Monitoring and Conservation of Japanese Murrelets and Related Seabirds in Japan

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Abstract

Of the 24 species in the Auk (or Alcidae) family of seabirds living in the northern hemisphere, 22 reside within the North Pacific Ocean. These "penguins of the north" use their small wings to "fly" underwater, some to more than 200 meters, where they catch and eat a variety of small fish and invertebrates. In terms of sheer numbers (>65 million) and food consumption, the Auks dominate seabird communities on our continental shelves and they serve as indicators of the health of our ocean. If Auk populations are not all thriving, then we should be concerned about the status of the oceans, plankton and fish that normally sustain them. A few Auk "tribes" genera) are abundant and widespread (such as *Uria* murres and *Aethia* auklets), and some are rare and isolated such as *Synthliboramphus* murrelets, including the Japanese "Crested" Murrelet). Only 8 species of Auk breed in Japan, including species that have either widespread or isolated populations in the North Pacific. During the past century, most of these Auks have declined dramatically in Japan from many causes, including the introduction of predatory rats and cats to breeding islands, bycatch in fishing nets, alteration of food supplies by fishing and climate change, oil spills, and destruction of seabird nesting habitats. Widespread species such as the Common Murre and Tufted Puffin were once common in Japan but now breed in low numbers at only a few locations. Probably common in the past, small numbers of the widespread Ancient Murrelet were recently re-discovered breeding at Teuri Island, which is also home to the world's largest colony of Rhinoceros Auklet, another widespread species. Though common throughout the North Pacific, Pigeon Guillemots, breed only in the southern Kuril Islands. Their population status is unknown, but they were never considered common in Japan. In contrast, Spectacled Guillemots are an example of an uncommon and isolated population of Auk. They nest along coasts of the Sea of Okhotsk and Sea of Japan, and populations have declined in recent decades. The Long-billed Murrelet has a similar distribution to Spectacled Guillemot, and once bred in Hokkaido, but populations appear to have been extirpated. The Japanese Murrelet has a very small world population, and breeds at only a few locations in southern Japan and the Republic of Korea. The international community of research and conservation biologists is greatly concerned about the ability of this species—probably the rarest of all Auks in the world— to maintain its population size. Owing to its small size and high metabolic demand, this species is especially vulnerable to any stress that increases its food requirements such as changing fish stocks, disturbance on feeding or wintering grounds, or changing ocean climate. Immediate management actions are needed to preserve Japanese Murrelets and other Auks in Japan, by such means as eradicating rats and cats on breeding islands, altering fishing gear to minimize bycatch, and reducing human disturbance to nesting habitats. More research and monitoring of Auk populations in Japan is needed to track population trends, and further identify factors responsible for declines. Interaction between governments and biologists at regional and international levels will be mutually beneficial as we all strive to conserve precious resources and biodiversity in the northwest Pacific, and particularly the Japanese islands.

Key words: Alcid, Auk, auklet, *Brachyramphus perdix*, *Cepphus carbo*, *Cepphus Columba, Cerorhinca monocerata*, Conservation, *Fratercula cirrhata*, guillemot, indicator, Japan, Japanese Murrelet, murre, murrelet, puffin, *Synthliboramphus antiquus, Synthliboramphus wumizusume, Uria aalge*

Introduction

Of the 24 species in the Auk (or Alcidae) family of seabirds living in the northern hemisphere, 22 reside within the North Pacific Ocean (Gaston and Jones 1998). In comparison, only 6 species of Auks reside in the North Atlantic, while 4 species live in both oceans. These "penguins of the north", most dressed in black, or black and

white feathers, use their small wings to "fly" underwater, some to more than 200 meters (Piatt and Nettleship 2016). As a group, the Auks can exploit the entire continental shelf of the North Pacific Ocean. Some specialize for feeding close to shore, but most exploit the most productive shelf and shelf-edge habitats that comprise about 15% of the total area the northern North Pacific (ca. 30-65 degrees latitude). There they catch and eat a wide variety of small fish and invertebrates, including anchovy, sardines, capelin, sand lance, pollock, cod, squid, euphausiids and copepods (Gaston and Jones 1998). In terms of sheer numbers (>65 million) and food consumption, the Auks dominate seabird communities on our continental shelves and they serve as indicators of the health of our ocean. If Auk populations are not all thriving and stable, then we should be concerned about the status of the oceans, plankton and fish that normally sustain them.

A few Auk "tribes" (genera) are abundant and widespread (such as *Uria* murres and *Aethia* auklets), and some are rare and isolated such as *Synthliboramphus* murrelets, including the Japanese "Crested" Murrelet (*S. wumizusume*). Only eight of these species breed in Japan. While our focus of interest here is in the Japanese Murrelet, we are concerned about the status of all Auks in the region. In this paper we present a general overview of the ecology, protection and conservation of the Japanese Murrelet and the other seven auk species that are known or suspected to breed in Japan.

A pivotal time for evolution of **the Auk Family** was during the middle of the Miocene Epoch, more than 10 million years ago (Friesen et al. 1996a, b). As the earth was cooling down towards the end of this epoch, the original ancestor of the Auks evolved into six major groups, or "tribes" as we call them (Figure 1; scaled approximately to actual body size, images courtesy of Handbook of Birds of the World). Clockwise from the top left corner of Figure 1, we have the Auk tribe (inside the purple polygon), which included the Great Auk (GRAU, *Alca impennis*) which was the largest of all Auks. It was flightless, originally called a penguin by western explorers, and driven to extinction by human persecution in the early 1800s. The two murre species (TBMU: Thick-billed Murre *Uria lomvia*, COMU: Common Murre *Uria aalge*) are in this tribe as well, and remain today as the largest species of Auks. Only the Common Murre breeds in Japan. The Guillemot tribe (dark green polygon) includes three species, two of which are found in Japan (SPGU: Spectacled Guillemot *Cepphus carbo*, PIGU: Pigeon Guillemot *C. grylle*). The *Synthliboramphus* Murrelet tribe red polygon) contains five species, but only two are found in Japan (JAMU: Japanese Murrelet, ANMU Ancient Murrelet *S. antiquus*). While the Ancient Murrelet is found in temperate regions across the Pacific, and the Japanese Murrelet breeds in the subtropical south islands of Japan, the remaining trio of *Synthliboramphus* murrelets breed in subtropical waters of southern California and Baja. Two members of the familiar Puffin tribe (light green polygon) breed in Japan, including the Tufted Puffin (TUPU: *Fratercula cirrhata*) and the misnamed Rhinoceros Auklet (RHAU: *Cerorhinca monocerata*), which is a puffin and not an auklet (Friesen et al. 1996a). None of the five members of the Auklet tribe blue polygon) breed in Japan. And finally, in the middle of Figure 1, is the *Brachyramphus* Murrelet tribe (gold polygon). Of these three species, only the Long-billed Murrelet (LBMU: *Brachyramphus perdix*) is known to have a history of breeding in northern Japan. Note that each tribe split into several species at various times during the past 10 million years, most notably about 2-3 million years ago during the widespread cooling of the late Pliocene and beginning of the Pleistocene ice ages. Indeed, this was about the time that the *Synthliboramphus* tribe split into two main subgroups – with sister species of the Japanese and Ancient murrelets in one subgroup, and three sister species of the Scripps's (SCMU, *S. scrippsi*), Guadalupe (GUMU, *S. hypoleucus*) and Craveri's (CRMU, *S. craveri*) murrelets in the other subgroup.

Species within these tribes show similarities in size, plumage, and shape (Figure 1), and also in patterns of abundance (Vermeer et al. 1993, Gaston and Jones 1998). The most abundant species, with populations exceeding 10 million birds, are found within the tribes of the large-sized Auks (Figure 2), which are specialized for preying on adult age-classes of super-abundant schooling fish such as sardine and capelin, and the very small Auklets, which are specialized for preying on dense aggregations of euphausiids and copepods (Sanger 1986, Vermeer et al. 1987). The medium-sized puffins and guillemots are also moderately abundant, numbering in the hundreds of thousands, and they tend to feed on a wider variety of pelagic and benthic fishes and include more invertebrates in diets. If we use a scale on the graph in which each interval is ten times bigger than the previous value a logarithmic or "log" scale), we can see that except for the Ancient Murrelet—which is considerably larger than other members if its tribe—all the *Synthliboramphus* Murrelets are rare (Carter et al. 2005, Whitworth et al. 2014).

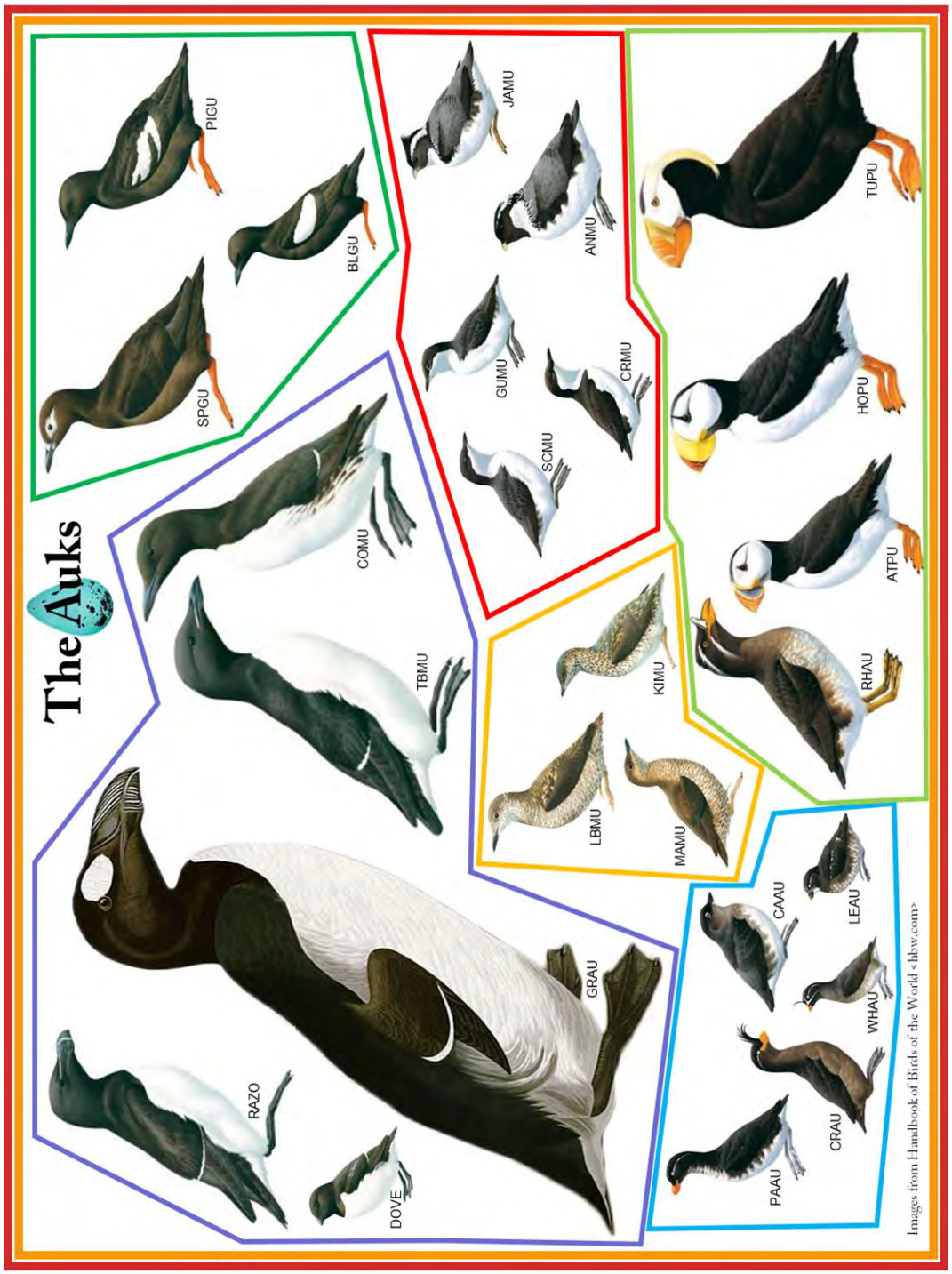

Figure 1. Auks of the world. Images courtesy of Handbook of Birds of the World, and scaled approximately to actual body size. Clockwise from the top left and grouped into different-colored polygons are the six different Tribes: Auks (5 species, inside the purple polygon), Guillemots (3, dark green), *Synthliboramphus* Murrelets (5, red), Puffins (4, light green), Auklets (5, blue) and inside the other tribes, *Brachyramphus* Murrelets (3, gold). Four-lettered codes for species are identified in text.

And of these, the Japanese Murrelet is least abundant of all the world's Auks (Figure 2). Only a few thousand birds are thought to breed in Japan and Korea, although this number was probably much higher in previous centuries (Carter et al. 2002).

There are also tribal patterns in the distribution of Auk species. Members of the Auk and Auklet tribes are widely distributed at nesting grounds and they also migrate over wide areas of the ocean during winter (Springer et al. 1993). The Puffin tribe is perhaps the most extreme, as they occupy northern coastal islands and adjacent shelf habitat during summer, but move far south during winter to a completely different large marine ecosystem with deep ocean habitats (Piatt and Kitaysky 2002a, b). In contrast, most members of the *Synthliboramphus*

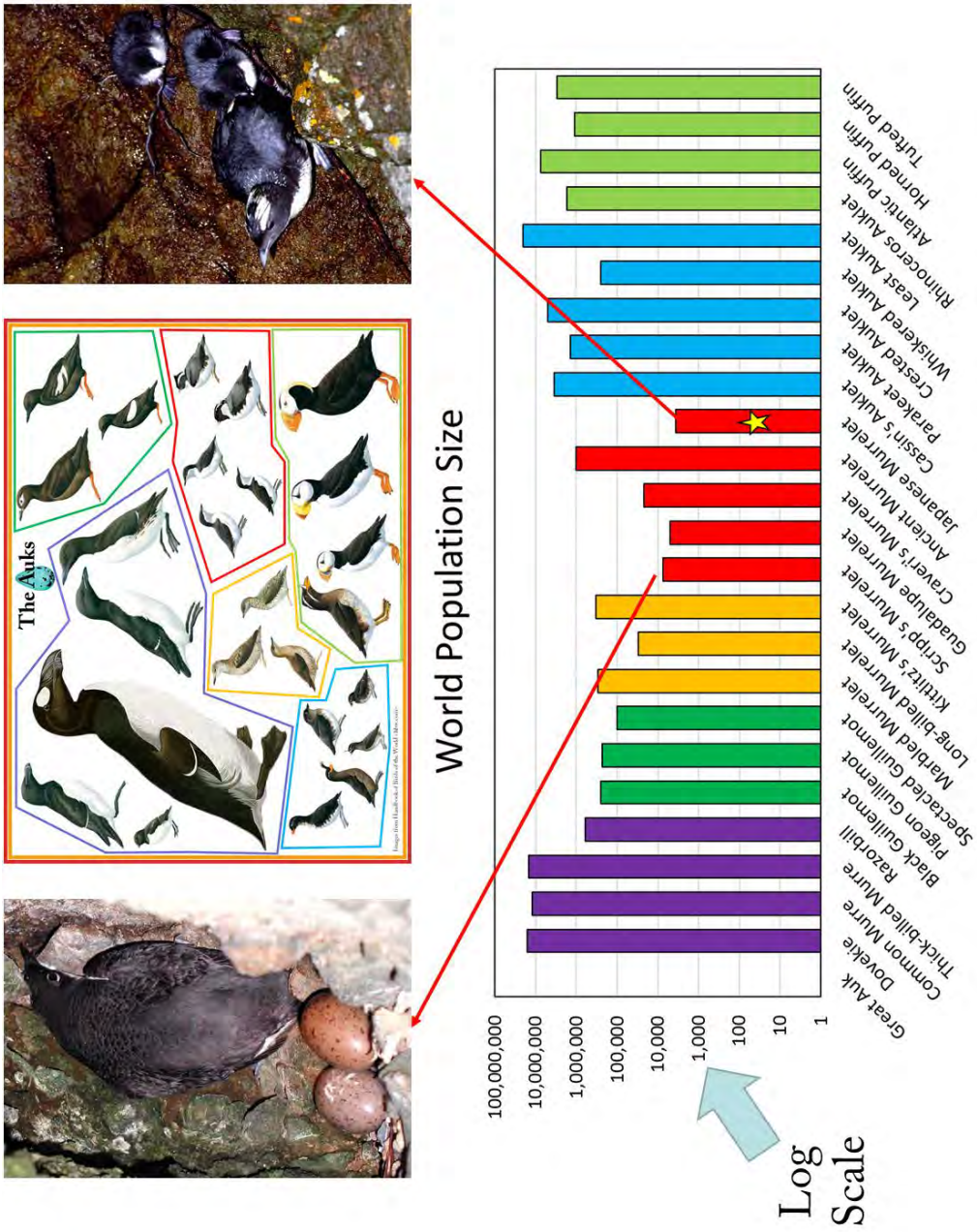

Figure 2. World population size of all the living Auks. Note that colors on the abundance graph are paired with colors of each Tribe (see also Figure 1). The least abundant Auks are members of the *Synthliboramphus* tribe (red bars, red polygon), including for example the Scripps's Murrelet (on left, photo by Darrell Whitworth) and, rarest of all, the Japanese Murrelet (gold star, on right, photo by Koji Ono). Note the scale is logarithmic ("log"), which means that each division is ten times greater than the previous division.

murrelet tribe tend not to migrate too far from nesting colonies and marine habitats. They occupy coastal subtropical waters during the breeding season, and remain in coastal habitat of the same large marine ecosystem during winter, although many migrate to the northern boundary of these systems (Springer et al. 1993). The Japanese Murrelet is one of the most extremely isolated species, and does not wander fare from its nesting sites (see below). These restricted distributions make *Synthliboramphus* murrelets more vulnerable to threats that may affect a large part of the region, such as any regional reduction of prey, or a large oil spill.

The **Japanese Murrelet**, or Crested Murrelet as it is called in South Korea, is one of the most beautiful and one of the rarest of Auk species, with breeding restricted to southern Japan and South Korea (Brazil 1991, Yamamoto 2010, Kim et al. 2012). Over 90% of the species breeds in Japan, mostly on islands off Kyushu and in

the Izu islands south of Tokyo. The world breeding population is estimated to be about 2,800-4,100 pairs (see Otsuki et al., page 15 in this booklet). Birojima, the fascinating island that is located in Kadogawa's backyard, is the world's largest colony with up to 1,500 pairs (Yamamoto 2010). Biologists are greatly concerned about the small size of the world population of Japanese Murrelets (Croxall et al. 2012). The Japanese Murrelet is on the Red List of Japan, which recognizes its conservation importance (Otsuki and Carter 2013). The species was also designated a Natural Monument in 1975.

The basic biology of the Japanese Murrelet is known (Gaston and Jones 1998, Kim et al. 2012). They breed with only one mate during their lifetime. They nest on the ground in crevices or burrows, where they lay 2 eggs. Adults take turns incubating the eggs for 31 days. After hatching, the chicks leave the nest in 1-2 days and walk to or jump into the sea. Adults join them at sea and feed them for many weeks until they can take care of themselves. During the nesting and fledging periods, both adult and chick murrelets are at high risk of being captured and eaten by predators such as crows and falcons. After nesting, birds do not migrate very far from their breeding colonies. Recent studies using geolocator tags to track movements (Yamaguchi et al. 2016) show that murrelets move around Japan seasonally, leaving Birojima in April for the central coast of Kyushu Island and offshore in the convergence zone of the Oyashio and Kuroshio currents. During fall and winter, birds continue further north to Hokkaido Island, and then cross into the Japan Sea to overwinter on the North and South Korean coasts. From there they return to colonies to breed in February and March. While not distant from their nesting grounds during winter by comparison to other Auks, this behavior also makes populations more vulnerable to local events such as oil spills or changes in local habitats or food webs, which may affect murrelets during both breeding and non-breeding seasons (Sato 1999).

The diet of Japanese Murrelets is unknown, but like other *Synthliboramphus* murrelets, they probably eat mostly larval (<40 mm) or small (<80 mm) young-of-the-year (age-0) fish and a variety of zooplankton, especially euphausiids (Sealy 1975, Gaston and Jones 1998, Yamamoto 2010). Like other small Auks, Japanese Murrelets have very fast metabolisms, and burn more energy on a gram-per-gram basis than larger species (Ellis and Gabrielsen 2002). Given that they eat small fish with energy content of about 3-5 kJ/g, this means that they must eat a weight of fish each day that is equal to about 60-90% of their body weight every day. Addition of extra work to their already busy schedule, such as flying back-and forth to their colony, raising chicks, staying warm, or fighting strong winds, may increase food requirements by another 20-50% (Hatch 2012, Agness et al. 2013). By comparison, a large cold-blooded) fish like cod may need to eat less than 0.1% of it body weight in smaller fish each day, whales need only 1-2% of body mass per day, and humans only need to eat 4-5% of their body weight in food each day. So murrelets must work hard all day long, and every single day of their lives just to find, catch and eat enough food to exist. This makes them more sensitive to environmental changes than larger Auks, more vulnerable to any disruption of food supplies, and less able to withstand oil pollution because oil on feathers causes loss of insulation and draining of thermal energy.

Immediate **management actions** are needed to preserve Japanese Murrelets in Japan and South Korea by protecting nesting islands, eradicating rats and cats on nesting islands, reducing the killing of murrelets in fishing nets and oil spills, reducing human disturbance to nesting habitats and stopping unnaturally high predation by crows (Piatt and Gould 1994, Carter et al. 2002, Otsuki 2013). Changes in climate may lead to reduction of local food supplies critical for their survival. While these sources of stress vary from year to year, we can expect that many of these problems will continue to have some negative impact on populations over time.

At Birojima, and some other murrelet colonies, high levels of crow predation on adult Japanese Murrelets and their eggs appears to be the chief conservation problem (Carter et al. 2002). Recent studies are trying to understand more about crow predation and impacts on the murrelet population, in advance of developing conservation actions to stop or reduce this predation, such as possibly removing small numbers of nesting crows from Birojima (K. Nelson et al., unpubl. data). Since 1992, the Kadogawa government has developed an extensive public education program about Japanese Murrelets to help reduce human impacts on nesting islands. In particular, surf-fishermen must remain in coastline fishing areas on Birojima and they need to clean up any leftover bait which feed and attract crows. The sea wall mural project and use of Kadoppi and Gawappi as town mascots also has helped to develop a great love of Japanese Murrelets in this town which is very important for conservation.

In summary, there are many reasons we should carefully monitor and preserve populations of Japanese Murrelets:

- They are highly valued by the Japanese and Korean communities that neighbor their colonies, and by people of many other nations, because they are a unique and beautiful species that deserves a safe place to live in our world.
- There are many threats to Japanese Murrelet populations. Most are caused by human activities, and could be reduced or eliminated with effort.
- They are a rare species and therefore face greater risk of extinction than any other members of the Auk family.
- Compared to other Auks, they are restricted to a very small area of the North Pacific during both the breeding and non-breeding phases of its life. This makes the population vulnerable to both large- and small-scale environmental disturbances.
- Therefore, in order to maintain and restore populations for the sake of ecosystem health, we should monitor populations so that we can know when and how populations change in the future, and respond accordingly to preserve them.

Other Auks

Ancient Murrelets, like the Japanese Murrelet, are unusual because they have very mobile and feathered chicks at hatch which leave the nest at 2 days old and are raised almost entirely at sea by both parents (Gaston and Powell 1989). They nest on islands and lay their two eggs in rock crevices, in cavities under tree roots in forests, or in excavated burrows. Ancient Murrelets are the most widespread and abundant member of the *Synthliboramphus* tribe (Springer et al. 1993). In the Northwest Pacific, they breed from Russia to northern China. However, they are rare on islands off China, South Korea and Japan, and common in the Sea of Okhotsk, Kurile Islands, and Kamchatka. The population in Asia includes about 2% of the world population. In Japan, 500 pairs used to breed on Teuri Island but populations have since declined dramatically, and were thought to be extirpated (Brazil 1991, Springer et al. 1993). Recently, small numbers of Ancient Murrelets have been re-discovered breeding on Teuri Island. Management actions needed to preserve Ancient Murrelets in Japan and South Korea include protecting nesting islands, eradicating rats and cats on nesting islands, reducing the killing of murrelets in fishing nets, and reducing human disturbance to nesting habitats.

The **Spectacled Guillemot** and **Pigeon Guillemot** are two Auks that may not be familiar to most Japanese citizens. They nest along rocky coastlines and lay 2 eggs on the ground in cavities or rock crevices located close to the water. Spectacled Guillemots are endemic to the Northwest Pacific (Russia and Japan) and their range is restricted to the Sea of Japan, Sea of Okhotsk, the Kurile Islands, Hokkaido, and Aomori Prefecture on Honshu (Brazil 1991, Vermeer et al. 1993). They used to occur off eastern Hokkaido and other prefectures in northeastern Honshu. Their populations have declined significantly in Japan; over 90% of colonies have decreased in size or no longer exist (Senzaki et al. 2015). On Teuri Island, off western Hokkaido, for example, their populations declined from 7,000 birds in 1949 to only 294 in 1994 (Hasebe et al. 2015). The total population in Japan is thought to be only about 1,100 birds. Pigeon Guillemots breed in in the Northwest Pacific from the northern Chukotka Peninsula south to the Kurile Islands and the eastern Sea of Okhotsk (Vermeer et al. 1993). They also occur in Alaska and the Northeast Pacific. In Japan, they breed only in the southern Kurile Islands. The population of Pigeon Guillemots in Asia is thought to be only 2% of the world population. Their exact numbers in Japan are unknown but they are considered uncommon in the dispersed locations where they breed.

Both guillemot species are trapped and accidentally killed by gill-net and fixed-net fisheries in Hokkaido and Russia (Senzaki et al. 2015). They also are affected by rats and cats on islands, disturbance by humans at breeding islands, and oil pollution, and potentially at risk from reduced food supplies due to overfishing and changes in the marine environment. Protection is needed immediately to greatly reduce the killing of guillemots in fishing nets, especially in areas with high killings near breeding islands. Small changes to fishing methods may keep birds away from nets. Rats and cats also should be removed from nesting islands. A conservation plan should be prepared for

the Spectacled Guillemot that outlines how to protect and conserve this rare species to help it return to higher numbers in Russia and Japan.

Tufted Puffins are well known because of their striking orange bills and dramatic sweeping white crests; but less well-known are **Rhinoceros Auklets**, which also is a type of puffin and has similar ecological requirements. Puffins mainly nest on islands and lay their single egg in burrows in dense ground vegetation, especially grass tussocks or grass covered slopes. Sometimes they also nest in rock crevices on steep cliffs (Piatt and Kitaysky 2002a). Rhinoceros Auklets also nest in the forest, in burrows excavated underground and around the roots of large trees. Tufted Puffins range widely in Northeast Pacific, Alaska and the Northwest Pacific. In the Northwest Pacific, where 18% of the world population resides, they occur from the Bering Sea south to eastern Hokkaido (Piatt and Kitaysky 2002a). Most of this regional population breeds in Russia. Numbers in Japan have declined dramatically. Until 25 years ago, Tufted Puffins were a common in eastern Hokkaido and the Kurile Islands, but now they are rare (Brazil 1991). In the past 30-50 years, many colonies no longer exist or are almost gone. Less than 30 remain in Japan and extinction here appears likely soon (Osa and Watanuki 2002). This Auk is now listed as critically endangered in Japan.

Rhinoceros Auklets breed on islands in the Sea of Okhotsk, off northern Japan, and northern North Korea (Vermeer et al. 1993, Gaston and Jones 1998). They also occur in the Northeast Pacific. In Japan they occur on many islands off Hokkaido and northern Honshu, and in the Kurile Islands. More than half of the world's population breeds in the Northwest Pacific, mostly on Teuri Island, off the west coast of Hokkaido. Overall, populations of this species are declining slowly (Osa and Watanuki 2002).

Many factors likely contributed to dramatic declines of Tufted Puffins in Japan, including introduced predators and adult mortality in gill-nets. Immediate conservation actions are needed to try to prevent extinction in Japan. Efforts are underway to use decoys and broadcast puffin calls to help some birds breed on islands off eastern Hokkaido where they have become extinct.

Common Murres nest on islands or mainland cliffs in very dense colonies and lay their single egg on the surface of rock ledges, slopes, and in caves. In the Northwest Pacific, Common Murres breed from the northern Bering Sea to Kamchatka, the Sea of Okhotsk, Kurile Islands and Hokkaido (Brazil 1991, Gaston and Jones 1998). They also breed widely in Alaska, the Northeast Pacific, and the North Atlantic Ocean. The Northwest Pacific population is estimated to be over 3 million birds, but most nest in Russia. Common Murres were once common in Hokkaido but now breed in small numbers at only one location (Osa and Watanuki 2002). At Teuri Island there were 8,000 birds in the early 1960s and now less than 19 remain. This Auk is now listed as critically endangered in Japan.

The main reasons for the near extinction of Common Murres in Japan are drowning in gill-nets, but other factors likely contributed, including lack of prey resources due to overfishing. Efforts have been underway for the past decade to use decoys and broadcast murre calls to encourage some birds to remain breeding at Teuri (Hasebe et al. 2012). Once numbers became low, predation by gulls and crows at nesting sites became a major problem. These predators could be controlled on Teuri Island to help increase nesting success. At the same time, bycatch in fishing nets near Teuri Island could be stopped and methods to reduce murre killings in nets should be examined (Hasebe et al. 2012). There are examples throughout the world of making minor changes in fishing locations and how the nets are set that can reduce killings of seabirds and help their populations to recover.

Finally, the **Long-billed Murrelet** is a most unusual Auk that nests on large branches in trees on the mainland or large islands. Long-billed Murrelets are endemic to the Northwest Pacific. They breed from Kamchatka to the Kurile Islands, Sakhalin Island, and the shores of the Sea of Okhotsk (Osa and Watanuki 2002, Namba 2013). Population size is not well known, but numbers appear to have declined significantly. At least a few once bred in northeastern Hokkaido but none are known to breed there today.

The primary cause of probable extinction of Long-billed Murrelets in Japan is the loss of nesting habitat in old-growth forests in Hokkaido (Nelson et al. 2002). Other factors likely contributed, including the lack of

adequate prey resources. The first step to determining if anything can be done to help this species in Japan is to conduct detailed at-sea and inland surveys of northeastern Hokkaido to see if any birds may still breed there (Nelson et al. 2002). If nests are found, those forested areas will require special protection. Net fishing should be reduced in coastal at-sea areas where murrelets forage and use of modified fishing methods to avoid killings should be examined.

In summary,

- Over the past century, populations of many Auks in Japan have declined dramatically because of negative human impacts on nesting islands and foraging areas at sea.

- Three Auks are in a critical state of getting close to global extinction: the Japanese Murrelet, Spectacled Guillemot, and Long-billed Murrelet. Because they only nest in the Northwest Pacific, it is the responsibility of Japan, Russia, and South Korea to find ways to save them from extinction.

- To help save Auks from extinction, research and monitoring are needed to gather information to show that Auks are declining, learn why they are declining, and devise strategies and methods to stop declines. This information is needed for explaining to governments, NGOs and the public why conservation actions are needed and raising money for important actions. Time is of the essence; now is the time to develop conservation actions to reverse declines of these rare Auks, before it is too late. Monitoring is a critical need for Japanese Murrelets, especially at Birojima.

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摘要

北半球に生息するウミスズメ類の海鳥 24 種のうち，22 種が北太平洋に生息している．これらの「北部のペンギン」は小さな翼を使って水中を飛行し，小さな魚や無脊椎動物を捕食する．なかには，200m を超える場まで潜るものもいる．個体数（6500 万羽以上）と食物消費量に関して，ウミスズメ類は，大陸棚の海鳥の生態系のトップに位置するため，海洋の健全さをみる指標となる．もし，ウミスズメ類の繁殖に問題がみられる場合，私たちは，海洋，プランクトン，および魚類など，彼らの存在を常日頃支えているものの現状に懸念すべきである．数種のウミスズメ属（「種族」）は数も多く広範囲に分布している（例として *Uria* 属の murres および *Aethia* 属の auklets）が，数種は局地的に分布している（例えば，「カンムリ」ウミスズメ *Synthliboramphus wumizusume* を含む *Synthliboramphus* murrelets など）．日本には，北部太平洋に幅広く生息する種，または生息息が限定的な種を含むウミスズメ類のうち，8 種類のみが分布している．過去 1 世紀にわたり，日本の多くのウミスズメ科の鳥類は多くの要因から劇的に減少している．それは，営巣地と採餌域に対する人間からの負の影響を含んでいる．この負の影響には，これら繁殖地に，捕食者にあたるネズミ類やネコの持ち込み，漁業による混獲，漁業や気候変動による食料供給の減少，油流出，および海鳥の営巣地の破壊が含まれている．広範に生息する種，ウミガラス(*Uria aalge*）やエトピリカ（*Fratercula cirrhata*）などは，かつては日本では一般的であったが，現在はごく一部でしか繁殖していない．おそらく過去には，広範囲に生息していであろうウミスズメ（*S. antiquus*）の少数が，広域に分布する種，ウトウ（*Cerorhinca monocerata*）の世界最大のコロニーでもある天売島で繁殖しているのが再発見された．北部太平洋全体に広く分布するウミバト(*Cepphus columba*) は，南千島列島でのみ繁殖する．ウミバトの個体数の状況は不明だが，日本では一般的な種ではないと考えられている．対照的に，ケイマフリ（*C. carbo*）は，ウミスズメ類のなかでは，個体数分布が限られている珍しい例である．ケイマフリは，オホーツク海および日本海の海岸沿いに営巣し，個体数はここ数十年で減少している．ロングビルド　ウミスズメ（*Brachyramphus perdix*）はケイマフリと同様の分布を示すが，かつて北海道で繁殖していた記録はあるものの，その個体群は消失してしまったようである．カンムリウミスズメは世界的にも個体数が非常に少なく，日本と韓国の限られた場所で繁殖している．研究・保全生物学者による国際的な団体は，この種の能力—おそらく世界中の Auks の中で最も希少なもの—の個体数規模を維持するという能力にたいして非常に懸念を抱いている．本種は，体のサイズが小さく，代謝の需要が高いため，餌資源である魚の数の変化や，採餌域や越冬地で妨害，または海洋の気象の変化など，食料需要を増加させるストレスに対して特に脆弱である．カンムリウミスズメやその他のウミスズメ類を日本で保護していくためには，繁殖地においては，ネズミ類やネコを駆除，混獲を最小限に抑えるための漁具に変更，営巣地への人間の妨害を減らす，などの管理が直ちに必要となる．日本では，個体数動向の追跡，そして減少要因の特定のためには，ウミスズメ類の調査とモニタリングが必要である．地域レベルおよび国際レベルでの政府と生物学者の協力関係は，私たちが，北西太平洋地域，特に日本の島嶼における貴重な資源と生物多様性の保全に努めているように，互いに有益である．