

Status and distribution of the Ashy Storm-Petrel (*Oceanodroma homochroa*)

at Point Reyes National Seashore, California, in 2001

Darrell L. Whitworth¹, Harry R. Carter¹, Richard J. Young¹,
Gerard J. McChesney¹, Michelle Hester¹, and Sarah Allen²

¹Department of Wildlife,
Humboldt State University,
Arcata, CA 95521

²U.S. National Park Service
Point Reyes National Seashore
Point Reyes Station, CA 94956

**Final Report
November 2002**

Suggested Citation: Whitworth, D. L., H. R. Carter, R. J. Young, G. J. McChesney, M. Hester, and S. Allen. 2002. Status and distribution of the Ashy Storm-Petrel (*Oceanodroma homochroa*) at Point Reyes National Seashore, California, in 2001. Unpublished report, Humboldt State University, Department of Wildlife, Arcata, California. 15 pp.

Introduction

The Ashy Storm-Petrel (*Oceanodroma homochroa*; Family Hydrobatidae) is a rare seabird with an estimated world population of only 10,000 birds and a breeding distribution restricted to the islands and coastal offshore rocks of central and southern California and extreme northern Baja California (Hunt et al. 1980; SOWLS et al. 1980; Carter et al. 1992, unpubl. data; Ainley 1995; Sydeman et al. 1998). The main breeding population centers are located at Southeast Farallon Island in central California, and San Miguel, Santa Cruz, and Santa Barbara islands in the southern California Channel Islands, but there is additional potential nesting habitat throughout the range which has yet to be adequately surveyed. Their often inaccessible nesting habitats and inconspicuous breeding behavior make detection of small and even medium sized petrel colonies difficult. Ashy Storm-Petrel colonies are located in coastal areas such as islands, offshore rocks, and sea caves which are inaccessible to terrestrial predators. Petrels often nest in small well-concealed crevices and are nocturnal in their above ground activities at the colony (James-Veitch 1970, Ainley et al. 1990, Ainley 1995). Their breeding habitats are often shared with sensitive surface nesting seabird species, such as Common Murres (*Uria aalge*) and Brandt's Cormorants (*Phalacrocorax penicillatus*), which further limits researcher access to petrel nesting areas during much of the breeding season to avoid disturbance.

Their small world population, restricted breeding range, and localized distribution make Ashy Storm-Petrels susceptible to a variety of threats, including; natural and introduced predators, human disturbance, habitat changes, and chemical, oil, and plastic pollution. Population declines over the past few decades at Southeast Farallon Island (Sydeman et al. 1998) have highlighted the need for expanded efforts to identify colonies of this vulnerable species. Although additional colonies have recently been discovered at the Castle/Hurricane Rock Complex (McChesney et al. 2000) in Monterey County and in sea caves at Santa Cruz Island (Carter et al., unpubl. data; McIver 2002), from the few surveys that have been conducted, few colonies have been identified, and regional population trends cannot be assessed.

In September and October 2001, Humboldt State University (HSU) with funding from the Point Reyes National Seashore (PRNS), conducted Ashy Storm-petrel habitat evaluations, nest searches and mist net captures in and near the PRNS to discover petrel breeding colonies and update limited surveys conducted by the U.S. Fish and Wildlife Service (USFWS) in 1989 (Carter et al. 1992, unpubl. data) and 2000 (M. Parker and H. Carter, unpubl. data). In this report, we describe our findings and provide preliminary population estimates for known and newly discovered petrel colonies in the PRNS in 2001. In addition, we discuss preliminary population trends at the colony on Bird Rock in the PRNS where comparable mist net capture efforts were conducted in 1989 and 2001.

Study Area

In 2001, Ashy Storm-petrel (hereafter "petrel") surveys were conducted at five locations along the central California coast (Fig. 1): 1) Point Reyes Headlands from Lighthouse Rock to

Chimney Rock; 2) Bird Rock near the mouth of Tomales Bay; 3) offshore rocks between Double Point and Point Resistance; 4) the coast between the Golden Gate Bridge and Point Bonita; and 5) Steep Ravine near Rocky Point. The first three areas are managed by the PRNS, while the latter two areas are managed by the Golden Gate National Recreation Area (GGNRA) and/or Mount Tamalpais State Park (MTSP). Coastal habitats in these areas are characterized by steep, rocky cliffs and slopes with numerous caves and offshore rocks which provide potential nesting habitat for petrels.

Methods

We scheduled our 2001 surveys for periods within a few days of the new moon (16-23 August and 10-14 September) when nights were darkest because petrel activity at colonies is reduced and mist-netting efforts are less effective on moon-lit nights (Ainley et al. 1990). Work completed in 2001 included: 1) daytime nest searches in sea caves along the Point Reyes Headlands and nighttime mist net captures and nest searches at Chimney Rock on 22-23 August; 2) mist net captures and nest searches at Bird Rock on 10-11 September; 3) habitat evaluation and nest searches on offshore rocks between Point Resistance and Double Point on 12 September; 4) habitat evaluation and nest searches in mainland sea caves along the GGNRA on 14 September; and 5) broadcasting of recorded tape lures and a habitat evaluation along the mainland shore and offshore rocks at Steep Ravine on 22 September and 4 October. Mist-netting efforts on the mainland shore just off Chimney Rock were attempted on 20-21 August, but high winds throughout the night prevented captures and at one point collapsed the mist net. Additional survey efforts were planned in 2001, specifically multiple night mist-netting efforts on Bird Rock, Chimney Rock, and Stormy Stack, but consistent strong winds and rough seas limited efforts to single nights at Bird and Chimney Rock.

Mist-Netting: The mist net site at Chimney Rock was set up near the top of a low saddle on the north side of the rock toward the west end. The mist net site at Bird Rock was located on a broad ledge on the northeast side of the rock, just outside several crevices where a mist net was set up and petrel nests were found in 1989 (Fig. 2 a-b). We deployed a single 2.1 x 5.5 m four tier mist net mounted on alloy metal poles at each site. Storm-petrel vocalizations (predominately Ashy Storm-petrel but also Leach's Storm-petrel [*Oceanodroma leucorhoa*] at Bird Rock) were broadcast from portable cassette players placed under the mist net to attract birds to the site. Captured petrels were banded with U.S. Fish and Wildlife Service #1 incoloy leg bands. For each bird, we examined and scored the development of the single medial brood patch (Ainley et al. 1974) and inspected and scored the primary, rectrix and body molt condition (Carter et al. 1992). We also measured several morphometric characters, including wing, tail, culmen, and tarsus lengths, and body mass.

Habitat Evaluation and Nest Searches: We used an inflatable boat powered with a 15 HP outboard engine for transport to and from all sites except Rocky Point which was accessed on foot. We evaluated each offshore rock or sea cave from the inflatable boat to determine if suitable petrel breeding habitat was present and whether or not a safe landing spot was available.

If suitable nesting habitat was present and accessible, crew members were dropped off on the offshore rock or near the cave entrance to inspect habitats and potential nest crevices with small hand-held flashlights. Nest searches were performed during the daytime at all locations except the two offshore rocks where capture efforts were conducted. All relevant information (i.e., date, observer, presence or absence of nest sites and suitable habitat, evidence of past nesting, other species present) for each location was entered directly into a field notebook by the searcher/observer. Most caves and offshore rocks were photographed for later identification. Nest searches at Bird Rock were limited to the north side of the rock to avoid disturbing hundreds of roosting Brandt's Cormorants and Brown Pelicans (*Pelecanus occidentalis*).

Results

Point Reyes Headlands: We evaluated two accessible caves for possible petrel nesting during limited daytime surveys on 22 August along the Point Reyes Headlands. The first cave was located high above the water just east of the Pt. Reyes Lighthouse, and the second cave in Sea Lion Cove. Although neither cave contained evidence of petrel nesting, the first cave contained suitable breeding habitat under large rocks on the cave floor and along the cave walls. Evidence of nesting by other seabird species, including an old Common Murre egg, was found under rocks on the cave floor. The cave floor in Sea Lion Cove was covered by water except for a small cobble beach at the rear and contained no potential nesting habitat. Rocky scree areas east of the lighthouse and on the west side of Sea Lion Cove were not searched in 2001, but did not appear to harbor much, if any, potential nesting habitat. Several rocks, caves, and scree areas along the Point Reyes Headlands were checked in September 2000, but few if any potential crevices and no petrel odor was noted (M. Parker and H. Carter, unpubl. data).

Chimney Rock: We captured five petrels at Chimney Rock over 6.75 h (21:26 - 04:10) of capture effort on the night of 22-23 August. The incubation patches of the captured birds indicated that all were actively breeding or had attempted to breed in 2001. Three birds had bare well-developed brood patches, one had a defeathering and the other a refeathering brood patch (Table 1). We observed two petrels flying around the net which were not captured (although they may have been captured previously or later that night). While nest searches of all accessible parts of the rock failed to discover any active nests on the night mist-netting was conducted, petrel odor was noted at several crevices, and petrel wings and feathers were collected just outside and within two crevices. These crevices extended well back beyond our view and could have easily concealed a number of nests. This was the first direct evidence of petrel nesting at Chimney Rock, as no previous capture efforts are known for this location. However, petrel odor was noted in several crevices at Chimney Rock in September 2000 (M. Parker and H. Carter, unpubl. data). Given the number of petrels captured, the small size of the rock, and the amount of suitable nesting habitat available, we estimated 5-10 pairs of petrels bred at Chimney Rock in 2001 (Table 2).

Bird Rock: We captured two petrels at Bird Rock over 8.25 h (21:00 - 05:12) of capture effort on 10-11 September. The refeathering incubation patches displayed by the captured birds indicated

that both were actively breeding or had attempted to breed in 2001 (Table 1). We observed three other petrels flying around the net which were not captured (although they may have been captured previously or later that night). We searched the numerous crevices (six small, 13 medium, and five large crevices) on the ledge wall in back of the mist net site where several nests were discovered in 1989, but no active nests were detected in 2001 and no petrel odor was noted within the crevices. Large numbers of roosting cormorants and pelicans prevented searches on the south side of the rock, but searches along the east and west sides of the rock failed to discover any active petrel nests or evidence of recent nesting. Although we captured only two petrels at Bird Rock and found no active nests, based on the few captures and available habitat we estimated 5-10 breeding pairs in 2001 (Table 2).

Our 2001 estimate for Bird Rock is markedly lower than the 1989 estimate of 47 breeding pairs (Carter et al. 1992; Table 2) based on two nights of capture and nest search efforts (Table 1). On the night of 6-7 August 1989, forty petrels were captured and three nests were observed. Two nests (one unattended chick and two adults attending an egg) on the north side and one nest (unattended chick) on the south side of Bird Rock. All but two of the captured petrels had bare ($n = 14$) or refeathering ($n = 24$) brood patches (Table 1). A few weeks later on the night of 31 August-1 September, twenty petrels were captured (12 recaptures and eight new captures) and six nests (all with chicks) were found in crevices on the north side of the rock. All twenty petrels captured during the latter effort had bare ($n = 2$) or refeathering ($n = 18$) incubation patches (Table 1).

Offshore Rocks between Point Resistance and Double Point: We evaluated five offshore rocks between Point Resistance and Double Point which were considered large enough to harbor potential petrel breeding sites including; Point Resistance Rock, North and South Millers Point Rocks, Double Point Rock, and Stormy Stack (Fig. 1). After visual inspection from the inflatable boat, we determined that the first four rocks contained little or no accessible breeding habitat and no further searches were conducted. While some accessible shallow crevices were present on all the rocks, it appeared from the boat that they were too shallow to serve as potential nest sites. Marginal crevice habitat was present on Millers Point South Rock and Double Point Rock, but crevices were located on steep rock faces which were not accessible without climbing gear. In contrast, there were numerous deep crevices on the accessible north side of Stormy Stack which we felt warranted further investigation.

Nest searches on Stormy Stack yielded four nests, two active nests with what appeared to be unattended chicks, one active nest with an incubating adult, and one apparently abandoned egg. Three of the nests were found in crevices within a deep fissure running up the steep northwest side of the rock (Fig. 3 a-b). This fissure contained numerous inaccessible crevice sites which could have harbored several undetected nests. We attempted to collect the abandoned egg, but it was too deep within the crevice to retrieve. On the basis of nest searches and an evaluation of the available habitat, we tentatively estimated 20-40 breeding pairs nesting on Stormy Stack. Mist netting captures would have helped refine our estimate, but a planned capture attempt at Stormy Stack on the night of 13 September was cancelled as rough seas encountered en route to

the rock forced us to abandon the effort.

Golden Gate National Recreation Area: Most of the caves between the Golden Gate Bridge and Point Bonita were evaluated from the boat as they were too shallow and the cave floors either completely submerged or composed of large cobbles which were inundated at high tides. We did search for nests inside ten of the caves but found no evidence of petrel nesting and noted no petrel odor. Habitat was poor in all the caves searched, with mainly sand or washed cave floors and few if any sheltered sites.

Steep Ravine: We evaluated mainland and offshore habitats at Steep Ravine near Rocky Point after reports of several petrel flying above campsites on 21 August 2000 (P. Pyle, pers. comm). On the night of 22 September 2001, we conducted limited nest searches in potential habitat near the campsites and attempted to attract petrels with taped vocalizations (20:30-22:30) from a mainland location near two small islets, but found no evidence of petrel nesting or presence at either site. A daytime evaluation of the coastal area on 4 October, indicated that further search and capture efforts should be conducted, particularly capture efforts and nest searches on the talus slope above the campsite and on the small islets just off Rocky Point.

Discussion

STORM-PETREL COLONIES IN THE POINT REYES NATIONAL SEASHORE

Our discovery of Ashy Storm-petrel colonies at Chimney Rock and Stormy Stack in 2001 is an indication that petrels are more widespread in central California than was previously thought. As late as 1996, the South Farallon Islands and Bird Rock colonies were the only documented petrel colonies in central California, and Ainley (1995) had stated that "most of the likely nesting areas have been surveyed". In addition, a nest search for petrels was conducted at the North Farallon Islands in September 1994, but few suitable crevices were found and no evidence of nesting or petrel odor was noted (McChesney et al. 1994). However, limited searches of suitable habitat along Point Reyes Headlands in 2000 discovered evidence (petrel odor in rocky crevices) of likely petrel breeding on Greentop and Chimney Rocks (M. Parker and H. Carter, unpubl. data), and stimulated more extensive surveys in the PRNS in 2001. The results of these surveys, together with the discoveries of several small colonies at Castle/Hurricane Rocks (McChesney et al. 2000) and Santa Cruz Island (Carter et al, unpubl. data; McIver 2002) have demonstrated that areas with potential nesting habitat exist along the central and southern California coast that have yet to be adequately surveyed. Detecting petrel colonies requires specific survey efforts (i.e., crevice searches and mist-netting). Prior to this study, the only petrel surveys conducted in the PRNS were at Bird Rock in 1972 (Ainley and Osborne 1972), 1979 (Sowls et al. 1980), and 1989 (Carter et al. 1992), and along the Point Reyes Headlands in 2000 (M. Parker and H. Carter, unpubl. data). Only the 1989 effort involved mist net captures. Although there is no history of previous surveys at Chimney Rock or Stormy Stack, we believe that the colonies discovered there represent long established colonies which have gone undetected due to a lack of adequate survey efforts, rather than recently established breeding

sites. It is possible that small petrel colonies are established in suitable habitats along the central California coast by petrels emigrating from the large Farallon Islands colony, but recent declines there make this unlikely (Sydeman et al. 1998). However, it is also possible that small petrel colonies in the PRNS are self-sustaining, but limited by the amount of nesting habitat available.

The discoveries of small petrel colonies scattered widely around central California is certainly a positive signal for the future of this vulnerable species, as a wider breeding distribution lessens the threat of a localized catastrophe extirpating the entire population. However, the recently discovered colonies in the PRNS and at Castle/Hurricane Rocks are all small and it is likely that less than a few hundred petrels breed along the central mainland California coast in Marin, San Francisco, San Mateo, Santa Cruz, Monterey and San Luis Obispo counties, although few rocks and mainland cliffs have been examined in this area (McChesney et al. 2000). For example, much suitable habitat exists on San Pedro Rock where petrel odor has been noted on several occasions between 1998 and 2002 (M. Parker and H. Carter, unpubl. data). Coastal areas at Steep Ravine and Double Point appear to contain suitable petrel breeding habitat for small numbers and warrant further survey efforts, but caves in the GGNRA appear unsuitable as petrel breeding habitat.

POPULATION TRENDS AT BIRD ROCK

Apparent population declines observed at the South Farallon Islands (Sydeman et al. 1998) and Bird Rock are alarming. These are the only colonies in central California with any data concerning petrel population trends, and, since both indicate decreasing populations, may indicate losses throughout the region. With scant available data, it is difficult to speculate about the cause of the apparent decline at Bird Rock between 1989 and 2001. It seems improbable that our survey on 10-11 September was conducted after most or all nesting attempts were completed at Bird Rock, as we observed chicks and incubating adults in nests at Stormy Stack just a few days later and September is the main chick-rearing period at the South Farallon Islands with most fledging in late September, October and early November (Ainley et al. 1990, Ainley 1995). Thus, considering the small captured sample and the lack of evidence of active nests and petrel odor from visible crevices, there is strong evidence large declines have occurred. In fact, our assessment of 5-10 breeding pairs may be an overestimate given the past history of the rock and the considerable nesting habitat available. Instead, it is possible that the few birds captured here are visitors from other colonies and that breeding no longer occurs at Bird Rock.

We have insufficient data to determine if the factors responsible for the suspected declines or possible extirpation of the petrel colony at Bird Rock reflect large scale regional problems (e.g., oil pollution, chemical pollution, reduced prey resources). If regional threats were having significant impacts in the region, the detrimental effects should be expressed at Point Reyes, the South Farallon Islands (just 35 km south of Point Reyes), and other colonies in central California whose birds probably share similar foraging habitats. However, population declines at the South Farallon Islands have been primarily attributed to increased predation by Western Gulls (*Larus occidentalis*) and owls and not any specific large scale at-sea threats (Sydeman et al. 1998),

although pollution and reduced prey resources have been noted as possible effects.

Similarly, the most plausible factors potentially responsible for population decline at Bird Rock are colony-specific impacts such as increased competition with other crevice nesting seabirds, Western Gull predation, and possibly human disturbance. Our surveys in 2001 were too late in the year to determine if other seabird species utilized crevices on Bird Rock, but surveys in 1989 did note Pigeon Guillemots (*Cephus columba*) nesting on Bird Rock and Rhinoceros Auklets (*Cerorhinca monocerata*) were noted at sea in the area of the rock. Rhinoceros Auklet numbers have increased and their range expanded over the past few decades in California (McChesney et al. 1995), and their specific breeding habitat requirements (i.e., large crevices or burrows), which are limiting at many colonies, are found on Bird Rock. Most of the crevices which harbored petrel nests in 1989 were found within larger openings that appeared to have been excavated by alcids, long ago and were now hardened within the bank composed of sediments and guano (Fig. 2a,b). Petrels probably do not nest in the main crevice chamber, and instead used smaller side chambers in 1989. Any alcid species present in the main chamber may prevent petrels from entering side chambers. However, small numbers of active petrel nests were found in small crevices on other parts of Bird Rock in 1989 (Carter et al. 1992, unpubl. data).

We have insufficient data to determine if the Western Gull colony on Bird Rock or gull predation on petrels at Bird Rock have increased to such an extent that the petrel population on the rock has been reduced or extirpated. In 1989, the gull colony on Bird Rock numbered 84 nesting pair (Carter et al. 1992). Petrels are sensitive to disturbance in the immediate area of the nest site, but it is unlikely humans landing and walking around the rock would cause large-scale abandonment. Even though Bird Rock lies just outside the entrance to Tomales Bay and considerable boat traffic passes the easily accessible rock, there was no visible evidence of human presence during our 2001 survey there.

FUTURE RESEARCH

With petrel population declines apparently occurring at the South Farallon Islands and at Bird Rock, expanded survey efforts over a wider area and broader time period are needed to identify other small colonies and monitor known colonies in the PRNS. We recommend an ongoing monitoring program including nest searches and mist-netting at known PRNS petrel colonies (Bird Rock, Chimney Rock and Stormy Stack). Survey and monitoring efforts should be initiated as soon as the sensitive surface nesting seabirds on these rocks have completed breeding and continue once a month through October. Special permits may be required to disturb roosting Brown Pelicans. Capture efforts should be standardized and conducted within 3-4 days of the new moon, if weather and sea conditions permit. General seabird surveys at known petrel colonies would also be useful to determine if Rhinoceros Auklet, Pigeon Guillemot, or Western Gull numbers are increasing and detect any potential detrimental effects on petrels.

Acknowledgments

Research in 2001 was funded by the U.S. National Park Service (Point Reyes National Seashore). Administrative support was provided by Humboldt State University, and the U.S. Geological Survey, Western Ecological Research Center (Dixon Field Station) through the efforts of Rick Golightly and Dennis Orthmeyer. We thank Patience Browne for her assistance at Steep Ravine and Deborah Carter for boat work on 13 September. Mike Parker (U.S. Fish and Wildlife Service, San Francisco Bay National Wildlife Refuge Complex) provided information from September 2000 surveys at Point Reyes Headlands.

Literature Cited

- Ainley, D.G. 1995. Ashy Storm-petrel (*Oceanodroma homochroa*). In A. Poole and F. Gill (Editors). Birds of North America, No. 185. Academy of Natural Sciences, Philadelphia, PA and the American Ornithologists' Union, Washington, D.C.
- Ainley, D.G., R.P. Henderson, and C.S. Strong. 1990. Leach's Storm-Petrel and Ashy Storm-Petrel. Pages 128-162. In D.G. Ainley and R.J. Boekelheide (Eds.). Seabirds of the Farallon Islands. Stanford Univ. Press, Stanford, California.
- Ainley, D.G., S. Morrell, and T.J. Lewis. 1974. Patterns in the life histories of Farallon storm-petrels. Living Bird 13: 295-312.
- Ainley, D.G. and T.O. Osborne. 1972. A Marin County, California, breeding site for Ashy Petrels. California Birds 3: 71.
- Carter, H.R., G.J. McChesney, D.L. Jaques, C.S. Strong, M.W. Parker, J.E. Takekawa, D.L. Jory, and D.L. Whitworth. 1992. Breeding populations of seabirds in California, 1989-1991. Unpublished draft report, U.S. Fish and Wildlife Service, Northern Prairie Wildlife Research Center, Dixon, California.
- Hunt, G.L., Jr., R.L. Pitman, M. Naughton, K. Winnett, A. Newman, P.R. Kelly, and K.T. Briggs. 1979. Summary of marine mammals and seabird surveys of the Southern California Bight area, 1975-1978. Vol. 3. Investigator's reports, pt. 3: seabirds of the southern California Bight, book 2: distribution, status, reproductive biology and foraging habits of breeding seabirds. Report to Bureau of Land Management, Regents of the Univ. of California, Irvine.
- James-Veitch, E.A.T.C. 1970. The Ashy Petrel, *Oceanodroma homochroa*, at its breeding grounds on the Farallon Islands, California. Unpubl. Ph.D thesis, Loma Linda University, Los Angeles, California.
- McChesney, G.J., H.R. Carter, and M.W. Parker. 1994. Report on an investigation of the North Farallon Islands, Farallon National Wildlife Refuge, California, 2 September 1994. Unpublished report, National Biological Survey, California Pacific Science Center, Dixon, California.
- McChesney, G.J., H.R. Carter, and M.W. Parker. 2000. Nesting of Ashy Storm-Petrels and Cassin's Auklets in Monterey County, California. Western Birds 31: 178-183.
- McChesney, G.J., H.R. Carter, and D.L. Whitworth. 1995. Reoccupation and extension of southern breeding limits of Tufted Puffins and Rhinoceros Auklets in California. Colonial Waterbirds 18: 79-90.

McIver, W.R. 2002. Breeding phenology and reproductive success of Ashy Storm-Petrels (*Oceanodroma homochroa*) at Santa Cruz Island, California, 1995-98. Master's thesis, Humboldt State University, Arcata, California.

Sowls, A.L., A.R. DeGange, J.W. Nelson, and G.S. Lester. 1980. Catalog of California seabird colonies. U.S. Fish and Wildlife Service, Biological Services Program, FWS/OBS 37/80, Washington, D.C.

Sydeman, W.J., N. Nur, E.B. McLaren, and G.J. McChesney. 1998a. Status and trends of the Ashy Storm-petrel on Southeast Farallon Island, California, based upon capture-recapture analyses. *Condor* 100: 438-447.

Table 1. The number and incubation patch scores of Ashy Storm-petrels captured at Bird Rock and Chimney Rock in the Point Reyes National Seashore in 1989 and 2001.

Location	Date	Incubation Patch Score						Total
		0	1	2	3	4	5	
Chimney Rock	20-21 August 2001	-	1	-	3	1	-	5
Bird Rock	6-7 August 1989	1	1	-	14	24	-	40
	31-1 September 1989	-	-	-	2	16	2	20*
	10-11 September 2001	-	-	-	-	1	1	2

*Total includes 12 petrels recaptured from previous mist-netting effort on 6-7 August 1989.

Table 2. Numbers of breeding pairs of Ashy Storm-petrels estimated for all known colonies in the Point Reyes National Seashore, including the number of captured petrels and documented nests at each site.

Location	Year	Captures	Nests	Estimated Number of Breeding Pairs
Bird Rock	1989 (two nights)	48	6	47
	2001 (one night)	2	0	5-10
Chimney Rock	2001 (one night)	5	0	5-10
Stormy Stack	2001 (one day)	--	3	20-30

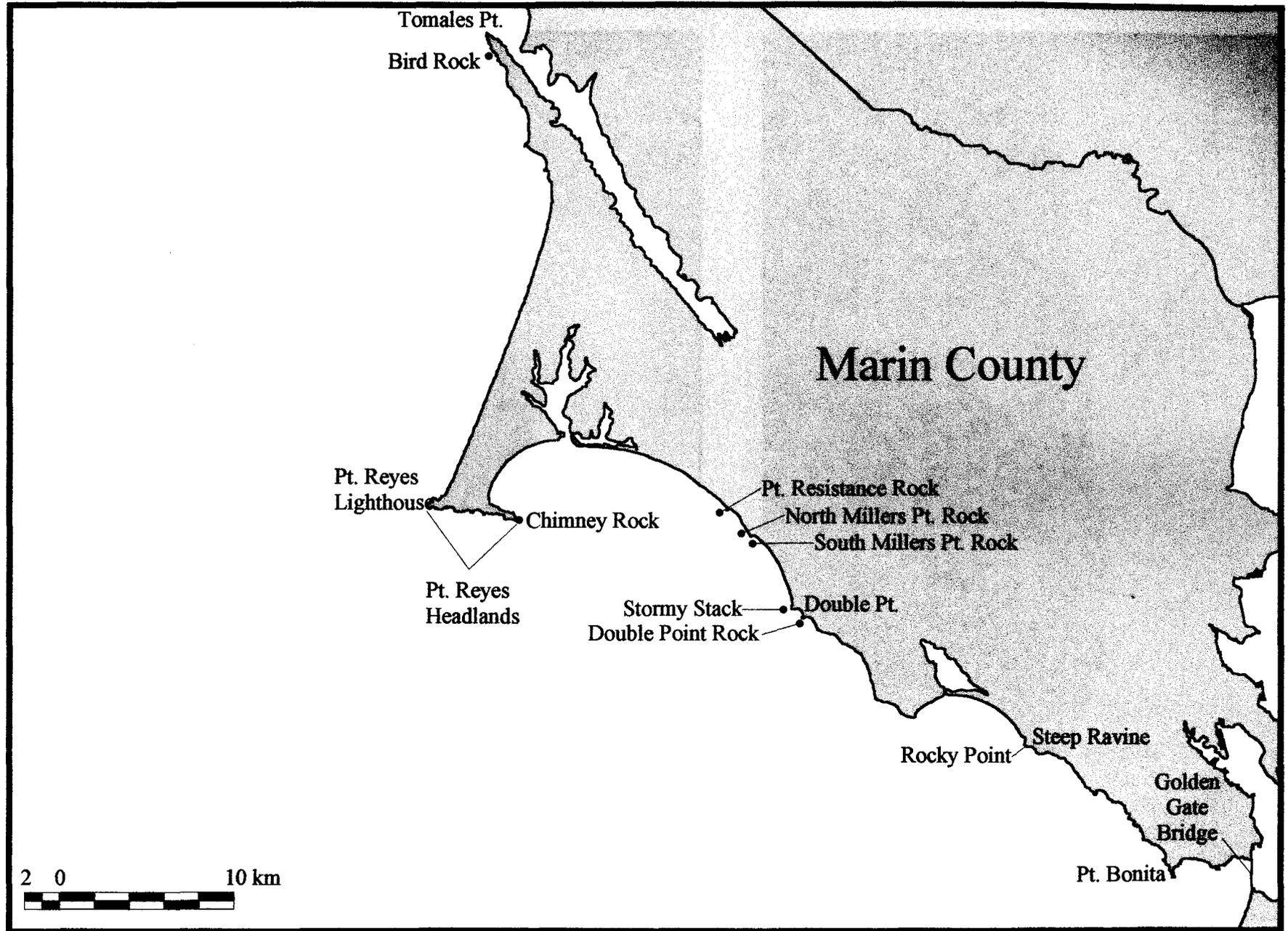


Figure 1. Ashy Storm-petrel study areas in Point Reyes National Seashore and the Golden Gate National Recreation Area.

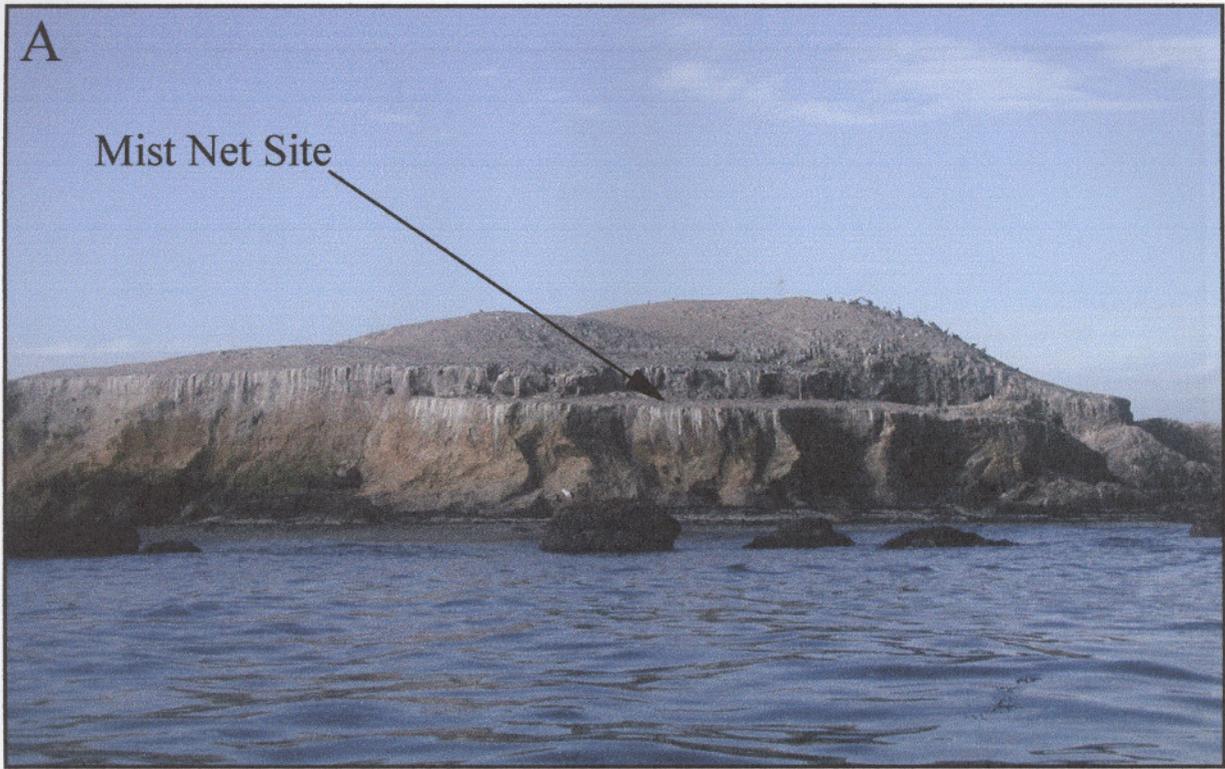


Figure 2 a-b: a) Photograph of Bird Rock indicating the location of the Ashy Storm-petrel mist netting site of 6-7 August and 31 August-1 September 1989, and 10-11 September 2001. b) Close-up photo of the mist net site and crevice habitat where the petrel nests were found in 1989. Photographs by D.L. Whitworth, 10-11 September 2001.

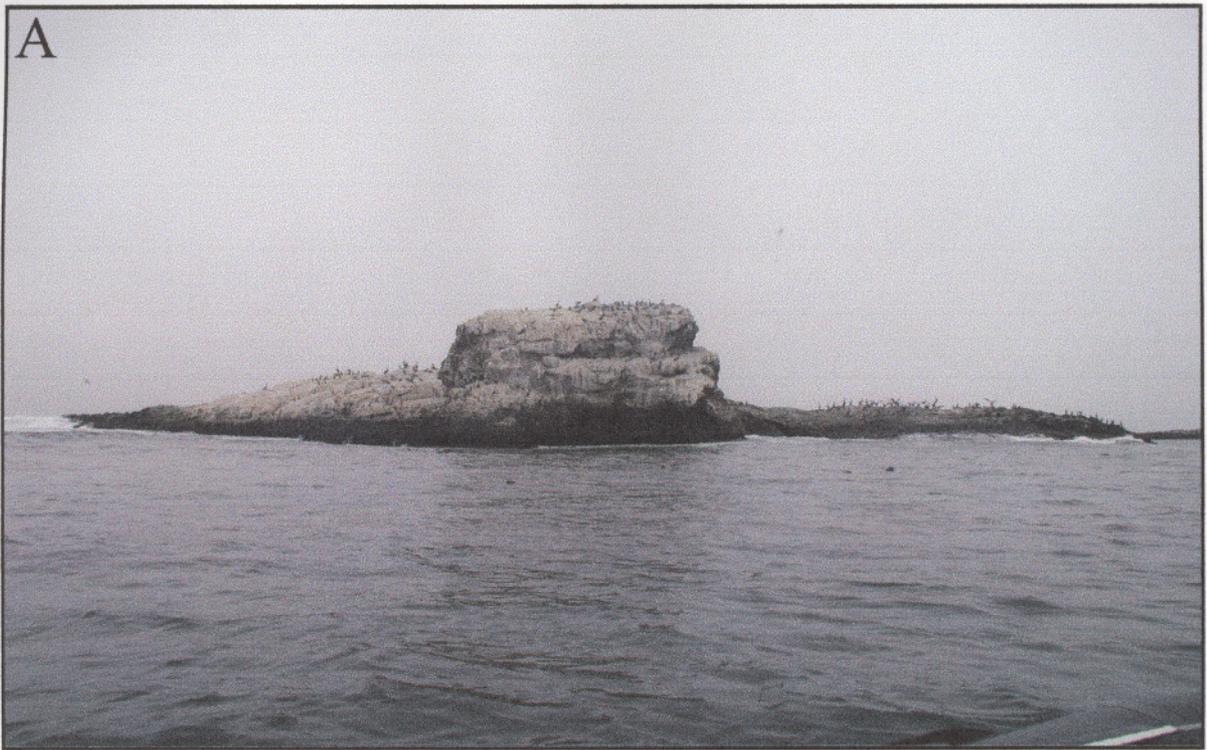


Figure 3 a-b: a) Photograph of the north side of Stormy Stack illustrating the location of three Ashy Storm-petrel nests found during surveys on 12 September 2001. b) Close-up photo of the crevice habitat where three petrel nests were found. Photographs by D.L. Whitworth, 12 September 2001.