# STATUS OF THE KITTLITZ'S MURRELET *BRACHYRAMPHUS BREVIROSTRIS* IN RUSSIA

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**SUMMARY**

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The Kittlitz's Murrelet *Brachyramphus brevirostris* is one of the rarest seabird species in northeastern Asia. The species is widely distributed in the Chukchi and Bering seas, where it is observed from de Long Strait to Kamchatsky Bay and also in the northern Sea of Okhotsk. However, the species' Asian breeding range is not well documented. All four nests found historically in the region were located in inland alpine habitats. The species' wintering areas are also poorly documented; the northern boundary of winter distribution lies along the Sireniki polynya near the southern coast of Chukotka Peninsula. Migrating and wintering birds have also been recorded near northeastern Sakhalin and the islands of northern Japan. We provide an overview of the known distribution and conservation status of the Kittlitz's Murrelet population in the Russian Far East. Our assessment is based on at-sea surveys conducted from the 1970s to the early 2000s, with a total survey distance of >10 000 km. These surveys covered the presumed main potential breeding area of the Kittlitz's Murrelet in our study area. In the Bering Sea, highest densities were observed in the coastal waters of the eastern and southern parts of the Koryak Highlands and southern Chukotka Peninsula. In the Sea of Okhotsk, the species occupies roughly 500 km of coastline from Amakhton Bay to Tavatum Bay, with a total estimate of roughly 500 breeding pairs. The Asian coast likely supports a larger proportion of the global population of Kittlitz's Murrelet than previously acknowledged, and an expansion of surveys, research and monitoring of this species in Asia will be important for its conservation.

Key words: at-sea survey, *Brachyramphus brevirostris*, Kittlitz's Murrelet, Russian Far East, Okhotsk Sea, Bering Sea, Chukchi Sea

## INTRODUCTION

The Kittlitz's Murrelet *Brachyramphus brevirostris* is a rare, poorly known seabird species of Alaska and northeastern Asia. Information on this species in Asia found in recent Russian reports (Shibaev 1990, Shuntov 1998, Kondratyev *et al*. 2000a) is based partly on conclusions drawn in the middle of the last century (Dementyev 1951, Kozlova 1957). The situation is similar in North American reviews as well (Gaston & Jones 1998, Day *et al*. 1999). It has been widely assumed or reported that the majority of the global Kittlitz's Murrelet population inhabits the northwestern coast of North America, while the Asian population is relatively insignificant (Day *et al*. 1999, US Fish and Wildlife Service 2010). However, recent observations from the Russian Far East, in addition to previously collected data, lead us to believe that a considerable portion of the global Kittlitz's Murrelet population may breed and winter along the Asian coast. If so, this would have important implications for the conservation and protection of Kittlitz's Murrelet, especially in light of recent declines documented in parts of the species' Alaskan range (US Fish and Wildlife Service 2010).

In this paper, we present available information on the nesting and seasonal occurrence of the Kittlitz's Murrelet in Asia. We summarized our own field results and all available published information, largely from the original Russian sources. In addition, we review current potential threats to this species in and near Russian waters.

## STUDY AREA AND METHODS

This review is based on observations and surveys the authors conducted along the Asian coast of the Chukchi and Bering seas and the Sea of Okhotsk from the 1970s to the present (Fig. 1). Surveys encompassed most of the known and presumed Kittlitz's Murrelet breeding range in Asia.

Artukhin carried out counts of seabirds in the coastal area along the entire Russian part of the Bering Sea in 2004 and 2005 (Fig. 2). Counts were made from a 50 m vessel along transects 3–20 km from shore. Birds were counted according to strip-transect methods with a transect width of 300 m; survey protocol followed Gould &

Forsell (1989). Surveys were completed from 17 July to 11 August 2004 and from 19 July to 8 August 2005 on transects 1662 and 2067 km, respectively, in length.

Vyatkin counted Kittlitz's Murrelets during seabird colony investigations along the eastern coast of Kamchatka (Fig. 3). Observations were made from a 5 m inflatable motorboat within 3 km of the shore. Transect width was 100 m. Timing and length of routes were 26 June–4 July 1973 (290 km), 1–5 August 1975 (192 km), 9–22 June 1990 (683 km), 29 June–1 August 1994 (2048 km) and 1–2 August 1995 (147 km). Vyatkin also counted Kittlitz's Murrelets from the shore in some bays of the eastern

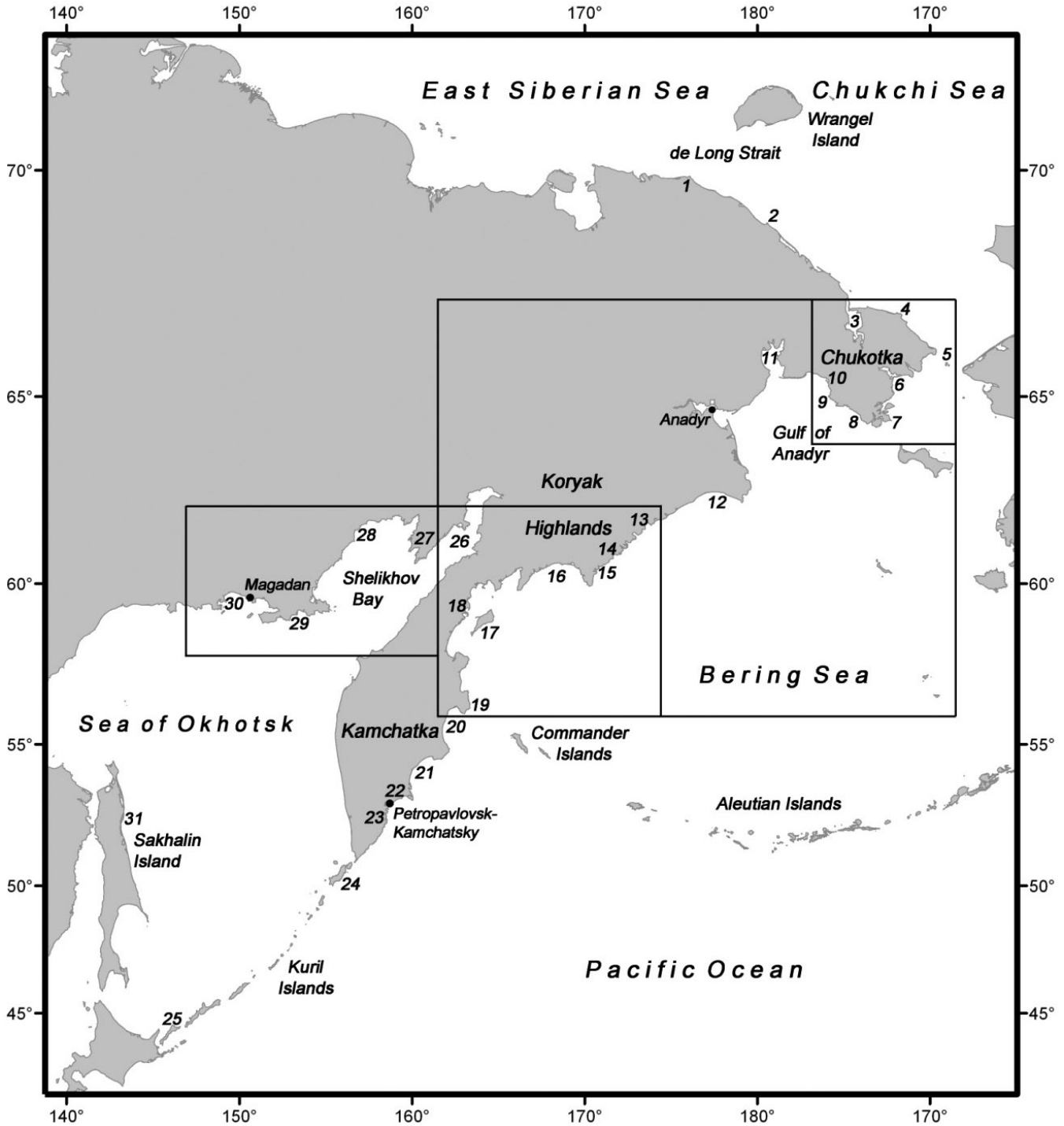


**Fig. 1.** Map of northeastern Asia with locations of main sites mentioned in the text: 1–Cape Billings, 2–Cape Schmidt, 3–Kolyuchin Bay, 4–Cape Serdtse-Kamen, 5–Diomede Islands, 6–Mechigmen Bay, 7–Cape Chaplin, 8–Sireniki polynya, 9–Cape Bering, 10–Rudder Bay, 11–Kresta Bay, 12–Maynopylgino Village, 13–Dezhnev Bay, 14–Severnaya Mochevna Bay, 15–Bolshoy Tigil Bay, 16–Olyutorsky Bay, 17–Karaginsky Island, 18–Ossora Bay, 19–Kamchatsky Peninsula, 20–Kamchatsky Bay, 21–Kronotsky Bay, 22–Cape Nalychev, 23–Russkaya Bay, 24–Paramushir Island, 25–Kunashir Island, 26–Penzhina Bay, 27–Taygonos Peninsula, 28–Tavatum Bay, 29–Babushkin Bay, 30–Amakhton Bay, 31–Chayvo Bay.

Koryak Highlands coast and along the northwestern coast of the Kamchatka Peninsula in the 1970s–1980s.

Konyukhov counted Kittlitz's Murrelets from Cape Bering (Bering Sea) to Cape Serdtse-Kamen (Chukchi Sea) during seabird colony studies on the Chukotka Peninsula (Fig. 4; Konyukhov *et al*. 1998). Counts were made from an *anyapik*, a traditional Yupik skin-covered boat, up to 500 m from shore. Transect width was 50 m. Timing and length of routes were 2–14 August 1985 (672 km), 14 August–3 September 1985 (887 km), 6–10 August 1987 (447 km) and 9–13 August 1991 (291 km). Additional observations were made at sea in the Sireniki Village area from late March to mid-October in several years between 1984 and 1990. For these Sireniki observations, the surveyed area was up to 20 km to each side of the village and up to 5 km seawards.

Andreev & Van Pelt (2007) carried out a dedicated Kittlitz's Murrelet survey along the northern coast of the Sea of Okhotsk from Amakhton Bay to Tavatum Bay during 21 June–13 July 2005 (Fig. 5). Total transect length was 829 km. Andreev (in press) made similar counts along the western coast of Taygonos Peninsula (from Rechnaya Matuga Island to Cape Taygonos) along a route of 230 km during 23 July–1 August 2008. Both censuses were made from a 12 m motor vessel 250–500 m from shore. Transect width was 200 m. Andreev also investigated some parts of the Okhotsk coast from Sheltinga Bay to Cape Iretskiy in 1993–2007.

In addition to original data from field observations, all available information on the Asian population of Kittlitz's Murrelet, most of it published in Russian, was used in this review. We used data from the following museums in Russia, Sweden, and the United States: Zoological Institute, Russian Academy of Sciences (ZIN RAS); Zoological Museum, Moscow State University (ZM MSU); Department of Geography, Moscow State University (DG MSU); Swedish Museum of Natural History, Stockholm (NRM); American Museum of Natural History, New York (AMNH); Carnegie Museum, Pittsburgh (CM); Field Museum of Natural History, Chicago

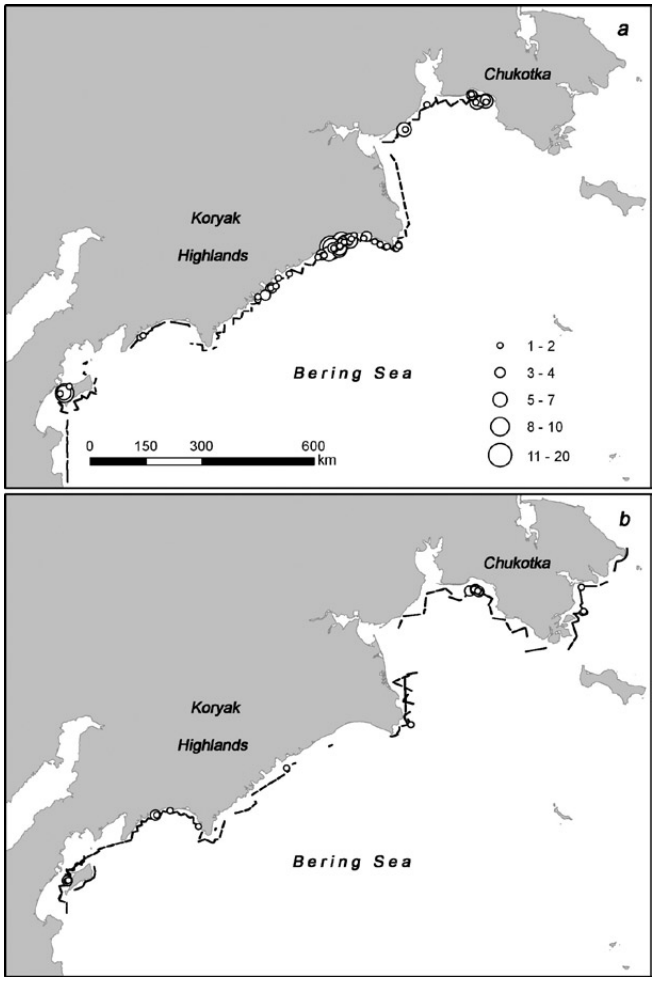


**Fig. 2.** Distribution and counts of Kittlitz's Murrelets on transects (line segments) in the coastal area of the western Bering Sea, Russia in: (a) 2004 and (b) 2005.

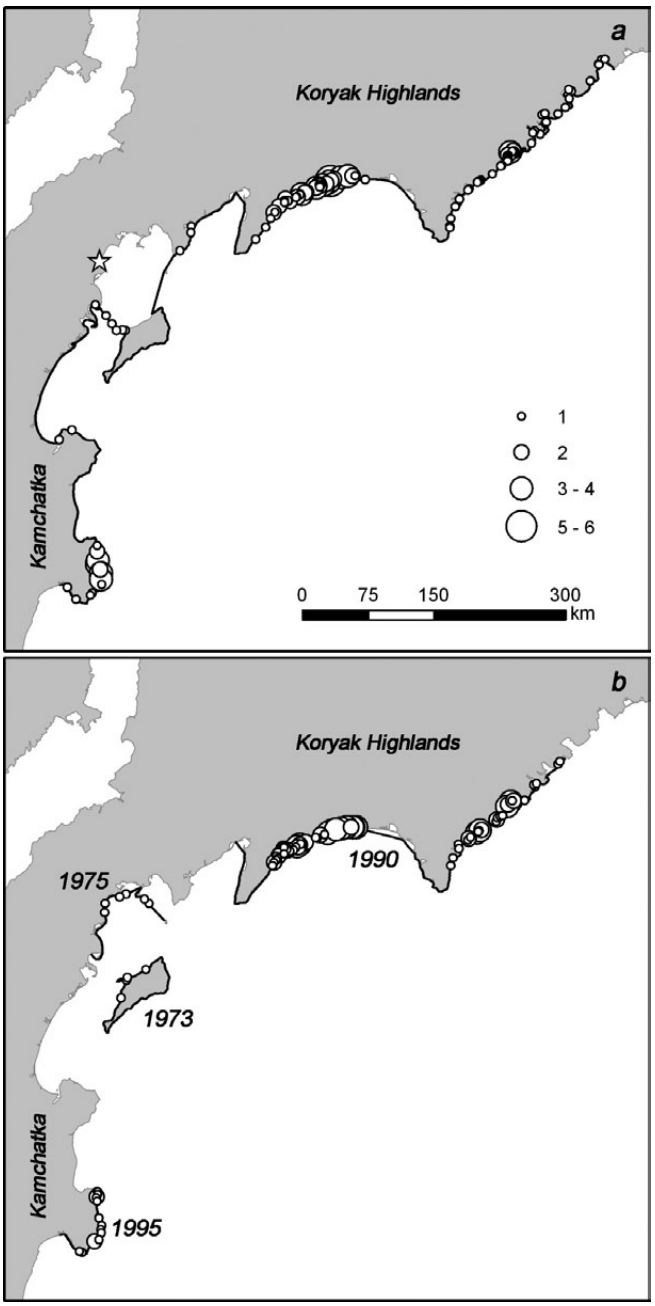


**Fig. 3.** Distribution and counts of Kittlitz's Murrelets on transects (in black) in the Kamchatka Region, Russia in: (a) 1994 and (b) 1973, 1975, 1990 and 1995. Star symbol marks location of a nest found in 1990.

(FMNH); Museum of Comparative Zoology, Harvard University, Boston (MCZ); and the Burke Museum of Natural History and Culture, Seattle (BMNHC).

## RESULTS

### Summer distribution (May–August)

*East Siberian and Chukchi seas*

Kondratyev (1986) investigated seabird colonies along the coast of the East Siberian and Chukchi seas in July–August 1984. Most Kittlitz's Murrelets were found in de Long Strait (Northeast Passage). Thirty Kittlitz's Murrelets were counted along the coast from Cape Billings to Cape Schmidt (ca. 200 km). In this same region, two Kittlitz's Murrelets were seen in earlier years: one bird was observed by J. Koren (Thayer & Bangs 1914) in the vicinity of Cape Yakan on 8 September 1912, and an immature female was collected near Cape Schmidt on 29 July 1973 (Sudilovskaya 1978; ZM MSU R-98171).

Kittlitz's Murrelets very likely nest above the coast of Kolyuchin Bay, at least in the southern part of the bay, where mountains approach the sea. A pair of Kittlitz's Murrelets was collected in Kamak Bay on 4 July 1973; the female's ovary showed traces of a recently laid egg (Lutsyuk & Sychev 1974). Pairs and single birds were observed several times in this area during the breeding

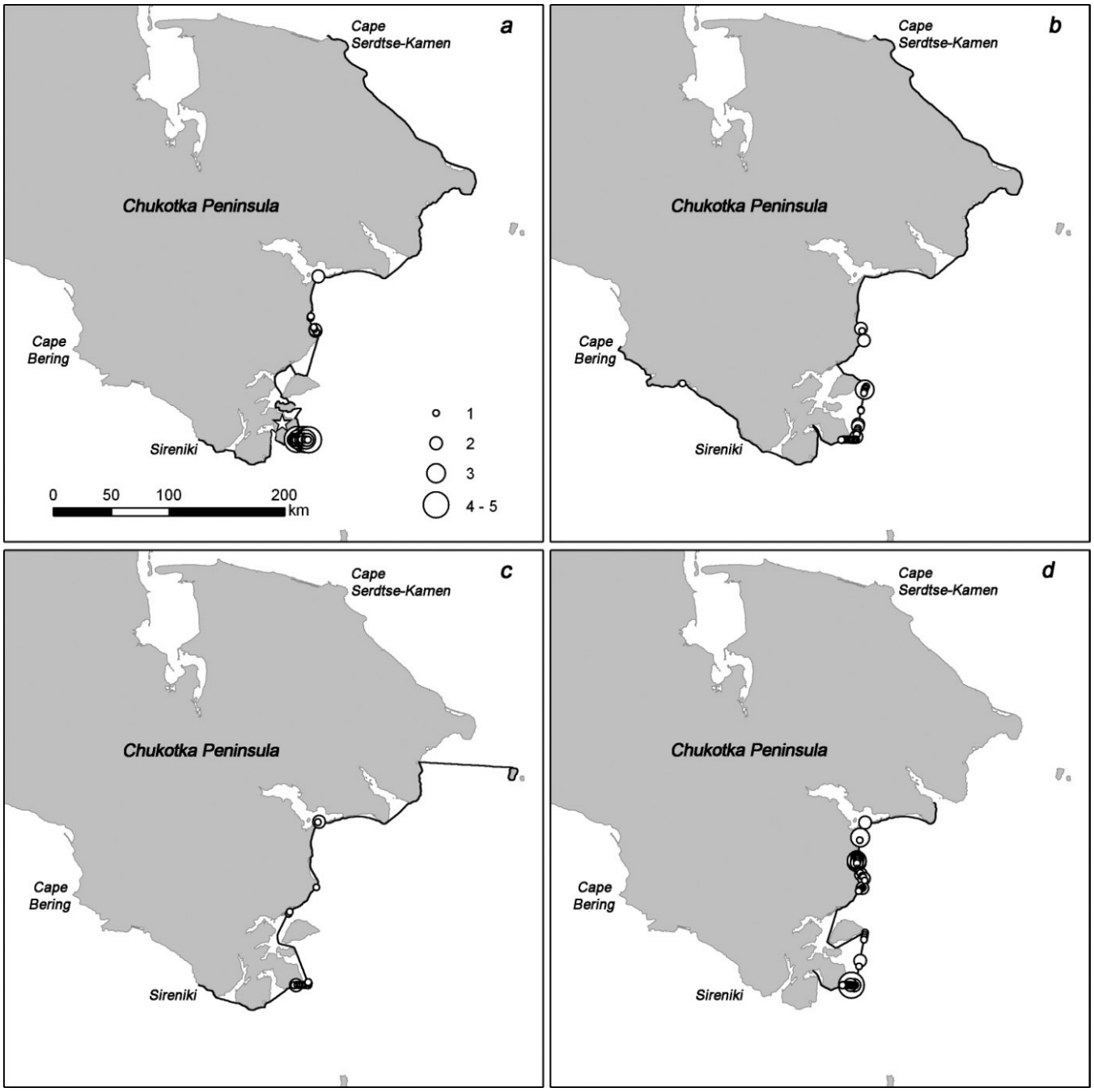


**Fig. 4.** Distribution and counts of Kittlitz's Murrelets on transects (in black) along the Chukotka Peninsula, Russia in: (a, b) 1985, (c) 1987 and (d) 1991. Star symbol in (a) marks location of a nest found in 1971.

period: 12 Kittlitz's Murrelets were counted from a motorboat from the mouth of Kolyuchin Bay to Cape Rekokaurer on 23 July 1974 (Krechmar *et al*. 1978), and six birds were counted in the bay in August 1984 (Kondratyev 1986).

Previously, Kittlitz's Murrelet was recorded in the Kolyuchin Bay area twice: a bird was taken in a polynya near Pitlekay Village on 22 June 1879 (Palmén 1887), and Koren (1910) observed a pair of birds near Idlidlya Island on 29 June 1909; he misidentified the birds as Marbled Murrelet *B. marmoratus*, but one of them was collected (FMNH 126291) and subsequently identified correctly (Artukhin, in press).

Kittlitz's Murrelet has long been known to occur at Wrangel Island (Uspensky *et al*. 1963, Velizhanin 1965, Portenko 1973, Krechmar *et al*. 1979, Pridatko 1987, Stishov *et al*. 1991). Most birds have been encountered in the Somnitelnaya Bay area, along the southern coast of the island, during the post-breeding migration in August–September. In a book by Kozlova (1957), Wrangel Island was mentioned as a breeding place of the Kittlitz's Murrelet. However, analysis of all known data did not show even circumstantial evidence of breeding on Wrangel Island. Two "young" birds (Uspensky *et al*. 1963, Sudilovskaya 1964) collected in Somnitelnaya Bay on 19 August 1960 and near Davydov Spit on 31 August 1960 turned out to be adults (ZM MSU R-87315 and DG MSU A-1597). Birds taken along the coast between Rodgers and Somnitelnaya bays on 15 August 1939 (Portenko 1973; ZIN RAS 97957/95-40) and in Krasin Bay on 4 August 1975 (ZM MSU R-102284) were also adults. The current status of the Kittlitz's Murrelet at Wrangel Island is as a rare species observed during migration (Stishov 2004).

*Bering Sea*

During mapping of seabird colonies on the Chukotka Peninsula in 1985, 1987 and 1991, Kittlitz's Murrelets were regularly observed along the southeastern coast, from the mouth of Mechigmen Bay to Tkachen Bay, but in no other locations (Konyukhov 1992). During those observation years, counts of Kittlitz's Murrelet ranged from 18 to 107 birds, but the pattern of distribution was consistent from year to year (Fig. 4). However, there was a relatively lower number of birds seen in the region in 1987, which might be explained by bad weather conditions during surveys—strong wind and rough seas may have decreased bird detection. In all years, we rarely encountered Kittlitz's Murrelets >500 m from shore. Kittlitz's

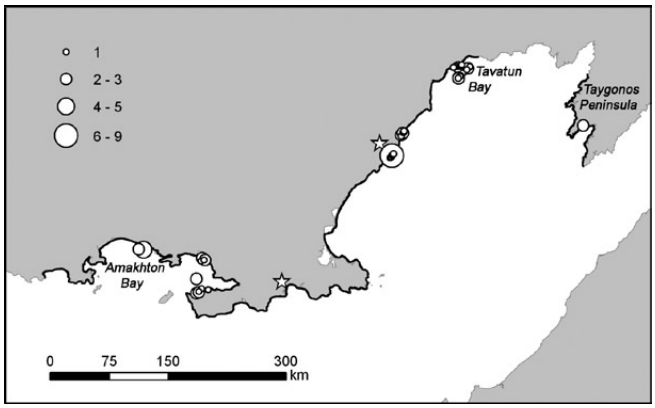


**Fig. 5.** Distribution and counts of Kittlitz's Murrelets on transects (coastline delineated in black) in the northern Sea of Okhotsk, Russia in 2005–2008. Star symbols mark locations of nests found in 1963 and 1994.

Murrelets were observed feeding along with other small alcids, usually as single birds. Mean group size was 1.41 birds (SD 0.76, n = 167) and the largest group consisted of five.

The largest Kittlitz's Murrelet aggregation in Chukotka was observed near Cape Chaplin; in a 50 m by 10 km transect, we counted 58 birds on 3 August 1985. Two pairs of birds were seen on 28 June 1984 in this area as well (Konyukhov & Zubakin 1988), farther out to sea (around 2 km from shore). A large concentration of Kittlitz's Murrelets has been characteristic of this area for many years. Johan Koren collected 42 Kittlitz's Murrelets at Cape Chaplin on 1–3 August 1910 (37–MCZ, 2–AMNH, 2–NRM, 1–ZIN RAS), Portenko (1973) took one on 23 August 1932 (ZIN RAS 159929/425-974), and, in this same area, A.P. Kuzyakin found a Kittlitz's Murrelet nest in Goryachie Klyuchi (Hot Springs) area about 6 km from the sea on 18 July 1971 (Tomkovich & Sorokin 1983; Fig. 4a).

During our three surveys, we were unable to reach some bays of the Chukotka Peninsula with suitable nesting habitat for Kittlitz's Murrelet, where birds had been previously observed. For example, V.N. Lyubin collected one Kittlitz's Murrelet in Lavrentiya Bay on 30 July 1948 (Portenko 1973); A.B. Savinetsky took a male near the abandoned Pinakul Village on 4 August 1998 (Severtsov Institute of Ecology and Evolution RAS, Moscow, pers. comm.); C. Albrecht collected a bird in Penkigney Bay on 22 July 1913 (FMNH 45691); in August 1981 single birds were seen in Aboleshev Bay and were caught in fishnets in Yanrakynnot Village (Konyukhov & Zubakin 1988). In Provideniya Bay, P.T. Butenko took one on 6 August 1938 (Portenko 1973; ZIN RAS 3577/21-947), M.M. Sleptsov collected three in juvenile plumage on 30 and 31 August 1950 (ZM MSU R-79188-79190), Gudkov (1959) took one adult bird on 4 July 1955 (ZM MSU R-125871), and Dorogoy (1995) observed three Kittlitz's Murrelets in the vicinity of Cape Stoletiya on 16 July 1993.

The status of the Kittlitz's Murrelet at the Diomede Islands is still unclear. Kozlova (1957) included these islands in the breeding range of the species, but did not provide any documentation. The basis of this conclusion may have been the observation of two Kittlitz's Murrelets on 3 June 1922 near the Diomede Islands (Bailey 1948) or, in accordance with other sources (Bailey 1925, 1943), near Cape Dezhnev. Similarly, Ivanov (1976) and Stepanyan (2003) may have had the same source of information in mind when they noted the presence of Kittlitz's Murrelets at the islands. Two birds were collected by A.H. Dunham at the Diomede Islands on 4 June 1908 (FMNH 137234 and 137235) and one bird on 6 July 1910 (AMNH 753394).

Along the southern coast of the Chukotka Peninsula, we did not observe any murrelets in summer either during at-sea surveys or in the course of colonial seabird studies, except for a single bird in Bezymyannaya Bay on 26 August 1985 (Fig. 4b).

Most of the nearshore land area of the Gulf of Anadyr is flat and unfit for Kittlitz's Murrelet nesting, except its northwestern corner, where there are mountains close to the sea. We found that murrelets were common in nearshore waters between Rudder Bay and Meechkin Spit Island, where 33 and 21 birds were counted in 2004 and 2005, respectively (Fig. 2). In total, 80 birds in flocks of 3–5 birds were observed at sea in this area on 30 June 1993 (Dorogoy 1995).

Evidently, murrelets nest in the head of Kresta Bay, where Belopolsky (1934) collected one bird on 28 May 1931 (ZIN RAS 5021/39-935).

He observed pairs of murrelets in the bay and at sea, but mistakenly identified them as Ancient Murrelet *Synthliboramphus antiquus*, a mistake later corrected by Portenko (1973). Three Kittlitz's Murrelets were caught in fishnets used by native people in Egvekinot Village in July 1971 (B.M. Zvonov, Severtsov Institute of Ecology and Evolution RAS, Moscow, pers. comm.).

Toward the south, large aggregations of murrelets were discovered along the northeastern coast of the Koryak Highlands, where a spur of the Maynopylgino mountain range comes close to the sea. We counted 115 murrelets during vessel transects in late July 2004 (Fig. 2a). Transects (246.5 km in length) zigzagged along the coast from 3 to 20 km offshore. The mean density of Kittlitz's Murrelet was 1.63 birds/km$^2$. Birds were observed mainly singly or in pairs; mean raft size was 1.82 birds (SD 0.93, range 1–5, n = 52).

Multiple surveys of the whole Bering Sea coast of the Kamchatka region in 1973–1995 revealed that Kittlitz's Murrelet was continuously distributed from Dezhnev Bay to Kamchatsky Bay, except for bays adjacent to flat, unmountainous land (Fig. 3). Bird density on transects was 0–3.8 birds/km$^2$, with a mean of 0.8 birds/km$^2$ (Vyatkin 1999a). The largest aggregations of murrelets along the southeastern coast of the Koryak Highlands were discovered during 26 June–1 July 1984 in Bolshoy Tigil Bay, where 100 Kittlitz's Murrelets were counted from the shore, and Severnaya Mochevna Bay, where 150 were counted from the shore; birds in both bays were seen singly or in rafts of up to eight birds. During transect counts in this area in 1990, we observed a pattern of distribution similar to the survey results in 1984, but in 1994, the number of birds was roughly 2–3 times lower. However, these counts are not comparable because the 1984 surveys were conducted from shore.

Kittlitz's Murrelets were numerous at sea in the nearshore area (<3 km from shore) of Olyutorsky Bay, where the Pylginsky mountain range of the Koryak Highlands comes close to the sea. We counted 71 and 77 murrelets in transects running along the shoreline in 1990 and 1994, respectively (Fig. 3). Also in this area, we observed murrelets during vessel transects farther (3–10 km) out to sea (Fig. 2). There is one specimen in museum collections from this area, an adult bird in alternate plumage (without date) taken in Korf Bay (Kistschinsky 1980; ZM MSU R-64652).

Murrelets were uncommon in the north of Karaginsky Bay. In this area, the only known Kittlitz's Murrelet nest in Kamchatka was found adjacent to Kichiginsky Bay, 5 km from the sea, on 26 June 1990 (Smetanin 1992; Fig. 3a).

In Litke Strait, Kittlitz's Murrelet was common (Figs. 2, 3b). Birds observed in the strait might nest on the mainland or on Karaginsky Island where suitable habitat exists, although the species' status on the island is still unclear. During a census carried out from a motorboat on 16 June 1968, 25 murrelets were counted along a route 60 km in length (Gerasimov 1979). Those surveys were from a boat traveling about 5–7 km seaward around Karaginsky Island. Birds were observed in rafts of 2–4 individuals; three birds were collected. Also, Kittlitz's Murrelets were observed in this area by V.O. Belopolsky, who took a year-old male in Karaga Bay on 20 May 1931 (Belopolsky & Rogova 1947; ZIN RAS 5027/39-933), and by F.V. Kazansky, who observed a flock of six birds from a motorboat south of Tymlat Bay on 17 June 2009 (Kronotsky State Nature Biosphere Reserve, Yelizovo, pers. comm.).

Within the Bering Sea area (Fig. 1), the most southerly large area of the Kittlitz's Murrelet breeding range is at the Kamchatsky Peninsula (a small peninsula located on the eastern side of Kamchatka roughly at the border of the Bering Sea and the Pacific Ocean). In this area, we counted 23 and 17 birds in 1994 and 1995, respectively (Fig. 3). This area is the southern limit of the species' main breeding range in Asia.

*Pacific coast of Kamchatka Peninsula and Kuril Islands*

There are only two known areas of possible isolated Kittlitz's Murrelet breeding in southeastern Kamchatka (Fig. 6). The first is Cape Nalychev, where 1–5 Kittlitz's Murrelets along with Long-billed Murrelet (*B. perdix,* common in this area) were regularly seen 100–800 m from the shore in June–July 2000 (E.G. Lobkov, Kamchatka State Technical University, Petropavlovsk-Kamchatsky, pers. comm.). Kittlitz's Murrelets had not been observed in this area before. The second is Russkaya Bay, where birds were seen on 13 August 1972 (3 adults; Vyatkin, unpublished data), on 22 June 2000 (1 adult; Artukhin, unpublished data), on 4 July 2006 (2 adults & 1 immature; E.G. Lobkov, pers. comm.), and on 25 June 2009 (3 pairs; Collins 2009). In all cases, Kittlitz's Murrelets were observed along with Long-billed Murrelets, enabling accurate and reliable identification. There are suitable habitats for Kittlitz's Murrelet nesting in this area. Also, the only known ground nest of Long-billed Murrelet was found at Cape Nalychev (Lobkov 2002).

Farther south along the Kamchatka coast, Kittlitz's Murrelet was observed only once, in Vestnik Bay on 4 September 1972, but it was probably a migrating bird (Vyatkin, unpublished data; Fig. 6).

There are no other reliable records of the Kittlitz's Murrelet during the breeding season on the Pacific coast of Kamchatka Peninsula. According to E.G. Lobkov (pers. comm.), who has long worked in this area, purported summer records of Kittlitz's Murrelet in Kronotsky Bay (Stenchenko 1975) pertain to the Long-billed Murrelet. The origin of two Kittlitz's Murrelet specimens obtained in northeastern Asia in 1828 and delivered by F.H. von Kittlitz to St. Petersburg (ZIN RAS 911 and 5018) has not been determined, though J.F. von Brandt (1837) indicated that these specimens were from Kamchatka. Published citations locating the origin of von Kittlitz's birds as Petropavlovsk-Kamchatsky (Dementyev 1951) are not currently substantiated. During the last 50 years, none of the Kamchatka ornithologists who have worked intensively both in Avacha Bay, on the shore of which Petropavlovsk-Kamchatsky is situated, and in Avacha Gulf has observed the Kittlitz's Murrelet in that region (Gerasimov & Gerasimov 1998, Vyatkin 2000, Lobkov 2009; Artukhin, unpublished data).

The status of the species on the Commander Islands is not clear. The Long-billed Murrelet has been collected once at the Commander Islands (Hartert 1920). However, taking into consideration the common occurrence of Kittlitz's Murrelet along the neighboring Kamchatka coast and the Aleutian Islands (Gibson & Byrd 2007), sporadic presence and nesting of Kittlitz's Murrelet at the Commander Islands is quite possible. Bycatch of Kittlitz's Murrelet in the Japanese salmon driftnet fishery 90 km north of Bering Island on 16 June 2001 supports this assumption (Artukhin *et al*. 2001; ZM MSU R-117539; Fig. 6).

Kittlitz's Murrelet records from the Kuril Islands are not numerous. Two birds were collected by Captain H. Snow in the 1870s–1880s

(Seebohm 1890) and one on Paramushir Island on 12 July 1928 (Yamashina 1929; Fig. 6). Apparently, these findings were the rationale for inclusion of Kittlitz's Murrelet on early lists of Japanese birds (Uchida 1912, Ornithological Society of Japan 1922, Carter *et al.* in press). Both the above-mentioned records of Kittlitz's Murrelet in the Kuril Islands and recent observations of the species on Kunashir and Hokkaido Islands (Carter *et al*. in press) apparently pertained to migrating, nonbreeding birds. Neither Russian (Nechayev 2005) nor Japanese (Kawanabe *et al*. 2002, Fukuda 2009) ornithologists have found Kittlitz's Murrelet in this area since the middle of the last century, except for one sighting on Kunashir Island in July 2009 (Carter *et al*. in press; Fig. 6).

*Sea of Okhotsk*

Kittlitz's Murrelets were recorded in summer only in the northern part of the Sea of Okhotsk (Fig. 5). Sixty-five birds were observed during transect counts scattered along a coastline of about 500 km (from alongside Lake Glukhoye, Amakhton Bay, to the Khikindya River, Tavatum Bay). Birds aggregated mainly in heads of large bays

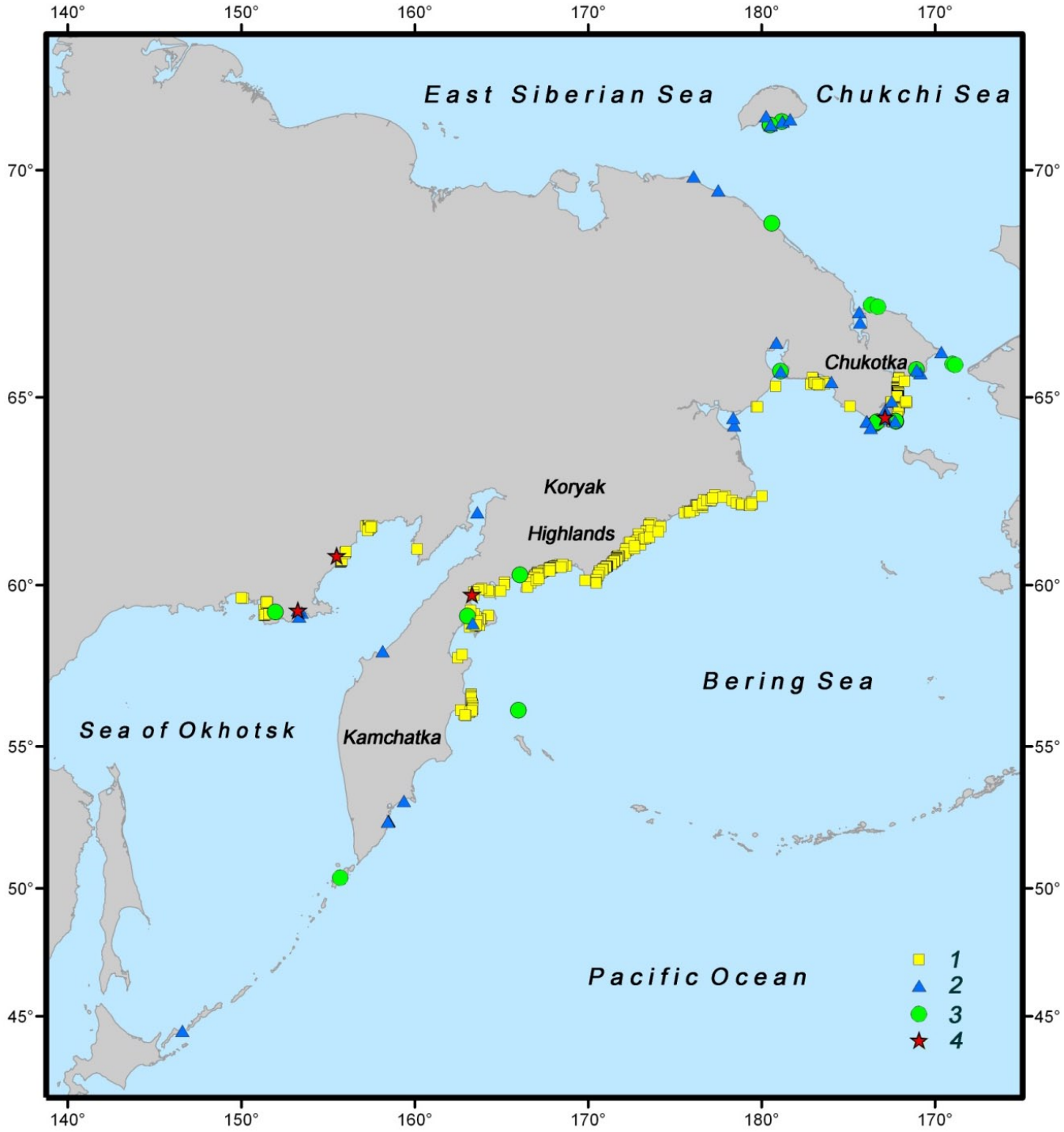


**Fig. 6.** Distribution of Kittlitz's Murrelets in northeastern Asia in the breeding period: transect survey location of identified birds (yellow squares), opportunistic records by authors and other investigators (blue triangles), museum specimens (green circles) and nests (red stars).

and wide valleys (Fig. 5). The greatest numbers of Kittlitz's Murrelet were near the Bulun and Tumany rivers, and around Cape Gorka. Birds were seen near forested shores bordering bare mountains. They preyed on capelin *Mallotus villosus* (observed in their bills) up to 10 km seawards, where bottom depth was 8–20 m. They were in pairs or alone; the mean group size was 1.39 birds (SD 0.52, n = 52), suggesting that most birds were potential breeders. Two nests have been found in this area, one in the southern part of the Kolyma Mountains, 30 km inland in the watershed of the Bulun and Naslachan rivers on 16 June 1963 (Kistschinsky 1968; Fig. 5), and the other 6 km inland on the shore of northern Babushkin Bay on 30 June 1994 (Andreev & Golubova 1995; Fig. 5). Also, one adult with a young bird was seen 1 km offshore near Cape Bratyev, Babushkin Bay on 28 August 1995 (Andreev 2005).

Before 2005, Kittlitz's Murrelets were seen in the western part of the known Sea of Okhotsk breeding area only once; an adult was collected in Odyan Bay, Koni Peninsula, on 28 June 1992 (Koblik et al. 2001; BMNHC 44436). In June–July 2007, we visited this area and observed 1–2 birds in the vicinity of capes Kharbiz, Plosky and Skalisty (Fig. 5). In recent years (2005–2008), we could not find Kittlitz's Murrelets in Babushkin Bay where they were repeatedly observed in 1964 and 1994–1995 (Kistschinsky 1968, Andreev & Kondratyev 2001, Andreev & Van Pelt 2007).

While inspecting the western coast of the Taygonos Peninsula, we found Kittlitz's Murrelets only in Vnutrennyaya Bay, on 24 July 2008 (Fig. 5). A pair fed in an inlet about 200 m from shore, where depth to the sandy bottom was 8–10 m. Assuming these birds were potential breeders, this would move the eastern border of Kittlitz's Murrelet breeding in the Sea of Okhotsk about 175 km to the east. The northeastern limit of nesting in the Sea of Okhotsk is poorly known. Yakhontov (1979) studied the seabird colonies of Penzhina Bay in 1969–1970. He included the Kittlitz's Murrelet in the list of birds of this area as a possible breeder, but his paper lacked details. The only substantiated observation of the Kittlitz's Murrelet in this area took place near the mouth of Tigil River, on the northwestern coast of the Kamchatka Peninsula, where Vyatkin observed two single murrelets on 14 July 1977 (Fig. 6).

Using available data, Andreev & Van Pelt (2007) estimated the Kittlitz's Murrelet population in the Sea of Okhotsk to be about 1000 birds.

### Migration and winter distribution (September–April)

The distribution of the Asiatic part of the Kittlitz's Murrelet population during the nonbreeding period is almost unknown. Common statements that murrelets migrate along the coast of Kamchatka Peninsula and the Kuril Islands during the nonbreeding period (Dementyev 1951, Kozlova 1957) have not been confirmed. Data that could clear up this question have begun to appear only during the last two decades.

Observations of Kittlitz's Murrelet in the Sireniki polynya, south of the Chukotka Peninsula, in April–May 1989 (Konyukhov 1990), and winter observations of this species in the American part of its range (Day *et al*. 1999; Kuletz & Van Pelt, unpublished data), suggest that at least part of the population may remain within the breeding range, residing in polynyas and cracks in marine ice fields. Birds observed near Cape Komsomol, Wrangel Island, on 26 September 1976 (Krechmar *et al*. 1979) and near the mouth of Vtoraya River, Kronotsky Bay, in April 1973 (Lobkov 1997, E.G. Lobkov, pers. comm.) may have been similarly overwintering. Likely as a result of their scarcity and scattered distribution, Kittlitz's Murrelets were not observed in ice-covered parts of the western Bering and Chukchi seas during surveys at sea and from the air (Trukhin & Kosygin 1987; A.M. Trukhin, Il'ichev Pacific Oceanological Institute FEB RAS, Vladivostok, pers. comm.).

Kittlitz's Murrelets may leave their breeding range in the Sea of Okhotsk, which is subject to heavy ice conditions in winter. However, observations of small alcids in cracks of ice fields in the northern Sea of Okhotsk (Trukhin & Kosygin 1986) suggest conditions may allow overwintering there. Migrating murrelets were observed in the Sea of Okhotsk only in Chayvo Bay, Sakhalin, where one bird was seen in Kleye Strait on 9 October 1999 and 15 birds (young or adult) in groups of 1–5 birds were observed about 30–60 m seawards along a 5 km route on 10 October 1999 (A.Y. Blokhin, Environmental Company of Sakhalin, Yuzhno-Sakhalinsk, pers. comm.). In September 1998, Kittlitz's Murrelet was not observed in the nearshore waters of northeastern Sakhalin (Sobolevsky 2001). After breeding, a few birds appear to move to the southern Sea of Okhotsk and Sakhalin in some years, and some may continue farther south to Hokkaido, Japan; one has been recorded as far south as central Honshu (Carter *et al*. in press).

## DISCUSSION

According to results of surveys in coastal areas, the breeding range of Kittlitz's Murrelet in northeastern Asia encompasses the coasts of the Chukchi, Bering and Okhotsk seas (Fig. 6). Distribution of the species in this vast area is very scattered and patchy. Kittlitz's Murrelets were most commonly seen along the southeastern coast of the Chukotka Peninsula, the northeastern part of the Gulf of Anadyr, along the eastern and southern coasts of Koryak Highlands and adjacent areas of Kamchatka Peninsula, and along the northwestern coast of Shelikhov Bay. Murrelets tended to be found along coastlines where alpine landscapes were close to the sea.

The breeding ranges of the Kittlitz's Murrelet and closely related Long-billed Murrelet overlap in the southern Bering Sea (south of Ossora Bay) and in the north of the Sea of Okhotsk (Vyatkin 1999b, Andreev & Van Pelt 2007). Distribution of these species in the eastern and western parts of their range differs considerably. In the Bering Sea, both species inhabit the same habitats (Vyatkin 1999a,b), whereas in the Sea of Okhotsk their distributions in many cases do not overlap but instead occur in a "striped" pattern that reflects alternation of forest (usually found in coastal plain areas) and mountain tundra (Andreev & Van Pelt 2007), probably reflecting their nesting habitat preferences.

Recent estimates of numbers of both local Kittlitz's Murrelet populations (Vyatkin 1999a, Kondratyev *et al*. 2000a, Andreev & Van Pelt 2007) and the Asian population as a whole (Shuntov 1998, Day *et al*. 1999) are preliminary. Statistically robust determination of the size of the Asian population of Kittlitz's Murrelet, based on GIS analyses of recent data, is a priority task for future studies. We believe the Asian coast likely supports a significant proportion of the global population of Kittlitz's Murrelet, and the Koryak Highlands region could be one of the most important areas for this species.

The northeastern Asian part of Kittlitz's Murrelet range is not currently influenced directly by human economic activity. Therefore,

this population is generally affected only by natural conditions. It is important to note that the Asiatic breeding range is not related to glaciers, as no glaciers exist in this area. By contrast, glacial retreat has been linked to the sharp reduction of murrelet numbers in Alaska (Kuletz *et al*. 2003). Farther south, bycatch is an anthropogenic influence on both the Asian and American populations. In Russian waters, most bycatch is in the nearshore gillnet fishery. As mentioned above, Kittlitz's Murrelets have been caught in nets in Chukotka, Long-billed Murrelets have been caught along the east Kamchatka coast (Lobkov 2002), and Ancient Murrelets are taken in the northern Sea of Okhotsk (Kondratyev *et al*. 2000b). An additional factor is bycatch in Japanese salmon drift nets; mortality in this fishery is on average about 1 bird/year (95 % CI = 0–2; Artukhin *et al*. 2010).

A potential danger for Kittlitz's Murrelet in northeastern Asia is pending oil and gas development on the shelf of northeastern Sakhalin, where Kittlitz's Murrelet migration apparently takes place, as well as plans to drill for gas on the western Kamchatka shelf (Gazprom 2010), which borders the Kittlitz's Murrelet breeding range.

The Kittlitz's Murrelet, as an insufficiently known species, is included in the Red Data Book (a state document of rare and endangered species and sub-species) of the Russian Federation, and the Red Data Books of all administrative regions where it occurs. However, no special protection or conservation actions have been conferred on this species in the Russian Federation. Surveys of potential breeding areas (especially in Penzhina Bay), more accurate definition of distribution in its main breeding areas, determination of regional and global population structure through genetic analyses, establishment and maintenance of population monitoring in representative and feasible areas, and studies of factors affecting populations (e.g. bycatch) are among the priority tasks for protection of the Asian Kittlitz's Murrelet population.

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