

# BERMUDA

LAND AREA 53 km<sup>2</sup> ALTITUDE 0–76 m  
HUMAN POPULATION 66,160 CAPITAL Hamilton  
IMPORTANT BIRD AREAS 1, totalling 7.6 km<sup>2</sup>  
IMPORTANT BIRD AREA PROTECTION 100%  
BIRD SPECIES 375  
THREATENED BIRDS 3 RESTRICTED-RANGE BIRDS 0



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Castle Harbour Islands, at the eastern end of Bermuda.  
(PHOTO: ANDREW DOBSON)

## INTRODUCTION

Bermuda, a UK Overseas Territory, is situated in the western North Atlantic, 917 km from Cape Hatteras, the nearest landfall in the USA. It is made up of a mini-archipelago of approximately 150 islands, of which the eight largest are joined by bridges or causeways. Bermuda is volcanic in origin and is the largest of three volcanic seamounts, which rise from mid-oceanic depths of over 3,500 m. Over time, and due to ideal conditions for coral growth, limestone deposits built up over the eroded volcanic base such that the present visible islands are entirely formed of limestone. The present-day islands comprise a hilly, rolling landscape with relatively steep, parallel hills and ridges separated by inter-dune lows or valleys, some of which extend below water level to form wetland areas. There are very few natural level areas of any size, the largest being the inland peat-marsh basins in Devonshire and Pembroke Parishes. Extensive land reclamation by the US military in the early 1940s to build naval and air force operating bases added over 1.5 km<sup>2</sup> to Bermuda's area and greatly increased the amount of relatively low, level area on the otherwise hilly island.

Bermuda's climate is considered sub-tropical, mainly due to the influence of the Gulf Stream, which passes to the west

and north-west of the island. Annual rainfall is 1,400 mm, distributed fairly evenly throughout the year. Monthly average temperatures range from 18°C in February to 27°C in August. Bermuda was discovered in about 1505 but has only been settled since 1609. Today, the country is largely suburban in nature and is one of the most densely populated countries in the world. The impact of human development on native fauna and flora has been significant. About 94% of present flora is introduced, much of it now naturalised.

## Conservation

Bermuda's first conservation legislation was passed in 1616, when the Governor issued a proclamation against "the spoyle and havocke of the cahows". A number of current acts cover the protection of species and habitats. These include: the Coral Reef Preserves Act 1966; the Fisheries Act 1972; the Protection of Birds Act 1975; the Endangered Animals and Plants Act 1976; the Bermuda National Parks Act 1986; and the Protected Species Act 2003. Although birds are covered there are other terrestrial species—for example, the Critically Endangered Bermuda skink *Eumeces longirostris*—that have no protection unless they are found within a national park. There are a number of government bodies responsible for the management of natural resources on Bermuda, which all fall under the

umbrella of the Ministry of Environment and Sport. These include the Department of Environmental Protection, the Department of Conservation Services, the Department of Planning and the Department of Parks. There are also 13 NGOs which play an important role in assisting the government in meeting its conservation objectives. In 2003, Bermuda produced a five-year Biodiversity Strategy and Action Plan. This outlines 12 objectives and a series of prioritised actions for achieving them. A total of 9% or c.500 ha of Bermuda's land area is designated as park and nature reserves. National parks are areas that are protected under the National Parks Act 1986 for the enjoyment of present and future generations. Nature reserves are areas of special scientific interest, and all forms of development are prohibited. There are 177 ha of privately-owned nature reserve, of which the Bermuda National Trust and Bermuda Audubon Society own about half.

At the time of its discovery, Bermuda was almost entirely covered in a dense, mostly evergreen forest dominated by several endemic tree species, notably Bermuda cedar *Juniperus bermudiana*, Bermuda palmetto palm *Sabal bermudiana* and Bermuda olivewood *Cassine laneanum*. Massive disturbance of Bermuda's vegetative cover was carried out by the early settlers, through clearing for agriculture and lumber, wholesale burning of large areas of forest to control a plague of rats, and the introduction of mammals such as pigs, rats, goats and cattle. By the late 1800s, only the Bermuda cedar remained common, becoming Bermuda's main forest cover, with an understorey of other, less common, native and endemic plants. Following an infestation of accidentally introduced juniper scale insect in the late 1940s, up to 96% of the Bermuda cedar forest died, leaving the land essentially defoliated. Over 1,000 species of exotic plants have been introduced since that time, with many becoming invasive and completely dominating the inland vegetation cover. In 2003, only some coastal cliff and dune areas were still dominated by native plant communities,

along with some of the more exposed and isolated offshore islands. There are a number of native reforestation projects carried out by the Bermuda Department of Conservation Services, notably the Nonsuch Island Living Museum, the Walsingham Trust Property, Paget Marsh Nature Reserve and Morgan's Island Nature Reserve. The Department of Conservation Services manages the Nonsuch Island Living Museum project which has (since 1960) focused on the restoration of island habitats and their floral and faunal communities to pre-colonial status. Much of the island is now covered with a dense, 40-year old replanted forest comprising native and endemic tree and shrub species. This unique project has created a perfect environment for the establishment of a more secure Bermuda Petrel *Pterodroma cahow* population (see below).

Bermuda's small size and geographical isolation have made it very difficult for mammals, amphibians and reptiles to become naturally established. Prior to human settlement, only one species of terrestrial reptile was resident, the endemic rock lizard or Bermuda skink *Eumeces longirostris*, which is now only common on some of the offshore islands, in particular the Castle Harbour Islands. Because of accidental and deliberate introduction by man, there are two species of rat—*Rattus norvegicus* and *Rattus rattus*—now common on Bermuda, as well as the house mouse *Mus musculus*. There is also a large population of domestic and feral house cats, which impact on bird populations in some areas. Dogs are much better controlled, with a dog authority enforcing annual licensing and compulsory microchip tagging, ensuring that there are very few, if any, feral animals. Other mammals sold primarily as pets, such as guinea pigs and hamsters, are occasionally released in parks or nature reserves by irresponsible owners. Attempts by pet stores to introduce other exotic mammals, such as African pygmy hedgehogs and descended skunks, were recently prevented by the introduction of new legislation.

The coast of Nonsuch Island Living Museum, the focus of a restoration project since 1960. (PHOTO: ANDREW DOBSON)



■ **Birds**

About 375 bird species have been recorded in Bermuda, most of which are Neotropical migrants. Although most of these migrants stay only for a matter of days or weeks to rebuild energy reserves before continuing on their migration, a number will stay on in varying numbers for the entire winter period (October to April). For example, up to 25 species of North American wood warbler regularly winter on Bermuda, in addition to orioles and various raptors.

Three globally threatened birds occur on Bermuda. The Near Threatened Piping Plover *Charadrius melodus* and Buff-breasted Sandpiper *Tryngites subruficollis* are both regular to occasional migrants, visiting mainly in autumn. The third species is the Endangered Bermuda Petrel (or Cahow) *Pterodroma cahow*. The Cahow is Bermuda's national bird. It was super-abundant before human settlement, but was nearly driven to extinction by earlier settlers. It was thought extinct for almost 300 years but was rediscovered breeding on the rocky islets in Castle Harbour in 1951. The population in 1960 was just 18 pairs, producing eight fledged chicks annually. In the 2007–2008 breeding season the population had reached a record high of 85 established nests (with an additional six nest burrows being investigated) with a total of 40 chicks successfully fledging. The birds nest on four rocky islets near Cooper's and Nonsuch Islands. A recovery program for Bermuda's national bird has been under way since 1951 and is managed by the Department of Conservation Services under the direction of the Terrestrial Conservation Officer. As part of this recovery program, (pre-fledging) birds have been translocated to artificial nest burrows on Nonsuch Island in order to establish a new breeding colony. Over five years, 101 chicks have successfully fledged from Nonsuch. Cahows spend the first 3–4 years of life out at sea, but the first Nonsuch Island fledglings were seen prospecting nest burrows on Nonsuch in February–April 2008, providing hope that a new colony could be established as early as 2009. Nonsuch Island represents a more elevated and less vulnerable nesting island for the Cahows than the rocky islets that are frequently over-washed and eroded by hurricanes (compounded by sea-level rise). Nonsuch Island has the capacity to hold a significantly larger breeding population than the other islets.



Cahow chick being translocated to an artificial nest burrow on Nonsuch Island. (PHOTO: ANDREW DOBSON)

Bermuda supports just 18 resident (regular) breeding birds, including one endemic sub-species, the Bermuda White-eyed Vireo *Vireo griseus bermudianus*, and several native species including Mourning Dove *Zenaida macroura*, Common Ground-dove *Columbina passerina*, Grey Catbird *Dumetella carolinensis*, Eastern Bluebird *Sialia sialis* and Barn Owl *Tyto alba*. The Yellow-crowned Night-heron *Nyctanassa violacea* was successfully reintroduced to Bermuda for natural control of the abundant red land crab *Gecarcinus lateralis*, after the discovery of sub-fossil remains in limestone caves and the descriptions of early settlers confirmed that the bird once nested there. Breeding of the Green Heron *Butorides virescens*, suspected for years, was confirmed in 2003 around the edge of the mangrove-fringed Trott's Pond and Mangrove Lake; it extended its breeding range in 2004 and by 2008 was nesting in at least seven locations around Bermuda. Three seabird species visit Bermuda to breed: the Cahow *P. cahow* (as discussed above); White-tailed Tropicbird *Phaethon lepturus*, with c.2,000 nesting pairs found on coastal cliffs and offshore islands around Bermuda; and Common Tern *Sterna hirundo* nests on small rocks and islets in several of the larger inshore harbours, maintaining a small population of 18–25 nesting

The Bermuda Petrel or Cahow, the islands' national bird. (PHOTO: JEREMY MADEIROS)





Bermuda's endemic subspecies of White-eyed Vireo. (PHOTO: ANDREW DOBSON)



White-tailed Tropicbird, Bermuda's commonest seabird. (PHOTO: ANDREW DOBSON)

pairs. Hurricane Fabian (2003) had a disastrous effect on *S. hirundo*, with only six pairs returning to breed in 2004, and 9–10 pairs breeding in 2008.

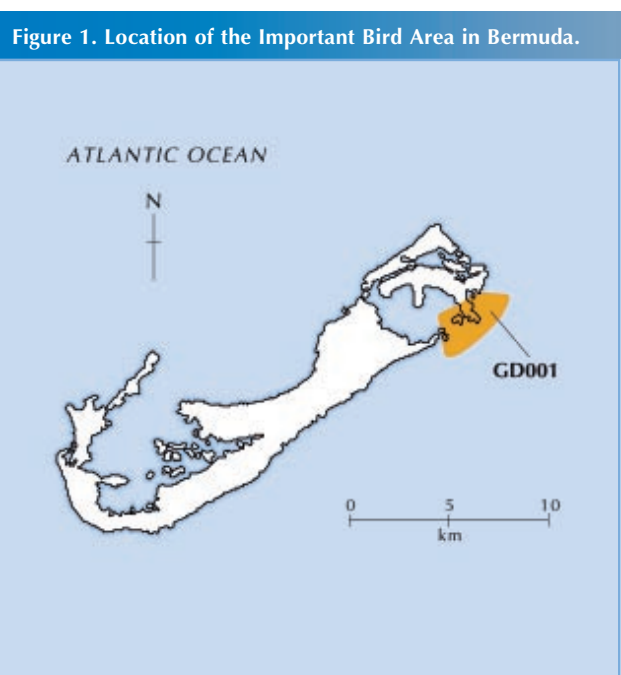
The Department of Conservation Services has management programs in place for all of the seabird species. Efforts for the White-tailed Tropicbird *Phaethon lepturus*, Bermuda's commonest seabird, include studies of breeding success and chick growth-rates at a number of nesting locations, and installation of artificial nests by the department's Conservation Unit at managed nature reserve areas such as the Castle Harbour Islands. Recent hurricane activity has resulted in the loss of many of the natural nest sites for this species through cliff collapse and erosion. Artificial nests provide an alternative that has been readily accepted by the birds (which otherwise rely on natural cavities as they are unable to dig their own). These efforts are augmented by the Bermuda Audubon Society which provides artificial nests to private land-owners and has installed nests at several of its own nature reserves. Bermuda has by far the largest nesting population of this species in the North Atlantic and hosts nearly half of the breeding population for the *P. lepturus catsbyii* subspecies. Research is also ongoing on the greatly diminished population of *S. hirundo* on the island and has indicated a shortage of male birds, which, coupled with the threat posed by hurricane activity to their tiny nesting islands, seriously threatens the future of this species on Bermuda. Several other species of seabird, some of which may have nested on the island at the time of human colonization, visit Bermuda as vagrants.

## IMPORTANT BIRD AREAS

Cooper's Island and Castle Islands is Bermuda's only IBA—the territory's international priority site for bird conservation. It covers 7.6 km<sup>2</sup> (including marine areas), and about 1% of the islands' land area and has been identified on the basis of two key bird species (listed in Table 1) that trigger the IBA

Key bird species	Criteria	National population	Bermuda IBA BM001	
			Criteria	Population
Bermuda Petrel <i>Pterodroma cahow</i>	■ ■	255	■	255
White-tailed Tropicbird <i>Phaethon lepturus</i>	■	6,000	■	2,100

All population figures = numbers of individuals.  
Threatened birds: Endangered ■. Congregatory birds ■.



criteria. With the recent protection afforded Cooper's Island (Cooper's Island National Park) almost all of the IBA is protected to some extent. The monitoring work undertaken for the White-tailed Tropicbird *Phaethon lepturus* and Bermuda Petrel *Pterodroma cahow* should be used to inform the annual assessment of state, pressure and response variables at the IBA to help provide an objective status assessment and highlight any additional management interventions that might be required to maintain this internationally important biodiversity site.

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### BM001 Cooper's Island and Castle Islands

### National Nature Reserve/National Park/World Heritage Site

COORDINATES 32°21'N 64°39'W  
 ADMIN REGION St George's  
 AREA 760 ha  
 ALTITUDE 0–21 m  
 HABITAT Sea, reef, coastline, shrubland



THREATENED BIRDS ■  
 RESTRICTED-RANGE BIRDS ■  
 BIOME-RESTRICTED BIRDS ■  
 CONGREGATORY BIRDS ■

#### Site description

Cooper's Island and Castle Islands IBA (43 ha of which is terrestrial) is situated at the east end of Bermuda. The 31-ha Cooper's Island was connected to St David's Island during the (1943) construction of the US Air Force base (now the international airport). It is on the eastern side of Castle Harbour and juts out into the centre of the Castle Harbour Islands which form a chain across the south-eastern edge of the harbour. The Castle Islands Nature Reserve includes Nonsuch (the largest at 6.9 ha, and most ecologically diverse), Castle Island (1.9 ha), Charles Island (1.8 ha) and about 15 other smaller islands that are surrounded by extensive coral reefs and sea grass beds. The former NASA tracking station on the diverse, and ecologically important Cooper's Island peninsula has recently been incorporated into a new national park.

#### Birds

This IBA supports the world population (85 pairs in 2008) of the Endangered Bermuda Petrel (or Cahow) *Pterodroma cahow* which breeds on four of the islets. Birds have been translocated to Nonsuch Island to establish a new breeding colony. The breeding population (700 pairs) of White-tailed Tropicbird *Phaethon lepturus* is globally significant. The marine portion of this IBA covers areas where *P. cahow* congregates before flying to the nesting islets, and is a concentration point for shearwaters each spring. The endemic subspecies of White-eyed Vireo *Vireo griseus bermudianus* occurs in the IBA.

#### Other biodiversity

The Critically Endangered Bermuda cedar *Juniperus bermudiana* and Bermuda sedge *Carex bermudiana* and Endangered Bermuda palmetto palm *Sabal bermudana* and Bermuda olivewood *Cassine lanceanum* grow in the IBA. The Critically Endangered Bermuda skink *Eumeces longirostris* is found on the Castle Harbour islands, and may occur on Cooper's Island. The Critically Endangered hawksbill *Eretmochelys imbricata* and Endangered green *Chelonia mydas* and loggerhead *Caretta caretta* are present, with the latter recently nesting on Coopers Island.

#### Conservation

The recently designated Cooper's Island National Park embraces the majority of the peninsula, including the former NASA tracking station. There is some pedestrian access, but some of the most environmentally sensitive sections of Coopers Island may remain off-limits except by special permit or on guided tours. The park provides a valuable buffer to the Castle Islands Nature Reserve (part of which, due to the presence of early colonial fortifications, is a world heritage site). Access to Castle and Charles islands is strictly regulated (but landing is allowed). The other islands east of Castle Roads Channel (including Nonsuch and the Cahow nesting islands) are all restricted access nature reserves with landing by special permit only. There is occasional illegal landing on the Cahow nesting islands.