Waterfowl at risk

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This review of the waterfowl group (Anseriformes) gives brief accounts of why species or subspecies are considered to be endangered, present numbers if known, avicultural history, and any recent conservation projects or proposals. The two main sources of information on which animals are believed to be at risk have been the *Red Data Book*, and the Washington Convention. In addition, we have included those island forms with small populations that, although not endangered at present, could decline suddenly due to loss of habitat, disturbance, the introduction of predators, or natural disaster.

Classification, and therefore the definition of species and subspecies, follows *A Coloured Key to the Wildfowl of the World*, by Peter Scott (1968 edition), except where the *Red Data Book* or the Washington Convention differ from this. Where more recent taxonomic work has questioned the validity of one or two subspecies, particularly of geese, this is noted in the appropriate place in the text.

The *Red Data Book* (RDB) Vol. 2: Birds, compiled and currently being revised by the International Council for Bird Preservation, is a guide to those birds that are rare and in danger of extinction. Its purposes are to draw attention to their plight and to provide the information necessary to influence their future. Four headings categorize their status:

Endangered—birds in danger of extinction and whose survival is unlikely if the causal factors continue operating.

Vulnerable—birds believed likely to move into the endangered category in the near future.

Rare—birds with small world populations that are not at present endangered or vulnerable, but are at risk.

Indeterminate—birds that are suspected of belonging to one of the above categories but for which information is lacking.

The Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora (WC in this paper, but also known as CITES) was signed in Washington, USA, in March 1973 by over 30 countries, including the United Kingdom. It lists 'Endangered' species in two appendices, and licences to import or export listed birds, and certain bird products, have to be obtained from the appropriate Government Department. Appendix 1 (Endangered) contains animals that were considered by delegates at the original Convention to be threatened by extinction and which are or may be threatened by trade, and Appendix 2 (Vulnerable) contains those that, although not at the moment threatened with extinction, might become so unless trade is regulated. Appendix 2 also contains the so-called 'look-alike' species: those not threatened themselves but being so similar to a threatened species that they are included to aid enforcement. Most contracting countries have adopted legislation that controls the import and export of Appendix 1 birds fairly tightly, but merely 'records' such movements for Appendix 2 species.

The bird lists of the Washington Convention already need revision, and do not always agree with the *Red Data Book*. In general, it is likely that species will be added to the lists requiring licences rather than removed. The United Kingdom Government has, indeed, now subjected the majority of animal species to licence. List A in the British Endangered Species (Import and Export) Act 1976 is equivalent to Appendix 1 of the Washington Convention and contains those species that are considered seriously threatened. All other waterfowl are on List B (equivalent to Appendix 2) with the exception of domestic forms of the Mallard, Muscovy Duck, Greylag and Chinese Goose.

Cuban Whistling Duck *Dendrocygna arborea* (Figure 1).

RDB Vulnerable
WC Appendix 2

Has declined throughout its range, especially in the last 40 years, possibly due to the introduction of the Indian Mongoose *Herpestes auropunctatus* (in 1872 into Jamaica, from where it spread to many Caribbean islands), excessive shooting, and the collection of eggs for food. More recently, its habitat (freshwater and brackish swamps) has been partly destroyed by drainage, particularly in the Greater Antilles.

In Cuba and Hispaniola, it is described as common, but declining. It is still resident and reasonably common on the Cayman Islands and in the Bahamas; on Inagua and possibly Andros, there is a small but secure popula-

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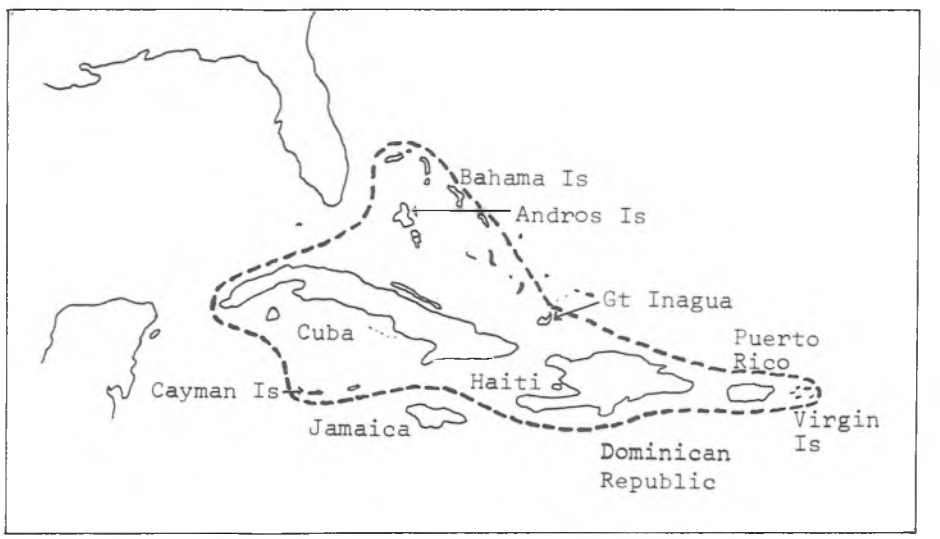

Figure 1. Range of Cuban Whistling Duck

tion. In Puerto Rico it was thought to be very rare, although a flock of 80 birds was found in 1970 in the north-east of the island. It has not been seen in Jamaica since 1960 (W. King, pers. com.).

Hunting is prohibited in the Bahamas, Cuba, Puerto Rico, the Virgin Islands and Jamaica, although enforcement is generally non-existent, except in Puerto Rico. It is sometimes shot on Cuba, where it occurs with the Fulvous Whistling Duck *D. bicolor*, a species that may be legally hunted, and is said to be something of an agricultural pest. It is not protected on Hispaniola, although a closed hunting season during the species' breeding season has been proposed in the Dominican Republic (W. King, pers. com.).

It is widely represented in waterfowl collections throughout the world, and breeds freely in captivity (although it is not particularly hardy in the northern winter). It is thus a species that might benefit from captive rearing and re-introduction into areas, especially islands, where hunting could be controlled and the mongoose is rare or can be exterminated.

Coscoroba Swan *Coscoroba coscoroba*

Black-necked Swan *Cygnus melanocoryphus*

WC Appendix 2

Listed in the Washington Convention apprently because numbers exported from the wild in South America for the purposes of aviculture were felt to be unacceptably high; however, there seems no recent evidence that large numbers of either have been imported into North America or the United Kingdom. Numbers in the wild are not known, so counts of both species are required. The Black-necked Swan breeds fairly readily in captivity, but the Coscoroba much less so.

Bewick's Swan, Western race *Cygnus columbianus bewickii*

Whilst the total number of this race is probably as high as it has ever been (estimated to be at least 10,000 individuals), the population is still small and vulnerable.

Although legally protected throughout its range (apart from Poland, where the Mute Swan *C. olor* is protected and the Bewick's is thought to benefit from this), X-ray examination has shown that 44% of the adult population carries at least one lead shot-gun pellet (Evans *et al.* 1973).

The swan breeds in northern Siberia between the Pechora delta and the Lena delta, an area that is likely to be increasingly disturbed by, for example, the search for oil, and by projects such as the reversal of the Rivers Ob and Yenesi to irrigate the desert areas of central USSR. In such circumstances, reserves may have limited value, since the swans breed far apart and the areas required would be vast.

In the winter, Bewick's Swans migrate to Germany, the Netherlands, Britain and Ireland. They traditionally feed on wet

pastureland, a habitat fast disappearing through drainage, and there has been considerable alteration in the distribution of this swan within its wintering range (for example, the last twenty years have seen decreases on the flood plains of the Rhine and Waal, and increases on the Ouse Washes in eastern England). Sites holding large numbers and sites where there is a gradual increase in numbers should be secured as reserves. 'Baiting' wintering populations with grain has been shown to be successful in increasing numbers at two existing reserves in Britain. To some extent, this has the disadvantage of rendering large proportions of the population vulnerable to hazards such as pollution.

It is one of the paradoxes of the Washington Convention that 'Jankowski's Swan' is listed, while Bewick's Swan is not, especially as some taxonomists argue that the taxonomic distinction does not exist (Scott *et al.* 1972).

Bewick's Swan, Eastern race (Jankowski's Swan) *Cygnus columbianus jankowskii*

WC Appendix 2 (as *Cygnus bewickii jankowskii*)

Little is known about the numerical status of this race but it is likely that the population is larger than that of the western one. It breeds between the Lena and Kolyma deltas on northern Siberia and migrates to Japan, Korea and western China as far south as Kwangtung province for the winter. It is fully protected in Japan and Russia.

The main reason for including this race in Appendix 2 of the Washington Convention was the large number leaving China via Hong Kong for the bird trade. For instance, a shipment of about 300 reached Hong Kong in November 1972, of which 30% were maimed (Webster 1974). X-rays of a small sample of birds brought to Britain indicate that they are often captured by being shot and crippled.

It is doubtful that aviculture could usefully supplement the natural populations of the migratory and arctic-breeding Bewick's Swan, for neither race has reproduced well in temperate-zone zoos.

Trumpeter Swan *Cygnus c. buccinator*

This North American swan, although once listed in the *Red Data Book* as rare and endangered, is now increasing. It is sufficiently numerous, particularly in Alaska, where 2,848 were counted in 1968 and 3,400 estimated as a minimum figure, and readily enough conserved to be no longer threatened. In February 1975, the US Rocky Mountain population stood at 595 adults and 128 cygnets, and had been fairly stable for some 20 years. It breeds quite freely in captivity in North America and Europe. A booklet '*A Guideline for Propagation of Captive Trumpeter Swans*' has recently been published by the Trumpeter Swan Society (Box 32, Maple Plain, Minnesota 55359, USA), for those wishing to keep and breed this species.

Swan Goose *Anser cygnoides*

The Swan Goose is a migratory species, breeding in the steppe and forest-steppe zones of central Asia—in the USSR, from Sakhalin west to the Altai and Saissan Depression; north to Transbiakala, Lake Baikal and the Minusinkaya Depression; and southwards into west Mongolia and north-east China. It winters in eastern China from the Yangtze to Fukein and the Kwankug coast, occurring irregularly in Japan, although until 1950 it used to be a common winter visitor there, particularly to Shinhama, Chiba Prefecture. It is now rare in the two most northerly Japanese islands (Yamashina 1974). It formerly occurred in Korea but is no longer found there in winter (G. Archibald, pers. com.).

Despite the lack of a reliable population estimate, it is apparent that there has been a steady decline in numbers throughout the species' fairly extensive range. It is no longer present in the Altai region of the USSR, where it was previously abundant, and human disturbance is blamed for this disappearance. The construction of the Bukhataminsky Reservoir drowned the Chyorny-Irtysch delta causing the loss of much favoured habitat, and in Mongolia shooting has caused numbers to decline (Pziclonskij 1976). At present it is a quarry species throughout its range. Protection, if enforced, would help but the main problem seems to be human development and loss of habitat, and the species will be difficult to conserve because of its wide range.

Johansen's Bean Goose *Anser fabalis johanseni*

Winters in western Sinkiang and in the west China area (Cheng 1976). Estimates of numbers are required.

Middendorf's Bean Goose *Anser fabalis middendorffii*

This race of the Bean Goose winters along the central and lower Yangtze River valley and on the Kwangtung coast in China (Cheng 1976) and breeds in the extreme north of Manchuria and in the Siberian highland taiga zone east of the Yenesei. It comes to Japan in mixed flocks together with *A.f. serrirostris*, but is rare. There is no estimate of the numbers of this subspecies alone, but the total count for *Anser fabalis* in Japan has increased from around 1,500 between 1970 and 1974 to 5,000 in 1976 (Y. Yamashina, pers. com.).

White-fronted Goose *Anser albifrons*

The sub-species of Whitefront, the Tule Goose, has recently been reclassified by Delacour and Ripley (1975) as two subspecies, rather than one:

A. albifrons gambelii, occurring east of the Rocky Mountains and *A. albifrons elgasi*, to the west.

At the time of the Washington Convention (1973), this separation had not been made, and therefore the Convention recognized the original sub-species and placed it in Appendix 2. This new classification has the effect of creating two probably endangered subspecies out of one rare sub-species. Both have bred in captivity, although they are not commonly represented in waterfowl collections.

Note, however, that in the *Handbook of North American Birds*, Volume 2, edited by R. S. Palmer (1976), these races are not acknowledged.

Elgas's White-fronted Goose *Anser albifrons elgasi*

RDB Rare

A. albifrons elgasi winters in the Sacramento region of central California, USA, preferring small ponds with a heavy growth of reeds. Its breeding range is unknown, but is assumed to be in the taiga zone just south of the Alaskan tundra. The mountains along the northern Alaska-Canada boundary separate *elgasi* from *gambelli*.

The population is estimated at about 1,500 individuals and thus must be regarded as endangered. At least 100–150 birds are shot every year, which is a fairly heavy proportion of the total population. A pair has been sent to the Patuxent Wildlife Research Center, Maryland, for aviculture and study purposes.

It is difficult to suggest a method of affording this sub-species protection from hunting, beyond the normal open and close seasons for wildfowl. In flight, it is virtually indistinguishable from the Pacific Whitefront *A. albifrons frontalis*, but because it flies lower and is less wary, it is likely to suffer heavier losses from shooting. Therefore, without giving all Whitefronts protection, that for *elgasi* alone is unlikely to be successful.

Tule Goose *Anser albifrons gambelli*

WC Appendix 2

This sub-species migrates from the wintering grounds in coastal Texas, Louisiana and northern Mexico, north to the Arctic where small groups of breeding birds have been found in the Old Crow Flats marshes of the Mackenzie Basin area in the North-west Territory. This is in a taiga zone, ecologically isolated from the open tundra (and from *elgasi*) to the north and west by the Richardson Mountains. The numerical size of this population is unknown. Only a few birds have been found on the Old Crow Flats, and no counts of wintering birds have been made.

The problems of the conservation of this sub-species, particularly as regards shooting, are the same as for *elgasi*. In 1964, six birds were taken into captivity from the Old Crow Flats and an additional 52 were ringed for studies of their distribution.

Bar-headed Goose *Anser indicus*

A mountain species nesting on the high lakes of Tyan-Shan, Pamir, Altai and Tuvinskaya, in the Soviet Union; in western Mongolia; in Tibet and Sinkiang; in the Peoples' Republic of China; and Ladakh in north-west India. During the winter months it migrates to northern India, Assam and northern Burma (particularly to the Irrawaddy in Myoding Katha district).

Russian populations seem to total around 2,000 geese at most, and have undergone a rapid decline. Soviet Scientists attribute this to flooding of nest sites, and to predation on eggs and young by foxes *Vulpes*, Raven *Corvus corax*, Common Crow *C. corone*, Black Kites *Milvus migrans*, and Pallas's Fish Eagle *Haliaeetus leucoryphus*. Additionally, ringing results have shown that a large number are shot, both on migration and in winter quarters (despite the goose being

protected in Uzbeck SSR, RSFSR, Kirghiz SSR and Tadzhik SSR). Concern at this decline has resulted in the declaration of new reserves, further enforcement of protection laws, and the initiation of water management schemes to protect nesting islands from flooding (Pziclonskij 1976). It appears to be holding its own in Mongolia, and in the southern part of its range and in Ladakh, but is said to be less common than 25–30 years ago (C. Savage, pers. com.). Regular counts on the wintering grounds, in combination with colour marking, would be extremely useful.

Giant Canada Goose *Branta canadensis maxima*

At one time considered to be extinct, this lost giant was rediscovered in Minnesota USA in January 1962 by Hanson (1965). It has an estimated population of 54,600 in the wild and in captivity. The race has therefore been removed from the *Red Data Book*. Note, also, that this race is merged with the very abundant *moffitti* in *The Handbook of North American Birds*, Volume 2, edited by R. S. Palmer (1976).

Aleutian Canada Goose *Branta canadensis leucopareia* (Figure 2)

RDB Rare
WC Appendix 1

Once breeding throughout the outer two-thirds of the Aleutian Islands and in the Commander (Komandorski) and Kurile Islands, this very distinctive subspecies of the Canada Goose probably now only nests on the small island (1720 ha) of Buldir. Populations declined during the late 19th and early 20th centuries because of native hunting, but were decimated after the introduction of arctic fox *Alopex lagopus* and red fox *Vulpes vulpes* for commercial fur trapping in the early 1900s. Trapping was abandoned at the start of the Second World War, but the foxes remained. The use of the Aleutian Islands for military purposes, the intentional introduction of dogs and cats, and the accidental introduction of the black rat *Rattus norvegicus* during the war, caused further reductions in the goose population.

The goose at one time wintered commonly in Japan, but declined suddenly in the latter half of the 19th century (Austin 1949). Even until 1922, flocks of up to 100 birds were noted, but since then they have only been seen on two occasions—two in 1974 and a further two in 1976 (Y. Yamashina, pers. com.). The Japanese population probably originated from the Commander and Kuril Islands, where the bird has been extinct since 1914; the chances of re-establishing it seem remote, for there are no wild 'pathfinder' geese to guide captive-reared or transplanted birds along the traditional routes to the western wintering grounds. Some taxonomists consider that these Japanese geese were a sub-population of the Aleutian Canada Goose *B.c. leucopareia*, whilst others gave full racial status as the Bering Canada Goose *B.c. asiatica*.

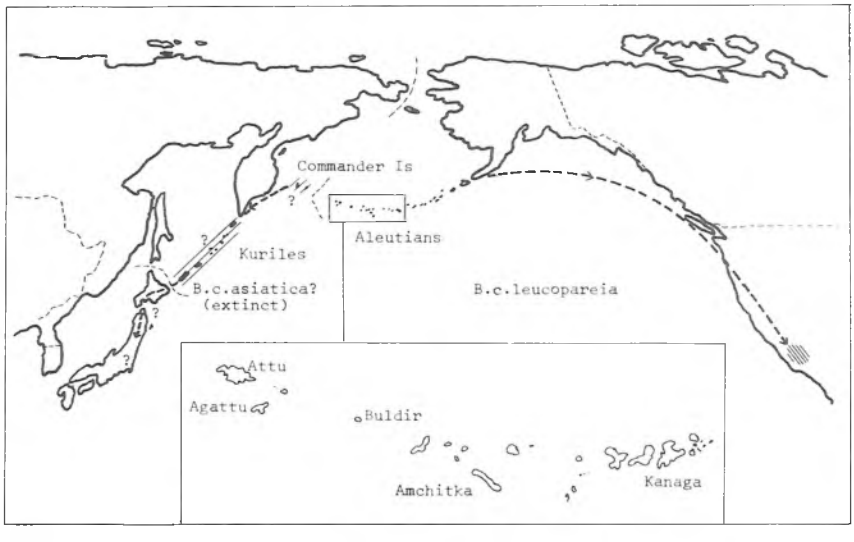

Figure 2. Range of Aleutian Canada Geese

In 1963, numbers were thought to be as low as 300, and because of this a captive rearing programme was started by the US Fish and Wildlife Service. A flock was established at the Patuxent Wildlife Research Center, Maryland, from goslings taken from Buldir Island in 1963, 1972 and 1975, and over 380 young had been produced by 1977.

Foxes had never occurred on Buldir, and were eradicated from several islands including Amchitka, Nizki and Alaid; control has started on Kanata and is nearing completion on Agattu. Seventy-five captive-bred geese were released on Amchitka Island to try to extend both the numbers and range of the natural population. Their fate could not be closely monitored, but a later check revealed no trace. They were probably lost to Bald Eagles *Haliaeetus leucocephalus* or on migration, or perhaps they moved to Buldir. In 1974, Agattu Island was tried, it being considered more suitable due to the absence of Eagles. Forty-one captive-reared and nine Buldir 'guide' birds were released. The same year, five pairs formed, four females laid eggs and two successfully raised a total of five goslings.

The non-breeding birds remained in a flock on the release site throughout the summer. Although they successfully migrated (two were recovered and one sighted in California) none returned to Agattu or Buldir during the summer of 1975. Some may still be alive, however, as sightings of colour-banded birds were reported in central California the following winter. In February 1976, 61 geese were transported from Patuxent to new propagation facilities on Amchitka. Twenty-eight birds were released but lost to eagle predation.

Marking of both the native and introduced stock has revealed that this race winters in the interior valleys of California at the Sacramento and San Joaquin. Birds from Buldir and Agattu were shot during the 1974–1975 season and, since then, hunting of all Canada Geese in these areas has been stopped (Report of the AOU Committee on Conservation, 1975 and 1976).

The bird breeds fairly readily in captivity. It is not a true inhabitant of the arctic, despite its small size. Buldir is at 52° 32′N and this may be one reason why the Aleutian Canada breeds well in temperate-zone waterfowl collections (Slimbridge UK, is at 51° 44′N, for instance, and Patuxent, USA at 39° 05′N). It is difficult to assess the extent to which aviculture has helped restore the numbers of Aleutian Canada Geese. Spring counts of the whole population at a staging area near Crescent City in north California revealed an average annual increase of 22% (in the spring of 1975, 790 birds; in 1976, 900, and in 1977, 1,150, while 1,600 were counted in autumn 1977). Most of this can be attributed to birds saved by hunting prohibitions in the protected areas, and to increased productivity during the 1975, 1976 and 1977 breeding seasons (P. F. Springer 1977, and pers. com.).

Hawaiian Goose or Nene *Branta sandvicensis* (Figure 3, p. 14)

RDB Vulnerable
WC Appendix 1

The Nene is found on the big island of Hawaii between 1,525 and 2,440 m on the mountains of Hualalai, Mauna Kea and Mauna Loa, and has been re-introduced into Haleakala Crater, on the island of Maui (Berger 1972).

The species was reduced from an estimated 25,000 birds in the late 18th century to less than 50 by 1948 through hunting, predation from introduced mammals, and habitat destruction. The Indian Mongoose, *Herpestes auropunctatus* for instance, was introduced in 1833 in an attempt to reduce numbers of the introduced rats. Instead it turned to the much more readily obtained native birds, including the Hawaiian Duck *Anas wyvilliana* and the Nene. The Nene is now fully protected by law.

A captive propagation programme at the Pohakuloa Game Farm, Hawaii (by the State Division of Fish and Game, assisted by federal funds) and at the Wildfowl Trust, UK, produced enough stock to allow the reintroduction of 1,600 geese. The results of this reintroduction is being investigated at the moment. Concurrently, a control programme on the introduced mammals (both domestic and feral) in the breeding areas has helped to consolidate and increase the native populations so that by the summer of 1976 there were probably 750 in the wild, 650 on Hawaii and 100 on Maui. Until that year the released birds' productivity on Maui, where the species had become extinct, seemed to have been poor. This was thought to be due partly to the high rainfall that is normal in the area and is detrimental to the survival of young goslings. Recently, many more ringed geese (i.e. hatched in the wild) have been reported, and this may be connected with a severe drought on Maui.

In captivity, the bird appears to be doing well and, unless inbreeding problems recur, their future seems assured. About 1,250 are thought to be in zoos and private collections around the world, nearly 200 in the collections of the Wildfowl Trust.

Red-breasted Goose *Branta ruficollis*

WC Appendix 2

Twenty years ago, the world population of the Red-breasted Goose was over 40,000; by 1963, it seems to have fallen to about 25,000, but the most recent available information suggests it has stabilized at or perhaps a little below that level (M. Smart, pers. com.). The alarming decline probably resulted from changes on both wintering and breeding grounds.

The species summers on the tundra of the Taimyr Peninsula between the latitudes of 67° and 72°N. It breeds in small colonies of about five pairs close to a Peregrine Falcon *Falco peregrinus* nest, or occasionally next to a Rough-legged Buzzard *Buteo lagopus* eyrie or in colonies of the larger species of gull. The birds of prey unwittingly protect the geese from their main predator, the arctic fox. It has been suggested that the reason for the decline is the reduction of falcons through toxic poisons accumulated on the wintering grounds via their prey. Additionally, human development has increased disturbance in the area; the collection of eggs and killing of moulting birds by the local population continues (Pziclonski 1976). Fishermen's dogs may also disturb nesting birds.

Developments of various kinds on the wintering grounds pose additional threats. The Kyzyl-Agach Sanctuary on the south-east Caspian has been largely abandoned. However, over 15,000 geese were observed in the autumn of 1975 migrating over the Manych lowlands between the Caspian and the Black Sea (M. Smart, pers. com.). Hunting pressure used to be immense, particularly during the Second World War, and it was not until 1959 that a ban was imposed. About this time the geese adopted new wintering grounds on the Danube Delta region of Romania. Here, they are again threatened by the conversion of brackish lagoons to fresh-water lakes for irrigation. Areas in Iran and Iraq, especially on the Gyurgen River, have also been utilized. Recent surveys in Romania have not found more than about 6,000 geese, but nearly 7,000 were recorded on the Soviet side of the Danube Delta in 1975. The International Waterfowl Research Bureau have set up a special Goose Research Group devoted to this species, which is led by A. A. Vinokurov. Concern at the decline in USSR resulted in a total ban on the export of trapped birds imposed in 1970, and this has had the effect of cutting off supplies for aviculture. A co-ordinated captive breeding policy needs to be followed, since only a small proportion of the population will breed in temperate zoos and so the captive stock rather quickly becomes inbred.

Crested Shelduck *Tadorna cristata*

Extremely rare, if not extinct, this species is known only from three specimens, the last of which was taken in South Korea in 1916. There are descriptions of the bird in two Japanese natural histories of the 18th century, and a number of early Japanese paintings exist that are between 100 and 250 years old. Probably the subjects for these paintings were imported from Korea (Austin 1949). Reports of sightings, or of birds being shot, do occasionally come from China, USSR, Manchuria and Korea (the most recent in 1964), but none has been confirmed. The species' status was recently reviewed by Yamashina (1976).

Ruddy-headed Goose *Chloëphaga rubidiceps*

Although the Falkland Islands population of this species remains reasonably high (probably 40,000 at a minimum (J. Harradine, pers. com.)), there has been much alarm expressed as regards its status on Tierra del Fuego where decline has been rapid. As late as 1954, it was considered to be the commonest sheldgoose in the northern grasslands of Isla Grande (the main island) and more than 50% were of this species. By spring 1973, only 6 birds out of 6,263, or 0·1%, were Ruddyheads. Counts on its wintering grounds suggested that in 1976 the continental population totalled less than 1,000 birds (Rumboll 1978).

Its demise can be linked to two factors. The most important was the introduction in the late 1940's of the Patagonian gray fox *Dusicyon griseus* to Tierra del Fuego in order to reduce the numbers of introduced rabbits. Predation upon the Ruddy-headed Goose, as opposed to any other, has been high, and the increase in the fox is reflected by a decrease in the goose, due apparently to their similar grassland habitat preferences. A

less important factor may be the destruction of nests by ranchers in order to reduce the numbers of grazing geese. Ashyhead *C. poliocephala* and Upland *C. picta* Geese populations have not been affected, however, despite similar treatment.

The situation on Tierra del Fuego seems critical, and the species is still on the Argentine 'plague' list. Although the fox is controlled on the Argentinian side of Tierra del Fuego and is hunted for its pelt, it is protected on the Chilean side. Therefore, any vacuum created in the Argentinian part of the island by poisoning or trapping is soon filled by 'surplus' foxes from the Chilean side.

On the Falkland Islands, the Ruddy-head is not protected, and there is the danger of programmes against grazing geese in general affecting its status. The species there appears to be more vulnerable to predation than other sheldgeese, and to nest desertion following disturbance. Proportionately fewer young seem to survive than in the other species. It breeds fairly readily in captivity but is not, at the moment, particularly common in waterfowl collections.

Cape Barren Goose *Cereopsis novaehollandiae*

Controversy surrounds the status and management of this species. Although the world population is usually given as only 6,000 individuals, recent figures of 20,000 have been suggested (Pearse 1975; Smith 1976) with 10,000 in South Australia and 5,000 in Tasmania.

Found on several islands off the south coast of Australia and in the Bass Strait, its range and numbers were much reduced by shooting, mainly for sport and by farmers complaining of damage to grass. Concern at the fall in population size resulted in the goose being given partial protection in the early 1960's which, together with an increase in the areas of suitable nesting habitat, and in the quality and quantity of food available to young geese in summer, has resulted in a dramatic increase during the last 10–15 years (Pearse 1975). A problem is caused by the birds in the eastern part of the range concentrating during the dry season on areas where clover and crops are green, at considerable cost to a few farmers, who are not compensated, but may obtain licences to shoot the geese. The Tasmanian Government allowed an open season on the geese on Flinders Island in January 1976, with the take limited to 750 birds. This action produced a storm of protest.

There is no simple answer to the conflict. Perhaps, learning from the North American example with Canada Geese, the best policy would be for the Government or some conservation body to buy or lease favoured farmland and manage it for the geese in summer. Obviously many of the geese are attracted to agricultural land simply because it provides the nearest available green food during the dry season. Alternatively, a compensation system might be introduced. Both schemes cost money, and in the end the conservation of this unique species in the wild will depend upon how much Australian and international conservation groups are willing to pay.

It breeds readily in captivity and is widely represented in zoos and waterfowl collections throughout the world.

Marbled Teal *Anas (Marmaronetta) angustirostris*

This species nests around the Mediterranean and in Asia Minor, southern USSR, Mesopotamia, Iran, Afganistan and Pakistan. It winters in the warmer parts of this range and in north-west India. It has recently declined rapidly in Pakistan and southern Spain, but surveys in Turkey, Iraq and Iran in the late 1960s revealed large numbers and the world population is thought to total somewhat over 21,000 birds.

Attempts have been made to re-introduce captive-bred Marbled Teal in Pakistan, but so far without success. The species does well in waterfowl collections.

Galapagos Pintail *A. bahamensis galapagensis*

This race of the Bahama or White-cheeked Pintail is included because of its limited island distribution.

The population probably consists of several thousand individuals. It is reported to be quite numerous on Narborough, where there are no introduced rodents or domestic animals, and also occurs on Indefatigable, Tower and James Islands. The bird is reportedly tame and easy to kill and was at one time hunted intensively by settlers. Around 2,000 Pintail are thought to have perished in June 1968, when the floor of the shallow Fernandina Crater Lake on Narborough Island (a huge caldera measuring 2·7 × 3·9 km) collapsed, falling 300 metres

and causing the lake to tip from the north-west to south-east corner of the caldera (R. W. Tindle, pers. com.).

The duck has not bred in captivity, nor are any currently held in waterfowl collections.

Niceforo's Pintail *A. georgica niceforoi*

This race of the Chilean, or Brown Pintail, once restricted to the Eastern Andes of Colombia, appears to be extinct.

Kerguelen Pintail *A. acuta eatoni* (Figure 3)

This race of the Northern Pintail is restricted to a desolate island in the Indian Ocean only 3,500 sq. km in size, and is therefore at risk from any habitat change. No estimates of numbers are available. A few specimens are held and breed in captivity. A similar race occurs on Crozet Island, 1,100 km west, and may be more abundant there than on Kerguelen. Introductions were made onto New Amsterdam where the pintail is now breeding, and onto St Paul, both 1,600 km north-east.

Bernier's or Madagascar Teal *A. bernieri*

RDB Vulnerable

WC Appendix 2

Restricted to the western part of Madagascar, this duck appears to be declining and has been recently recorded only from Lakes Bemamba (120 estimated in 1973) and Masama (60 seen in 1970). It is perhaps not in immediate danger of extinction, as the areas where it may occur are seldom visited by ornithologists, but its status and the cause of its decline merit study (Scott and Lubbock 1975). The bird is not protected, and appears to be in some danger from shooters. Reserves are required (Salvan 1970). There are no specimens in captivity.

Rennell Island Grey Teal *A. gibberifrons remissa* (Figure 3)

Restricted as it was to a small elevated atoll (80 km long by nearly 16 km wide) in the Pacific Ocean, this race of the Grey Teal was regarded as being at risk, especially as the island contains bauxite.

The fish *Tilapia* were introduced into the single lake and the bird is now extinct, apparently as a direct result of the activities of the fish (W. King, pers. com.).

Andaman Teal *A. gibberifrons albogularis* (Figure 3)

This distinctive race of the Grey Teal may be at risk through development in the Andaman Islands. Drainage schemes and residential settlements are the principal threats, particularly in the middle Andamans, but the level of the hazard is unclear, and reports are urgently required. A survey should indicate the possibility of setting up effective sanctuaries. One reserve already exists on Rees Island, where there is a sweet-water lake (A. Wright, pers. com.).

The duck has not bred in captivity since the beginning of this century, but three pairs are currently held at Slimbridge, UK.

Auckland Islands Flightless Teal *Anas aucklandica aucklandica* (Figure 3)

RDB Vulnerable

WC Appendix 2

One of the two flightless forms of the Brown Teal is restricted to the Auckland Islands (460 km south of New Zealand), where it formerly occurred on all islands in the group, but was reduced both in range and numbers by the introduction of cats and pigs. Very rare on Auckland Island proper, it is locally abundant on six other islands (Adams, Enderby, Disappointment, Rose, Ocean and Ewing) and Weller (1975) estimated 1,200–1,500 birds in 1974.

Provided cats and pigs are not dispersed from the Main Island (where it is doubtful that these predators could be eradicated), the future of the Teal seems secure (Weller 1975). It is fully protected by law. The race has not bred in captivity and is not held in any waterfowl collection.

Campbell Island Flightless Teal *Anas aucklandica nesiotis* (Figure 3)

RDB Vulnerable

WC Appendix 1

This subspecies of the Brown Teal is restricted to Campbell Island (800 km south of South Island, New Zealand, and 240 km from the Auckland Islands), and was probably always very rare, since less than twenty have ever been seen. It was discovered in 1840; one specimen was taken in 1886 and two more collected in 1944. Between 1944 and 1975, there were no

Figure 3. Map of west Pacific and east Indian Ocean with location of islands mentioned in the text.

positive records (although four birds seen in 1958 were believed to be Campbell Island Teal) and it was feared that it might be extinct, since Campbell Island itself is overrun by black rats, and cats (Bailey & Sorensen 1962). In late 1975 however, a party from the New Zealand Wildlife Service located four Teal on Dent Island, a small jagged stack 1·6 km off the west coast of Campbell Island. They were caught, measured and released. The examination of Skua *Catharacta* 'middens' revealed the part skeletons of six Teal, this level of predation suggesting that the race is relatively plentiful with a population of possibly 30–50 birds. Subsequent parties had glimpses of Teal on every visit. The bird is fully protected by law. None have ever been held in captivity, and it is doubtful that a propagation programme need be considered. There is now no doubt that this duck is racially distinct from the flightless form on the Auckland Islands (Robertson 1976).

New Zealand Brown Teal *Anas aucklandica chlorotis*

RDB Vulnerable

WC Appendix 1

Abundant over the whole of New Zealand until the 1880s this species went into rapid decline, and by the 1920s had disappeared from most of the North, South and Stewart Islands (Williams 1964). Important in this

was the loss of the small pond and swamp habitat that it favoured, following the development of New Zealand for agriculture. Excess shooting may have played a part and it has also been suggested that an introduced poultry virus hastened the ducks' demise (McKenzie 1971). Today it is common only on the Barrier Islands (one of which is a nature reserve), but is also found in very localized areas in Northland, Fiordland, Stewart Island, and Codfish Island. The total population is estimated at 1,000. Although fully protected by law, this level may not be maintained if habitat losses continue. Ten captive-bred birds released on Kapiti Island, off the south west coast of North Island, resulted in 45 juveniles being fledged there in 1970–1971 (Reid & Roderick 1973). Further birds were released at four localities in 1973. In 1975, 'Operation Pateke' was launched by Ducks Unlimited (N.Z.) Inc. and the Wildlife Service. This scheme aims to rear and liberate 1,000 Teal over the next ten years, from a nucleus of 15 pairs held at the Mt Bruce Native Bird Reserve and by members of Ducks Unlimited (Hayes 1976). The duck first bred in captivity at Slimbridge, UK, in 1960, but since then the Slimbridge stock (derived from no more than six birds) has become inbred and infertile.

Mexican Duck *Anas (platyrhynchos) diazi*

WC Appendix 1

The Mexican Duck breeds in localized areas of New Mexico and Texas and in the central highland areas of north Mexico, particularly in the state of Chihuahua. The vast majority of the northern breeding duck migrate up to 600 miles southwards into central Mexico, particularly to the States of Jalisco, Michoacan and Guanajuato.

Numbers may vary widely according to the success of the breeding season. When there is much surface water, the duck flourishes, only to decline when the shallow waters disappear during drought.

Counts made on the wintering grounds have shown that the population has risen from around 5,000 in the early 1960s to about 15,000 in 1970. Despite this, the future may not be bright, for continued conversion of wetlands to arable and pasture are likely to reduce the available habitat. Additionally, hybridization with the Mallard *Anas platyrhynchos* is increasing with the continued southward spread of the latter species (Bellrose 1976).

Between 1963 and 1970, the Game Management Division of the New Mexican Department of Fish and Game bred and released 295 birds.

Oustalet's Duck or Mariana's Mallard *Anas oustaleti (A. platyrhynchos* × *A. superciliosa)* (Figure 3)

RDB Endangered

WC Appendix 1

Research has suggested that the populations of Mallard-type duck from the islands of Guam, Saipan and Tinian in the western Pacific are hybrids between northern Mallard and southern Black Duck (Yamashina 1948). This 'hybrid swarm' is thought to be decreasing, although numbers have probably always been small and unstable. It was declared extinct on Guam in 1974, where shooting during the Second World War may have exterminated it. The scientific interest of this natural experiment in the evolution of a species through hybridization is felt to be such that the population deserves protection whatever its taxonomic status.

Hawaiian Duck or Koloa *A. (platyrhynchos) wyvilliana* (Figure 3)

RDB Vulnerable

The purchase of a key wetland refuge in Hanalei Valley on the island of Kauai, the only place where this Duck is now found, improved the outlook for the Koloa, which in 1967 numbered about 3,000. Until recently, Kauai was free of Mongooses; however the predator has now become established and may threaten the Duck in its last haunt. Originally found on all the main Hawaiian Islands, except Lanai and Kahoolawe, its decline was associated with hunting (there was a bag limit of 25 duck per day in the early 1920s), and introduced predators (Berger 1972). It is now fully protected by law, and a propagation scheme is underway at Pohakuloa. Captive-bred birds have been released on Oahu and Hawaii. It breeds readily in captivity, and is represented in many waterfowl collections.

Laysan Duck *A. (platyrhynchos) laysanensis* (Figure 3)

RDB Rare
WC Appendix I

Confined to Laysan Island (one of the leeward group of the Hawaiian chain) it is doubtful that this species ever had a greater range, unless it occurred also on Lisianski Island, from where it was reported in the early 19th century. Although plumage hunting and introduced rabbits nearly exterminated the species in the early part of this century, it seems normal for its numbers to fluctuate widely. For example, in 1973 only 25 birds were counted, but by August 1975 the population had increased to 251. It was reported that in 1930 the Laysan Duck had declined to the ultimate population low of a single female with sufficient semen in her oviduct to replace a clutch destroyed by curlews (Ely and Clapp 1973). What is more certain is that on several occasions single figure population counts have been made. The total wild population has probably never exceeded 700 birds. Numbers appear to be controlled by the amount of water, and its salt concentration, in the central lagoon on the island. These determine the quantity of food available. It has also been suggested that severe storms periodically reduce numbers.

Laysan Island is part of the Hawaiian Islands National Wildlife Refuge and is uninhabited. It is afforded as much protection from interference by landing parties as possible, and is normally only visited once a year by refuge officers. However, the island's remoteness (1,440 km west of Honolulu) and small size (285 ha of land) is such that patrolling is difficult, and any accidental introduction of rats, dogs, cats or of a food competitor (from a shipwreck, for instance) could alter dramatically the status of the duck.

The species breeds well in captivity without showing any adverse inbreeding effects (so much so that it is more common in this state than in the wild), and the Wildfowl Trust has produced over 400 birds from a single pair sent in 1958. The US Fish and Wildlife Service has a captive breeding programme as part of its Laysan Duck Recovery Plan, and it is possible that birds may be released onto other suitable islands.

Philippine Duck *A. luzonica*

This inhabitant of the Philippine Islands is said to be local and uncommon, but not endangered. There are recent reports of up to 100 birds on Mindoro Island, and smaller numbers at Candaba Swamp, Luzon, and at two locations on Mindanao. It is possible that its future may be jeopardized by an increase of shooting (temporarily halted by the declaration of Martial Law in 1973) and the loss of permanent freshwater marshes to agriculture (E. Dickenson, pers. com.). It breeds freely in captivity.

Meller's Duck *A. melleri*

Very little is known about the numbers of any Madagascan wildfowl species. This duck is probably uncommon, but there are no recent reports of its status. Like most endemic 'game' birds, it is not protected.

A small population exists on Mauritius, 840 km east of Madagascar and 1,865 sq. km. in extent. It is thought that the duck was introduced to the island prior to 1800, but it is also possible that cyclonic winds were responsible for its arrival. In the 1930s, it was fairly common (numbering some hundreds of pairs) but at present there are only about 20 pairs in the wild, the decline being due to shooting (A. W. Owadally, pers. com.). The species is known to have bred on the nearby island of La Reunion, but is now extinct.

Dr J. Delacour imported a few pairs from Madagascar in 1929 and these bred in France, Holland and England, but eventually died out. M. Chauveau has successfully bred them in captivity on Mauritius and one pair from this source has recently been brought to Slimbridge, UK, and another pair to Jersey Zoo.

Blue Duck *Hymenolaimus malacorhynchos*

Although this unique New Zealand species is still widespread, habitat destruction has resulted in a considerable reduction in population and range. Its requirement for swift, clear streams now limits it to mountainous areas, and clearance of native forest continues to erode its status. Predation from introduced mammals may also have played a part in its decline, as well as the introduction of various food competitors, including trout (Kear 1972). The population, which is highly territorial, is believed to be still in excess of 5,000 birds (Bell 1975). However, it is falling and, with the birds' specialized habitat requirements, there is little room for complacency. The Blue Duck is fully protected by law and portions of its range lie within National Parks—notably the Urewera and the Tongariro Parks of the North Island. The New Zealand Wildlife Service began a long-term study in 1969.

The general reluctance of the duck to nest in captivity (it has bred only at Mt Bruce Native Bird Reserve), means that re-

introduction programmes are unlikely to be successful. Only the conservation of habitat will ensure the species' survival.

Pink-headed Duck *Rhodonessa caryophyllacea*

WC Appendix 1

Salim Ali (1960) reviewed the status of the Pink-headed Duck, concluding that it was now probably extinct. He listed the last reliable sight record of the duck as being one in June 1935 by C. M. Inglis in the Darbhanga district of Bihar Province, India, although a male may have been alive in the aviaries of Sir David Ezra in Calcutta as late as 1945. Ali further suggests that it has never been particularly numerous, as indicated by the relatively few museum specimens that exist. He attributes the decline of the species to the loss of its natural habitat—swampy grass jungle—under the demands of increasing population, and as the species attained additional rarity value, to killing.

Since then there have been several unconfirmed reports of the duck from north Burma close to the borders with Assam (those from India seem attributable to confusion with the Red-crested Pochard *Netta rufina*). One record comes via U. Tun Yin who reports that S Cushing Po, whilst Deputy Commissioner of Putao District, Kachin State, saw about five ducks in some rapids of the Mali Kha River, near Machanbaw (in Kachin State close to the Burmese-Tibetan border) in the winter of 1965–1966. U Tun Yin further reports that small flocks of 4–6 birds regularly visit north Burma in winter, but do not remain to breed. He considers it possible that the duck survives in the Land of Jove area of Tibet. Confirmation of the status of the Pink-headed Duck in north Burma, however, is likely to be difficult, since visas for foreigners are unobtainable, and the area is even restricted for the Burmese due to the presence of insurgents.

The habitat in which the species is now being reported is not at all typical of earlier accounts. Obviously, however, if the Pink-headed Duck does still exist, it will be in some relatively unexpected locality, or the repeated searches of the last three decades would have found it.

Freckled Duck *Stictonetta naevosa*

Although often described as Australia's rarest duck, little is known about the total numbers of this species. During the breeding season it is confined to south-eastern Australia (particularly the Murray-Darling basin) and the extreme south-west of Western Australia where it lives in densely vegetated swamps. Its range outside the breeding season may extend over a much greater area of southern Australia.

The main population of inland New South Wales is dependent on a small number of permanent swamps which are being increasingly threatened both by drainage projects, and by unintentional drainage where water is used for irrigation. Thus, if the future of the Freckled Duck is to be secured, swamp areas probably need to be designated as reserves and management schemes implemented to ensure their water supplies (Frith 1965; Braithwaite 1976).

The species has seldom been held, and has never bred in captivity.

Southern Pochard (South American race) *Netta erythrophthalma erythrophthalma*

RDB Indeterminate

This rather ill-defined sub-species has shown a recent serious decline throughout much of its range, the causes of which are unknown. Status reports are urgently required (W. King, pers. com.).

None appears to be held in captivity.

Madagascar White-eye *Aythya innonata*

RDB Vulnerable

Restricted to the north and east of the island of Madagascar, there is no modern information about its status, but it is believed to be at risk through shooting. It is not represented in any waterfowl collection.

Banks Island White-eye *Aythya australis extima* (Figure 3)

Little is known of this race of White-eye. Restricted to the Banks Islands part of the New Hebrides Archipelago, it would seem vulnerable to habitat changes and disturbance. None is maintained in captivity.

New Zealand Scaup *Aythya novaeseelandiae*

Once distributed over most of New Zealand's rivers and lagoons, loss of habitat has restricted this species to the north and east of North Island and the west high coun-

try lakes of South Island. Its removal from the game list in 1934 and creation of some new habitat (such as the lakes of the Waikato River hydroelectric scheme) have helped numbers to increase in recent years (Williams 1964). The species is still at risk from habitat destruction, however, particularly since the main wintering population of 2,000 Scaup concentrates at one site (Hamurana Springs, Rotorua, North Island), but the statement by Reid and Roderick (1973) 'that they will persist indefinitely seems unlikely' is probably unduly pessimistic.

A captive breeding programme, directed by the New Zealand Wildlife Service and based on the Mount Bruce Bird Reserve but including zoos, game farms and private collections, has been initiated. About ten captive bred birds released on Lake Mangamahoe and Pukekura Lagoon (near New Plymouth, North Island), have thrived. By 1971 the resident population on Lake Mangamahoe numbered over 150 birds and had colonized another small lake some 20 km away (Reid and Roderick 1973). The species has done particularly well at the Wildfowl Trust in England; between 1958 (when it was bred in captivity for the first time) and 1975, 364 individuals were reared, and most of the birds in European collections originate from the Trust. This is noteworthy, since the whole of the Trust stock emanates from no more than three pairs, and yet no decline due to inbreeding has been noted.

Mandarin Duck *Aix galericulata*

Although well established in captivity, the future of the Mandarin Duck is by no means so well assured in the wild. The reasons for its decline are obscure.

In Japan, Mandarins have decreased although still said to be 'quite common'. A count of 11,280 was made in the winter of 1976 (Y. Yamashina pers. com.), and some of these birds will stay during the summer to breed in the north of central Honshu and Hokkaido. Their tameness may make them easy prey for the shooter. In 1974, 'hundreds' or possibly 'thousands' of birds were captured (probably at their wintering grounds in northern China) and exported to pet and animal dealers in Hong Kong. Most died of Newcastle disease or were eaten. For such numbers to be caught, several thousand Mandarins must exist, although their winter habitat is fairly restricted (Cheng 1976). That their decrease is causing concern to the Chinese government was reflected in an export ban in 1975.

Although vulnerable in the wild state, it is doubtful that this species is in danger of extinction. Besides being extremely common in captivity, there is a well established feral population in Britain estimated at between 300 and 400 pairs (Tomlinson 1976; Sharrock 1976). It appears to have reached the limits of its UK niche, however, and is possibly decreasing, as tree felling and other clearances near water erode its nesting habitat.

Comb Duck *Sarkidiornis melanotos*

WC Appendix 2

This perching duck is listed in the Washington Convention appendices apparently because of worries about trade in the South American subspecies *S.m. carunculatus*. There seem to be no recent reports of a decline in its status in the wild (it occurs in Venezuela, and south to southern Brazil, Paraguay and northern Argentina), but the nominate race *S.m. melanotos* has a very wide range in Africa, India, Ceylon, Burma and south-eastern China. Distribution is, however, patchy and there is a need for counts to provide reliable comparative data.

The South American Comb Duck has not bred frequently in captivity, probably because it is uncommon in waterfowl collections, and very few are held in North America or Europe. The African-Asian race breeds at Slimbridge, UK, during most years.

White-winged Wood Duck *Cairina scutulata*

RDB Vulnerable

WC Appendix 1

The disturbance and increasing destruction of primary rain forest, the habitat of this species, has perhaps reduced it to under 200 pairs, mainly in north eastern Assam, India, Bangladesh, and in Burma, and to an unknown number in Malaysia, Java and Sumatra. A review of the status and aviculture of this species was published by Mackenzie and Kear (1976). Omitted from that paper were two records from Indo-China: a female at Nakai, central Laos, in January 1932, and a bird on the Plateau des Boravino, south Laos, later in the same year (Dickenson 1970). The species was earlier

recorded from the Plateau des Boravino (Engelback 1932) but no Indo-Chinese records exist after 1932, and we assume that the duck has been eliminated from the region. A paper by Smith (1942) lists further observations in Burma prior to the Second World War.

Recently a hundred duck were reported in the Moe-Yun-Gyi Waterfowl Sanctuary (of 10,360 ha), Pzgu Forest Division, Lower Burma, as compared with 1,000 recorded in the census of 1971. Previously a fishery, the area was made a wildlife sanctuary in 1974. Cushing Po usually saw a pair of duck (but sometimes as many as 10–12) at Myitkyina, Mogaung Chaung, Maga Nanda lake near Shwebo and in the Sagaing area (between Mandalay and Myitkyina).

Holmes (1977) reports, from Sumatra, Indonesia, that the duck is widely distributed and possibly common in the swampy areas of Lampung (the southernmost province). He suggests that it may be found over much of the southern half of Sumatra.

In Bangladesh, the Kassalong Reserve (in the Chittagong Hills) has been designated and the department of Zoology, Dacca University, are investigating distribution, status and behaviour. It is also intended to collect young ducklings soon after they have left the nest, rear them in captivity at the Pablakhali Sanctuary, Chittagong Hill Tracts and to release them as adults to prevent local people from collecting the ducklings as pets. Most of these 'pets' either die, or escape soon after capture and fall victim to predators.

Equal priority must be given to encouraging effective conservation measures in Upper Assam and Amuchal Pradesh, India. Field observations in Indonesia are also important since they should indicate whether the population there has similar habitat requirements to the Assamese stock; the suggestion is that the duck in Indonesia integrates rather more readily with man, for instance by taking some cultivated foods, than it does in India.

The White-winged Wood Duck now breeds fairly well in captivity at the Wildfowl Trust, where over 100 young birds have been reared since 1971, with a view to reintroduction into suitably protected habitat if such can be found. A captive propagation project was started at the same time, but has not been so successful, at Gauhati Zoo, Assam. It is hoped that a similar project will soon be under way at Pablakhali Sanctuary, Bangladesh. The Slimbridge stock is becoming inbred, and there is need for fresh genetic material to reinvigorate the stock and prevent the occurrence of the problems which can arise from inbreeding.

Brazilian Merganser *Mergus octosetaceus*

RDB Indeterminate

The status of this shy jungle species is uncertain, partly because its habitat makes a proper census difficult, and Weller (1974) suggests that it could disappear before man's recognition of any rapid decline. It is sparsely distributed in small streams of Brazil, Paraguay and Argentina, and is uncommon everywhere. It is protected in Brazil. None is presently held in captivity, at least outside South America.

Chinese Merganser *Mergus squamatus*

RDB Indeterminate

Breeds along streams in the Amur Basin and the southern Sikhote Alin range and in north-east China. Some birds winter in this area also; others migrate to the area between western Szechwan and central Fukien, and south to western Yunnan, Tibet. No population estimate is available but Pziclonskii (1976) reports that numbers are declining in all areas of its rather restricted range, due to the loss of habitat (broad-leafed and cedar forests), shooting (it is only protected in the RSFSR) and predation by introduced mink *Mustela vison* from North America. None is maintained in captivity.

White-headed Stifftail *Oxyura leucocephala*

The total world population is probably between 10,000 and 15,000 individuals. There are breeding centres in the swamps of Kazakhstan and Turkey with a few pairs around the western Mediterranean. The species winters in Turkey, Tunisia and Pakistan, but numbers are declining in association with the drainage schemes. The bird bred for the first time in captivity at Slimbridge UK, in 1973, and now does so annually.

Discussion

A number of facts emerge from this rather brief review. One is the depressing frequency of the statement that introduced predators have been responsible for bringing an island species or subspecies to the verge of extinction. Foxes nearly eliminated the Aleutian

Canada Goose and the Ruddy-headed Goose on the island of Tierra del Fuego is currently threatened by another introduced fox. The Indian Mongoose still plays havoc in the Caribbean and Hawaiian Islands, while the Black Rat restricts the Campbell Island Teal, surely one of the world's rarest birds, to a tiny, inaccessible stack of rock. Cats have pushed its relative, the Auckland Islands Flightless Teal, on to the offshore islands of that archipelago. The Auckland Islands Merganser *Mergus australis* has gone (as recently as 1902)—the introduced cats, dogs, and pigs presumably proved too great a hazard. We have included in this paper most of the island forms of duck, not because they are necessarily rare at the moment but because the risk of accidental introductions of predators and food competitors is still great.

Habitat destruction, especially drainage of wetlands, is the second major factor threatening waterfowl. Changing the salt-water lagoons around the Danube Delta to fresh-water lakes will mean that they freeze at higher temperatures in winter and the Red-breasted Goose will no longer have a secure winter roost (foxes again, will be the enemy, but native ones this time). The destruction of the rain forests of south-east Asia is eliminating the White-winged Wood Duck, as well as a wide variety of other plant and animal species. The White-headed Stiff-tail will become rarer as the swamps around the Mediterranean are 'cleaned up'.

Excessive hunting is nowadays usually a contributory rather than the major reason for decline, although this has not always been the case, and uncontrolled shooting still seems to occur on the island of Madagascar. Aviculture and the trade in wild birds no longer removes large numbers of waterfowl from their natural habitat. The Washington Convention has controlled the traffic in endangered birds to some extent, but its lists need revision, and more countries must be persuaded that the world's wildlife needs protection from indiscriminate trading.

In the case of a number of rare waterfowl species and subspecies we do not know enough about numbers, biology or the hazarding factors. If the readers of this review have information that can help us to obtain a more accurate assessment of waterfowl at risk, we should be grateful to hear from them.

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Summary

Brief accounts are given of all species and subspecies of wildfowl (Anseriformes) considered to be endangered. Details are given of present numbers, avicultural history, and any recent conservation projects or proposals.

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The Hawaiian Duck or Koloa *Anas (platyrhynchos) wyvilliana* (above) and the Laysan Duck *A. (platyrhynchos) laysanensis* (below) are confined to single Pacific islands. Fortunately both breed well in captivity. (*Philippa Scott*)