OVERWINTERING OF BLACK SKIMMERS IN CALIFORNIA: SITE FIDELITY AND INTER-SITE MOVEMENTS

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During the last two decades, Black Skimmers (*Rynchops niger*) have become increasingly common along the southern California coast. They are now found year-round in southwestern California (Collins et al. in press) and in northwestern Baja California (Palacios and Alfaro 1992). Little detailed information has been published, however, about their winter distribution and abundance in this region. Most previous studies of the Black Skimmer have focused on the breeding season, with little attention paid to survival, behavior, and habitat requirements in the wintering areas. Since the difficulties skimmers face on the breeding grounds (e.g., predation, human disturbance, parasitism, disease, inclement weather, contaminants, entanglements, and food shortage) may affect them also on the wintering grounds, Burger and Gochfeld (1990) suggested that further studies of wintering birds are needed. They suggested also that most mortality of adults takes place away from the breeding grounds and that young birds are particularly vulnerable during their first winter.

Because of their long migrations and an inability of researchers to follow specific individuals or populations, the winter ecology of the Black Skimmer in the eastern U.S. has been little studied. With just a few breeding colonies and extensive overwintering, the Pacific coast offers a unique opportunity to study the winter ecology of Black Skimmers from known colonies (Gazzaniga 1995). In this article, I delineate the skimmer's important wintering sites, examine its seasonal abundance on these wintering areas, document dispersion of skimmers among sites, and examine winter site fidelity.

METHODS

The principal colony of origin of the skimmers followed in this study is at Bolsa Chica Ecological Reserve, Huntington Beach, California (33° 41′ 30″ N, 118° 03′ 00″ W) (Figure 1). In 1988, Charles T. Collins began banding skimmers at Bolsa Chica with the goal of determining whether young returned to the natal colony. Marking consisted of colored tape, denoting the annual cohort, placed around a United States Fish and Wildlife Service numbered aluminum band. Beginning in 1992, chicks were not only color-banded by year but also marked individually with a specially constructed band of laminated plastic into which an alphanumeric code had been etched. The plastic band was placed on the tarsus and then heat-sealed with a hand-held butane burner. These bands were later read with a telescope or binoculars on birds in winter roosting flocks. Older chicks were aged and sexed by wing measurements and body weight (Schew and Collins 1990).

I established six survey sites (Figure 1) and organized a network of seven cooperating observers. From September to May, from 1992 to 1995, Santa

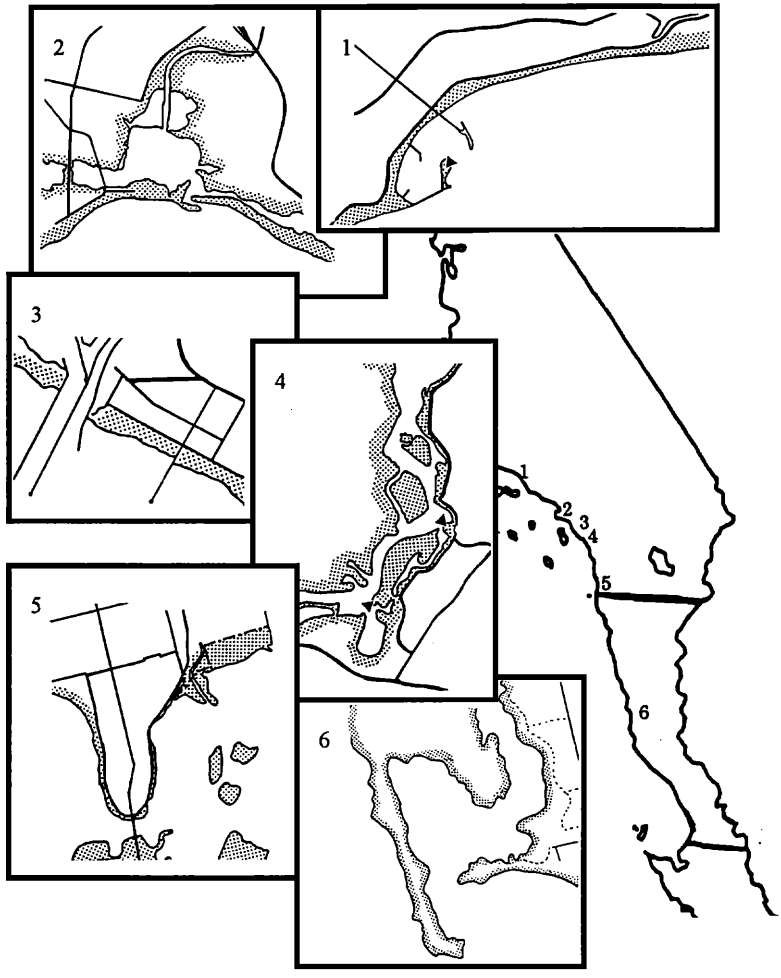

Figure 1. Sites of regular surveys for wintering Black Skimmers. 1, beach front and harbor sand spit, East Beach, city of Santa Barbara, Santa Barbara County. Monitor: Florence Sanchez. 2, coastal sand spit, mouth of Callegaus Creek, Point Mugu Naval Air Station, Ventura County. Monitors: Tom Keeney and Tiki Baron. 3, beach front, city of Seal Beach, near the mouth of the San Gabriel River, Orange County. Monitor: Kathleen Gazzaniga. 4, estuarine sand spit, near mouth of Big Canyon and Shellmaker Island, Upper Newport Bay, Newport Beach, Orange County. No specific monitor. 5, beach front, Kendall–Frost Ecological Reserve, Mission Bay, San Diego, San Diego County. Monitor: Virginia "Ginger" Johnson. 6, sand spits near Cemetery Point, Punta Azufre, and Sand Point, all in San Quintin Bay, Baja California, Mexico. Monitors: Eduardo Palacios, Lucia Alfaro, and David Ward and associates.

Barbara (Santa Barbara County) and Seal Beach (Orange County) were surveyed weekly, Point Mugu (Ventura County) and Mission Bay (San Diego County) at least monthly, and Upper Newport Bay (Orange County) and San Quintin (Baja California) irregularly.

To describe the pattern of the skimmers' use of each site, I devised an "observation index" to quantify the likelihood that a particular individual will be seen. The observation index is defined as the percentage of times an individual bird was seen at a site during the interval between the first and last sightings in any single winter.

RESULTS

Skimmers roosted extensively at all sites monitored during this study except Upper Newport Bay; each site was occupied during the entire winter season. The results of the censuses for these five sites are presented in Figure 2. In addition to these sites, wintering skimmers were sighted at Ensenada (Baja California, Mexico), the mouth of the Santa Margarita River, Camp Pendleton (San Diego County), Shoreline Aquatic Park, Long Beach (Los Angeles County), Malibu Beach (Los Angeles County), and Princeton Harbor (San Mateo County). All of the winter sightings of roosting Black Skimmers were near beaches and estuaries, usually with gulls and terns, occasionally with shorebirds.

At Santa Barbara, in 1992, skimmers first arrived in September, increased steadily until they reached their peak (117) in February 1993, and then decreased during March and April. Only two, a banded yearling and an adult, remained through the summer. During the 1993–1994 season, skimmers arrived sooner, attained greater numbers, and left later than in the previous year. During the summer of 1994, five skimmers remained in Santa Barbara; two were unbanded yearlings and three were adults.

At Point Mugu, the first counts each season were not taken until October; therefore, exact arrival dates are not known. Data were recorded inconsistently from January to June of 1993. During each season, the skimmers reached their peak (139 in 1992, 168 in 1993) in October and tapered off until December (no data were taken in December of 1993), then increased again in January, and tapered off from March to June.

At Seal Beach, the first skimmers arrived each season in September, increased until they reached a peak (200) during November and December, and then tapered off from January through March. There was a slight increase in numbers during May of both years.

At Mission Bay, there was an increase in numbers each season during October and November. The arrival date in 1992 is unknown; nonetheless, numbers of skimmers were stable by November and began to decrease from January to February. In 1993, skimmers began to arrive in September, reached their peak (140) during October and November, and began to decrease in January.

At San Quintin, in 1992, the first skimmers appeared in September, followed by a steady increase in numbers until November. Then, although there were wide monthly variations, the mean numbers roughly stabilized until April, after which they started to decrease. The highest count was of

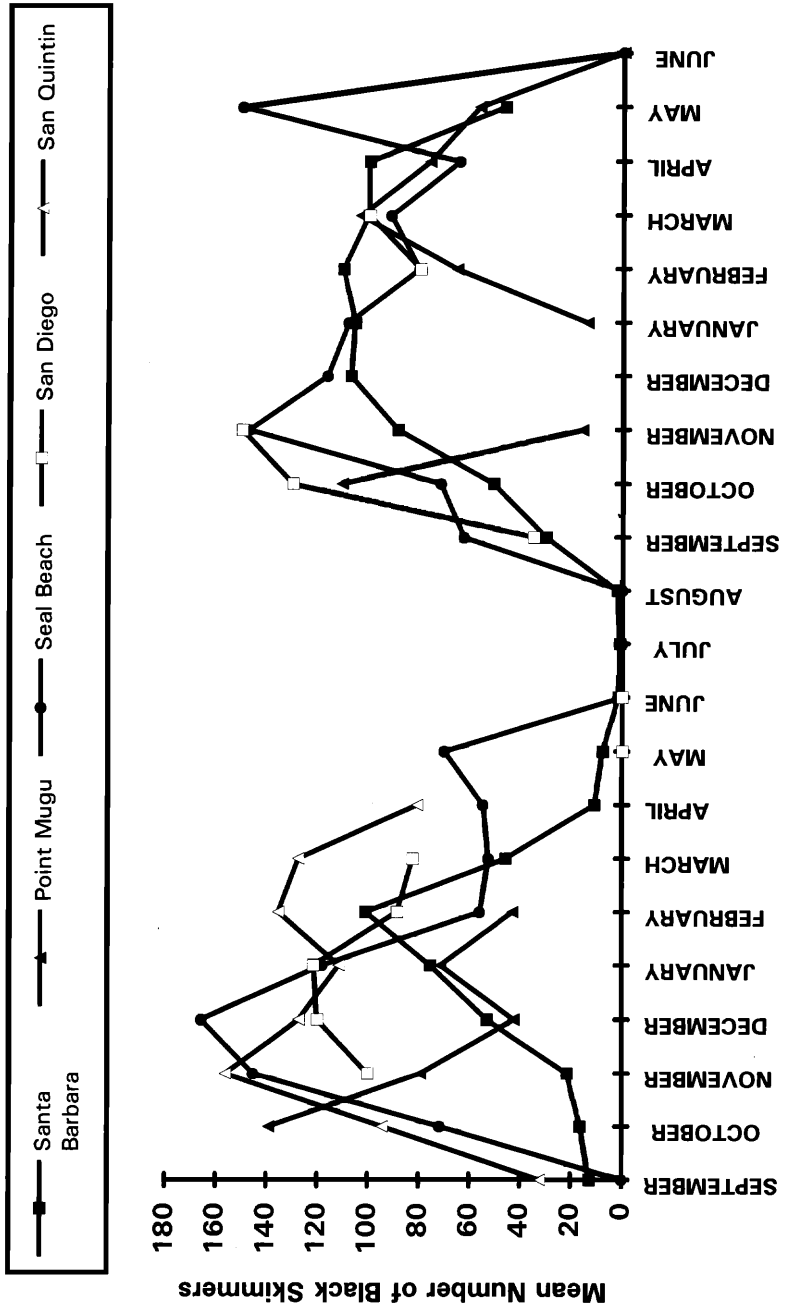

Figure 2. Mean numbers of Black Skimmers observed by month, 1992–1994, at five Pacific coast sites.

265 on 18 February 1993. No adequate data were taken for this site during the winter of 1993–94.

For all sites except San Quintin, I used a t test to assess the difference in skimmer numbers for the winters of 1992–93 and 1993–94. At Santa Barbara, there was a significant increase ($t = -5.93$, $p < 0.01$); at all other sites, there was no significant difference between the two years.

At Bolsa Chica Ecological Reserve, 55 skimmers in 1992, 69 skimmers in 1993, and 14 in 1994 were color-banded. In 1992, 31 (56.4%) of these birds were seen at least once during their first winter after banding. Twelve (22%) of these were seen in their second winter, and five (9%) were seen in their third winter. Of the young banded in 1993, 38 (55%) were seen at least once their first winter. Of the young banded in 1994, 14 (100%) were seen at least once their first winter.

Of the surviving 1992 cohort, 20 (65%) were seen at only one site over their first winter season, while the remaining 11 (35%) were seen at more than one site. During their second winter, 10 (84%) were seen at one site, while two (16%) were seen at more than one site. Of the birds hatched in 1993, 23 (61%) were seen at one site during their first winter, while the remaining 15 (39%) were seen at more than one site. Of those hatched in 1994, 12 (86%) were seen one site during their first winter, while the remaining two (14%) were seen at more than one site.

Of the surviving 1992 cohort, in their second winter, six (50%) of the birds returned to the same site as in their first winter, three (25%) moved to a new site, and three (25%) moved among sites during both winter seasons. In their third winter, three (60%) of the birds returned to the same site and two (40%) moved to a new site. Of the surviving 1993 cohort, in their second winter, 12 (60%) returned to the same site, five (25%) moved to a new site, and three (15%) moved among sites during both years.

I figured the observation index (the percentage of times an individual bird was seen at a site during the interval between when it was first seen and when it was last seen) for all sites, though at Point Mugu, Upper Newport Bay, Mission Bay, and San Quintin repeated sightings of individual birds were too few for this index to be useful. I did not include birds that were seen only once, which would have greatly inflated the index for all sites. During the 1992–93 season, the index for Santa Barbara was 65.4%; that for Seal Beach, 52.2%. During the 1993–1994 season, the indices were 74.6% for Santa Barbara, 83.5% for Seal Beach. These figures indicate that if a bird is in the area, there is a high likelihood that it will be observed repeatedly.

DISCUSSION

The Princeton Harbor sighting (260 kilometers to the north of Bolsa Chica), 20 February 1993, was one of the northernmost records of the Black Skimmer in California to date (see also Layne 1996). This bird was banded at Bolsa Chica Ecological Reserve in 1992 and seen 12 times in Santa Barbara between 20 October 1992 and 10 February 1993; it was not resighted after 20 February 1993. At Seal Beach during the 1992–93 season numbers decreased in December, corresponding to a movement of marked birds from Seal Beach to Santa Barbara. In addition, one bird moved

from Seal Beach to Ensenada and two moved from Seal Beach to Upper Newport Bay. At this time, there were a number of winter storms and a sharp decrease in sightings of young skimmers, implying that many died. Skimmers appeared to have a higher mortality rate coupled with, and in part due to, a higher dispersal rate among sites during this period of stormy weather. Skimmers may be moving from the Bolsa Chica and Newport Bay breeding colonies to Seal Beach at the onset of winter, then leaving the area for other sites later in the season, thereby adding another component to the decrease in numbers in midwinter at Seal Beach.

The movements of young skimmers often corresponded with increases and decreases in the total number of skimmers at each site. This may signify that adults and young are moving from site to site together. Therefore, the site fidelity and movements I describe for the banded young may be representative of the skimmer population as a whole.

At Point Mugu during the 1993–94 season, there was a significant decrease in numbers of skimmers during December. This pattern was unlike that at any other site monitored during this study, except Seal Beach. The decrease may have been due to weather or food availability but is more likely explained by the sampling technique at this location. The Point Mugu site is located on a naval air station in which surveyors have been restricted from some areas. Skimmers may have been roosting in these unsurveyed areas and may not, in fact, have completely left the area. Unfortunately, data from the first season were insufficient for comparison with the second season to show if there was a similar decrease during December 1992. More complete surveys of the Point Mugu Naval Air Station are needed for reliable conclusions about the overall use of this site by wintering skimmers to be drawn.

Numbers at Santa Barbara increased significantly from winter 1992–93 to winter 1993–94, while those at all other sites remained nearly the same. The wintering areas farther south may already be well established, whereas the northern sites are not as stable (or more dynamic) because of the relatively recent range expansion. Other factors such as weather and food resources may also come into play; these were not examined during this study. Although my study provides a first analysis of the winter population dynamics of the Black Skimmer in southern California, investigation of all aspects of the species' biology remains appropriate as it continues to expand its range northward.

SUMMARY

Beginning in 1992, juvenile Black Skimmers at Bolsa Chica Ecological Reserve, Orange County, were equipped with uniquely numbered color banded so their subsequent movements could be tracked. At Santa Barbara, Point Mugu, Seal Beach, and Mission Bay in Upper California and at San Quintin in Baja California regular observations made from September to May in 1992–93, 1993–94, and 1994–95. Skimmers arrived at their wintering sites during September and October, reached peak population levels in midwinter, then departed during April and May. Site fidelity was

high; over 50% of each cohort remained at one site through the winter, although there was also some regular movement between sites within the winter season.

ACKNOWLEDGMENTS

I thank Lucia Alfaro, Tiki Baron, Charles Collins, Virginia Johnson, Tom Keeney, Eduardo Palacios, Florence Sanchez, and David Ward for their valuable field assistance, and Kimball Garrett and Charles Collins for their useful comments on an earlier draft of the manuscript.

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Accepted 20 April 1996