



# INTRODUCED NON-NATIVE WATERBIRDS

Status within the African-Eurasian Flyways

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## Status within the African-Eurasian Flyways

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This publication is a summary of Banks, A.N., Wright, L.J., Maclean, I.M.D., Hann, C. & Rehfisch, M.M. (2008). Review of the Status of Introduced Non-Native Waterbird Species in the Area of the African-Eurasian Migratory Waterbird Agreement: 2007 Update. AEWA Technical Series No.32. Bonn, Germany.

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This publication is also available in French.

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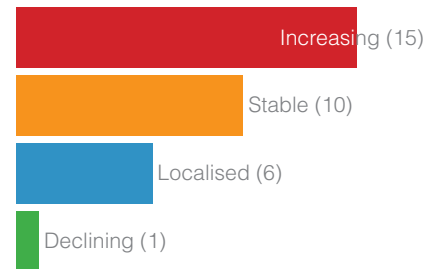
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Photo on the cover page: Greater Canada Geese (*Branta canadensis*)  
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## NON-NATIVE WATERBIRDS IN THE AFRICAN-EURASIAN FLYWAYS

For centuries, waterbirds have been kept as attractive ornaments to enhance water features and gardens. However, accidental escapes from carelessly managed captive collections or deliberate releases into the wild have resulted in the introduction of waterbird species occurring outside their native range. These introduced waterbirds are referred to as *non-native species* (also known as alien species). The invasive non-native species - plants or animals - are considered as being one of the most significant threats to global biodiversity.

Within the AEWA region, the majority of introductions of waterbirds have occurred in areas of North and West Europe. Most of these populations are ducks, geese and swans, with some from other waterbird families. Overall, there are 32 non-native waterbird species known to be regularly breeding in the AEWA region (more than five times in the last 20 years). Of these, 15 species are increasing in number, and only the Ruddy Duck (*Oxyura jamaicensis*) population is decreasing due to an actively implemented eradication programme.



Graph 1: Trends of introduced waterbird populations across the AEWA region. A total of 32 species were recorded as breeding more than five times in the last 20 years.

A further 27 species were recorded as breeding - or suspected to be breeding - one to five times in the last 20 years and another 45 species had been introduced, but were not thought to have bred.



Map of the AEWA area  
© UNEP/AEWA Secretariat

## IMPACTS ON NATIVE SPECIES AND THE ENVIRONMENT

Some species that are introduced to a habitat outside of their native range have no obvious impacts on native biodiversity. However, other species of introduced waterbirds pose specific risks to native waterbirds and the environment. In many instances, the severity at which native species are affected by introduced species is poorly understood; thus, further research into these potential problem areas is essential.

### Hybridisation

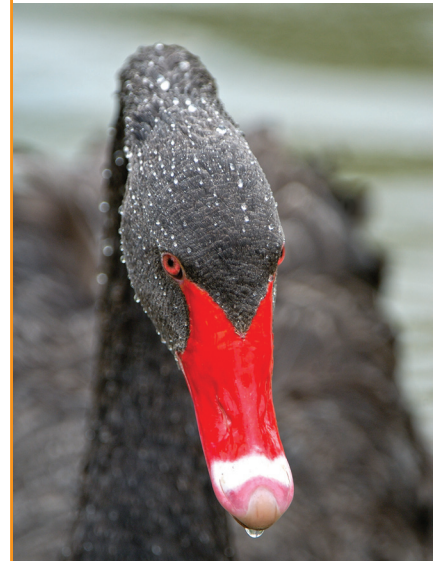
Breeding with closely related species poses a significant threat to native populations as it can cause a loss of genetic purity, and ultimately, extinction of a species.

Hybridisation has been recorded or suspected in the case of 18 non-native species across the AEWA range, and there are two hybridising species that cause particular conservation concern: The Ruddy Duck hybridises with the globally threatened White-headed Duck (*Oxyura leucocephala*), while the Mallard (*Anas platyrhynchos*) breeds with the globally threatened Meller's Duck (*Anas melleri*) and the Yellow-billed Duck (*Anas undulata*) in Africa.

### Competition and aggression

Non-native populations will compete with other waterbird species for food resources or territory. In some cases these introduced birds will out-compete natives, who are then forced to leave breeding grounds and feeding areas in search of resources elsewhere.

Competitive exclusion and territorial aggression has been reported for 13 introduced species and can result in the forced displacement of native species from breeding sites. The Greater Canada Goose (*Branta canadensis*) often shows aggression through territorial behaviour, and has been known to prevent other species, like geese native to Norway, from creating territories of their own. The Black Swan (*Cygnus atratus*) may be aggressive towards native Mute Swans (*Cygnus olor*) in France, Italy and the United Kingdom, and may also disturb the breeding of Greater Flamingos (*Phoenicopterus roseus*) in the Camargue (France).



Black Swan (*Cygnus atratus*)  
© Mark Carwardine / naturepl.com



Mute Swan (*Cygnus olor*)  
© Sergey Dereliev (UNEP/AEWA), www.dereliev-photography.com

Extreme aggression has also been observed, where non-native species have killed natives through territorial attacks, for example Greater Canada

Geese have been observed killing native Moorhen (*Gallinula chloropus*) and Coot (*Fulica atra*).

### **CASE STUDY: GREATER CANADA GOOSE (*Branta canadensis*)**

Canada Geese, which were originally introduced for ornamental and hunting purposes, have established populations throughout Europe, and numbers are rapidly increasing. The largest of these populations is found in the United Kingdom, and was estimated to consist of 89,000 individuals (in 2000). Also, the number of breeding pairs residing within Scandinavia is thought to exceed 19,000.

This species is considered as being highly invasive. Competitive exclusion and direct aggression is observed regularly through territorial behaviour, which can prevent smaller native waterbirds from establishing territories of their own. Extreme aggression towards Moorhen (*Gallinula chloropus*) and Coot (*Fulica atra*) has also been recorded and has resulted in a number of deaths to native individuals.

Greater Canada Geese have also been reported to damage wetland habitats through over-grazing. They are perceived as agricultural pests and can cause localised eutrophication of water bodies and a change in soil composition where large numbers of the species congregate. In addition, the species may hybridise with native Greylag Geese (*Anser anser*) in Scotland, along with other introduced species of geese.

Although a number of control schemes have reduced the rate of population increase at a local scale, no effective control measures have been taken to reduce the introduced population as a whole, which is a considerable cause for concern. Populations are growing at an increased rate, and the problems this species causes will be exacerbated if control schemes are not implemented. An internationally coordinated approach is required in order to counter increasing populations of this particular introduced species.



Greater Canada Goose (*Branta canadensis*)

Photos from left to right © Don Delaney; Sergey Dereliev (UNEP/AEWA), [www.dereliev-photography.com](http://www.dereliev-photography.com); Jan Vink / Foto Natura

## Predation

Predation can have a considerable impact on native waterbird populations, where competitive exclusion together with predation may result in displacement or localised extinction. Direct predation has, so far, been recorded for one species only: The

Sacred Ibis (*Threskiornis aethiopicus*) is an opportunistic feeder and will predate on smaller natives and the eggs of other species, which poses a threat and forces others away from their breeding grounds.

## Habitat damage

Different forms of habitat damage are generally observed on a local scale. Water eutrophication caused by non-native waterbirds has been recorded for seven species. Large numbers of introduced waterbirds can alter soil

conditions, caused by large amounts of faecal matter being deposited. In addition, six introduced species have been reported to cause damage to crops and have become agricultural pests, such as the Greater Canada Goose.

## Indirect effects

Six introduced waterbird species have been seen to prevent the accurate monitoring of native species, particularly where the distribution of a feral population overlaps with the native range of the same species. This is an indirect effect, but can result in imprecise data and population counts of native waterbirds. Feral populations often exhibit very different behaviour and migration patterns from native populations and their presence prevents an accurate assessment of any environmental effects on the natural population. Feral populations of both Greylag Geese (*Anser anser*) and Mute Swans are known to affect data collection in this way.



Greylag Goose (*Anser anser*)  
© Jerome Whittingham

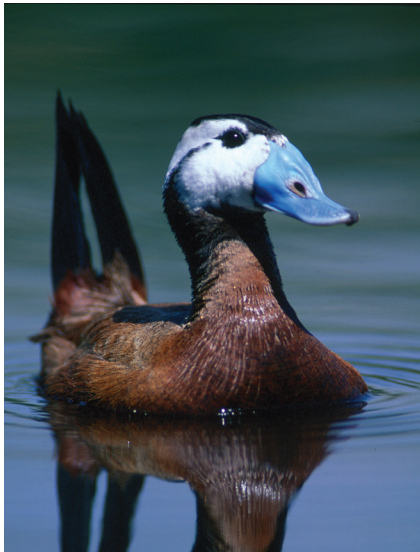


Mute Swan (*Cygnus olor*)  
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## PERTINENT LEGISLATION AND CONTROL SCHEMES



Ruddy Duck (*Oxyura jamaicensis*)  
© Deepankar Das,  
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White-headed Duck (*Oxyura leucocephala*)  
© Jorge Sierra

Within the AEWA region, 54% of countries have reported some form of legislation that prevents the introduction of non-native waterbirds in the last 5 - 20 years. However, the majority of introductions may well have occurred regularly and legally before legislation was put into place. Stakeholders from many countries consider legislation to be too flexible or requiring more rigorous enforcement.

Control schemes put in place to reduce the number of introduced species have had variable levels of success.

A control scheme implemented for a small population of Black Swans in Austria has been highly successful. All 60 individuals within the area were eradicated through the process of egg pricking and egg collection, and the species has so far shown no indication of the return of breeding pairs within the area. The swans, which were introduced around Europe as an ornamental species, display aggression towards other native swan species and had been influencing water quality on a local scale.

### CASE STUDY: RUDDY DUCK (*Oxyura jamaicensis*)

It is believed that Ruddy Ducks were introduced to the UK by an accidental release in 1952, and the majority of populations are thought to have originated from this escape. Before control schemes were implemented, a dramatic increase in numbers of Ruddy Duck showed populations establishing themselves in many European countries from the 1960s onwards.

The Ruddy Duck is aggressive towards native species, such as the Slavonian Grebe (*Podiceps auritus*); however it causes the most damage through hybridisation. The White-headed Duck (*Oxyura leucocephala*) is a globally threatened species and its greatest threat is hybridising with the Ruddy Duck, as hybrids are fertile and cross-breeding could potentially lead to extinction of the White-headed Duck.

A control scheme implemented in Spain has resulted in the eradication of the Ruddy Duck within the country since 2006. In addition, eradication of the species has been carried out in Iceland, where re-population has not occurred for a significant number of years since.



A wide-scale control scheme to reduce populations of Ruddy Ducks has only proved successful due to an internationally coordinated approach. Numbers of individuals has fallen from 6,000 (in 2000) to fewer than 700 in the UK. However, the long-term successes of these localised extinctions will depend on control measures taken by other European countries that contain populations of Ruddy Duck. There are particular concerns in France and The Netherlands, where Ruddy Duck populations have been continuously expanding since the early 1990s.

## CONSTRAINTS ON RESOLUTIONS OF PROBLEMS CAUSED BY NON-NATIVE SPECIES

### Lack of cooperation and awareness

The effective control of introduced populations within an area is highly dependent on different local or national regions working together. A lack of knowledge or awareness, or the underestimation of non-native species' effects on habitats by the public is a major issue in many areas experiencing unfavourable effects caused by introduced populations. A lack of awareness or understanding, and inaccurate collection of population trend data may cause introduced populations to be overlooked as their detrimental effects will appear less considerable.

### Lack of resources

Limited funding will restrict the development of control schemes, the level and accuracy of monitoring,

and the effectiveness of prevention of introductions. Although many measures taken for controlling a population are cost effective, there are many countries that lack the initial equipment and expertise.

### Inadequate legislation

In certain areas, legislation is in place for the protection of native bird species. These, however, may also encompass introduced species, leading to complications when control schemes or eradication programmes are being developed.



Sacred Ibis (*Threskiornis aethiopicus*)  
© Chris Twine

## CASE STUDY: SACRED IBIS (*Threskiornis aethiopicus*)

Populations of Sacred Ibis have established themselves in France, Italy and, most recently, the Canary Islands. The largest population is found in France, where 1,205 (2004 - 2007) breeding pairs have been recorded. Numbers of the species continue to increase.

The Sacred Ibis is an opportunistic feeder. It will commonly prey on the eggs and hatchlings of smaller native waterbirds, such as species of terns. The Sacred Ibis also competes with egrets. Competitive exclusion of Cattle Egrets (*Bubulcus ibis*) and Little Egrets (*Egretta garzetta*) has been recorded, which has resulted in these indigenous waterbirds being forced from their breeding grounds.

There are currently no schemes being undertaken to control Sacred Ibis populations. An increase in numbers of the species will continue unless control is implemented.

## MEASURES TO PREVENT INTRODUCTIONS OR REDUCE THEIR IMPACT

In order to avoid the introduction of non-native waterbirds, or to minimise a population's influence over native species, a number of methods are used. These will differ depending on the circumstances in which introductions have occurred and what threat they pose.

### Prevention

Both a highly cost-effective and ecologically sound measure, preventing non-native waterbird species from being introduced or becoming established avoids the need to counter the effects of invasive species later on.

A greater focus on regulating avicultural collections by monitoring aviaries and pens will significantly reduce the risk of escapes and the consequential need for control schemes.

Strengthening and thoroughly enforcing legislation will greatly help prevention, however many countries within the AEWA region lack the resources to implement this.

### Monitoring and regulation

Monitoring and regulation are also simple and economical measures and

are required throughout the AEWA region. AEWA Parties could potentially focus on the development of action plans for the management of specific introduced species across their entire introduced range.

Ornithological organisations are encouraged to monitor non-native species in general waterbird counts, while including both feral and hybrid waterbird populations as they are often disregarded. Research into the effects introduced species have on native biodiversity should be encouraged, so that control schemes can be effectively prioritised.

Investment is required in countries within the region that are lacking sufficient resources to carry out effective monitoring.

## Legislation

Governments are urged to introduce legislation where there is none, or to strengthen existing policies regarding the avoidance and control of introduced waterbird populations.

Prohibiting the deliberate release of non-native waterbirds (for ornamental or hunting purposes) will prevent introduced species from establishing wild or feral populations. A better regulation of sites containing captive waterbirds will reduce the number of accidental or premeditated releases.

## Control

If a non-native population has had the opportunity to establish in the wild, and is perceived as a threat to native populations, eradication of the species may be necessary.

Control schemes are most effective when carried out on a national or international scale. Those schemes restricted to a local level are not likely to have a significant impact on an introduced population (unless the species is only present locally).

In addition, legislation designed to protect waterbird species can be amended to allow the control of specific introduced species.

## Research and education projects

In many cases, the extent to which introduced waterbirds threaten native species, and the damage they cause to the surrounding habitats, is not well known. Further research into these effects is required in order to inform proper and adequate management responses.

Also, establishments such as zoos and public collections that contain captive waterbirds must fully acknowledge the potential damage that escaped individuals can cause. Education projects are needed where these risks are not recognised, as the majority of introductions arise from escapes.



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## CASE STUDY: MALLARD (*Anas platyrhynchos*)

The Mallard has been widely introduced within and outside its native range within the AEW region and legislation to prevent this has not existed in most countries until relatively recently. Also, a number of individuals are released each year for traditional hunting purposes in some European countries. For these reasons, assessing introduced populations proves somewhat difficult.

The biggest concerns relating to Mallard populations lie outside of their native range, where interbreeding and competitive exclusion threaten native species. Mallards are thought to displace native waterbirds from food and breeding sites within South Africa and Madagascar. The species will also hybridise with Yellow-billed Ducks (*Anas undulata*) and, more worryingly, Meller's Ducks (*Anas melleri*) (an endangered species).



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Control schemes have been implemented in South Africa to reduce populations of the Mallard, due to the threat they pose to Yellow-billed Duck. Mallard Ducks are of particular concern in Mauritius, as they are continuing to cross breed with Meller's Ducks. The Meller's Duck population in Mauritius is also considered introduced, but in Madagascar, where the species is native, it is Critically Endangered, therefore the Mauritius population may have conservation value. It is unknown how many breeding pairs of Mallards reside in Mauritius, but the population seems to remain stable.



### **CASE STUDY: EGYPTIAN GOOSE (*Alopochen aegyptiaca*)**

The Egyptian Goose is native to Africa and, like many other introduced species, established populations in Europe due to deliberate releases for ornamental purposes and various accidental escapes. Populations have since successfully established themselves in many countries, with 10,000 breeding pairs thought to exist around Western Europe. The population residing in The Netherlands has been especially successful (around 5000 pairs were recorded in 2000), which is most likely due to the network of man-made canals and drainage ditches that create a highly favourable environment for the species.

Egyptian Geese show severe aggression towards a variety of native species, including ducks and coot, consequently preventing natives from potentially establishing communities and territories of their own. Egyptian Geese will also cause habitat damage, and large roosting populations can cause eutrophication via faecal deposition.

As is the case with many thriving populations of introduced species, there are no significant control schemes currently in place to reduce Egyptian Geese numbers.

**List of 32 regularly breeding introduced waterbird species in the AEWA region in descending order of “risk status” (high risk - low risk)<sup>1</sup>**

<b>Introduced Species</b>	<b>Risks Posed to Natives</b>	<b>Current Status</b>	<b>Geographic Area</b>	<b>Risk Status</b>	<b>Resource Requirement<sup>2</sup></b>
Ruddy Duck <i>Oxyura jamaicensis</i>	Competition and aggression, hybridisation	Widespread, declining	Western Europe	Very High	High
Mallard <i>Anas platyrhynchos</i>	Competition and aggression, hybridisation, interfering with monitoring	Widespread, increasing locally	Madagascar, Mauritius, South Africa Other parts of AEWA region	Very High Medium	Very High Very High
Canada Goose <i>Branta canadensis</i>	Competition and aggression, hybridisation, eutrophication, habitat damage	Widespread, increasing rapidly	Europe	High	Very High
Sacred Ibis <i>Threskiornis aethiopicus</i>	Competition and aggression, predation	Localised, increasing rapidly	South and Western Europe, United Arab Emirates	High	Low - Medium
Mute Swan <i>Cygnus olor</i>	Competition and extreme aggression	Widespread, increasing	Canada Mauritius Europe	High Medium Very Low	High Medium Very High
Egyptian Goose <i>Alopochen aegyptiaca</i>	Competition and aggression, eutrophication, habitat damage	Widespread, increasing rapidly	Western Europe, Mauritius, UAE	Medium - High	High
Ruddy Shelduck <i>Tadorna ferruginea</i>	Hybridisation, possible displacement of natives	Widespread, increasing	Western Europe	Medium - High	Medium
Greylag Goose <i>Anser anser</i>	Hybridisation, possible displacement of natives	Widespread, increasing rapidly	Europe	Medium	Very High
Black Swan <i>Cygnus atratus</i>	Competition and aggression, hybridisation, eutrophication	Widespread, increasing	Europe, Mauritius	Medium	Medium

<sup>1</sup> Some of the species on this list are native to parts of the AEWA area, but have been introduced to other parts which lie outside of their native ranges or feral populations have been established.

<sup>2</sup> For the implementation of control/eradication schemes

Introduced Species	Risks Posed to Natives	Current Status	Geographic Area	Risk Status	Resource Requirement
Mandarin Duck <i>Aix galericulata</i>	Competition and aggression, hybridisation	Widespread, increasing	Europe	Low - Medium	High
Barnacle Goose <i>Branta leucopsis</i>	Habitat damage	Widespread, increasing	Western Europe	Low - Medium	High
Upland Goose <i>Chloephaga picta</i>	Possible displacement of natives, habitat damage	Localised, increasing	Belgium, Netherlands, United Kingdom	Low - Medium	Very Low
Chilean Flamingo <i>Phoenicopterus chilensis</i>	Hybridisation	Localised, stable	Germany/ Netherlands, France	Low - Medium	Low
Swan Goose <i>Anser cygnoides</i>	Hybridisation, possible displacement of natives	Widespread, increasing locally	Europe	Low	Low - Medium
Bar-headed Goose <i>Anser indicus</i>	Hybridisation	Widespread, increasing slowly	Western Europe	Low	Medium
Wood Duck <i>Aix sponsa</i>	Hybridisation	Localised, increasing	Western Europe	Low	Medium
Muscovy Duck <i>Cairina moschata</i>	Competition and aggression, hybridisation	Widespread, stable	Europe, Africa	Low	Very High
Snow Goose <i>Chen caerulescens</i>	Aggression, hybridisation	Localised, stable	Germany, Netherlands, United Kingdom	Low	Low
Emperor Goose <i>Chen canagicus</i>	Hybridisation	Localised, occasional breeding	Netherlands, United Kingdom	Low	Very Low
Purple Swamphen <i>Porphyrio porphyrio</i>	No known risks	Localised, stable	Italy, United Arab Emirates	Low	Very Low
Caribbean Flamingo <i>Phoenicopterus ruber</i>	Hybridisation	Localised, stable	Germany/ Netherlands	Low	Very Low

<b>Introduced Species</b>	<b>Risks Posed To Natives</b>	<b>Current Status</b>	<b>Geographic Area</b>	<b>Risk Status</b>	<b>Resource Requirement</b>
White-faced Whistling Duck <i>Dendrocygna viduata</i>	Possible hybridisation	Localised, increasing	Mauritius	Low	Low - Medium
Greater Flamingo <i>Phoenicopterus roseus</i>	Hybridisation	Localised, stable	Germany/ Netherlands, United Arab Emirates	Very Low	Low
Red-crested Pochard <i>Netta rufina</i>	Hybridisation	Localised, increasing	United Kingdom	Very Low	Medium
Gadwall <i>Anas strepera</i>	No known risks	Widespread, stable	United Kingdom	Very Low	High
Bean Goose <i>Anser fabalis</i>	No known risks	Localised, occasional breeding	Belgium, Netherlands, United Kingdom	Very Low	Very Low
Pink-footed Goose <i>Anser branchyrhynchus</i>	Occasional hybridisation	Localised, occasional breeding	France, Germany, United Kingdom	Very Low	Very Low
Greater White-fronted Goose <i>Anser albifrons</i>	Interfering with monitoring, occasional hybridisation	Localised, occasional breeding	Germany, Netherlands, United Kingdom	Very Low	Low
Eurasian Wigeon <i>Anas penelope</i>	No known risks	Localised, occasional breeding	United Kingdom	Very Low	Low
Lesser White-fronted Goose <i>Anser erythropus</i>	Captive hybridisation	Localised, occasional breeding	Finland / Sweden, United Kingdom		
Meller's Duck <i>Anas melleri</i>	Hybridisation	Localised, stable	Mauritius	Very Low	Low - Medium



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