The Status and Conservation of the Long-billed Murrelet in Japan

S. Kim Nelson*, Yoshihiro Fukuda** and Nariko Oka***

Abstract. The Long-billed Murrelet (Brachyramphus perdix) is one of the rarest and most poorly understood alcids in Asia. First described by Pallas in 1811 as Cepphus perdix (the Partridge Murrelet), their solitary nesting at inland sites in remote areas of eastern Siberia and northern Japan has limited studies of their habitat preferences and population status. Because of this paucity of information, we were concerned whether viable populations would continue to persist in the southern portion of its breeding range in the face of a variety of conservation issues. Therefore, we compiled historical and recent at-sea and inland records of Long-billed Murrelets in Japan during the breeding and winter seasons. We also conducted inland, from-shore and at-sea surveys in northeastern Hokkaido between 1996 and 2001. Few murrelets were recorded during these surveys and based on historic information, murrelets may have been extirpated from some areas where they may have bred historically (e.g., northern Honshu and eastern Hokkaido). We discuss the conservation problems, including gill-net fishing, logging of mature forests in coastal regions, oil pollution, and predation, that may have led to its extirpation from some areas of Japan during the breeding season.

Key words: Brachyramphus perdix, Breeding status, Conservation, Historical review, Inland and at-sea surveys, Japan.

Introduction

The Long-billed Murrelet (Brachyramphus perdix) is one of the rarest and poorly known seabird species in Asia. First described by Pallas in 1811 as Cepphus perdix or the Partridge Murrelet, this species has also been called Temminck’s Murrelet and the Asian Mottled Murrelet. By 1837, the Long-billed Murrelet was placed in the genus Brachyramphus, and for a short time between the mid and late 1900s it was recognized as conspecific with the Marbled Murrelet (Brachyramphus marmoratus). Recent molecular genetic evidence (Zink et al.1995, Friesen et al. 1996), however, suggested that, as originally described, these two forms merited recognition at the species level. Brachyramphus perdix was listed as a unique species by the American Ornithologists Union in 1997 (AOU 1997).
Data are limited on the abundance, habitat preferences, and status of Long-billed Murrelets in Asia because of this species' rarity and a lack of research specific to their biology. Given this paucity of information, we were concerned about their status and whether viable populations would continue to persist throughout their range in the face of a variety of conservation issues, including breeding and foraging habitat losses, bycatch, and oil spills. We felt that a compilation of all existing information on Long-billed Murrelets was needed to begin to assess their status and threats to their survival. To that end, we compiled published and unpublished information on the distribution, breeding status, habitat use, and conservation problems of the murrelet in Japan. While we focused on the status of the Long-billed Murrelet in Japan, we also included details on the Russian population when important to the Japanese population. Our specific objectives included: (1) summarizing the historic sightings and collections of Long-billed Murrelets in Japan; (2) presenting the results of our survey efforts in northeastern Hokkaido, Japan between 1996 and 2001; (3) discussing the probable breeding status of this species in Japan; and (4) presenting key conservation issues that could be affecting the status of the Long-billed Murrelet in Japan.

Methods

Published Literature and Unpublished Survey Information

We compiled all available published and unpublished data on breeding and winter season observations of Long-billed Murrelets in Japan to assess their historic and current status. To compile these data, we conducted an extensive search of published journals and books, and unpublished reports. We also examined specimens of Long-billed Murrelets (and those labeled as Marbled Murrelets) from the following museum collections: Aomori Prefecture Museum (Aomori, northern Honshu), Hakodate Museum (Hakodate, Hokkaido), Kobayashi Collection (currently housed at the Hyogo Prefectural Man and Nature Museum, Sanda City, Honshu), Kushiro City Museum (Kushiro, Hokkaido), Museum of Comparative Zoology (Harvard University, Cambridge, MA), Mutsu City Educational Committee (Mutsu, northern Honshu), Rishiri Museum (Rishiri, Hokkaido), Sanbe Field Museum (Oda City, Honshu), Shiretoko Museum (Shari, Hokkaido), Tomakomai City Museum (Tomakomai, Hokkaido), U.S. National Museum (Smithsonian, Washington, DC), Yamagata Prefecture Museum (Yamagata City, Honshu), and the Yamashina Institute of Ornithology (Abiko, Honshu). To supplement this information, we contacted birders and seabird biologists throughout the region regarding sightings of this rare species. In summarizing these data, we separated observations during the breeding season (April–September) from those during March (could be breeding or wintering birds depending on ocean conditions and weather) and winter (October–February).

Field Surveys

Given limited information on the current status of Long-billed Murrelets in Japan, we also decided to implement inland, from-shore, and at-sea surveys between 1996 and 2001 to determine if murrelets were present and nesting on Hokkaido. We selected the
Fig. 1. Locations of our at-sea, from-shore, and inland survey stations, along with Long-billed Murrelet sightings from our study and others, along the Shiretoko Peninsula, Hokkaido, Japan.

Shiretoko and Abashiri (Mt. Mokoto) areas of northeastern Hokkaido to conduct our surveys based on recent sightings of this species during the breeding season (1982 and 1995; Sekine 1988, Matsuda 1997; Fig. 1). In 1996, our survey objectives were to: (1) locate potential breeding sites on the Shiretoko Peninsula and Mt. Mokoto; and (2) identify areas of suitable nesting habitat. Inland surveys were conducted according to the Pacific Seabird Group survey protocol (Ralph et al. 1994) at three sites on Mt. Mokoto and 15 sites in Shiretoko National Park (Fig. 1). Survey stations were placed in a variety of habitats based on our knowledge of known nesting sites of this species in Russia (Kuzyakin 1963, Nechaev 1986, Labzyuk 1987, Kondratyev & Nechaev 1989) and those of the Marbled Murrelet in North America (Hamer & Nelson 1995). Therefore, we established survey stations in: (1) mixed species forests (conifer and hardwood) with the
largest potential platforms (≥10 cm in diameter) available; (2) in major drainages that murrelets might use as flight corridors; and (3) alpine or rock talus areas (Fig. 1). Surveys were conducted between 1 and 6 July 1996. Additional methods and locations of surveys stations were detailed in Nelson et al. (1997). To identify areas of suitable habitat we hiked and drove along roads looking for potential platforms. We also reviewed vegetation maps and consulted with local biologists to locate areas with large platform trees. The overabundance of brown bears (Ursus arctos yesoensis) limited our off-road exploration, however.

Between May and September 1997, 1998, and 1999, from-shore surveys were conducted on a weekly basis to document the presence of Long-billed Murrelets off the Shiretoko Peninsula. Survey stations were located along roads (Highway 334 and Shiretoko Koonen-sen Road) between the Yambetsu River (43°55′72″N, 144°28′50″E) west of Shari Town and the Rusha River (44°11′52″N, 145°11′14″E) in Shiretoko National Park (Fig. 1). Scans of the Okhotsk Sea were made with a 60 power spotting scope to a distance of approximately 400 m. The date, time, location, distance from shore, group size, plumage characteristics, behavior and age (adult vs juvenile) were recorded for each bird observed. From-shore surveys were limited to days with low swell and no rain or fog.

In 2000, our survey objectives were to: (1) conduct at-sea surveys in the Sea of Okhotsk; (2) conduct from-shore surveys along the edges of the Sea of Okhotsk; (3) locate potential inland breeding sites on the Shiretoko Peninsula; and (4) identify areas of suitable nesting habitat. In 2001, objectives 1 and 2 were also implemented. We conducted our at-sea surveys using a small fishing boat with a 40 hp engine (maximum survey speed 11 knots) between 26 June and 15 September 2000, and 3 June and 10 September 2001. We surveyed from transects parallel to shore at two primary distances, 200 m and 500 m (Fig. 1). Generally, one to three observers and a driver were on board. Each observer scanned a 90° arc between the bow and the beam of the boat, using binoculars to confirm identification if necessary. On several occasions, we conducted surveys from the tourist ferry from Utoro to the end of the Shiretoko Peninsula, as generally we were unable to travel beyond Rusha River in our small boat because of high winds and surf. All species of birds within at least 100 m of the boat were recorded. The date, time, location, distance, group size, plumage characteristics, behavior and age (adult vs juvenile) were recorded for each bird observed. At-sea surveys were limited to days with no rain, wind, high surf (Beaufort state 3 and above) or fog.

We conducted inland and from-shore surveys between 26 June and 6 July 2000 according to the methods outlined above. Additional from-shore surveys were conducted between mid-June and mid-September 2001. Our from-shore survey stations were located in the same area as listed above for the 1997–1999 surveys (Fig. 1). Five inland survey stations were established, three along the Iwaobetsu River (44°06′20″N, 145°02′96″E; 44°06′23″N, 145°02′72″E; 44°06′33″N, 145°03′85″E), one at Meadow Junction (44°07′15″N, 145°04′64″E), and one at the Horobetsu River (44°05′13″N, 145°00′70″E) just north of Utoro (see Nelson et al. (1997) for details on the first two locations; Fig. 1). We again consulted maps and reviewed the available vegetation information to locate
potential inland nesting areas. We hiked and drove along roads, and hiked into potential nesting forests along the Iwaobetsu River, to evaluate platform sizes.

**Results and Discussion**

*Published Literature and Unpublished Survey Information*

Based on a compilation of historic sightings, specimen records, and published and unpublished data on Long-billed Murrelets in Japan and Asia (1884 to the present), we have provided a summary of their current distribution and abundance, breeding records, and historic distribution.

**Current At-Sea Distribution and Abundance**—During the breeding season, Long-billed Murrelets are distributed in the nearshore waters (generally within 10 km of shore), in coastal lagoons and freshwater lakes, and along coastal boreal or taiga forests in northern Asia (Russia and Japan; Kistchinsky 1968, Babenko & Poyarkov 1987, Nechaev 1991). Their breeding range currently extends from Karaginsky Bay on the eastern Kamchatka Peninsula and Penzhinskaya Bay in the northern Sea of Okhotsk, Russia, south to the Shantar Islands, Sakhalin Island, and the southern Kuril Islands, the Sea of Okhotsk and Pacific Ocean along the north and east coasts of Hokkaido, Japan, and south and west along the coast of the southern Primorye Region and Sea of Japan to Vladivostok, Russia (Brazil 1991, Konyukhov & Kitaysky 1995, Kondratyev et al. 2000; Fig. 2). The southern limit to their breeding range is thought to be Peter the Great Bay (at Vladivostok; Konyukhov & Kitaysky 1995) and the southernmost nest is known from Olga Bay, 170 km northeast of Vladivostok (Labzyuk 1987). Observations of this species are rare in the Komandorskiye Islands, along the western Kamchatka Peninsula, in the northern Kuril Islands, and on Hokkaido, Japan; their breeding status is currently unknown in these areas. Long-billed murrelets are described as rare in Japan during summer, but individual and pairs are occasionally seen on the Sea of Okhotsk coast near the Shiretoko Peninsula, and less so on the Pacific Ocean along eastern Hokkaido south to Kushiro (Brazil 1991).

Long-billed Murrelets migrate southward during late summer and early fall, and winter primarily off central and southern Japan, Korea and northern China (more than 1,500 km south of the southernmost breeding area; Dement’ev and Gladkov 1951, Brazil 1991). The northern Sea of Okhotsk begins freezing over in mid to late October and by mid February 80% of the Okhotsk Sea is covered with pack ice. This species is sometimes described as nonmigratory (Flint et al. 1984), however most birds leave the northern areas to escape the ice formation and floes, and only small numbers can be found off Hokkaido and southern Russia during this time (Babenko & Poyarkov 1987, Brazil 1991). Described as both a common and an uncommon winter visitor (Austin & Kuroda 1953, Brazil 1991), Long-billed Murrelets generally occur in Japan between November and March, but in some years birds can be found wintering as late as May off central Honshu (near Tokyo, Fig. 3). During this time of year, they are most often observed in pairs in protected bays (e.g., Mutsu and Tokyo bays) and on brackish lakes (e.g., Nakaumi and Shinji lakes), although two inland sightings were recorded in central Honshu (Gifu and Nagano...
prefectures) in February and March during the early 1900s (Kuroda 1928, Kiyosu 1965, Oka 1999; Fig. 3).

During their southward movements in late summer and fall, small numbers of individual Long-billed Murrelets are found in North America, perhaps carried east during storms as birds move south from northern breeding areas. At least 44 definite North American sightings are known from 1984 to 1999 and almost entirely between early July and late December. These records extend from the Pacific eastward to the Atlantic, and from Alaska south to Florida (Jehl & Jehl 1981, Sealy et al. 1982, 1991, Sibley 1993, Konyukov & Kitaysky 1995, Di Labio 1996, Mlodinow 1997, Gilligan 1999, American Birding Association 1999, 2000; C. S. Strong pers. comm.). A perdix murrelet was also recorded from Lake Zurich, Switzerland in December 1997 (Maumary & Knaus 2000).

There are no exact population estimates for this species, but in Russia numbers are thought to be in the tens of thousands (Konyukov & Kitaysky 1995). In the far north of their range (Kamchatka and the northern Sea of Okhotsk), the breeding population was
Fig. 3. Winter, March and summer observations of Long-billed Murrelets in Japan based on published records, museum collections, and sightings from birders.

estimated at 9,000 birds (Vyatkin 1999, Kondratyev et al. 2000). In these areas densities have reached as many as 8.4 birds/km². In the southern portion of their breeding range in Russia, they are thought to be most numerous near the mouth of the Amur River and
near the Shantar Islands. Numbers in this area were estimated to be at least 600 birds (300–400 pairs; 0.5–2.0 birds per km of transect). There are no available population estimates from Japan during any season. They are considered a rare breeder in northeastern Hokkaido, either in small numbers or only occasionally (Brazil 1991).

**Breeding Records**—There are four known tree nests of this species from central and southern Siberia up to 12 km inland (Koni Peninsula near Magadan, northwest of Okhotsk, at Chaivo Bay on Sakhalin Island, and at Olga Bay, northeast of Vladivostok; Kuzyakin 1963, Nechaev 1986, 1991, Labzyuk 1987, Kondratyev & Nechaev 1989; Fig. 2). These nests were found in Dahurian larch (*Larix gmelini*) trees on relatively small intertwining, lichen- or twig-covered branches within 7 m of the ground. All of these nests (and other inland sightings in Russia) have occurred in coastal larch or mixed species taiga forests, although one nest tree was on a rocky coastal cliff with scattered large trees. No records exist for this species in treeless areas, which sets the Long-billed Murrelet apart from its previous conspecific, the Marbled Murrelet, which is known to nest on treeless scree slopes in Alaska and British Columbia (Day *et al.* 1983; G. Kaiser, pers. comm.).

In other evidence of breeding in Asia, eggs have been collected from the oviducts of two females in June, one on the northwestern coast of the Sea of Okhotsk and one on Semyachik Spit on the Kamchatka Peninsula (Konyukhov & Kitaysky 1995; Fig. 2). Adults carrying fish have also been observed along the Amur River in June and July, and during early July to late August in the northern Sea of Okhotsk (Shibaev 1990, Konyukhov & Kitaysky 1995). In addition, numerous juveniles have been recorded between June and September in the following locations (all located in Russia unless specified): on Ozhabachye Lake, Kamchatka; Avacha Bay, Kamchatka; Zavyalova Island, northern Sea of Okhotsk; Mordvinov Bay, Sakhalin Island; Aniva Bay, Sakhalin Island; Kuanshir Island, southern Kuril Islands; Nemuro, Hokkaido Island, Japan (1984), and Abashiri, Hokkaido Island, Japan (four individuals in 1982; Nechaev 1991, Konyukhov & Kitaysky 1995, Kirihara 2000, Kondratyev *et al.* 2000, Yamashina Institute of Ornithology; Fig. 2).

Long-billed Murrelets are suspected to breed on northeastern Hokkaido Island, Japan based on recent and continued observations of adults and juveniles along the Shiretoko Peninsula in the Sea of Okhotsk and Pacific Ocean off Kushiro during the summer months (Brazil 1991; Fig. 1 & Fig. 3). In addition, a recently fledged young was found on a road near the town of Nemuro on 21 September 1984 (Kirihara 2000; Fig. 2 & Fig. 3). Despite the presence of murrelets on the water in this area and numerous searches for inland nesting sites (e.g., Nakagawa *et al.* 1993, this paper), no inland occupied forests or nest sites have been located. In mid June, 1961, a murrelet nest was reported from Mt. Mokoto, on northeastern Hokkaido (Ornithological Society of Japan 1975, Sekine 1988), however the suspected ground nest, made of grasses, contained three quail-sized, pale yellow eggs spotted with red, blue and yellow (Sekine 1988), not the single chicken-sized, blue-green to greenish-yellow egg (finely spotted with black, brown, and purple) of the murrelet (Kuzyakin 1963, Day *et al.* 1983). An adult murrelet in summer plumage, supposedly collected from this site, is now in the collection at the Yamashina Institute of Ornithology.
**Historic Distribution**—Information is limited on the historic distribution of this species. Yet through museum specimens, we were able to determine some areas of Japan where this species occurred during the latter part of the 19th century and the early to late 20th century (Fig. 3, Appendix 1). The earliest records originate from the late 1800s, with one bird collected from Tokyo Bay in March 1883 and another from near the town of Hakodate on southern Hokkaido in April 1884. Since that time, breeding season records have occurred primarily on northeastern Hokkaido, although three records were from northern and central Honshu, in Mutsu Bay (Aomori Prefecture, 1927 and 1996), near Oshika (Miyagi Prefecture, 1932 and 1966), and in Tokyo Bay (1919). Outside the breeding season, murrelets were primarily collected and observed in the southern areas of Japan, especially near Tokyo in the early and mid 1900s (Fig. 3). Recently (1990s and 2000), however, the areas with the most sightings during the non-breeding season have been northeastern Hokkaido, northern Honshu including Mutsu Bay and the coastal waters off the Shimokita Peninsula (east of Mutsu Bay, Aomori Prefecture), and southeastern Japan, including Suruga Bay (south of Tokyo, Shizuoka Prefecture), Osaka Bay off Shikoko Island (Osaka Prefecture), and just north of Shibushi Bay off Kyushu Island (Miyazaki Prefecture; Fig. 3). In addition, recent sightings have occurred in southwestern Honshu, including 8 individuals in the Sea of Japan near Kanazawa that were victims of a 1997 oil spill and 4 individuals caught in set nets in Lake Shinji near Matsue (Ishikawa and Shimane prefectures, respectively; Helm et al. 1997, Oka 1999).

From our research and summary of historic sightings and specimen collection locations, we learned that murrelets have not been sighted south of Hokkaido between March and September since 1974, except a sighting in Mutsu Bay, northern Honshu, in March 1996 (Fig. 3, Appendix 1). In addition, on Hokkaido, more individual murrelets were sighted off Kushiro and eastern Hokkaido during the breeding season between 1930 and 1960 than have been recorded recently (Appendix 1). Only in the Sea of Okhotsk off the Shiretoko Peninsula on northeastern Hokkaido have sightings of murrelets regularly occurred during the breeding season, although this may be related in part to our intensive survey efforts there since 1997 (Fig. 1 & Fig. 3).

We found no historic information on murrelet population abundance and therefore have no concrete evidence that murrelet populations have declined. However, based on what appears to fewer sightings during recent winters than were recorded historically (before 1990), especially near Tokyo and along central Honshu, and fewer breeding season observations along northern Honshu and eastern Hokkaido, Long-billed Murrelet populations in Japan may be lower than historically. Given similar threats to their breeding and wintering habitat as the Marbled Murrelet, including loss of nesting habitat, bycatch, oil spills, and other environmental concerns (see Conservation Issues below), it would not be unexpected if Long-billed Murrelet populations had declined and were currently continuing to decline in both Japan and Russia. We suggest that continued research be conducted on this species in Japan, and research be initiated in Russia, to immediately address the issue of population trends.
Field Surveys

Inland Surveys—During more than 90 observer days at 25 stations, no Long-billed Murrelets were detected during our inland forest or scree slope surveys on Mt. Mokoto and the Shiretoko Peninsula in 1996 and 2000. In addition, Nakagawa et al. (1993) did not detect any murrelets during their inland surveys on Mt. Mokoto and Shiretoko in 1993 (Fig. 1). We could find no record of historic inland sightings during the breeding season other than the suspected nest site on Mt. Mokoto from 1961. In Russia, breeding sites and inland activity areas have occurred in forested areas as far as 12 and 60 km inland, respectively (Kondratyev & Nechaev 1989, Konyukhov & Kitayski 1995; Fig. 2).

At-Sea and From-Shore Surveys—Our at-sea and from-shore surveys revealed that murrelets are rare in the Sea of Okhotsk off northeastern Hokkaido. Off the Shiretoko Peninsula and Abashiri during the breeding season, only 6 birds were observed in 1996 (Kawasaki 1997), 4 birds in 1997, 12 birds in 1998, 16 birds in 1999, 0 birds in 2000, and 2 birds in 2001 (Fig. 1, Appendix 2; Fukuda 1999, 2001, unpubl. data; this paper). At least two of the murrelets were identified as juveniles, indicating breeding in nearby areas. Most of the sightings occurred off the Rusha and Teppambetsu Rivers on the Shiretoko Peninsula, although Kawasaki (1997) observed his birds off the Yambestu River, as did Matsuda (1997) in 1995 (n=24; Fig. 1 & Fig. 3). In addition to the presence of some suitable nesting trees nearby, the occurrence of murrelets near the mouths of the Rusha and Teppambetsu Rivers could be related to optimal foraging conditions. Where these rivers empty into the Sea of Okhotsk is an area of current convergence, where the currents from the deeper regions of the Sea of Okhotsk meet the shallow waters of the inner bay. Many other seabirds, including Spectacled Guillemots (Cepphus carbo) and Rhinoceros Auklets (Cerorhinca monocerata), congregate and forage extensively in this area (pers. obs.).

Potential Nesting Habitat—During our ground searches for murrelet habitat in the Mt. Mokoto and Shiretoko National Park areas, we found few remaining stands of ancient forests or forests with suitable nesting structures. However, we did locate some large limbs, primarily on single conifer (e.g., Abies sachalinensis, Picea jezoensis) or birch (Betula ermanii) trees, or small groups of trees in both areas, which could support small numbers of nesting murrelets. In contrast, large numbers of ground nesting murrelets could be supported by the extensive talus slope areas on the numerous volcanos within Shiretoko National Park and nearby areas.

Conservation Issues

Long-billed Murrelets are exposed to similar threats as the Marbled Murrelet, including foraging and nesting habitat loss, oil spills, coastal gill-net and set-net fishing, predation, disturbance, and changes in ocean conditions. Kondratyev et al. (2000) stated that there are no problems with protection of the murrelet at present, however any remaining breeding or wintering populations in Japan, as well as Russia, are probably being impacted by these various and extensive conservation issues.

Habitat Loss—The history of forested habitat loss in Japan is well outlined in numerous books and historical accounts. Logging has occurred throughout history in
Japan, however a noticeable increase in logging took place on Honshu and points south during the Tokugawa regime or Edo-period, which occurred between 1600 and 1868 (Ackerman 1953). Most of the logging during this time was for building houses, for fuel wood, and for building and rebuilding the huge temples and castles for the shogun. On Hokkaido, most of the forests were well preserved throughout this time period, as most of the island was inhabited by only a small number of native Ainu hunters and gatherers. In the late 1800s and early 1900s, the Meiji government instituted rapid industrialization and use of natural resources, increasing the loss of older-aged forests throughout Japan. During this time period, many ancient forests were logged for building houses and ships. The most extensive logging throughout Japan, however, occurred during WW II and the postwar reconstruction period (1940s and 1950s) when a tremendous amount of lumber was extracted from National Forests and other remaining older-aged forests (HNCS 1985; NFEA 1991, 1999). Today, despite the fact that more than three-quarters of Japan is covered by forest (NFEA 1999), replanting was not initiated until after 1955 (Kataoka 1991), therefore most of the forested habitat in Japan is young (<50 years old) and lacks the structures (e.g., large limbs) required for murrelet nesting.

Through our inquiries and explorations beyond our ground searches, we determined that, in general, the primary places where older-aged forest or individual large trees exist in Japan today are in the various national and county parks or surrounding temples and shrines. Preservation within these areas is not assured, however. We learned that many National Parks, wilderness areas and other reserves designated between the 1930s and 1970s were established in areas without complete government land ownership. For example, only 94% of Shiretoko National Park is nationally owned (2nd highest percentage of all the parks; Shari Government 1984). Individuals whose private land falls within park boundaries have some say about how their land is managed. The various government agencies involved in these parks and preserves are currently developing a national trust system for purchasing private lands in sensitive areas. In Shiretoko National Park, they are in the process of buying most (86%) of the remaining private lands within the park boundaries in what is called the Shiretoko 100 m² Movement.

Based on the limited suitable forested habitat in northeastern Hokkaido, and the fact that most of the recent breeding season sightings have occurred in late July and August (Appendix 2), it is possible that many of the breeding season observations of murrelets in Japan are post-breeding or non-breeding birds from Russia, given the proximity of this area to known nesting or inland locations of murrelets on the southern Kuril Islands and on Sakhalin Island. Discussions with biologists who have been to these nearby Russian islands (e.g., J. Minton, pers. comm.), revealed that some ancient forests with large conifer trees and large platforms still exist because, to date, logging has not occurred as extensively in these areas of Russia compared to Hokkaido and other areas of Japan.

Oil Spills—Marbled Murrelets are known to be highly affected by oil spills because of their inshore foraging habits (King & Sanger 1979). The same can be expected of Long-billed Murrelets because of their similar foraging strategies (Kondratyev & Nechaev 1989, Konyukhov & Kitaysky 1995). In addition, because wintering murrelets appear to carry no more than a day or two of energy reserves, a winter oil spill would likely kill many
birds as they attempt to counteract depleted thermal energy with increased metabolism (Oka & Hamasoto 2001). Such an event occurred in the Sea of Japan in January 1997, when at least 8 individual murrelets were killed during the Russian tanker Nakhodka oil spill (Helm et al. 1997). The current and planned extensive development of oil drilling and subsequent oil pollution along the continental shelf in the Sea of Okhotsk could have significant impacts on the most important breeding and foraging areas for the Long-billed Murrelet. Not only could this affect the relatively dense populations around Sakhalin Island and the Shantar Islands, but also the remaining breeding population along north-eastern Hokkaido and wintering populations throughout Japan. The possibilities of future spills are real, and they can create year-round effects on this species.

Gill-Net and Set-Net Fisheries—Extensive fisheries occur in all coastal waters of Japan, including the near-shore areas (Ackerman 1953). Because Long-billed Murrelets are inshore feeders they are highly threatened by the coastal set-net fisheries, especially during the winter when birds congregate in certain bays, lagoons and estuaries (Brazil 1991, Nelson 1997, pers. obs.). The primary coastal fishing of northeastern Hokkaido includes salmon trap-netting and pollock gill-net fishing. Although the local fishermen claim to not catch wildlife in their nets, Oka (1999) documented four incidental catches of wintering Long-billed Murrelets in set nets on Lake Shinji in the late 1990s, and we observed several dolphins, shearwaters, and Spectacled Guillemots drowned in nets during our at-sea surveys along the Shiretoko Peninsula. Additional documentation of murrelets being caught in fishing nets include: (1) a bird caught in a gill net at 5 m depth and 50 m off shore of Shari Town on 5 November 1996 (specimen at the Shiretoko Museum); (2) a bird found dead from suspected bycatch in the coastal waters of Mutsu Bay (specimen with the Mutsu City Educational Committee); (3) 9 birds caught in a driftnet off Okhostk Russia in 1998 (Artukhin et al. 1999); and (4) 9 and 32 birds caught in driftnets in the Russian Bering Sea in 1998 and 1999, respectively (Artukhin et al. 2000).

Predation—No information is available on the effects of predation on nesting Long-billed Murrelets. However, it is likely that Corvid populations (especially the Jungle Crow, Corvus macrorhynchos) have increased in areas of human establishment and habitat modification (Nechaev 1991), as they have in other areas in the world (Robbins et al. 1986, Marzluff et al. 1994). We know that Corvids play a significant role in the predation of Marbled Murrelet nests in North America (Nelson & Hamer 1995); Long-billed Murrelet nests may also be susceptible to predation by Corvids in areas where their distributions overlap. In addition, native and introduced carnivores such as mink, weasel, foxes and cats, which are increasing in number (Kondo 1991), could depredate any ground nests of this species.

Human Disturbance—We found no information on the effects of human disturbance on Long-billed Murrelets. As with Marbled Murrelets in North America, the most likely arena for disturbance would be in parks and preserves that attract tourists. There is some evidence that disturbances may affect Marbled Murrelets at their nest sites, causing them to flush when the disturbance is within visual range (Hamer & Nelson 1998). The best place to create or provide murrelet habitat would be in areas away from potential human disturbance.
Current Breeding Status in Japan and Recommendations for Conservation

Our research and field surveys suggest that Long-billed Murrelets are rare during winter and summer throughout Japan. These murrelets probably breed only in northeastern Hokkaido and only in small numbers or occasionally. Some of the recent breeding season sightings in northeastern Hokkaido could be post-breeding birds from Russia.

We speculate that Long-billed Murrelets once nested in suitable habitat throughout northern Japan, based on the historic presence of murrelets on northern Honshu and Hokkaido during the breeding season, recent observations of birds in eastern and northeastern Hokkaido, and the historic availability of large conifer trees in this area for nesting (HNCS 1985, NFEA 1991). If this speculation is true, then it currently appears as if Long-billed Murrelets have been extirpated from portions of their breeding range. This is not an unlikely scenario given what we know about the decline of Marbled Murrelets in North America in the face of a variety of threats to their populations, including habitat loss, gill-net fishing, and predation. For example, in northern California Marbled Murrelets apparently no longer nest in the small patches of old-growth forests that remain in southern Santa Cruz and Monterey counties (USFWS 1997). They were likely extirpated from this area in the early to mid 1900s because of nesting habitat loss and habitat fragmentation. Given the variety of conservation issues present in Japan (as discussed above), recent and future declines in the Long-billed Murrelet populations in Japan would not be unexpected.

While we are uncertain about the current status of the Long-billed Murrelet in Japan, given the likelihood of past and current breeding in northern Japan, we recommend that certain steps be taken to maintain safe wintering habitat and ensure the availability of breeding habitat for the remaining populations. First, every effort should be made to verify the breeding status of this species in northeastern Hokkaido and determine population trends in both Japan and Russia. At the same time, surveys should be implemented on nearby Russian islands to determine their preferred nesting habitat and foraging ranges. As these surveys are occurring, every effort should be made to provide and create habitat for this species in parks, reserves and other areas of northeastern Hokkaido. Even if this species is currently extirpated from nesting in Japan, Hokkaido was likely a historic breeding area, thus every attempt should be made to provide suitable habitat to maintain or restore populations of this species. Conservation should also include minimizing any impacts from oil spills and fishing that could affect both the wintering and potential breeding populations.

The status of the Long-billed Murrelet in Russia is unknown as well. While nesting is known to occur and populations have been estimated to be in the tens of thousands, the potential impacts to this species from logging, fishing and oil transport in Russia could easily create a tenuous status. In fact, the 40 year logging plan for the Russian Far East calls for cutting down most of the remaining ancient forests (Korovkin et al. 1998, PERC 1999). The restoration of breeding populations in Japan will depend on healthy populations in Russia. It is our hope that scientists and land managers from both countries can work together to maintain and recover populations of this extraordinary species.
Acknowledgments

We wish to thank those who helped us in the field between 1996 and 2001: Takeo Akama, John Fries, Tony Gaston, Tom Hamer, Stefan Hotes, Yasuhiro Kawasaki, Lora Leschner, Koji Ono, Yuichi Osa, Kuniko Otsuki, Mihoko Sato, Mutsuyuki Ueta, and Will Wright. Thanks also to Seiichi Abe, Takeo and Makiko Akama, Harry Carter, John Fries, Masao Hashimoto, Mitsuki Matsuda, Jason Minton, Koji Ono, Kuniko and Kota Otsuki, Mihoko Sato, Craig Strong, Akinori Takahashi, Michihiro Tazawa, and Yuri and Yutaka Watanuki for providing data or much-needed assistance during this project. We owe special thanks to the Japan Alcid Society and the Japanese Seabird Conservation Committee of the Pacific Seabird Group for planting the seed that made this study possible. Funding and support for this project was provided by the Nature Conservation Society of Japan, the Zenrousai Fund, and U.S. Geological Survey, Biological Resources Division, Oregon Cooperative Fish and Wildlife Research Unit at Oregon State University. Two anonymous reviewers provided comments on early drafts of this manuscript.

References


The Status and Conservation of the Long-billed Murrelet in Japan


日本におけるハシナガウミズムズ (Brachyramphus perdit) の現状と保護

ハシナガウミズムズ (Brachyramphus perdit) は、日本鳥学会日本鳥類目録改訂第 5, 6 版 (1974, 2000) ではマダラウミズムズの一亜種 (B. marmoratus perdit) に分類される。北米西岸種マダラウミズムズ Brachyramphus marmoratus m. より大型で、近年の分子生物学的分類手法によりアメリカ鳥学会では両種は同属別種に扱う。本論文では第 1 著者の所属するアメリカ鳥学会の分類手法を採用した。このハシナガウミズムズはアジアで最も稀で、しかも生態が知られていないウミズムズ科鳥類の一種である。本種は元来、東シベリアと北日本の遠隔地域の内陸に、他の海鳥類のような集団繁殖ではなく、個別に繁殖してきたことが原因して、Pallas が 1811 年にウミバト属 Cepphus perdix (the Partridge Murrelet) と初記載して以後、生息地の成立の好適要件と生息個体数の状況調査がほとんど行われずにきた。このため蓄積された知見が極めて少なく、本種の広範囲な保護策を考える際、飼育して本種個体群が、その繁殖南限域と考えうる地域で今もって残存しているかが関心事となってきた。

私たちは、本種の繁殖期と越冬期の日本での海上と内陸での記録について、過去から最近までの文献資料を渉猟し、とりまとめた。1996〜2001 年には、道東の知床半島周辺の内陸部と海岸、および海上での目録、あるいは音声による調査を行った。野外調査期間中、本種はほとんど目撃されず、また文献資料の調査結果から、かつて本種が繁殖したと考えられた地域（例えば東北地方、道東地方など）からほぼ絶滅した可能性が高いと考えられた。保護上の問題点、例えば、繁殖期に日本の冬の生息域から本種を一掃する要因になったと考えられる、刺し網漁、海岸周辺の原生林の伐採、汚染、捕食について議論した。

S. キム・ネルソン：米国地質局生物調査課オレゴン州立大学魚類野生生物共同体。104 Nash Hall, Corvallis, OR 97331-3803 USA. nelsonsk@ucr.orst.edu

福田佳弘：〒580-0014 大阪府松原市丘 5-2-25 マダラウミズムズ研究グループ。
murrelet@d1.dion.ne.jp

岡 奈理子：〒270-1145 千葉県我孫子市高野山115 財）山階鳥類研究所・研究部。
oka@yamashina.or.jp
<table>
<thead>
<tr>
<th>Island</th>
<th>No. and Age</th>
<th>Location</th>
<th>Date</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hokkaido</td>
<td>1884</td>
<td>Hokkaido (Ohshimia)</td>
<td>21 Apr 1927</td>
<td>Aiken (Kushiro)</td>
</tr>
<tr>
<td></td>
<td>21 Apr 1935</td>
<td>Ahsaki (Kushiro)</td>
<td>1 adult</td>
<td>Akatsuki (Kushiro)</td>
</tr>
<tr>
<td></td>
<td>22 Apr 1950</td>
<td>East Abashiri Bay (Abashiri)</td>
<td>1 adult</td>
<td>Akatsuki (Kushiro)</td>
</tr>
<tr>
<td></td>
<td>27 Apr 1950</td>
<td>East Abashiri Bay (Abashiri)</td>
<td>2 adults</td>
<td>Akatsuki (Kushiro)</td>
</tr>
<tr>
<td></td>
<td>5 Jun 1954</td>
<td>Kushiro (Kushiro)</td>
<td>6 adults</td>
<td>Akatsuki (Kushiro)</td>
</tr>
<tr>
<td></td>
<td>15 Jun 1961</td>
<td>Shiretoko (Abashiri)</td>
<td>1 adult</td>
<td>Akatsuki (Kushiro)</td>
</tr>
<tr>
<td></td>
<td>18 Aug 1965</td>
<td>Kushiro (Kushiro)</td>
<td>2 adults</td>
<td>Akatsuki (Kushiro)</td>
</tr>
<tr>
<td></td>
<td>25 Aug 1982</td>
<td>Kushiro (Kushiro)</td>
<td>4 adults</td>
<td>Akatsuki (Kushiro)</td>
</tr>
<tr>
<td></td>
<td>21 Sep 1984</td>
<td>Hamakoshizumi, Shari (Abashiri)</td>
<td>1 adult</td>
<td>Akatsuki (Kushiro)</td>
</tr>
<tr>
<td></td>
<td>17 Jun 1995</td>
<td>Omirometsu to Oshinkoshiri (Abashiri)</td>
<td>1 adult</td>
<td>Akatsuki (Kushiro)</td>
</tr>
<tr>
<td></td>
<td>9 Jul 1996</td>
<td>Yambetsu River, Koshimizu (Abashiri)</td>
<td>2 adults</td>
<td>Akatsuki (Kushiro)</td>
</tr>
<tr>
<td></td>
<td>10 Jul 1996</td>
<td>Yambetsu River, Koshimizu (Abashiri)</td>
<td>2 adults</td>
<td>Akatsuki (Kushiro)</td>
</tr>
<tr>
<td></td>
<td>19 Jul 1996</td>
<td>Yambetsu River, Koshimizu (Abashiri)</td>
<td>2 adults</td>
<td>Akatsuki (Kushiro)</td>
</tr>
<tr>
<td></td>
<td>12 Mar 1999</td>
<td>Oshinbashi (Nemuro)</td>
<td>1 adult</td>
<td>Akatsuki (Kushiro)</td>
</tr>
<tr>
<td></td>
<td>1 Aug 1997</td>
<td>Rokkoh River Mouth (Tokyo)</td>
<td>1 adult</td>
<td>Akatsuki (Kushiro)</td>
</tr>
<tr>
<td></td>
<td>24 May 1997</td>
<td>Katase, Sagami Bay (Kanagawa)</td>
<td>1 adult</td>
<td>Akatsuki (Kushiro)</td>
</tr>
<tr>
<td></td>
<td>10 Mar 1998</td>
<td>Nishin, Kamakura (Kanagawa)</td>
<td>6 adults</td>
<td>Akatsuki (Kushiro)</td>
</tr>
<tr>
<td></td>
<td>14 May 1998</td>
<td>Onaka, Miyagi (Miyagi)</td>
<td>1 adult</td>
<td>Akatsuki (Kushiro)</td>
</tr>
<tr>
<td></td>
<td>10 Mar 1999</td>
<td>Nakashima, offshore (Hyogo)</td>
<td>1 adult</td>
<td>Akatsuki (Kushiro)</td>
</tr>
<tr>
<td></td>
<td>9 May 1999</td>
<td>Nisai, (Nagita)</td>
<td>6 adults</td>
<td>Akatsuki (Kushiro)</td>
</tr>
<tr>
<td></td>
<td>14 Apr 1999</td>
<td>Naagat, Coast (Ehime)</td>
<td>1 adult</td>
<td>Akatsuki (Kushiro)</td>
</tr>
<tr>
<td></td>
<td>1 Apr 1999</td>
<td>Ofunawatari, Fumisawa, Miyazaki (Miyazaki)</td>
<td>1 adult</td>
<td>Akatsuki (Kushiro)</td>
</tr>
</tbody>
</table>

**The Status and Conservation of the Long-billed Murrelet in Japan**
Appendix 2. Breeding season (April-September) observations of Long-billed Murrelets recorded during our from-shore and at-sea surveys along the Shiretoko Peninsula, Abashiri Prefecture, Hokkaido, Japan, 1996-2001 (Fukuda 1999, 2001, unpubl. data; this paper).

<table>
<thead>
<tr>
<th>Year</th>
<th>Date</th>
<th>No. and Age (sex)</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>31 Jul</td>
<td>1 adult, 1 juv</td>
<td>Rusha River</td>
</tr>
<tr>
<td>1997</td>
<td>26 Aug</td>
<td>2 adults</td>
<td>Rusha River</td>
</tr>
<tr>
<td>1998</td>
<td>29 Jun</td>
<td>1 adult</td>
<td>Rusha River</td>
</tr>
<tr>
<td>1998</td>
<td>22 Jul</td>
<td>2 adults</td>
<td>Rusha River</td>
</tr>
<tr>
<td>1998</td>
<td>24 Jul</td>
<td>1 adult, 1 juv</td>
<td>Rusha River</td>
</tr>
<tr>
<td>1998</td>
<td>29 Jul</td>
<td>1 adult</td>
<td>Shishi Rocks</td>
</tr>
<tr>
<td>1998</td>
<td>29 Jul</td>
<td>1 adult</td>
<td>Poromoi Bay</td>
</tr>
<tr>
<td>1998</td>
<td>1 Aug</td>
<td>4 adults</td>
<td>Teppambetsu River</td>
</tr>
<tr>
<td>1998</td>
<td>6 Aug</td>
<td>1 adult</td>
<td>Teppambetsu River</td>
</tr>
<tr>
<td>1998</td>
<td>12 Aug</td>
<td>1 adult</td>
<td>Rusha River</td>
</tr>
<tr>
<td>1999</td>
<td>11 Jul</td>
<td>4 adults (?)</td>
<td>Rusha River</td>
</tr>
<tr>
<td>1999</td>
<td>12 Jul</td>
<td>1 adult, 1 unknown</td>
<td>Rusha River</td>
</tr>
<tr>
<td>1999</td>
<td>17 Jul</td>
<td>2 adults</td>
<td>Rusha River</td>
</tr>
<tr>
<td>1999</td>
<td>20 Jul</td>
<td>1 adult (?)</td>
<td>Rusha River</td>
</tr>
<tr>
<td>1999</td>
<td>21 Jul</td>
<td>1 unknown</td>
<td>Rusha River</td>
</tr>
<tr>
<td>1999</td>
<td>25 Jul</td>
<td>1 unknown</td>
<td>Utoro Bay</td>
</tr>
<tr>
<td>1999</td>
<td>6 Aug</td>
<td>2 adults</td>
<td>Rusha River</td>
</tr>
<tr>
<td>1999</td>
<td>7 Aug</td>
<td>2 adults</td>
<td>Rusha River</td>
</tr>
<tr>
<td>1999</td>
<td>8 Aug</td>
<td>1 unknown</td>
<td>Utoro Bay</td>
</tr>
<tr>
<td>2001</td>
<td>16 Jun</td>
<td>1 adult</td>
<td>Between Rusha and Teppambetsu Rivers</td>
</tr>
<tr>
<td>2001</td>
<td>11 Aug</td>
<td>1 adult</td>
<td>Teppambetsu River</td>
</tr>
</tbody>
</table>


Marbled Murrelet (*Brachyramphus marmoratus perdix*)