

WESTERN BIRDS



Volume 10, Number 3, 1979

OCCURRENCE AND DISTRIBUTION OF THE MOTTLED PETREL

DAVID G. AINLEY and BILL MANOLIS, Point Reyes Bird Observatory, 4990 Shoreline Highway, Stinson Beach, California 94970

The Mottled Petrel (*Pterodroma inexpectata*) is much reduced from its former numbers. Due to the clearing of forests and predation by introduced mammals, it no longer breeds on the two main islands of New Zealand but is now restricted to a few islands south and east of the South Island, principally the little ones near Stewart Island and the Snares Islands (Warham et al. 1977). Its confinement to so few sites led these authors to express concern for the future of the species. They went on to summarize what is known of the species' terrestrial (i.e., breeding) biology. Here we summarize information on its oceanic distribution.

We report for the first time several occurrences of Mottled Petrels in California and Washington, and summarize some recent records from other areas along the North American Pacific Coast. We also summarize the diffuse literature and unpublished observations on its oceanic occurrence, and from this establish its oceanic range and seasonal movements.

"NORMAL" RANGE

Reports summarized by Watson et al. (1971) and Warham et al. (1977), plus more recent observations (Ainley, unpubl. data), indicate that the Mottled Petrel, during its late October to early June breeding season, feeds in Antarctic waters just north of the pack ice from 95°E to 140°W (to 75°30'S), with scattered individuals occurring even farther east (Figure 1). Breeding birds could easily make the 2200 to 4000 km trip between nesting and feeding grounds, given the 12-14 day spells of incubation (Warham et al. 1977). Since the species is abundant in southern waters during the breeding

MOTTLED PETREL

season, most of the population must be present. A few individuals do occur elsewhere at that time (see below), but substantial occurrence near South America, as implied in Palmer (1962), is not consistent with data presently available.

Mottled Petrels are not present at breeding localities from early June through September (Warham et al. 1977). Neither are they very often, if at all, reported as beach-cast specimens in New Zealand during those months, as compared to breeding months (Roberts 1975, Veitch 1975). Szijj (1967), one of the few ornithologists to have censused pelagic birds in Antarctic waters of the South Pacific during winter, found no Mottled Petrels in areas where they occur commonly during summer. These several clues suggest that the species is absent from South Pacific waters during the non-breeding season, and North Pacific records support this conclusion.

Gabrielson and Lincoln (1959) listed four specimen records for coastal Alaska between mid-May and early August 1882-1911, and on that basis considered it to be a "straggler" to Alaskan waters. Kessel and Gibson (1978), summarizing the above plus many recent unpublished records, considered it to be a "very rare visitant" in southern Alaska coastal waters and an "uncommon visitant" in off-shore waters from May through October. As for pelagic waters of the northern North Pacific region, sufficient observations are now available to describe its status. Kuroda (1955), on a cruise from Japan to the western Aleutians and Bering Sea in June and July 1954, encountered a number of Mottled Petrels on several days when east of 162°E (at 50°N) and South of 53°N (at 164°E), thus in the north-central Pacific. Wahl (1978), on a cruise track very similar to Kuroda's (except that he also went much farther east on the extreme southern Bering Sea during June and July 1975), observed many Mottled Petrels between 45°N, 166°E and 50°N, 180°W, again in the north-central Pacific, and saw only four scattered individuals in the southern Bering Sea. Hamilton (1958), on a cruise between Japan and Seattle during June 1955, a more southerly route than the above, observed many individuals between 41°N, 180°W and 44°N, 155°W, a few hundred kilometers south of the Aleutians. Sanger (1972), working in eastern and central North Pacific waters during 1955-1967, considered the species to be "common" in waters 160 km NW of Vancouver Island and northwestward into the Gulf of Alaska during June-August, and considered it to be present but rare during February-March. In July 1969, he (in Gibson 1970) again found the species to be common between 52°N, 160°W (320 km south of the Shumagin Islands, Alaska) and 50°N, 140°W (760 km WSW of the Queen Charlotte Islands, British Columbia). His cruise track ran from Seattle to Adak Island (western

Aleutians) and back. When the cruise was repeated in early October, he observed only two Mottled Petrels, near 54°N, 144°W. Wiens et al. (1978), on a cruise from Alaska to Hawaii along 158°W during late October-early November 1976, considered the Mottled Petrel to be "common" north of 45°N and less abundant as far south as 36°N. For several cruises in coastal waters of southeast and western Alaska and the eastern Aleutian Islands in May-October 1975 and 1976, they did not report this species (see also Bartonek and Gibson 1972). Most recently, DeGange and Ainley (unpubl. data) conducted censuses on four summertime cruises criss-crossing almost all of the region just reviewed, as well as the Bering Sea from the Aleutians to Bristol Bay and Nunivak Island west to 175°E (at 57°N). Their observations agree with the above but they also found many Mottled Petrels (flocks of up to 22 birds) in a narrow corridor extending north from Adak Island, or just east of Bower's Bank, to about 57°N, 179°W in the Bering Sea (see also Kessel and Gibson 1978).

These records establish the Mottled Petrel as a common May-October resident in the northern and eastern North Pacific Ocean, principally in association with the Transitional, Central and Western Subarctic and Alaskan Stream domains of surface waters (Dodimead et al. 1963; Figure 1). Noteworthy facts consistent with this association are 1) the lack of records in warmer waters of the far western North Pacific (Austin and Kuroda 1954, Kuroda 1957, Dement'ev and Gladkov 1968, Ornithol. Soc. Japan 1974, Nakamura and Tenaka 1977) and 2) the scattered summer records in the Bering Sea (except in the corridor east of Bower's Bank where the species is abundant) and in the most western part of the northern North Pacific and adjacent Okhotsk Sea (Kenyon and Phillips 1965, Bartonek and Gibson 1972, Shuntov 1972, Nakamura and Tenaka 1977, Wahl 1978, Wiens et al. 1978, DeGange and Ainley unpubl. data).

P. inexpectata's movements through the tropical Pacific, established by records independent of those cited above, provide still more clues about the periods of residence in South and North Pacific waters. King (1967, 1970) reported the species' rapid migration through the Hawaiian Island area (175°E to 150°W), flying north in April and May and south in October and November (Figure 1). It appears now, based on new data, that the northward migration begins much earlier. Ainley (unpubl. data), on a cruise from Samoa to Los Angeles, noted many northward flying Mottled Petrels southeast of Hawaii between 24 and 30 March 1979. So abundant were they that the movement probably began at least a few weeks earlier and, based on the breeding season detailed by Warham et al. (1977), probably involved non-breeders or failed breeders. The route seems to be a diagonal one between New Zealand and the Gulf of Alaska, and

MOTTLED PETREL

there appears to be no evidence for the circular route clockwise around the Pacific as proposed in Palmer (1962). The many birds observed by Beck (*in* Loomis 1918), 640 to 1600 km west of central California between 19 and 26 November 1906, must have been at the eastward edge of their migratory route and among the last of the southward migrants that year. The 540 birds counted by Moberley (*in* Bourne and Dixon 1975) 112 km WNW of Cape Flattery, Washington, on 28 April 1972 must also have been at the eastward edge of the route but in the vanguard of the northward movement. Many of the birds observed by Wiens et al. (1978) were probably migrants, particularly those observed south of the Subarctic Front (at ca. 40°N; see Discussion).

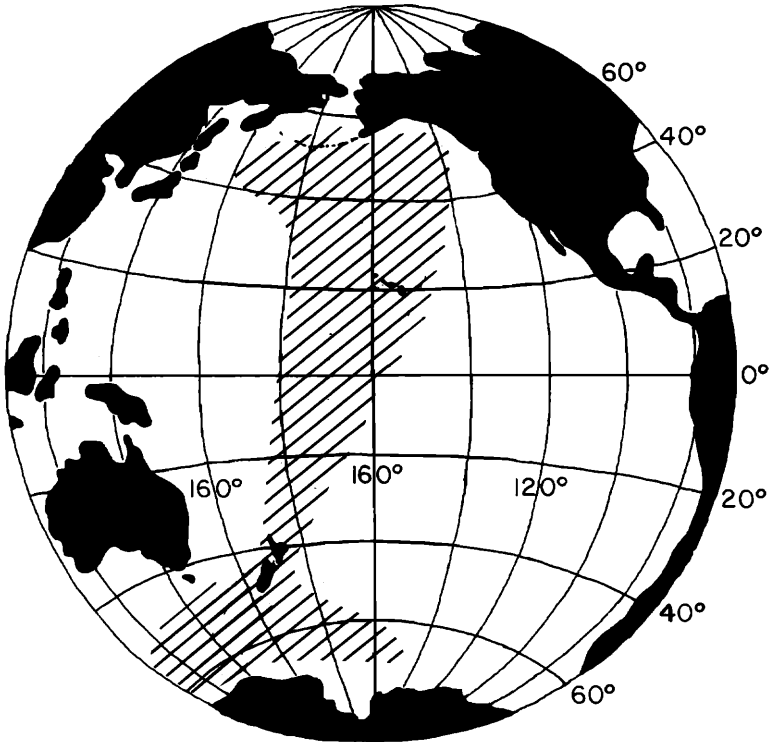


Figure 1. The approximate oceanic range of the Mottled Petrel (*Pterodroma inexpectata*).

"EXTRALIMITAL" RECORDS

Few records of the Mottled Petrel exist for areas outside the above described range. The first record for North America was a very unusual one as it was from New York (Wallace 1961). The bird perhaps flew north in the Atlantic, having probably been one of the individuals that occasionally fly as far east as the Drake Passage in the South Pacific (Watson et al. 1971). Szijj (1967) and Palmer (1962) are the only persons of whom we are aware who have reported this species in South American waters except in the Drake Passage; they reported it in Chilean waters and near the Galapagos, respectively. The species' usual migratory route brings it near the Americas only in Alaska, thus the scarcity of North American records from British Columbia south is not too surprising. In the last several years though several have been reported. Their timing is rather inconsistent with the species expected occurrence. These records are as follows:

British Columbia. A bird captured aboard ship, photographed and released 46 km SW of Estevan Point, Vancouver Island, on 24 February 1971 was the first record for inshore waters of this province (Campbell and Shepard 1973). The day before, one was seen about 280 km west of this locality (Crowell and Nehls 1971). During the next year, on 17 March 1972, one flew aboard another ship 480 km SW of the Queen Charlotte Islands. The specimen is now at the Vertebrate Museum, University of British Columbia (Campbell and Shepard 1973).

Washington. Three inshore occurrences have recently been recorded. One live bird was sighted by Glen and Wanda Hoge (pers. comm.) on 28 February 1976 at Ocean Shores, the north jetty of Gray's Harbor, Gray's Harbor County. The sighting is still being considered by rare bird authorities in Washington, but appears to be acceptable (T. Wahl pers. comm.). This would be the first state record. Two dead individuals were then found in Gray's Harbor County by Jack L. Smith (pers. comm.) while conducting beached bird censuses for the Washington Department of Game. The first was found on 2 March 1976 between Westport Lighthouse and the Twin Harbor access, and the second was found on 5 March 1976 just north of Moclips. The first is now a specimen at the University of Puget Sound; the second was badly decomposed, indicating that it probably washed ashore a week or more earlier.

Oregon. The first record for this state, and for the Pacific Coast south of Alaska, was a bird found dead 3 km north of Alsea Bay, Lincoln County, on 25 July 1959 (Wallace 1961). Its late stage of decomposition and the fact that it was in the "winter high tide line"

MOTTLED PETREL

suggest that it probably washed ashore long before it was found. The incomplete skeleton is now at the Museum of Vertebrate Zoology, Berkeley. More recently, on 16 February 1971, Narca Moore (pers. comm.) observed one 175 km west of Tillamook, Oregon, at RV YAQUINA station CP2A; and on 18 March 1972, Wayne Hoffman found two dead ones while conducting a beached bird census, 7 and 10 km south of Newport, Lincoln County (Crowell and Nehls 1972). Both of the latter birds are now in the collection at Oregon State University, Corvallis.

California. One of us (BM with Ane Rovetta), during a Point Reyes Bird Observatory beached bird census, found a Mottled Petrel at Point Reyes Beach, Marin County, on 25 February 1976. This was the first record for California. The study skin is now in the California Academy of Sciences (Figure 2). A few days later, on 28 February, another was found at Cayucos Beach, San Luis Obispo County, by Dana Tryde (pers. comm.). This specimen is now at California Polytechnic State University, San Luis Obispo. A third was found during another PRBO beach census at San Simeon Beach, San Luis Obispo County, on 13 March 1976 (DGA, Louise Squibb and Lois Felmlee). The skeleton is now at PRBO (Figure 3). Later that year, on 11 August, a freshly dead individual was found on a beached bird census at the mouth of the Mad River, Humboldt County (Winter and Erickson 1977a; specimen now at Humboldt



Figure 2. Mottled Petrel found on Point Reyes Beach, Marin County, California, on 25 February 1976; the first record for California.

MOTTLED PETREL

State University, Arcata). No more Mottled Petrels were recorded until 1 May 1977, when one was found alive but weak at Bolinas Lagoon, Marin County. The date and its extensive feather wear indicated it was at least 1 year old. It died on 8 May and is now a specimen at California Academy of Sciences.

DISCUSSION

Mottled Petrels breed at sites where waters are about 5-13°C, but during the breeding season they apparently prefer to feed at the northern edge of the Antarctic pack ice where temperatures are 1-3°C (Figure 1). A great many icebergs are a part of this preferred environment (Ainley unpubl. data). During the non-breeding season, after rapidly crossing tropical waters, they frequent subarctic waters in the central and eastern North Pacific that are about 5-13°C. Mottled Petrels conceivably have the opportunity to fly farther north to colder waters, and even to the edge of the Arctic pack ice. To do so, though, they would have to leave their preferred oceanic water and fly over the shallow shelf water of the northern Bering Sea. At the northern edge of the Antarctic pack ice in summer, the Mottled Petrel is virtually the only *Pterodroma* present, and



Figure 3. Mottled Petrel found on San Simeon Beach, San Luis Obispo County, California, on 13 March 1976; the third record for California.

is among the most abundant of avian species. In waters around its breeding islands at that time, many species of petrels occur abundantly including several *Pterodroma*. In North Pacific waters during the northern summer, the Mottled Petrel is the only *Pterodroma* (in those waters where the species regularly summers) and ranks among the most abundant of seabirds present. By flying farther north it would encounter many other seabird species in great numbers. If the long-distance movements of seabirds can be influenced by the existence of unexploited resources in certain areas, then the Mottled Petrel provides a good example.

The increased number of North American Pacific Coast records since 1971, compared to earlier years, is probably a result of intensified activity among bird watchers. For example, of the 10 *P. inexpectata* reported within 100 km of the coast south of central British Columbia since 1971, 7 were found on organized beached bird censuses. Before 1971 a few people made occasional beach censuses along this coast. Since then the number has increased dramatically, reaching a peak of about 80 beaches regularly censused by 1975.

Most of the Mottled Petrels (12 of 14) found from British Columbia south since January 1971 have occurred during the short period between 16 February and 18 March. The timing is outside the species' usual peak occurrence period in the North Pacific. The birds involved must have been non-breeders. Do non-breeders or failed breeders move away from nesting sites and into the North Pacific before breeders and juveniles do so in April and May? The close timing of records regardless of year does suggest a regular, though minor migratory movement. Ainley's recent observations of many Mottled Petrels crossing the tropical Pacific in March further support this.

Another pattern was visible in the "extralimital" occurrence of this species. Three birds occurred in Oregon and British Columbia within 8 days of one another in February 1971; two birds occurred a great distance apart off British Columbia but within a day of each other in late February 1972; three birds occurred in Oregon and Washington, a great distance apart, again within a day of one another, in mid-March 1972; and 6 birds occurred in California and Washington within 14 days of one another in February-March 1976. The close dates of occurrence in widely spaced localities is further evidence for migratory movement to the North Pacific earlier in the year than previously expected. It thus appears that few truly extralimital records exist for this species. In fact, the only ones of which we are aware are those from New York, the Galapagos and northern Chile.

The fact that 11 of 14 records (mid-February through mid-March) since 1971 were in two of a possible seven winters may provide some clues about the reasons for the more inshore occurrence during

some years. Using northern California as an index, the two outstanding winters for inshore Mottled Petrels, 1971-72 and 1975-76, also happened to be periods when Northern Fulmars (*Fulmarus glacialis*) were far more abundant than usual in coastal waters (cf. Ainley 1976; Stallcup et al. 1975; Stallcup and Winter 1975, 1976a, b; Winter and Erickson 1977a, b; Erickson and Morlan 1978; Winter and Manolis 1978). The latter species is abundant in the Gulf of Alaska during winter and moves southward and shoreward in conjunction with cold waters of high salinity (i.e., the characteristics of central Subarctic waters in the Gulf of Alaska; Dodimead et al. 1963, Ainley 1976). Possibly the same conditions brought the Mottled Petrels shoreward as well, since they too seem to prefer oceanic central Subarctic waters.

SUMMARY

Records in the literature are summarized to determine the oceanic range of the Mottled Petrel throughout the year and to establish the limits of its usual occurrence, especially in the North Pacific. The species is very infrequently reported within 100 km of shore from southern British Columbia south to California, but since January 1971 "first records" for the species were established in each coastal province and state, with the exception of Oregon. These records involved individuals not in the breeding population. They were the result of increased activities among birders, were probably in the forefront of the species' northward migration, and were probably influenced by fluctuations in oceanographic conditions.

ACKNOWLEDGMENTS

We wish to thank the several persons who contributed details of their observations and other information: John Butler, Wayne Campbell, George Divoky, Glen and Wanda Hoge, John Luther, Guy McCaskie, Narca Moore, Jack Smith and Dana Tryde. DGA's observations in the polar and tropical South Pacific were gathered on cruises funded by the National Science Foundation, Division of Polar Programs; cruises in the western Pacific and Bering Sea were funded by the U.S. Fish and Wildlife Service. Terry Wahl and Alan Baldrige improved the paper through their comments. This is Contribution 190 of the Point Reyes Bird Observatory.

LITERATURE CITED

- Ainley, D.G. 1976. The occurrence of seabirds in the coastal region of California. *West. Birds* 7:33-68.
- Austin, O.L., Jr. and N. Kuroda. 1954. The birds of Japan, their status and distribution. *Mus. Comp. Zool. Bull.* 109:279-637.
- Bartonek, J.C. and D.D. Gibson. 1972. Summer distribution of pelagic birds in Bristol Bay, Alaska. *Condor* 74:416-422.
- Bourne, W.R.P. and T.J. Dixon. 1975. Observations of seabirds 1970-1972. *Sea Swallow* 24:65-88.
- Campbell, R.W. and M.G. Shepard. 1973. Laysan Albatross, Scaled Petrel, Parakeet Auklet: additions to the list of Canadian birds. *Can. Field-Nat.* 87:179-180.
- Crowell, J.B., Jr. and H.B. Nehls. 1971. The winter season. Northern Pacific Coast region. *Am. Birds* 25:615-619.
- Crowell, J.B., Jr. and H.B. Nehls. 1972. The winter season. Northern Pacific Coast region. *Am. Birds* 26:644-648.
- Dement'ev, G.P. and N.A. Gladkov. 1968. Birds of the Soviet Union, vol. II (Transl. from Russian). Israel Prog. Sci. Transl., Smithsonian Inst., Washington, D.C.
- Dodimead, A.J., F. Favorite and T. Hirano. 1963. Review of oceanography of the subarctic Pacific region. *Int. N. Pac. Fish. Comm. Bull.* 13:1-195.
- Erickson, D. and J. Morlan. 1978. The autumn migration. Middle Pacific Coast region. *Am. Birds* 32: 250-255.
- Gibson, D.D. 1970. The fall migration. Alaska region. *Am. Birds* 24:79-82.
- Hamilton, W.J., III. 1958. Pelagic birds observed on a North Pacific crossing. *Condor* 60:159-164.
- Kenyon, K.W. and R.E. Phillips. 1965. Birds from the Pribilof Islands and vicinity. *Auk* 82:624-635.
- Kessel, B. and D.D. Gibson. 1978. Status and distribution of Alaska birds. *Studies Avian Biol.* No. 1.
- King, W.B. 1967. Seabirds of the tropical Pacific Ocean. Preliminary Identification Manual. Smithsonian Inst., Washington, D.C.
- King, W.B. 1970. The trade wind zone oceanography pilot study, Part VII: observations of sea birds March 1964 to June 1965. U.S. Fish Wildl. Serv. Spec. Sci. Rep. Fish. No. 586.
- Kuroda, N. 1955. Observations of pelagic birds in the northwest Pacific. *Condor* 57:290-300.
- Kuroda, N. 1957. A brief note on the pelagic migration of the Tubinares. Yamashina's Inst. Ornithol. Zool., Misc. Rep. No. 11:436-449.
- Loomis, L.M. 1918. A review of the albatrosses, petrels and diving petrels. *Calif. Acad. Sci., Proc., 4th Ser.,* 2:1-187.
- Nakamura, K. and Y. Tanaka. 1977. Distribution and migration of two species of the genus *Pterodroma* in the North Pacific. Yamashina Inst. Ornithol., Misc. Rep. 9:112-120.
- Ornithological Society of Japan. 1974. Check-list of Japanese birds. Gakken Co., Tokyo.
- Palmer, R.S. ed. 1962. Handbook of North American birds, vol. 1. Yale Univ. Press, New Haven, CT.
- Roberts, P.E. 1975. Sea birds found dead in New Zealand in 1965 and 1966. *Notornis* 22:151-161.
- Sanger, G.A. 1972. Checklist of bird observations from the eastern North Pacific Ocean, 1955-1967. *Murrelet* 53:16-21.
- Shuntov, V.P. 1972. Seabirds and the biological structure of the ocean (Transl. from Russian). Natl. Tech. Inf. Serv., Springfield, VA.

MOTTLED PETREL

- Stallcup, R., D. DeSante and R. Greenberg. 1975. The fall migration. Middle Pacific Coast region. *Am. Birds* 29:112-119.
- Stallcup, R. and J. Winter. 1975. The winter season. Middle Pacific Coast region. *Am. Birds* 29:735-740.
- Stallcup, R. and J. Winter. 1976a. The fall migration. Middle Pacific Coast region. *Am. Birds* 30:118-124.
- Stallcup, R. and J. Winter. 1976b. The winter season. Middle Pacific Coast region. *Am. Birds* 30:760-774.
- Szjij, L.J. 1967. Notes on the winter distribution of birds in the western Antarctic and adjacent Pacific waters. *Auk* 84:366-378.
- Veitch, C.R. 1975. Seabirds found dead in New Zealand in 1973. *Notornis* 22:231-240.
- Wahl, T.R. 1978. Seabirds in the northwestern Pacific Ocean and south central Bering Sea in June 1975. *West. Birds* 9:45-66.
- Wallace, W.M. 1961. Scaled Petrel in Oregon. *Condor* 63:417.
- Warham, J., B.R. Keeley and G.J. Wilson. 1977. Breeding of the Mottled Petrel. *Auk* 94:1-17.
- Watson, G.E., J.P. Angle, P.C. Harper, M.A. Bridge, R.P. Schlatter, W.L.N. Tickell, J.C. Boyd and M.M. Boyd. 1971. Birds of the Antarctic and Subantarctic. Folio 14, Antarctic Map Folio Ser. Am. Geograph. Union, New York.
- Wiens, J.A., D. Heinemann and W. Hoffman. 1978. Community structure, distribution, and interrelationships of marine birds in the Gulf of Alaska. Final Rep., Envir. Asses. Alaskan Cont. Shelf, OCSEAP, NOAA, Boulder, CO. Vol. 3:1-178.
- Winter, J. and D. Erickson. 1977a. The fall migration. Middle Pacific Coast region. *Am. Birds* 31:216-221.
- Winter, J. and D. Erickson. 1977b. The winter season. Middle Pacific Coast region. *Am. Birds* 31:367-372.
- Winter, J. and T. Manolis. 1978. The winter season. Middle Pacific Coast region. *Am. Birds* 32:394-397.

Accepted 7 September 1979



Sketch by Narca Moore