

DISCOVERY OF BREEDING BLACK-CAPPED PETRELS ON HISPANIOLA

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THE status of the Black-capped Petrel (*Pterodroma hasitata*), which formerly bred on several West Indian islands, has been obscure since late in the nineteenth century, when the location of the diminishing breeding colonies was lost to science. The early history and decline of this species has been well summarized by Bent (1922) and Murphy (1936). Both authors suggested that the species might be nearing extinction.

In 1951, a breeding colony of the closely allied Cahow (*Pterodroma cahow*) was discovered on Bermuda (Murphy and Mowbray, 1951). This event bode well for the status of *P. hasitata* for it soon became evident from a study of the Cahow that the survival problems facing that species since the seventeenth century must have been greater than any likely to have confronted the Black-capped Petrel. It seemed probable, even in 1960, that a breeding colony of the latter might survive in some part of the former range. Published references to the bird after 1900 support this view, although they deal mainly with sightings and specimen records.

Nichols (1913) and Wetmore (1927) have observed *P. hasitata* at sea during the present century. Wetmore saw several Black-capped Petrels in the Sargasso area of the Caribbean in 1920. In view of the vast ocean range characteristic of most petrels, this species must still have been fairly numerous at that date. A similar conclusion might be drawn from the record of an adult female found dead on Fairfield Beach, Connecticut, after the disastrous hurricane of 21 September 1938 (Holman, 1952). Hobley (1932) reported an adult picked up apparently exhausted in the streets of Roseau, in Dominica, on 2 May 1932. Although there is no positive indication that this bird came from a breeding colony on Dominica, it may be significant that this is the only island within the former breeding range of *P. hasitata* on which the mongoose (*Herpestes auropunctatus*) has not been introduced. The remaining published records pointed to Hispaniola as the last major breeding ground, and also gave some indication of comparative breeding success as late as 1938. Wetmore and Swales (1931) noted the capture of a specimen at Moca, an inland locality in the Dominican Republic, on 15 May 1928, and in another paper Wetmore (1932) stated that no less than 4 specimens were taken and fully 100 observed on this occasion. At a later date, Wetmore (1939) reported on a fledgling, not long out of the nest, captured on the streets of Port-au-Prince, Haiti, on 30 June 1938. James Bond (pers. comm.), who visited La Selle Ridge in Haiti in the summers of 1928, 1930, and 1941, was told by the natives that a ducklike nocturnal bird occurred there in winter. This seems

almost certain to have been *P. hasitata*. Bond also stated that the mongoose, after relatively recent introduction into Haiti, is thought to have reached La Selle Ridge about 1941.

Having shared in the rediscovery and subsequent study of the Cahow breeding colony, I early became interested in the possibility of rediscovering nesting colonies of the Black-capped Petrel. In 1961 I was enabled, through a grant from the Bermuda Government Aquarium Research Fund, to make a short reconnaissance expedition to the West Indies.

SEARCH EXPEDITIONS

In the late fall of 1961, I visited Dominica, B.W.I., and the Republic of Haiti on Hispaniola. The period of field work was timed to coincide with the traditional period of maximum activity on the breeding grounds. I decided that the best method of locating colonies would be to listen for the noisy aerial displays from likely vantage points at night. Some previously reported searches may have failed simply because they concentrated on the much more difficult task of locating occupied burrows in daylight.

Dominica, B.W.I.—This area was visited between 16 October and 10 November 1961. Conditions for field work were extremely difficult. In addition to the steep terrain and impenetrable nature of the rain forests, it was also a wet season. Nights were spent on or near the summits of the two highest peaks, Trois Pitons and Diablotin, where as much as 4 inches of rain fell each night and progress was possible only by climbing through the top of a matted dwarf forest. Western slopes of Morne Diablotin were watched on several clear and moonlit nights in early November, all with negative results. It was possible only to check a small proportion of potential breeding sites by night watches. Many parts of the island, including all climatic zones and some offshore rocks, were, however, visited in daylight hours. Examination of the terrain suggested that the original breeding population occupied only a narrow zone at about 1,200 m elevation on leeward, or 1,000 m on windward, slopes of one or more of the higher peaks. Excessive rainfall and ground saturation might be a limiting factor at higher altitudes, and continuity of tall forest cover a limiting factor at lower altitudes. Many potential sites within these limitations are probably above the reach of the introduced opossum (*Didelphis marsupialis*) which, according to plantation owners, does not occur much above 800 m, and are probably also too steep to be reached by pigs, which have probably roamed wild in the interior for more than three centuries. We found tracks of pigs on more level areas up to 1,200 m, but never on the near-vertical slopes. *Rattus rattus* may occur throughout, but is unlikely to be a significant factor. I have concluded, unlike Murphy and Mowbray (1951), that this species does not interfere much with the Cahow on Bermuda. In

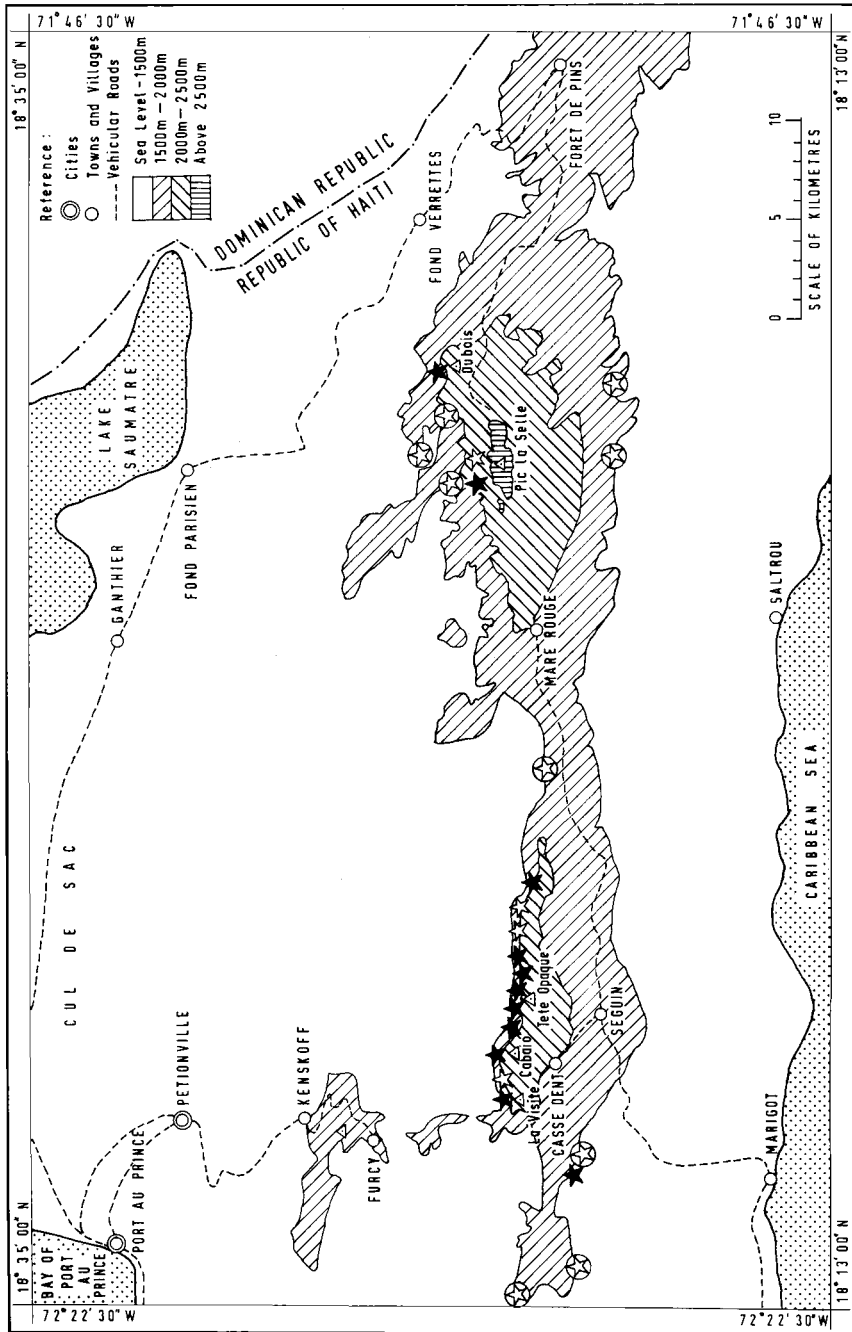
my excursions I questioned many local inhabitants about the petrel. Although some of the older people knew the tradition of the "Diablotin" as it was locally called, they unanimously agreed that it disappeared before their time. It should be pointed out, however, that more than 150 square miles of the interior of Dominica still remains uninhabited and is rarely, if ever, visited at night.

Haiti.—This country was visited between 12 and 23 November 1961. In Port-au-Prince I first inquired at the Department of Agriculture, and examined collections in taxidermists' shops, museums, and other institutions for specimens and information on the petrel. This resulted in the discovery of four specimens and two other records which were reliably reported. (Details of these and later specimens are given in the Appendix.) All of these records postdated the last published record of the petrel and two were fledglings obtained in the previous summer (1961). These records suggested that the petrel was still breeding successfully in fairly large numbers somewhere on Hispaniola in spite of the mongoose, which is now well established there. The Massif de la Selle was clearly indicated as a likely breeding area. One fledgling specimen was actually obtained there, and most of the others were recorded in or near Port-au-Prince which is only 25 km from high parts of the ridge.

The next step, therefore, was to proceed with a search for breeding colonies on La Selle Ridge. Plans to do this in November, 1961, unfortunately had to be cancelled when a political crisis in the neighboring Dominican Republic indirectly caused a restriction of my movements in Haiti.

A second expedition to Haiti, made possible by a grant from the Chapman Memorial Fund, was undertaken in 1963. January and February were chosen for the search, partly because this is the dry season in Haiti. In addition I assumed that noisy nocturnal activity would occur over the breeding grounds in these months on the basis of observations of the related Cahow.

My search itinerary consisted of a series of night watches, covering most major cliffs and steep forested slopes on the Massif de la Selle. Such areas were considered likely breeding sites for the petrel and were located initially by reference to the U. S. Army Inter-American Geodetic Survey Maps of Haiti. Shortly after my arrival in Haiti I was able to reconnoiter the entire Massif de la Selle by helicopter. This helped considerably in the final selection of likely breeding areas. These were then checked out on a series of excursions into the mountains varying from three days to a week in duration. Although a jeep was available for transport to the mountains, a great part of the traveling had to be accomplished on foot with the aid of hired porters. To facilitate communication with the native



inhabitants who speak a Creole dialect, I hired an interpreter. In order to increase the coverage of the night watches I often moved between two or three widely separated localities at night. In steep forested areas or on dark foggy nights, this was only possible by making well marked trails during daylight beforehand.

A breeding colony of *P. hasitata* was discovered at the first "likely area" checked, and thereafter ten more colonies were found during the survey. The position of these is indicated on the map (Figure 1). In spite of the number of colonies located, every one proved to be inaccessible in view of my limited climbing ability. Since I was unable to examine nest sites, many of my conclusions on the breeding biology of the petrel and its present status can only be generalized from indirect observations.

PRESENT STATUS

Breeding habitat.—At present the breeding habitat is confined to areas so steep as to be virtually inaccessible. This is in contrast to the historic accounts, which imply clearly that burrows occurred on slopes negotiable by men and dogs. The 11 colonies located were on forested cliffs 500 m or more in height and above 1,300 m altitude (Figure 2, C). Most were located between 1,500 m and 2,000 m above sea level. Proximity to the sea did not appear to be necessary. All but one of the colonies were on the north or inland side of La Selle Ridge, presumably because the most suitable habitat occurred there. One of these, near Pic la Selle, was 20 km from the sea. The mountains of the Massif de la Selle are composed primarily of dolomitic limestone. Where this rock is exposed as bare cliffs, mainly on east-facing slopes, there are no caves or crevices to provide a foothold for petrels. Colonies occurred only where a sufficient soil cover existed for burrowing—hence the association with forested cliffs where the vegetation held in place a steep talus of boulders, soil, and humus at a high level of stability. I reached such an area, where petrels had been burrowing, on one occasion and found loose feathers and soil kicked out from under boulders, but no occupied burrows. There were sufficient gaps in the horizontally growing forest cover here to give the petrels direct access to the ground.

Population.—It was exceedingly difficult to estimate the population when the nest sites were inaccessible and visited by petrels only at night.

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Figure 1. Breeding range of *Pterodroma hasitata* on La Selle Ridge, Haiti, showing relief and vehicular access routes. Black stars, forested cliffs checked in 1963 which were occupied by breeding colonies; open stars, forested cliffs checked in 1963 which were not occupied by breeding colonies; open stars inside circles, forested cliffs not checked in 1963 which may support breeding colonies.

Flying birds could not be seen to be counted and individual calls could not be discriminated from the total chorus. The volume of chorus was, however, arbitrarily measured and some advantage was derived from the fact that the ratio of chorus volume to total breeding population is known for the Cahow (Wingate, unpublished). On this basis I judged that each colony of *P. hasitata* contained at least 50 pairs and probably many more.

Estimating the number of colonies on Hispaniola was somewhat easier. This was done by calculating the ratio of occupied to unoccupied potential



Figure 2. A (above). Living *Pterodroma hasitata*, dorsal aspect. B (opposite, top). Ventral aspect of the same bird. C (opposite, bottom). View to the east from Morne Cabaio. Tête Opaque in middle distance. The cliff shown is about 600 meters in height. Five petrel colonies occur in the section of cliff shown.



sites as determined on La Selle Ridge and relating this to the approximate number of potential sites on the island, as deduced from maps. Assuming, on authority of Wetmore (1932), that mountain ranges in the Dominican Republic are occupied, something in the order of 40 colonies may exist. Correlating these estimates gives a minimum breeding population of 4,000 birds. The actual population is probably much higher.

Human contact.—The Haitian peasants living in the vicinity of breeding colonies are familiar with the petrel and its habits and call it "Chatte Huant," a name which they apply also to owls and goatsuckers. None of those whom I questioned had ever succeeded in reaching nest sites. In fact they unanimously declared that it was impossible to do so. They do, however, know of a way to catch the birds in limited numbers for food. The method is called "Sen Sel," which translated literally can mean either "without salt" or "salt water seine." It involves lighting a moderate fire on the cliff top above a colony on moonless nights when heavy fog shrouds the mountains. Birds flying near the fire in these conditions become disorientated and crash either directly into the fire or onto vegetation nearby. Because they are caught only when a fire is lighted *above* a colony the practice is fairly limited. Few people live in the predominantly pine forest zone above colonies and the reward is not great enough to induce them to climb up from the heavily populated valleys below. Also the practice is said to work only from January through March and the numbers of nights during that period when all conditions for success combine are few. This is indicated by my own record: between 26 January and 25 February, 12 nights were spent above colonies trying "Sen Sel," and success was achieved only once, near Morne Cabaio on 23 February. On this occasion, the night was moonless with heavy fog and drizzle, and four birds were caught. One of these flew directly into the fire and was badly burned (preserved as a skeleton). The others were retrieved from nearby vegetation in which they had become entangled and were later released, unharmed. In the same area employees of a logging camp at Cassé Dent near Sequin caught about 15 petrels in February. These were unfortunately eaten on the spot, leaving only feathers as evidence.

Population stability.—Until individual burrows can be studied, comments on breeding success and mortality are largely speculative. There is no doubt that a decrease of the breeding population on Hispaniola has occurred since European colonization, but whether this trend is still continuing remains to be determined. The fact that peasants living near colonies were unaware of any change in petrel abundance during their lifetime may be significant. Some factors which obviously limit the breeding population now and which may reduce it further in the future are:

(a) Direct human intervention. The "Sen Sel" practice probably takes

an insignificant toll at present. However, the already dense human population on Haiti continues to increase, bringing more people close to breeding colonies. Although these will continue to be inaccessible, agricultural clearings are now being made very close above and below them. The standard practice of burning the cleared vegetation on these clearings was reported to have the same effect as "Sen Sel."

(b) Forest fires. A direct development of increased human population is the higher frequency of accidental forest fires. The pine forest areas above colonies with their even ground cover of bracken (*Pteris* sp.?) are highly combustible. In recent years ground fires have raged over vast areas of the pine forest, particularly in the Forêt de Pins near La Selle. Although the forested cliffs generally escape burning because of the totally different nature of the vegetation, I did record one instance where a patch of cliff face had recently been burned off adjacent to a petrel colony. Depending on the location and season, such fires could have disastrous effects on petrel colonies.

(c) Introduced mammals. The mongoose has often been blamed for the decimation of *P. hasitata* and other native fauna of the West Indies. I received reliable reports of the mongoose above 2,000 m on the Massif de la Selle, but it is apparently not common there as I saw none during 25 days at that altitude. It is possible that some of the present breeding sites are inaccessible to this animal.

Standard break-neck traps for rats were set above and below colonies near Morne Cabaio in late February. These caught *Rattus norvegicus* and two distinct and sympatric races [?] of *Rattus rattus*. The former were caught only near dwellings and farm land and probably do not come commonly into contact with the petrel. The latter were widespread and common even on the steep cliffs but, as previously stated, are unlikely to be a significant predator.

NOTES ON TAXONOMY AND BEHAVIOR

Taxonomy.—I examined more than 15 individuals, including remains of petrels captured by "Sen Sel." All were typical of the black-capped phase, with white underparts, nape, and tail coverts (Figure 2, A, B). Variation was mainly confined to the extent of white or gray on the nape. Colors of soft parts were recorded for the four specimens captured alive: eye, deep brown; bill, black; gape, pale pink; tarsus and basal one-third of feet, pale pink; outer two-thirds and entire outer toe, black. Measurements of two live specimens and two mounted specimens in mm are: wingspread (live specimens only), 965 and 978 (971.5); wing chord, 285–294 (290.5); tail, 125–140 (131); tarsus, 37.5–39.0 (38.1); middle toe with claw, 53–57 (55.2); exposed culmen, 30.5–32.5 (31.4). Compared with *P.*

cahow, the tail of *P. hasitata* is proportionately short and the toes are proportionately long. It is a larger and much more robust bird than the gentle Cahow. Handled individuals can bite viciously with the hooked bill and easily draw blood.

No attempt is made in this paper to review the taxonomic status of this petrel in relation to other members of the closely related *Pterodroma* group. I have therefore followed the currently accepted treatment of *hasitata* as a separate species on the basis of its distinctive and nonoverlapping morphological characters.

Behavior.—Birds calling over a nest colony could easily be heard from the valleys 500 m below and up to a distance of 1 km laterally. The first calls usually began about 80 minutes after sunset, although birds could be heard coming in over the mountaintops with a swish of wings as much as 40 minutes earlier. Peak activity was reached between 2030 hours and 2200 hours and calling then diminished gradually to cessation by about 0230 hours. Activity was less during clear nights with a full moon but did not cease. On one such occasion it was possible to see the birds silhouetted against the tops of clouds. These were flying back and forth along the cliff on steadily beating wings and occasionally forming paired flights or tight groupings of up to six individuals during which ecstatic calls were uttered.

Voice.—At a distance the chorus of courting birds resembled the humming of a swarm of bees mixed with sharper notes similar to the *tick-ek* of tropicbirds. At close range, three distinct calls were identified. The first two, uttered during paired flights, were similar except in tone and may represent a sexual difference: (1) a long drawn out *aaa-aw* ending abruptly with *EEK*, repeated several times in succession and harsh and croaking in quality; (2) a long drawn out *ooooow* ending abruptly in *uk*, repeated several times in succession, mellow in tone and sometimes wavering; (3) another call, heard only during peaks of excited activity, is best described as a series of ecstatic whines and yelps like a hurt puppy—*week-week-week-cueek cu-u-EEK cu-u-EEK*. All calls compare closely with those of the Cahow, but are louder.

The extraordinary ability of the petrels to locate their breeding grounds and carry out aerial activity during nights when clouds blanketed the mountaintops deserves special comment. Even on nights when visibility with a flashlight was down to 15 meters the only change noted was a wider scattering and an increase of low passes over the ground, indicated by a loud “tear” of wings as birds hurtled past at high speed.

Birds captured by “Sen Sel” showed a range of temperament from complete docility to extreme aggressiveness accompanied by a harsher version of the *aaw-EEK* call. When confined in a dark enclosed place, however, all

remained calm and passive, one even after 18 hours. When placed on open ground in daylight they made no attempt to fly but searched anxiously for a dark spot to hide in. Palm Crows (*Corvus palmarum*) which occur commonly in the pine forest would probably attack and kill any petrel caught out in daylight. Flight over land in daylight could be induced only by throwing the birds in the air. Two released in this way were watched. The first, set free at 0700 hours from the south slope of Morne Cabaio within clear view of the Caribbean, immediately curved around to the northwest and disappeared inland behind the mountain. The second, released at 1500 hours, from the summit of Morne Cabaio with a clear view in every direction, headed northeast towards the very center of Hispaniola and continued on a straight course at 2,000 m in altitude until out of sight.

Food.—The stomach of the only specimen taken contained remains of cephalopod beaks and lenses, larger in size than those taken by Cahows.

Breeding calendar.—Peasants living within hearing range of breeding colonies were asked to define the seasons of nocturnal activity. Most said that activity occurred from late December until early April. A few living nearest to colonies heard birds as early as 1 November and as late as mid-May. Using this information together with the records of fledglings it is evident that the breeding calendar matches that of the Cahow very closely (for details see Palmer, 1962: 207–208).

FUTURE STUDY

Because so much additional information on the status and life history of *P. hasitata* could be obtained from an examination of occupied burrows, a return expedition enlisting the services of a professional rockclimber is contemplated. Also, in view of the success on Hispaniola, a renewed search on other islands of the Caribbean would seem justified. In particular, the method of searching described in this paper should be applied to the Blue Mountains of Jamaica where a dark form "*P. caribbaea*" was known to breed as late as 1890 (Scott, 1891).

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with driver for transport to and from the mountains. Through the kind cooperation of the U. S. Marine Mission in Haiti I was enabled to reconnoiter the entire Massif de la Selle by helicopter. I am particularly grateful to Mr. Leonce Bonnefil, Head of the Department of Zoology and Entomology at the Agricultural Institute in Damien, who did everything possible to help make the two expeditions a success and provided much information relevant to this study. Throughout my excursions in the mountains Royston C. Bryan served tirelessly as interpreter and made an excellent companion. Louis Cassagnol, Director of the logging camp at Cassé Dent near Sequin, provided hospitality on many occasions. In Port-au-Prince, William Bichotte, a taxi driver, Hughes Whiteman, a taxidermist, and his son Paul, all provided useful information and assistance.

APPENDIX

Recent specimens and records of *Pterodroma hasitata* on Haiti.

1. Sight record; found apparently exhausted on the waterfront of Port-au-Prince; 1951 (month uncertain); identified by Mr. Leonce Bonnefil; age and sex undetermined; subsequently recovered and released.
2. Mounted specimen; shot in the Gulf of Gonave, south of Gonave Island; 1953 or 1954; private collection of Mrs. Celeste Jean-Charles; adult, sex undetermined.
3. Mounted specimen; shot in the Bay of Port-au-Prince near the city; 1954 or 1955; biological collection of the school of St. Martial in Port-au-Prince; adult, sex undetermined.
4. Mounted specimen; flew against window in the logging camp at Forêt de Pins near Mont des Commissaires in the Massif de la Selle; summer, 1957; preserved by Mr. Leonce Bonnefil; collection of the Agricultural Institute at Damien, Port-au-Prince; fledgling bearing traces of down on underparts, sex undetermined.
5. Sight record; found alive near Port-au-Prince; June, 1961; identified by Mr. Richard Frisell; fledgling with traces of down, sex undetermined; subsequently died but not preserved.
6. Mounted specimen; struck mango tree and fell into streets of Port-au-Prince; 0630 hours, 1 July 1961; preserved by Mr. Hughes Whiteman; collection of the Bermuda Government Aquarium; fledgling with traces of down on the crown, sex undetermined.
7. Study skin; found alive with damaged right wing at Canadian Embassy in Port-au-Prince; 31 January 1963; preserved by Mr. Hughes Whiteman; American Museum of Natural History; adult, sex undetermined.
8. Skeleton; collected (by "Sen Sel") 2 km east of Morne Cabaio, 23 February 1963, by David Wingate; collection of the Bermuda Government Aquarium; adult male, testes 6×3 mm, moderately fat.

SUMMARY

A search for Black-capped Petrels on Dominica, B. W. I., late in 1961, gave negative but inconclusive results concerning this species, whose status had remained obscure since late in the nineteenth century. In Haiti, Hispaniola, however, evidence was obtained which indicated that a fair-sized population was still breeding on the Massif de la Selle.

A search for breeding colonies there was conducted in January and February, 1963. Eleven breeding colonies were located, chiefly by night

observations at forested cliffs above 1,000 meters in altitude, but the actual nests at all of them were inaccessible to any but professional climbers.

The field survey and earlier published data indicate that the breeding population may include colonies on other mountain ranges in Hispaniola and may total well over 4,000 birds.

Peasants living near petrel colonies are very familiar with the birds and catch them by lighting fires above colonies on foggy nights in January and February (the disoriented birds crash into and around the fires). This practice, known as "Sen Sel," is limited and probably takes an insignificant toll. Petrels were caught by the writer in this way.

The breeding calendar, nocturnal activity, and voice are very similar to those of the Cahow of Bermuda and indicate close affinity with that species, but taxonomic differences between the two are distinct and not overlapping.

Factors which may limit breeding success include direct human intervention, forest fires, and introduced mammalian predators. Information from people living near colonies and examination of present breeding habitat indicated that the petrel population may be stable in the restricted, inaccessible portions of a formerly more extensive breeding area.

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