27	0	0	0	0	0	1	0	28	0
Shorebirds										
Black Oystercatcher	8	(1)*	4	0	6	0	8	0	26	(1)*
Wandering Tattler	0	0	0	0	2	0	0	0	2	0
Whimbrel	0	0	0	8	1	0	0	0	1	0
Red-necked Phalarope**	0	0	0	0	280	0	0	0	280	0
Red.Phalarope**	0	0	0	0	20	0	0	0	20	0
Other birds										
Peregrine Falcon	0	0	1	0	0	0	0	0	1	0
Belted Kingfisher	0	0	1	0	0	0	0	0	1	0
Marine Mammals										
California Sea Lion	19	--	66	--	0	--	127	--	212	--
Harbor Seal	74	--	26	--	0	--	17	--	117	--
Northern Elephant Seal	38	--	4	--	0	--	0	--	42	--

* Potential nest site

** Observed on the water or flying off the islands.

Table 2: Numbers of nests and birds observed during Brown Pelican censuses at Islas Los Coronados, 24 April 1995.

	South Coronado	Middle Coronado	Middle Rock	North Coronado	Totals
<u>Nests</u>					
Total Attended by Adults	0	167	39	293	499
(attended by "standing adults") ¹	0	49	5	--	--
(attended by "sitting adults")	0	118	34	--	--
Total Empty Nests	0	17	3	--	--
Total Chick Broods ²	0	67 ³	11	-- ⁴	--
(1+ Chicks)	0	37	5	--	--
(2+ Chicks)	0	30	5	--	--
(3+ Chicks)	0	0	1	----	
Total Nests	0	251	53	293 ⁴	597
<u>Birds</u>					
Adults in Nesting Area	0	385	100	178	663
Roosting Birds	36	9	15	0	60
Total Birds	36	,394	115	178	723

¹ Chicks not visible.

² Includes nests where large chicks were visible and broods where no nest was visible.

³ Omitted one dead chick observed.

⁴ Less than 10 large chicks noted but difficult to observe.

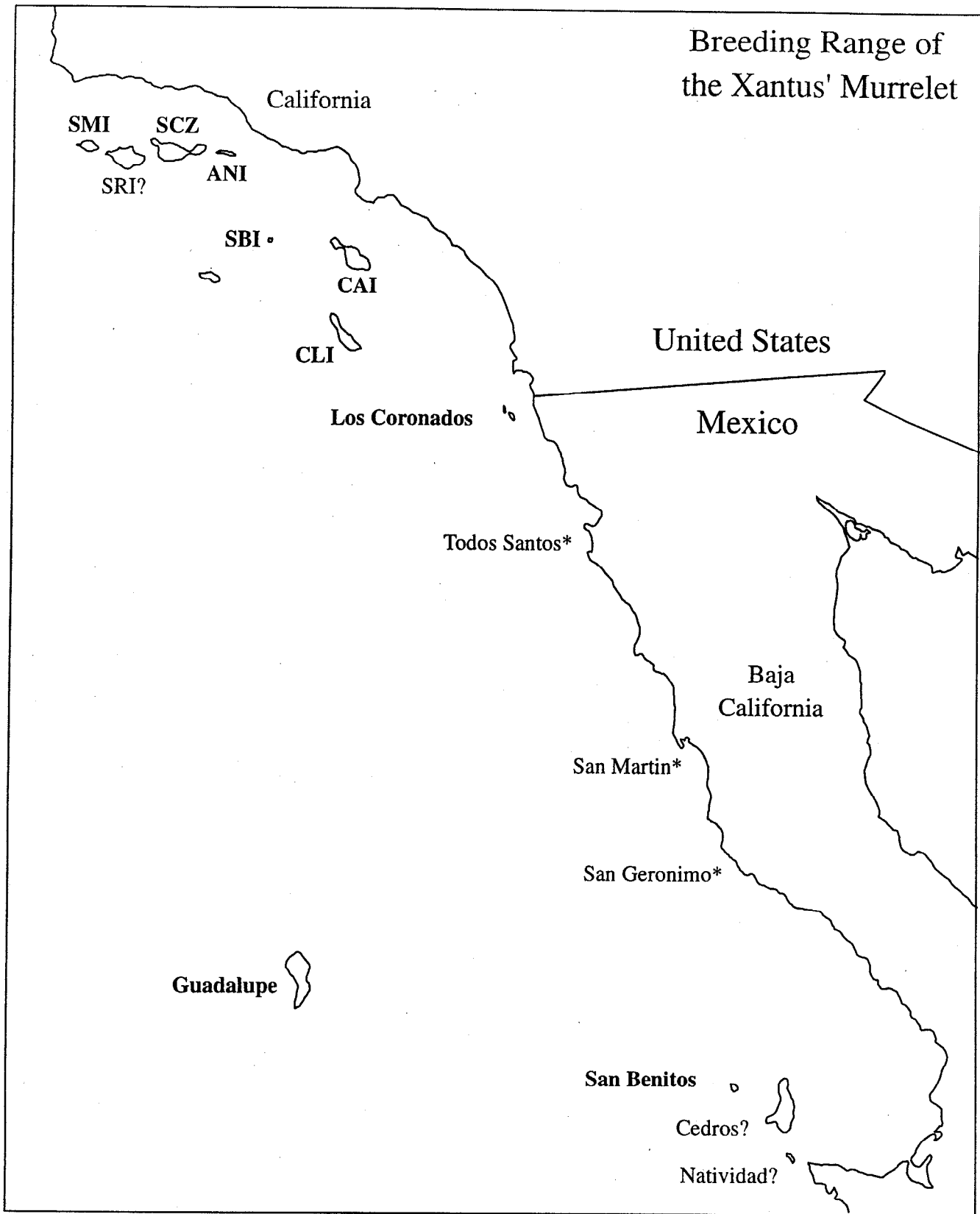


Figure 1: Breeding range of the Xantus' Murrelet in southern California and northwestern Baja California, showing known active (**bold**), extirpated (*) and suspected (?) colonies (adapted from Drost and Lewis 1995). California nesting islands include San Miguel (SMI), Santa Rosa (SRI), Santa Cruz (SCZ), Anacapa (AN), Santa Barbara (SBI), Santa Catalina (CAI), and San Clemente (CLI).



Figure 2. North Coronado Island, 13 May 1993 (NBS Slide No. 93-OV-7-25; photographer: Harry R. Carter). Steep slopes and rocky outcroppings on the east side of the island where Xantus' Murrelets probably nest are shown.

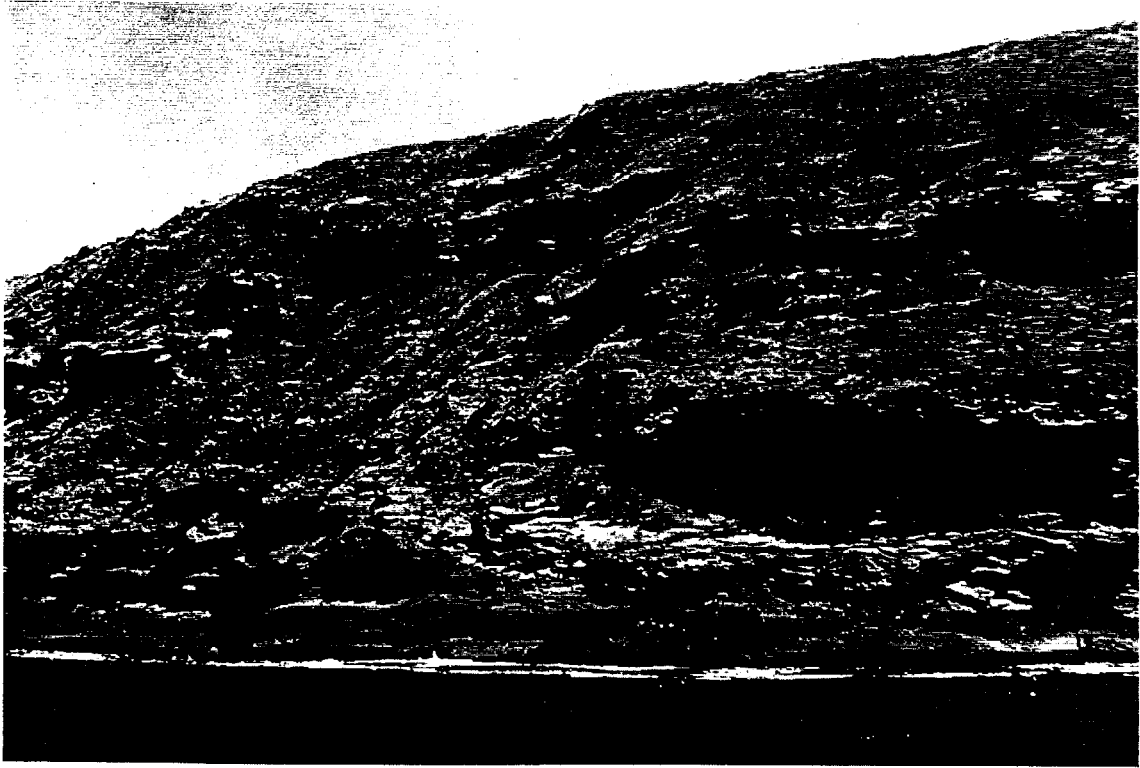


Figure 3. South Coronado Island, 24 April 1995 (NBS slide No. 95-BT-7-17; photographer: Darrell L. Whitworth). Steep slopes and rocky outcroppings on the southwest side where Xantus' Murrelets probably nest are shown.

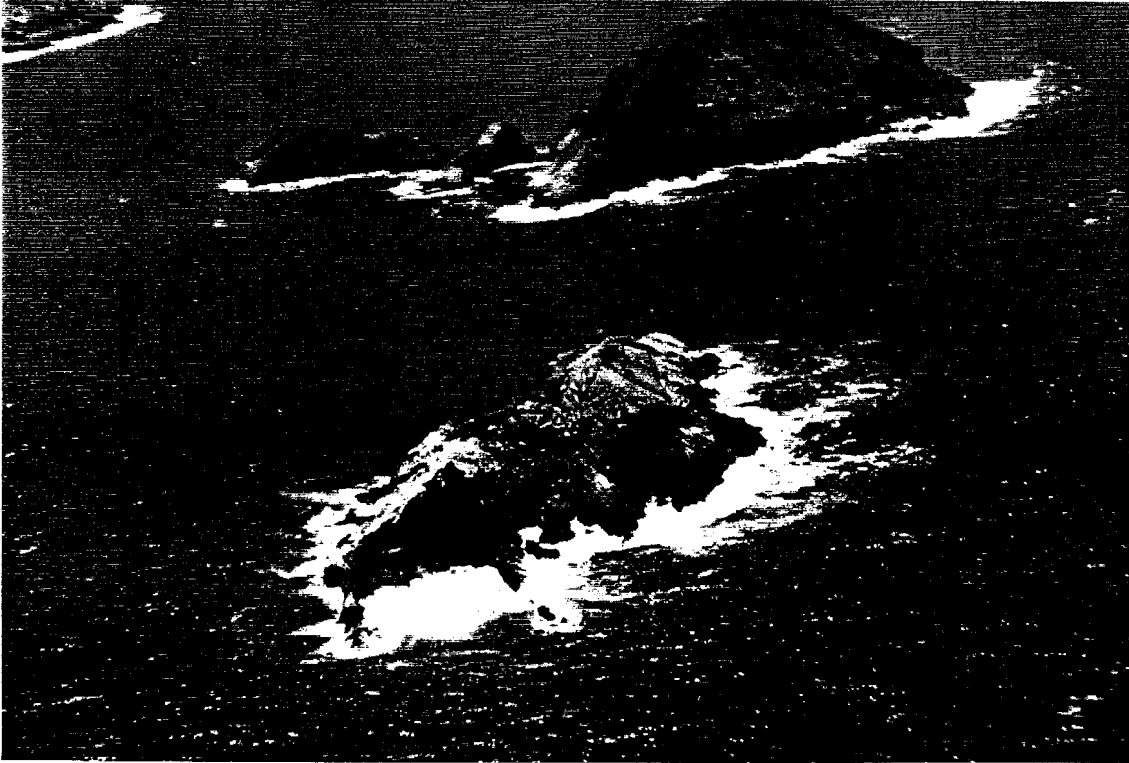


Figure 4. Middle Rock (foreground) and Middle Island (background), 13 May 1993 (NBS Slide No. 93-OV-8-3; photographer: Harry R. Carter). The smaller size and more barren vegetation of these islands are shown.

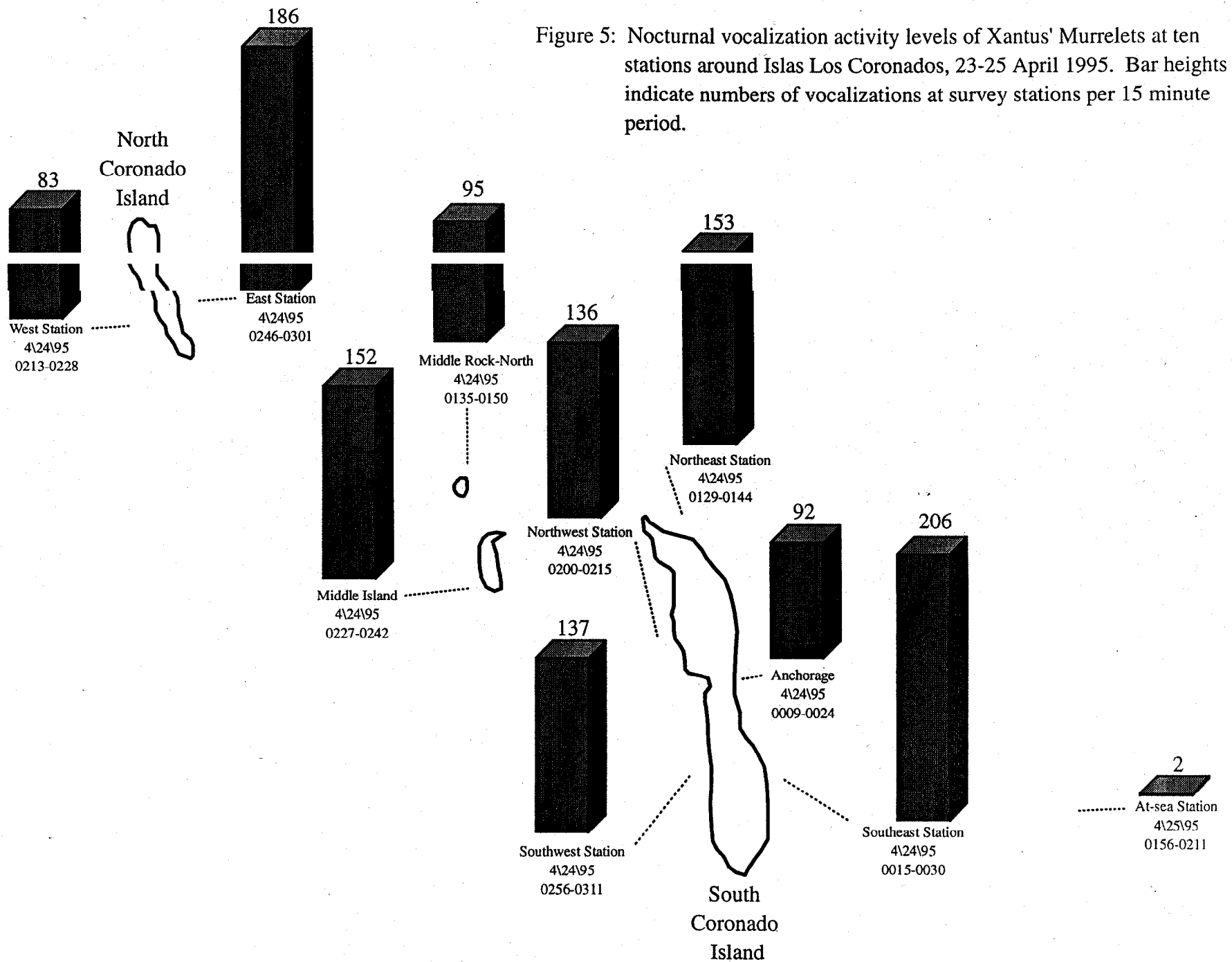


Figure 6: Nocturnal vocalization activity levels of Xantus' Murrelets at two stations off South Coronado Island, 24-25 April 1995. Bar heights indicate numbers of vocalizations at survey stations per 15 minute period.

