

BREEDING POPULATIONS OF SEABIRDS  
IN CALIFORNIA, 1989-1991

VOLUME I - POPULATION ESTIMATES

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**DRAFT**



## ASHY STORM-PETREL

Ashy Storm-petrels breed almost entirely in California. Only a few pairs are known to nest at Islas Los Coronados in Baja California, Mexico (Jehl and Everett 1985). They are extremely difficult to census because they nest in crevices among rockpiles, under boulders, or in steep cliffs and are only active at the colony at night. Hunt et al. (1979, 1980) estimated numbers breeding at 8 colonies in southern California plus one other possible colony. Sowls et al. (1980) estimated numbers of breeding birds at one colony in northern California and provided a historical estimate for the South Farallon Islands in central California that was surveyed only in 1971-1972 (Ainley and Lewis 1974). In 1989-1991, we focused on updating and improving population estimates at the smaller known colonies in the state, primarily by mist netting birds at night. For some colonies where insufficient survey effort was expended in 1989-1991, we reported historical estimates. At several colonies, we have provided the most standardized and well-documented population estimates available.

### Northern California

"Van Damme Cove" - On the night of 5-6 August 1989 at 0033 hrs, we captured one Ashy Storm-petrel in a mist net on "Van Damme Rock" (subcolony 03 on Map 35; see Appendix 2) while broadcasting a tape of Leach's Storm-petrel vocalizations (Table 9; Appendices 2, 3). This bird had a bare, vascularized incubation patch. No other storm-petrels were seen or heard. No storm-petrel nests were found during a thorough search of the rock, although rock crevice habitat was available. If Ashy Storm-petrels did nest here, it would extend their breeding range about 85 miles north. The Van Damme Cove area was used extensively by sport divers. There was much evidence of human activity on this rock was prevalent which may prevent nesting or impact nesting birds.

Sowls et al. (1980; see 1979-1980 survey archives) camped on this rock (referring to it as "Anchor Rock") on the night of 5-6 June 1980. They mist netted from 2000-2400 hrs but no storm-petrels were detected.

Bird Rock - We captured and banded a total of 48 Ashy Storm-petrels on two nights in 1989 (Table 9, Appendix 3). Mist nets were placed in front of many large burrow/crevices in a small bank on the north side of the rock (site 1). Many birds were captured entering and departing the same large, deep crevices which may have contained several nests each. Another net was placed near the top of the rock (site 2) on 6-7 August but no activity occurred at this site (Appendix 3). We located 5 nests within the north bank and one nest in a crevice on the south side. Several other crevices were available in both areas. Population size was estimated at about 65 birds (95% confidence



interval of 47-83) with Chapman's (1951) modified Lincoln-Petersen method, using all birds captured. Since tapes did not appear to attract birds to the nets, we added about 10 birds to account for those nesting on the south side of the rock (Table 13).

Ashy Storm-petrels were first proven nesting at Bird Rock in 1972 when 2 nests were found and 20-24 breeding birds estimated (Ainley and Osborne 1972). On 1 July 1979, Sowls et al. (1980; see 1979-1980 survey archives) found one adult on an egg in a crevice in the north bank and noted petrel smell in 6 others (Table 13). Our higher estimate probably reflected increased effort rather than a population increase.

South Farallon Islands National Wildlife Refuge - The South Farallon Islands hosts the world's largest Ashy Storm-petrel colony (Sowls et al. 1980; Ainley and Boekelheide 1990; This study). We did not survey this colony in 1989 due to the large effort required to compare to or improve on previous efforts. About 4,000 breeding birds were estimated for Southeast Farallon Island subcolony only by Ainley and Lewis (1974) from an extensive mist net study conducted in 1971-1972. However, West End Island (subcolony 02 on Map 64) and the North Farallon Islands were not examined. Ainley and Boekelheide (1990) speculated that the total Farallon Islands population could be as large as 7,000 breeding birds, based on numbers observed each fall in nearby Monterey Bay. Extensive mist netting was also conducted at Southeast Farallon Island between July-September 1987 when 611 Ashy Storm-petrels were captured and banded at several sites (McChesney et al. 1992). Breeding population estimates (using 496 breeders) using program CAPTURE (Otis et al. 1978) ranged from 508 birds (model M(bh)) to 1529 birds (model M(h)). At this time, these estimates are not directly comparable to the 1971-1972 estimate. Further work conducted in 1990 (McChesney et al., unpubl. data) and 1992 (Sydeman et al., unpubl. data) will help further assess the status of this important population.

#### Southern California

Castle Rock - Due to potential disturbance to breeding seabirds and marine mammals, we did not land on Castle Rock during the main part of the nesting season. Since we could not assess the storm-petrel population, we reported Hunt et al. (1979, 1980) rough estimate of 200 breeding birds. However, during burrow/crevice counts on 21-22 October 1991, we found 1 nearly-fledged Ashy Storm-petrel chick and one adult was captured in a mist net at night (Table 9, Appendix 4). This bird had a refeathering incubation patch and was undergoing body, primary and rectrix molt. We counted 455 sites (mainly small crevices) on the rock (Table 10). Using a L correction factor of 75% to account for burrow occupancy, 341 breeding birds were estimated.



However, this L correction factor may be too high for crevices only.

Prince Island - In 1991, we captured and banded 309 Ashy Storm-petrels over 9 nights at 2 mist nets on the southeast side of the island (Table 9; Appendix 4; see Figure 50). Of these, 67.6% were determined to be breeders based on incubation patch condition (see Figure 12). Of 14 breeders recaptured, 2 were recaptured in the same period as the original capture. These recaptures were not included in analyses to determine breeding population size. Of the 2 nonbreeders recaptured, both were in the original capture period. The small number of captures in April were due to extremely windy conditions and did not represent the number of birds present. On both nights, birds were almost continuously circling but avoiding the net. Several nests also were located with limited effort. Five nests with eggs plus a pair with no egg were found in a narrow cave at the base of the steep northwest cliff on 8 June. Five other nest sites were located in June and July in crevices on the east and south sides.

Breeding population size was estimated using programs CAPTURE (Otis et al. 1978) and JOLLY (Pollock et al. 1990) (Tables 14, 15). Three capture periods were used for analyses: pre-egg-laying (January-April), early incubation (June), and late incubation (July) for the population (Figures 12, 15). Since no single model appeared to fit the capture data appropriately (see methods), we took a mean of all model estimates (1,154 breeding birds) as the breeding population estimate. We considered this to be a standardized and repeatable approach given our inability to assess the inherent biases in each model. By adjusting the 967 small crevices counted with the rough L correction factor, we derived a second estimate of 1,451 breeding birds. As noted for Castle Rock, the L correction factor may be too high. However, this second estimate served to indicate that the capture-recapture estimate was reasonable.

Ashy Storm-petrels have been reported breeding at Prince Island by several observers, dating back at least to 1950 (reviewed in Hunt et al. 1979). Rough population estimates have ranged from 50-100 birds in 1968 (Huber 1968) to 800 birds in 1965 (Craig and Sheppard, unpubl. data in Hunt et al. 1979). Hunt et al. (1979, 1980) banded 161 birds over 12 nights in 1976-1977 and estimated 600 breeding birds. Our higher estimate probably reflected greater survey effort on this species.

Scorpion Rocks - In 1991, we banded 63 Ashy Storm-petrels (76.2% breeders) on 2 nights in May (Table 9, Appendix 4). Only one bird was recaptured on the second night. Mist nets were placed on the south edge of the largest rock (subcolony 01 on Map 190). Using Chapman's (1951) modified Lincoln-Petersen method, the breeding population was estimated to be 303 breeding birds (95 %



confidence interval, 0-627). For comparison, we estimated population size based on 51 potential small crevice sites counted on the 2 larger rocks. In addition, we included the proportion (25%) of medium (N=37) and large (N=5) crevices not considered to be used by Cassin's Auklets. By applying the rough L correction factor (75%) to 93 potential sites, we derived an estimate of 140 breeding birds. Given the small size of these rocks, we considered the lower estimate (based on crevice counts) to be most appropriate. However, if crevice use by auklets was lower than estimated, more storm-petrels may breed here.

Ashy Storm-petrels have been recorded breeding at Scorpion Rocks since 1928 (Hunt et al. 1979). Hunt et al. (1979) mist netted 9 birds on the night of 25 June 1976 and found one nest. They found 4 nests in 1977 and estimated 40 breeding birds. Our higher population estimate reflects greater mist netting effort.

Willows Anchorage Rocks - We captured and banded 51 Ashy Storm-petrels at this newly-discovered colony on 7-8 May 1991 (Table 9, Appendix 4). The mist net was placed near the top of the south rock. On a brief late night search for nests in accessible areas, adults without eggs were found occupying at least 6 crevices of various sizes. One pair occupied a crevice containing two Xantus' Murrelet eggs. During burrow/crevice counts on 23 October, 2 crevices contained downy chicks, one contained a hatched eggshell, and 10 crevices smelled of petrel. We treated all 62 sites on the south rock which did not contain evidence of alcid use as potential storm-petrel sites, and 12 sites were estimated for the very steep and inaccessible north rock. By applying the rough L correction factor, we estimated 111 breeding birds.

Santa Barbara Island Area - In 1991, we captured and banded 393 (74.5% breeders) Ashy Storm-petrels at Santa Barbara (n=315) and Sutil (n=84) islands (Table 9, Appendix 4). At least 5 birds were captured on both islands. One bird captured at Sutil Island may have been banded on Prince Island, Santa Barbara County (Appendix 4). However, it can be difficult to read the small numbers on these bands at night and, if one number was misread, this bird could have been banded on Santa Barbara Island. Of 15 breeders recaptured, one bird was recaptured in the same period as its original capture. This recapture was not used in capture-recapture analyses. Of the 11 nonbreeders recaptured, 7 were recaptured in the period of original capture, including 1 bird captured twice in the same night at different sites and 1 bird captured 3 times in the same capture period. Only 5 recaptured birds (including 3 breeders) were captured at the same site twice. No birds were captured more than once on Sutil Island. Net sites were placed at various sites on Santa Barbara Island (Figure 11). At Sutil Island, site 15 was located in the saddle at the top of the east side and site 16 was located at the base



of the cliff on the south side. We located one nest on Santa Barbara Island by tape playback on 12 April 1991. The calling bird responded to a tape broadcasting Ashy Storm-petrel vocalizations. It was located in a crevice under an overhanging boulder in the bluffs across from Shag Rock (between Arch Point and "Spire Pt.").

Breeding populations were estimated using programs CAPTURE (Otis et al. 1978) and JOLLY (Pollock et al. 1990) (Tables 14, 15). Numbers at Santa Barbara Island were estimated using the number of breeders captured there (as for other colonies). Because birds were not recaptured on Sutil Island, numbers there were estimated using breeders captured both at Sutil and Santa Barbara islands, then subtracting the number estimated for Santa Barbara Island only from the total. Since no single model appeared to fit the capture data appropriately (see methods), we took a mean of all available model estimates (874 and 1,460 breeding birds for Santa Barbara Island and Santa Barbara and Sutil islands combined. By subtraction, we estimated 586 breeding birds for Sutil Island (Table 13).

Ashy Storm-petrels were first confirmed nesting at Santa Barbara and Sutil islands in 1976-1977 by Hunt et al. (1979). In 1976, they mist netted 9 birds (2 recaptured) on 2 nights at Sutil Island and located at least 1 nest. In 1977, they banded 62 birds (9 recaptured) at Santa Barbara Island and located 1 nest. They estimated 40-50 and 300 breeding birds at Sutil Island and both islands combined, respectively (Table 13).

Our 1991 estimates were much higher than previous estimates, probably due to increased mist netting effort. We were not able to compare capture-recapture estimates to site counts since birds appear to nest primarily in inaccessible cliff habitat. Since no birds were recaptured on Sutil Island, we may have derived an inflated estimate of the population at both islands combined. Thus, less birds may nest at Sutil Island than we have surmised.

Other southern California colonies - We discovered two new nest sites within the Profile Point Area in 1991 (Table 13; see Appendix 2). On 6 May, 3 eggs (possibly old and abandoned) presumably of this species were found in "Cave of the Bird's Eggs" (named after Bunnell 1988; see subcolony 07 on Map 184). The eggs were found (along with several Pigeon Guillemot eggs) on the open floor of the cave. On 13 May, one bird was found incubating an egg in a crevice on a nearby unnamed rock (subcolony 01 on Map 184). Historically, Ashy Storm-petrels also nested in nearby Painted Cave as late as 1938 or 1940 (see Hunt et al. 1979). Storm-petrels there laid eggs on the exposed surface and in crevices among the cave walls (Wright and Snyder 1913). We did not find any there during an incomplete search of the cave walls near the cave entrance on 6 May.



We reported historical estimates for 4 other colonies in the Channel Islands that were not surveyed effectively in 1991. Hunt et al. (1979) mist netted 3 birds at Cuyler Harbor (at the south end of the Harris Point to Cuyler Harbor colony) on 24 June 1976. At Diablo Rocks, the larger southeast rock was searched extensively for nests on 5 May 1991. About 12 potential small crevices were counted but no evidence of petrel breeding was found. However, this survey date may have been too early to detect a small breeding population there (see Figure 15). Spitt Rock also was searched on 5 May 1991 but no sign of storm-petrels was found. Like at Diablo Rocks, storm-petrels may not have yet laid eggs by the survey date. Gull Island was not searched extensively for nests during the breeding season to prevent disturbance to nesting Brandt's Cormorants and marine mammals. One nest was discovered there in 1977 (Hunt et al. 1979).

### Summary

The 1989-1991 estimate of 7,207 breeding birds was higher than the total of 5,216 breeding birds estimated in 1976-1980 (Table 13; Hunt et al. 1979, 1980; Sowls et al. 1980). Higher numbers probably resulted from increased effort towards sampling this species, particularly in Channel Islands National Park. At all locations where mist netting was conducted, as many or more birds were captured than were previously estimated breeding there. Ashy Storm-petrels exhibited an asynchronous nesting period in southern California in 1991, based on incubation patch data (Figures 12, 13 and 15). However, breeding phenology at Southeast Farallon Island and Bird Rock in central/northern California was similar but started slightly later than in Southern California (Figures 2, 3 and 10; Ainley et al. 1974; Ainley and Boekelheide 1990). Colony attendance probably occurred almost year-round, indicated by captures of birds at Prince Island in January 1991.

By tape luring, we greatly increased the number of birds captured. Whenever a tape was not in use, activity around the net decreased rapidly and very few birds were captured. Few Ashy Storm-petrels were captured when vocalizations of another species (i.e. Leach's or Black storm-petrels) were being broadcast. Our low numbers of recaptures of breeders were likely due to: 1) heterogeneity of capture probabilities; 2) behavioral responses (i.e. "trap-shy") of birds after the first capture; 3) visits by breeding adults from other colonies; and 4) some nonbreeders (which do not regularly attend colonies) may have been misclassified as breeders.

Heterogeneity of capture probabilities (i.e. each bird does not have an equal chance of being captured) was an obvious problem. Birds recaptured at Prince Island and the Santa Barbara Island area rarely were captured at the same site twice. Birds were mobile around the colony area, particularly during the



"flighting" period (prelaying and incubation periods), and were captured when attracted to broadcast vocalizations. Birds captured at different sites possibly were captured once near the nest site and once in another area of the colony. For example, at Prince Island, most recaptures were at net site 2, even though the majority of those birds were banded at net site 1 (Appendix 4). These net sites were only 50-75 meters apart. Net site 1 was located on a dirt slope some distance from most nesting areas whereas net site 2 was placed among rock outcrops where 3 nests were found. In the absence of broadcast vocalizations, most vocal activity occurred among the cliffs and rock outcrops (i.e. in nest areas). Thus, our tape luring attracted birds away from nesting areas, probably including birds from other areas of the island. On the other hand, birds nesting closer to net sites probably have higher capture probabilities than birds nesting further away. It was even more difficult to sample birds at Santa Barbara Island, where nets were placed at the tops of the high, precipitous nesting cliffs. Birds nesting in lower cliff areas or further from net sites probably would have lower capture probabilities than those nesting higher on the cliffs and closer to nets and tape-lures.

Storm-petrels appeared to exhibit a "trap-shy" behavioral response after the first capture. Stress resulting from capture and handling likely led them to avoid further capture. Behavioral response to a tape-lure may explain why recapture rates were much lower than that reported in Hunt et al. (1979) who did not use Ashy Storm-petrel tape lures (R. L. Pitman, pers. comm.). Previously-captured birds also may better avoid nets. On several nights, many more birds appeared to fly around net sites than were captured. This type of behavioral response would act to decrease the recapture rate and could have inflated population estimates.

Some storm-petrels captured in mist nets may breed at other colonies. Birds appeared to move freely between Santa Barbara and Sutil islands which might function as one loose colony. A similar situation was found with Leach's Storm-petrels in the Trinidad Bay area, Humboldt County, in 1989 (Table 9, Appendix 3). Two birds were captured at 2 different colonies there. At Prisoner Rock, more birds were captured than could be accounted for from breeding population estimates based on burrow counts. At Prince Island, Del Norte County, Leach's Storm-petrels were captured in mist nets even though they apparently did not breed there. This situation also has been found with British Storm-petrels (Hydrobates pelagicus) in the eastern North Atlantic where tens of thousands of birds have been captured at locations away from known colonies (Mainwood 1976, Fowler et al. 1982, Fowler and Okill 1988). Birds also have been recaptured at sites many kilometers from original capture locations. Most of these movements have been attributed to wandering nonbreeders, although breeders may also be involved. If Ashy Storm-petrels wandered



between colonies in the Channel Islands, the high capture rates at the relatively small Scorpion and Willows Anchorage rocks colonies could be explained. However, birds also may nest on the adjacent mainland cliffs of Santa Cruz Island which appeared to have abundant potential crevice habitat.

We may have underestimated the number of nonbreeders in our captured samples. Data on other storm-petrel species has indicated that even immature birds may develop incubation patches (Furness and Baillie 1981, Harris 1969, Scott 1970, Wilbur 1969). Up to a third of nonbreeding British Storm-petrels have been reported to undergo complete defeathering of the incubation patch (Scott 1970). If significant numbers of nonbreeding Ashy Storm-petrels develop incubation patches, capture-recapture estimates may be high.

Mist-netting conditions also affected capture probabilities (i.e. time effects). Nights with little or no moonlight had much higher bird activity than those with bright moonlight. Storm-petrels also were difficult to capture on windy nights (i.e. over about 10 knots). Birds detected and avoided mist nets billowing in the wind.

Although some of these factors may have contributed to overestimating breeding population sizes, most capture-recapture estimates for Leach's Storm-petrels at "Button Rock" (Trinidad Bay Rocks) were lower than estimates based on burrow counts. In part, this situation may reflect the small and discrete nature of burrow-nesting colonies of Leach's Storm-petrels, compared to the more spread out crevice-nesting colonies of Ashy Storm-petrels (such as found at Prince and Santa Barbara islands, Santa Barbara County). In any case, we expended minimal effort necessary to derive reasonable and repeatable estimates. Much more effort would be required to improve the reliability of estimates. Such efforts have been underway at the South Farallon Islands (McChesney et al., unpubl. data; Sydeman et al., unpubl. data). Revised estimates for this colony, the world's largest, should be available in the near future.

Although the 1989-1991 estimate was considerably higher than the past estimate, the world population of Ashy Storm-petrels was still very small. A catastrophe (e.g. a large oil spill) near a major aggregation could extirpate a large proportion of this species' population. For example, 4,000-7,000 Ashy Storm-petrels congregate each fall in Monterey Bay off central California (Ainley 1976, Roberson 1985). We recommend the instigation of a monitoring program at all medium and large colonies. Through extensive mist netting and nest searching, yearly fluctuations in breeding population size could be monitored as well as improving population estimates. Occupancy rates of nest crevices also could be determined, permitting comparisons with mist-net derived estimates. Nocturnal visitation and mist netting at other







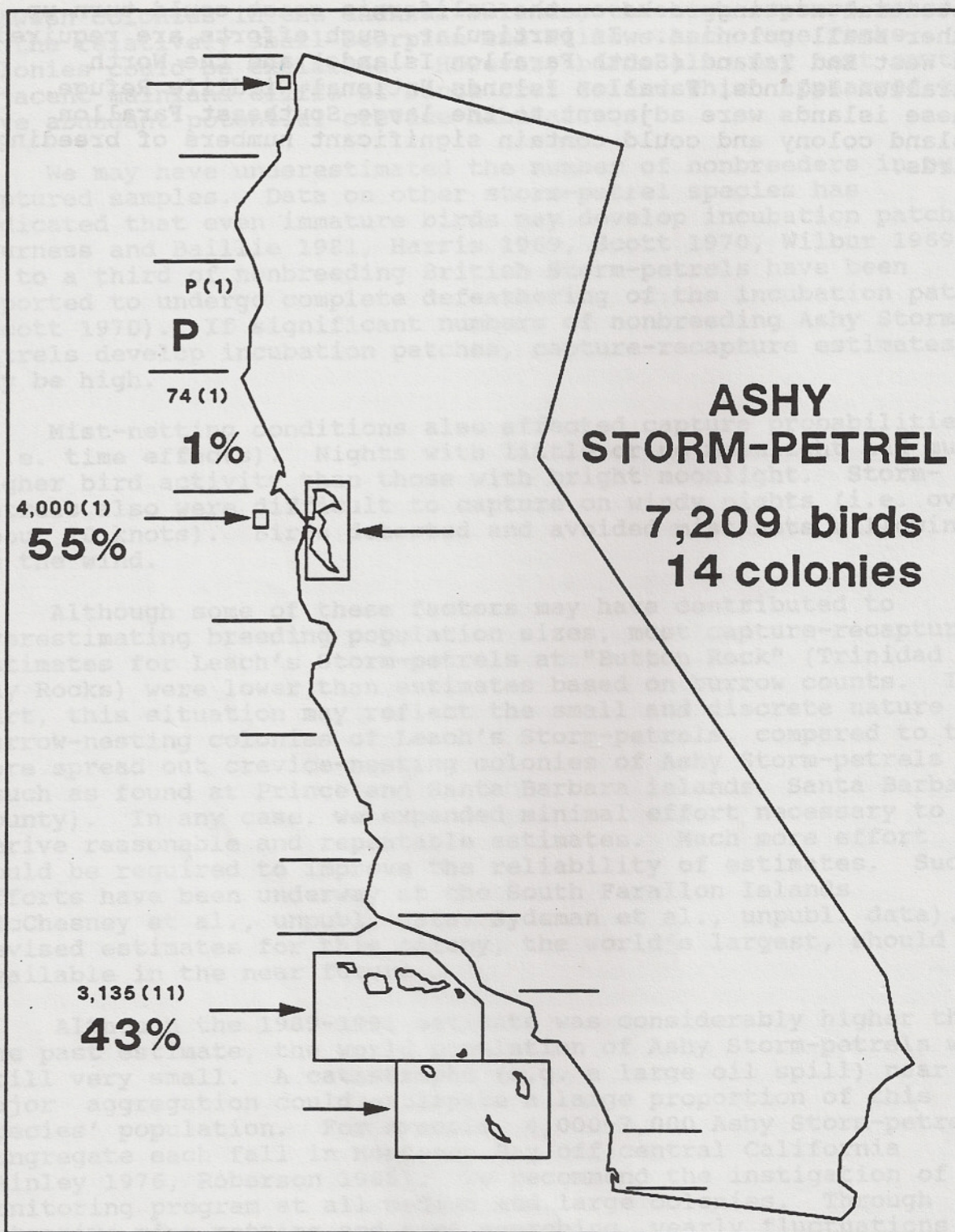


Figure 22. Percentage of state breeding population of Ashy Storm-petrel in coastal regions of California, 1989-1991. Symbols as in Figure 19.



Table 13. Numbers of breeding Ashy Storm-petrels in California in 1975-1980 (Hunt et al. 1979, 1980; SOWLS et al. 1980) and in 1989-1991 (This study).

Colony Name	Colony Number		Number of breeding birds <sup>1</sup> (percent)			
	CA	USFWS	1975-1980		1989-1991	
<u>Northern California</u>						
Van Damme Cove	ME-390-05	379-027	0	(0.0)	X	(0.0)
Bird Rock	MA-380-04	404-010	14	(0.3)	74	(1.0)
<u>Central California</u>						
South Farallon Islands	SF-FAI-02	429-052	[4,000]	(76.7)	[4,000]	(55.5)
<u>Southern California</u>						
Castle Rock	SB-SMI-02	501-005	[200]	(3.8)	[200]	(2.8)
Harris Point to Cuyler Harbor	SB-SMI-06	501-015	[X]	(0.0)	[X]	(0.0)
Prince Island	SB-SMI-07	501-004	600	(11.5)	1,154	(16.0)
Profile Point Area	SB-SZI-03	502-017	H <sub>2</sub>	(0.0)	8	(0.1)
Diablo Rocks	SB-SZI-06	502-020	20 <sub>2</sub>	(0.4)	[20]	(0.3)
Sppit Rock	SB-SZI-08	502-013	40 <sub>3</sub>	(0.8)	[40]	(0.5)
Scorpion Rock	SB-SZI-14	502-010	40	(0.8)	140	(1.9)
Willows Anchorage Rocks	SB-SZI-20	524-019	0	(0.0)	111	(1.5)
Gull Island	SB-SZI-22	524-001	2	(<0.1)	[2]	(<0.1)
Santa Barbara Island	SB-SBI-02	524-008	250	(4.8)	874	(12.1)
Sutil Island	SB-SBI-03	524-009	50 <sup>4</sup>	(0.9)	586	(8.1)
<u>Total</u>			5,216 <sup>5</sup>		7,209	

<sup>1</sup> X, present; H, historical nesting only; estimates in brackets [ ] are based on previous information.

<sup>2</sup> Formerly included in "Kinton Point to Diablo Point" (502-014) in SOWLS et al. (1980).

<sup>3</sup> SOWLS et al. (1980) reported 16+ birds. Estimate is from Hunt et al. (1979).

<sup>4</sup> Estimate is from Hunt et al. (1980). Hunt et al. (1979) and SOWLS et al. (1980) reported 40-50 birds.

<sup>5</sup> SOWLS et al. (1980) reported 5,187 breeding birds.



Table 14. Program CAPTURE breeding population estimates for Ashy Storm-petrels at 3 colonies in southern California in 1991.<sup>1</sup>

Colony Name	Model							
	M(o)	M(h)	M(b)	M(bh)	M(t)	M(th)	M(tb)	M(tbh)
Prince Island	1330 ± 355.5 (633-2027) 0.76	404 ± 19.8 (444-551) 0.86	NE <sup>2</sup> - 0.05	NE <sup>2</sup> - 0.00	1226 ± 323.1 (592-1860) 0.01	NE - 0.27	NE - 0.39	NE - 1.00
Santa Barbara I.	1754 ± 495.1 (783-2725) 1.00	451 ± 21.0 (409-493) 0.89	NE <sup>2</sup> - 0.19	NE <sup>2</sup> - 0.51	1728 ± 482.9 (781-2675) 0.00	NE - 0.35	NE - 0.33	NE - 0.84
SBI & Sutil I. <sup>3</sup>	2204 ± 552.2 (1121-3287) 1.00	570 ± 23.6 (523-616) 0.94	NE <sup>2</sup> - 0.19	NE <sup>2</sup> - 0.47	2191 ± 550.0 (1112-3270) 0.00	NE - 0.36	NE - 0.37	NE - 0.92

<sup>1</sup> See Table 11 and methods for explanation of table presentation.

<sup>2</sup> No estimate due to failure criteria.

<sup>3</sup> SBI = Santa Barbara Island.

Table 15. Program JOLLY breeding population estimates for Ashy Storm-petrels at 3 colonies in southern California in 1991.<sup>1</sup>

Colony Name	Model						
	A	B			D		
	Period 2	Period 2	Period 3	Mean <sup>2</sup>	Period 2	Period 3	Mean <sup>2</sup>
Prince Island	1119 +1038.6 (-916-3155)	1865 +1722.6 (-1511-5242)	1519 +881.9 (-209-3248)	1693 +1670.9 (-1582-4968)	NE <sup>3</sup> - -	NE <sup>3</sup> - -	- - -
Santa Barbara I. 1662)	297 +270.4 (-232-827)	411 +378.6 (-331-1153)	109 +203.0 (-289-507)	260 +397.2 (-518-1038)	743 +323.8 (108-1377)	763 +340.8 (95-1431)	753 +464.0 (-157-
SBI & Sutil I. <sup>4</sup> 4108)	1013 +790.6 (-537-2562)	1406 +1082.9 (-716-3529)	786 +1011.9 (-1197-2770)	1096 +1395.4 (-1638-3831)	1651 +858.4 (-31-3334)	1711 +906.1 (-65-3487)	1681 +1238.4 (-746-

<sup>1</sup> See Table 12 and methods for explanation of table presentation.

<sup>2</sup> Mean was used in calculation of final population estimates.

<sup>3</sup> No estimate due to failure criteria.

<sup>4</sup> SBI = Santa Barbara Island.