

BONAIRE

LAND AREA **288 km²** ALTITUDE **0–240 m**
HUMAN POPULATION **14,000** CAPITAL **Kralendijk**
IMPORTANT BIRD AREAS **6, totalling 238 km²**
IMPORTANT BIRD AREA PROTECTION **50%**
BIRD SPECIES **214**
THREATENED BIRDS **2** RESTRICTED-RANGE BIRDS **3** BIOME-RESTRICTED BIRDS **2**



JEFF WELLS (BOREAL SONGBIRD INITIATIVE) AND
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Washington-Slagbaai National Park. (PHOTO: ROWAN O. MARTIN)

INTRODUCTION

Bonaire, which is politically part of the Kingdom of the Netherlands¹, is one of the three Netherlands Antilles islands (Aruba, Bonaire and Curaçao) that lie off the north-west coast of Venezuela. Bonaire is the easternmost of the three islands (c.50 km east of Curaçao) and the island furthest (c.85 km) from mainland Venezuela. It is 35 km long, 8–15 km wide, and consists of a volcanic core, surrounded by limestone formations. The northern end of the island, within Washington-Slagbaai National Park (IBA AN009), is dominated by hills including Mount Brandaris, the island's highest point. The flat, low-elevation southern end of the island contains the Pekelmeer (IBA AN014), once a series of natural shallow lagoons that have been modified over hundreds of years for salt production. Bonaire has jurisdiction over an offshore island—Klein Bonaire (IBA AN012)—situated c.1 km from the central west coast. Klein Bonaire is a low coral-limestone island fringed with sandy beaches.

¹ At some point in the near future the “Netherlands Antilles” will be dissolved. St Maarten and Curaçao will become separate countries within the Kingdom of the Netherlands (similar to the status currently enjoyed by Aruba). The islands of Bonaire, Saba and St Eustatius will be linked directly to the Netherlands as overseas territories.

Bonaire (as Aruba and Curaçao) is very dry with an average annual rainfall of 450 mm falling mostly in the period October–January. As a result, the island's vegetation is generally xerophytic with many areas dominated by columnar cactus intermixed with low scrub and large expanses of land largely devoid of vegetation, especially along the eastern shoreline which receives slightly less rainfall on average than the western side of the island. Virtually all trees on the island were removed by the early nineteenth century and woody vegetation continued to be cut for charcoal production into the twentieth century. Grazing animals were introduced by 1700 and have significantly altered the vegetation. Free-roaming goats and donkeys have continued to have an impact in many areas even to the present day. In some regions, notably within Washington-Slagbaai National Park, there are patches of thicker and taller (3–4 m) thorn scrub forest supporting some epiphytic growth. Lac Bay (IBA AN013) on the south-eastern side of the island supports Bonaire's only significant mangrove woodland.

Bonaire's human population is significantly less than that of neighbouring Aruba (100,000) and Curaçao (138,000). The island's economy is largely dependent on ecotourism centered on scuba diving within the marine park. Apart from tourism, the salt production industry, a small oil transfer facility,



Free-ranging donkeys are a major threat to Bonaire's vegetation.
(PHOTO: BERT DENNEMAN)

banking, and fishing provide much of the remaining employment outside of the service and support sectors.

■ Conservation

Bonaire has a relatively long history of natural resources protection and legislation. The Bonaire Nature Management Plan 1999–2004 (ratified by the Island Council in 1999) defines protected zones and recommends a number of other portions of the island to be designated with varying levels of conservation protection (see “Important Bird Areas” below). Areas currently protected include: Washington-Slagbaai National Park (IBA AN009) that encompasses 17% of the island's land area; Bonaire National Marine Park that extends from the high-water mark to the 60-m depth contour around the coast of Bonaire and Klein Bonaire, covering an area of c.2,700 ha; and Klein Bonaire (IBA AN012) that was designated a protected area in 2000. These three areas are under the management authority of the local NGO STINAPA Bonaire, with the marine park primarily financed through scuba-diver user fees.

Conservation action (research, monitoring and education) on Bonaire is currently focused largely on marine issues, and is implemented through STINAPA Bonaire. However, CARMABI Foundation has a long legacy of carrying out and supporting a variety of ecological research (including on birds) throughout the Netherlands Antilles. CARMABI has recently completed a vegetation mapping and analysis project that provides baseline information and recommendations for protecting Bonaire's habitats. The foundation has also undertaken or facilitated a number of surveys of nesting terns and plovers. Other research and outreach and education campaigns implemented by University of Sheffield (UK) have focused on the Yellow-shouldered Amazon *Amazona barbadensis*. National Audubon Society (BirdLife in the USA) has facilitated some ornithological/birdwatching training of staff from Washington-Slagbaai National Park. A long-term monitoring program for bird populations in the park was initiated by STINAPA in 2007.

Biodiversity faces a wide range of threats on Bonaire including disturbance from recreational activities, pollution of (and increasing run-off into) the marine environment and wetlands, and unplanned development. However, the greatest impact on the environment can be attributed to the direct destruction of vegetation by free-ranging goats and donkeys, predation of the native fauna by cats, and the capture (and keeping) of parrots and other birds for pets. These issues will only be addressed through an integrated program aimed at changing local attitudes towards traditional land and biodiversity use, legal enforcement and wardening, invasive species control and eradication, and securing of long-term funding for the management of the island's protected areas.

■ Birds

Over 210 species of bird have been recorded from Bonaire. Only 55 of these species are resident (current or former) breeding species, the vast majority being migrants, winterers, and occasional vagrants. Most of the migrants are Neotropical migrants from breeding grounds in North America, although many (50–60 species) are vagrants (recorded on average less than once a year). A smaller number of species are of South American origin, representing either dispersing individuals or austral migrants overshooting their northern South American wintering grounds having originated from breeding grounds further south or west.

Bonaire's resident avifauna is a rather unique, with species of West Indian origin mixed with those originating in South America. This is demonstrated by the presence of two Northern South America biome-restricted birds, namely Bare-eyed Pigeon *Patagioenas corensis* and Yellow-shouldered Amazon *A. barbadensis*, as well as a number of more wide-ranging South American species. *Amazona barbadensis* is also one of three restricted-range species that constitute the Netherlands Antilles secondary Endemic Bird Area (EBA), the other two being West Indian birds, namely Caribbean Elaenia *Elaenia martinica* and Pearly-eyed Thrasher *Margarops fuscatus*. At least 16 subspecies have been described from Aruba, Bonaire and Curaçao; four exclusively from Bonaire. The Bonaire form of Brown-throated Parakeet *Aratinga pertinax xanthogenius* is particularly well-differentiated (based on plumage and vocalisations), and a subspecies of Grasshopper Sparrow *Ammodramus savannarum caribaeus* found only on Bonaire and Curaçao appears vocally distinct from other North American and Caribbean forms. Similarly, vocalisations of White-tailed Nightjar *Caprimulgus cayennensis insularis* from Bonaire and Curaçao are distinct from mainland forms. Further taxonomic research is needed on all of these subspecies.

The threat category and national population sizes of the globally threatened birds are listed in Table 1. The Vulnerable *A. barbadensis* has a disjunct range in northern coastal Venezuela (Falcón, Lara, Anzoátegui and Sucre) and the islands of Margarita and La Blanquilla. The Bonaire birds are clearly important in the context of a global population estimated at 2,500–9,999 individuals. However, over 300 birds were illegally caught for the local pet trade between 1998 and 2002 which has presumably halted any potential population growth on the island. In 2008 several broods were poached from nests on Bonaire, some of which have reportedly

The Vulnerable Yellow-shouldered Amazon.
(PHOTO: ROWAN O. MARTIN)



Table 1. Key bird species at Important Bird Areas in Bonaire.

Key bird species	Criteria	National population	Bonaire IBAs						
			AN009	AN010	AN011	AN012	AN013	AN014	
Caribbean Flamingo <i>Phoenicopterus ruber</i>	■	1,500–7,000	500						5,000
Caribbean Coot <i>Fulica caribaea</i>	NT ■	250			246				
Royal Tern <i>Sterna maxima</i>	■	255							170
Sandwich “Cayenne” Tern <i>Sterna sandvicensis</i>	■	540	360						340
Common Tern <i>Sterna hirundo</i>	■	115	20						60
Least Tern <i>Sterna antillarum</i>	■	2,375	412		452	100			582
Bare-eyed Pigeon <i>Patagioenas corensis</i>	■	500–1,000	✓	✓	✓	✓	✓		
Yellow-shouldered Amazon <i>Amazona barbadensis</i>	VU ■ ■ ■	650	250	267	100			100	
Caribbean Elaenia <i>Elaenia martinica</i>	■	250–500	✓	✓	✓	✓	✓		
Pearly-eyed Thrasher <i>Margarops fuscatus</i>	■		✓	✓	✓				

All population figures = numbers of individuals.
 Threatened birds: Vulnerable ■; Near Threatened ■. Restricted-range birds ■. Biome-restricted birds ■. Congregatory birds ■.


 Bonaire's endemic subspecies of Brown-throated Parakeet.
 (PHOTO: BERT DENNEMAN)

been seen as pets in homes in Bonaire and neighbouring Curaçao.

Bonaire is of global importance for its waterbird populations including Caribbean Flamingo *Phoenicopterus ruber* whose numbers, over the last 10 years have fluctuated between c.1,500 and 7,000 breeding individuals (though most normally averaging c.5,000). The flamingos fly to mainland Venezuela to feed in lagoons along the coast of the state of Falcón where hundreds are regularly seen but are not known to breed. The movements of the flamingos within the island and to-and-from mainland Venezuela are poorly known and warrant further research. Bonaire supports significant populations of breeding terns (*Sterna* spp.), including the “Cayenne” form of Sandwich Tern *S. sandvicensis eurygnatha*, primarily within Washington-Slagbaai National Park IBA (AN009) and Pekelmeer Saltworks IBA (AN014).

IMPORTANT BIRD AREAS

Bonaire's six IBAs—the island's international site priorities for bird conservation—cover 23,830 ha (including their marine extensions). They embrace c.55% of the island's land area. Washington-Slagbaai National Park IBA (AN009) and Klein

Figure 1. Location of Important Bird Areas in Bonaire.


Bonaire IBA (AN012) are formally protected within the national system. Parts of Washikemba–Fontein–Onima IBA (AN011), Pekelmeer Saltworks IBA (AN014) and Lac Bay IBA (AN013) have been identified as proposed protected areas within the Bonaire Nature Management Plan, but these recommendations have not been acted upon. However, the latter two IBAs are designated Ramsar sites, offering them formal recognition of their importance.

The IBAs have been identified on the basis of 10 key bird species that variously trigger the IBA criteria (see Table 1). The majority of these birds occur in two or more IBAs. However, Royal Tern *Sterna maxima* only nests in Pekelmeer Saltworks IBA (AN014), and the Near Threatened Caribbean Coot *Fulica caribaea* only occurs on the freshwater reservoirs in Washikemba–Fontein–Onima IBA (AN011). Perhaps of greater concern is the fact that c.60% of the Vulnerable Yellow-shouldered Amazon *Amazona barbadensis* population occurs outside of formal protected areas, leaving the species totally exposed to capture for the local pet trade. For example, Dos Pos IBA (AN010) contains some of the most important breeding and roosting sites for the species on Bonaire but receives no protection from future development (although there are no immediate threats to this area), or poaching.



Yellow-shouldered Amazon nesting cliffs at Fontein.
(PHOTO: ROWAN O. MARTIN)

There is an urgent need to establish secure, protected areas for breeding terns (*Sterna* spp.) on Klein Bonaire IBA (AN012), the islands in Goto Lake (IBA AN009) and in the Pekelmeer Saltworks IBA (AN014) through the eradication of cats and rats where possible (e.g. on Klein Bonaire), signage, fencing, and regular patrols. Such proactive management would likely see a dramatic increase in the breeding tern (and plover *Charadrius* spp.) populations. More attention should also be given to balancing the management of Pekelmeer Saltworks IBA for its ecological values in addition to its economic value. Washington-Slagbaai National Park IBA would benefit from a concerted program of removing goats, donkeys and pigs that are so dramatically impacting the vegetation. The landbird (and vegetation) monitoring program started in 2007 should help to determine the impact these grazing animals have had.

Amazona barbadensis would benefit from increased patrolling of the Washington-Slagbaai National Park IBA in an effort to stop poaching, although this would be difficult and costly. More practical would be a public awareness campaign to raise local pride in combination with enforcement of the laws prohibiting the possession of unregistered birds, thereby reducing local demand for wild-caught birds. Ideally this would reach beyond Bonaire to the neighbouring island of Curaçao as a (currently unknown) proportion of parrots poached on the island are exported to Curaçao. *Amazona barbadensis* on Bonaire is perceived by many as an agricultural pest. A detailed study to determine the extent of agricultural damage caused by the parrot, accompanied by measures to address this conflict with humans is also needed. Further research to determine the factors limiting the parrot population on Bonaire is required to inform management decisions within the IBAs.

State, pressure and response variables at each IBA should be monitored annually to provide an objective status assessment

and highlight management interventions that might be required to maintain these internationally important biodiversity sites.

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AN009 Washington-Slagbaai National Park

COORDINATES 12°17'N 68°24'W
 ADMIN REGION Bonaire
 AREA 6,900 ha
 ALTITUDE 0–243 m
 HABITAT Shrubland, salina, coast



Yellow-shouldered Amazon

National Park/Ramsar Site

THREATENED BIRDS	1
RESTRICTED-RANGE BIRDS	3
BIOME-RESTRICTED BIRDS	2
CONGREGATORY BIRDS	<input checked="" type="checkbox"/>

■ Site description

Washington-Slagbaai National Park IBA encompasses c.25% of Bonaire at the northern end of the island. It is the area of greatest geographic relief, including the island's highest point, Mount Brandaris. The park has a generally well-maintained road network for visitor access, and supports some of the island's most extensive areas of vegetation (xerophytic shrublands with columnar cacti). There are a number of water holes in the park, and salinas/lagoons along the coast. An oil storage facility is located on the south-eastern border. Dos Pos IBA (AN010) is adjacent to Goto Lake, and the Washikemba–Fontein–Onima IBA (AN011) abuts the park's north-eastern corner.

■ Birds

This IBA is a significant nesting, roosting, and foraging area for c.300–400 Vulnerable Yellow-shouldered Amazon *Amazona barbadensis*. The shrublands support all three Netherlands Antilles secondary EBA restricted-range birds, the two Northern South America biome-restricted birds, and a number of endemic subspecies. Globally significant numbers of Common Tern *Sterna hirundo*, and regionally important numbers of Sandwich *S. sandvicensis* and Least *S. antillarum* terns nest. A regionally important concentration of 500 Caribbean Flamingo *Phoenicopterus ruber* occurs.

■ Other biodiversity

The endemic fish *Poecilia vandepolli* occurs in the freshwater streams and ponds. One Bonaire and Curaçao endemic plant, seven endemic lizards, and a number of endemic land-snails are found inside the park.

■ Conservation

This IBA is a state-owned protected area that includes two Ramsar sites—Goto Lake and Boca Slagbaai. The park is managed by STINAPA Bonaire National Park Foundation. Researchers from CARMABI Foundation have conducted ecological studies; those from Sheffield University (UK) are working on the parrot; from University of Amsterdam on raptors; and from Zoological Museum Amsterdam on waterbirds and fish. Once a privately-owned ranch (exporting animals, and producing charcoal and aloe resin), the park still has free-roaming goats and donkeys (and now pigs) which continue to negatively impact the vegetation. Illegal trapping of *A. barbadensis* is a major threat. Feral cats and human disturbance are problems for nesting terns and shorebirds, and oil spills represent a potential threat due to the park's close proximity to a major oil shipping lane and oil storage facility.

AN010 Dos Pos		Unprotected
<p>COORDINATES 12°14'N 68°21'W ADMIN REGION Bonaire AREA 235 ha ALTITUDE 10–140 m HABITAT Rocky areas, inland wetland</p>	 <p>Yellow-shouldered Amazon</p>	<p>THREATENED BIRDS 1</p> <p>RESTRICTED-RANGE BIRDS 3</p> <p>BIOME-RESTRICTED BIRDS 2</p> <p>CONGREGATORY BIRDS 0</p>

Site description

Dos Pos IBA is in northern Bonaire, on the leeward (western) side of the island and immediately east of Goto Lake. It is south-east of Washington-Slagbaai National Park IBA (AN009) and is characterised by numerous small hills and sheltered valleys. Roi Sangu—a 100-m wide canyon with 25-m high cliffs—is within the eastern portion of the IBA. The area also embraces a former fruit plantation (mainly mangoes) and a small, ephemeral pond.

Birds

This IBA is significant for its population of the Vulnerable Yellow-shouldered Amazon *Amazona barbadensis*. In winter, c.40% of the island’s parrots roost (in three separate roosts) in the IBA. Roi Sangu is an important nesting area for the species. All three of the Netherlands Antilles secondary EBA restricted-range birds occur at this IBA, as do both the Northern South America biome-restricted bird species. Dos Pos IBA appears to be important for Neotropical migrant passerines, and the small pond supports some waterbirds (including the Near Threatened Caribbean Coot *Fulica caribaea*).

Other biodiversity

As one of the few freshwater sites of Bonaire, Dos Pos has received extensive natural history attention, and a recent study documented the butterfly fauna of the site. Several endemic lizards and land-snail species occur.

Conservation

Dos Pos is adjacent to the Washington-Slagbaai National Park but is itself unprotected. It is a mix of state and private ownership. Feral donkeys and high densities of goats have had a profound effect on the area’s habitat structure and composition. Their continued presence combined with an apparent increase of feral pigs is preventing natural regeneration of the flora. *Amazona barbadensis* is threatened by habitat loss and degradation, introduced mammalian predators including cats and rats and by poaching for the local pet trade. Although natural lands are being developed at an alarming rate on Bonaire, this area is not likely to be under immediate threat.

AN011 Washikemba–Fontein–Onima		Unprotected
<p>COORDINATES 12°14'N 68°17'W ADMIN REGION Bonaire AREA 5,960 ha ALTITUDE 0–45 m HABITAT Shrubland</p>	 <p>Least Tern</p>	<p>THREATENED BIRDS 2</p> <p>RESTRICTED-RANGE BIRDS 3</p> <p>BIOME-RESTRICTED BIRDS 2</p> <p>CONGREGATORY BIRDS ✓</p>

Site description

Washikemba–Fontein–Onima IBA is situated along the windward (north and east) coast of Bonaire, between the Washington-Slagbaai National Park IBA (AN009) in the north, and Lac Bay IBA (AN013) in the south-east. It extends inland to the escarpments from Washikemba in the south to Playa Grandi in the north, and includes the natural springs and cliffs of Fontein and the cliffs and intermittent ponds at Washikemba, Onima dam, and inland from Playa Grandi. There is very limited human settlement in this barren area but it does embrace a number of sites of cultural and historic significance with ancient inscriptions of Bonaire’s original (aboriginal) inhabitants. The vegetation is sparse, with cacti, small shrubs, *Euphorbia* species and low-growing salt-tolerant plants.

Birds

This IBA is important for the Vulnerable Yellow-shouldered Amazon *Amazona barbadensis* which breeds in the Onima–Fontein cliffs. Over 100 birds form a winter roost at Fontein. More than 240 Near Threatened Caribbean Coot *Fulica caribaea* occur and breed at reservoirs in Onima, Playa Grandi and Washikemba. The coast from Boca Onima to

Washikemba is regionally important for breeding Least Tern *Sterna antillarum*. All three Netherlands Antilles secondary EBA restricted-range birds occur at this IBA, as do the two Northern South America biome-restricted species.

Other biodiversity

The fauna of this area includes at least five endemic land-snails, two endemic lizards, and six endemic arthropods.

Conservation

This IBA is under a mix of private and state ownership, and none of it is currently protected. However, about half of the area is within regions recommended (in the 1999–2004 Bonaire Nature Management Plan) for status as “Island Park” or “Protected Landscape”. Ecological research, waterbird and freshwater fish surveys have been carried out (variously) by the CARMABI Foundation, Zoological Museum of Amsterdam and Jeff Wells. Threats to the area and its birds include: the continued illegal trapping of wild *A. barbadensis*; destructive foraging of free-ranging goats and donkeys; potential depredation by feral cats on nesting terns and shorebirds; and human disturbance of tern nesting colonies.

AN012 Klein Bonaire

COORDINATES 12°09'N 68°18'W
 ADMIN REGION Bonaire
 AREA 1,810 ha
 ALTITUDE 0–7 m
 HABITAT Coastline, shrubland



Marine Park/Ramsar Site

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

Site description

Klein Bonaire IBA is a low, coral-limestone island, situated c.1 km offshore from the central west coast of Bonaire, opposite Bonaire's capital Kralendijk. The island is dominated by low shrubby vegetation that has been severely impacted from a long history of the felling of trees and overgrazing by introduced goats. The island's shoreline includes three salinas (c.36 ha), five freshwater springs or wells, sandy beach areas and coral rubble strands with low shrubby vegetation. The island is uninhabited but has been used in the past for camping by residents, and as a quarantine facility (as evidenced by a ruin of a small building).

Birds

This IBA is significant for Caribbean Elaenia *Elaenia martinica*—a Netherlands Antilles secondary EBA restricted-range species—and the Bare-eyed Pigeon *Patagioenas corensis*—one of the two Northern South America biome species on the island. The breeding population of 100 Least Terns *Sterna antillarum* is regionally important. The terns and a number of shorebirds (especially plovers) nest along the shoreline and in the salinas. Ruby-topaz Hummingbird *Chrysolampis mosquitus* occurs at relatively high densities.

Other biodiversity

Klein Bonaire IBA is the most important sea-turtle nesting area in Bonaire, supporting good numbers of the Critically Endangered hawksbill *Eretmochelys imbricata* and the Endangered loggerhead *Caretta caretta* turtles. Bonaire endemics present on the island include three land-snails and one lizard. The island harbours the only major population of the Vulnerable kalabari tree *Zanthoxylum flavum*.

Conservation

Klein Bonaire is state-owned, and is protected (along with its surrounding reef) within the Bonaire National Marine Park. The island is also a designated Ramsar site. The government has delegated management of the marine park to the non-profit organisation STINAPA Bonaire (that also manages the Washington-Slagbaai National Park IBA, AN009). Goats were eradicated in the 1980s. Further assessment is required to determine if rats and mice still occur, but feral cats were confirmed as present in 2006. Predation of nests and eggs by cats (and possibly rats and mice) is likely the greatest threat to the nesting terns. Disturbance from occasional visitors may also be a problem. Biological inventories and some rare plant reintroduction work have been carried out by the CARMABI Foundation. The most recent bird survey was in 2006.

AN013 Lac Bay

COORDINATES 12°06'N 68°14'W
 ADMIN REGION Bonaire
 AREA 2,075 ha
 ALTITUDE 0–10 m
 HABITAT Coastline, sea, mangrove



Ramsar Site/Marine Park

THREATENED BIRDS 1
 RESTRICTED-RANGE BIRDS 2
 BIOME-RESTRICTED BIRDS 2
 CONGREGATORY BIRDS

Site description

Lac Bay IBA is on the south-east side of Bonaire and comprises a shallow bay (with sea-grass beds) protected from the open ocean by a fringing reef at its mouth. The island's only significant mangrove woodland (c.100 ha) is within the IBA. On the north side of the bay are large expanses of saltflats and small salinas. A small resort and two windsurfing centres are located on the south side and a small harbour for fishing vessels (that fish outside of the bay) and associated buildings (including a restaurant) are on the northern side of the bay mouth. Scattered farms and homes abut the edge of the IBA in its north-west corner.

Birds

This IBA is significant as a (sporadic) roost site for c.100 Vulnerable Yellow-shouldered Amazon *Amazona barbadensis*. Also, two (of the 3) Netherlands Antilles secondary EBA restricted-range birds occur at this IBA, as do both of Bonaire's Northern South America biome-restricted species. Numbers of Caribbean Flamingo *Phoenicopterus ruber* occasionally exceed 200, and the IBA supports good numbers of breeding and wintering shorebirds, breeding herons, breeding Least Terns *Sterna antillarum*, and a roost (historically over 100) of Magnificent Frigatebird *Fregata magnificens*.

Other biodiversity

Lac Bay lagoon is important as nursery habitat for reef fishes and queen conch *Strombus gigas*, and contains sea-grass beds used by globally threatened sea-turtles.

Conservation

Lac Bay IBA is state owned. The marine environment is protected (activities in the area, and use of natural resources are regulated) within the Bonaire National Marine Park. Lac Bay is also a Ramsar site and has been proposed for national park designation. A multi-year management and education program for Lac Bay was undertaken by STINAPA and the Marine Park (with funding from WWF Netherlands). The bay has become popular for a variety of recreational water-sports (jet-skis and kite-surfing are banned) which may cause disturbance of foraging flamingos and other birds. There are also naturalist-guided kayak trips among the mangroves. However, the greatest potential threats are probably from pollution and increased nutrient loading, and also sedimentation from adjacent development-related land clearing. The roost sites for *A. barbadensis* should be mapped and protected from clearance/cutting.

AN014 Pekelmeer Saltworks

COORDINATES 12°03'N 68°18'W

ADMIN REGION Bonaire

AREA 6,850 ha

ALTITUDE 0–10 m

HABITAT Coastline, shrubland, saline lagoons



Caribbean Flamingo



Flamingo Breeding Reserve/Ramsar Site

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

Site description

Pekelmeer Saltworks IBA is the flat, low-elevation southern end of the island. It was once a series of natural shallow lagoons, but these have been modified over hundreds of years for salt production. Since the 1950s the area has been further modified for large-scale industrial salt production, with water levels tightly controlled within a series of condenser lagoons for maximum salt production. Most of the area (over 90%) is under active management for salt production. Low bushes (mostly buttonwood *Conocarpus erecta*) grow along the shores of some of the lagoons but the area is largely open. Lac Bay IBA (AN013) lies on the south-east coast, just to the north of Pekelmeer.

Birds

This IBA is globally significant for Caribbean Flamingos *Phoenicopterus ruber*—numbers fluctuate between 1,500 and 7,000 (most often c.5,000) individuals, with a maximum of 1,300 pairs nesting in 1996. The IBA is also an important nesting area for terns, including: 60 Common Terns *Sterna hirundo* breed (globally important); 340 Sandwich Tern *S. sandvicensis* (regionally important); 170+ Royal Tern *Sterna maxima* (regionally important); and 582 Least Tern *Sterna antillarum* (regionally important). Hundreds (and sometimes thousands) of migratory and wintering shorebirds

use the site, as do numerous herons. The Northern South America biome-restricted Bare-eyed Pigeon *Patagioenas corensis* occurs.

Other biodiversity

No threatened or endemic species have been recorded although there are numerous studies documenting various aspects of the area's biodiversity, such as arthropods, lizards, land-snails and euryhaline fishes.

Conservation

Much or most of the IBA is government owned but is leased to the commercial salt works company. However, a 55-ha area (including an island) has been set-aside since 1969 as a Flamingo Breeding Reserve, which is where most of the birds nest. Pekelmeer (and the flamingo reserve) are designated as a Ramsar site. A section along the south-west side has been proposed as a "Strict Reserve" and the remainder (excluding the crystalliser basins on the western side) as an "Island Park" in the 1999–2004 Bonaire Nature Management Plan. The CARMABI Foundation has carried out research within the IBA. The bird populations within the IBA co-exist with the industrial activities of the salt production area. While there may be some disturbance to the birds, the character and extent of any disturbance has not been assessed.

CURAÇAO

LAND AREA 444 km² ALTITUDE 0–375 m
HUMAN POPULATION 138,000 CAPITAL Willemstad
IMPORTANT BIRD AREAS 5, totalling 163 km²
IMPORTANT BIRD AREA PROTECTION 86%
BIRD SPECIES 215
THREATENED BIRDS 1 RESTRICTED-RANGE BIRDS 1 BIOME-RESTRICTED BIRDS 1



ADOLPHE DEBROT (CARMABI FOUNDATION) AND
JEFF WELLS (BOREAL SONGBIRD INITIATIVE)



Mount Christoffel, the highest point in Curaçao. (PHOTO: JEFF WELLS)

INTRODUCTION

Curaçao, which is politically part of the Kingdom of the Netherlands¹, is one of the three Netherlands Antillean islands (Aruba, Bonaire and Curaçao) that lie off the north-west coast of Venezuela. Curaçao is the middle one of the three islands (c.80 km east of Aruba, and 50 km west of Bonaire), and lies c.70 km off the coast of mainland Venezuela. It is the largest of the three “Leeward” Netherlands Antillean islands and c.56 km long by 4–10 km wide. The island consists of a basaltic centre of volcanic origin, rimmed in the coastal zones by marine limestone terraces. The landscape is rugged and rocky with prominent cliffs. Christoffelberg, at the north-west end of the island, is the highest point in Curaçao. The island has a dry, windy climate with an annual average rainfall of c.550 mm. The resultant vegetation comprises xeric shrubland characterised by columnar cacti. Curaçao possesses several semi-enclosed inland bays, which are densely fringed by

mangroves. There are also several enclosed shallow, hypersaline lagoons that are important for waterbirds, as are the numerous man-made freshwater catchment dams, some of which retain significant amounts of fresh water well into the dry season. The island is surrounded by coral reefs and a variety of rocky, sandy or rubble shores.

Curaçao has the largest human population of the Leeward Netherlands Antilles, and about 30% of the island has been occupied by housing and industry. In bygone eras, the vegetation of the island was heavily impacted by agricultural activities such as the cultivation of seasonal crops, charcoal production and livestock grazing. However, traditional agricultural activities have all but ceased due to economic factors, rampant theft of livestock and produce, and an increase in speculative private land ownership. As a consequence, dense secondary woodlands are gradually recuperating from the impacts of man and beast, and are not uncommon, especially on the western half of the island.

Conservation

In Curaçao about 30% of the island surface area has been legally designated as conservation habitat since 1997 by means of a land-use ordinance, the Curaçao Island Development Plan. Environmental policy and implementation is overseen

¹ At some point in the near future the “Netherlands Antilles” will be dissolved. St Maarten and Curaçao will become separate countries within the Kingdom of the Netherlands (similar to the status currently enjoyed by Aruba). The islands of Bonaire, Saba and St Eustatius will be linked directly to the Netherlands as overseas territories.

by the Department of Environment and Nature (Ministry of Public Health and Social Development), the Curaçao Urban Planning and Public Housing Service, the Curaçao Environmental Service, and the Curaçao Agricultural and Fishery Service. However, the CARMABI Foundation is the island's park service and formally manages nine conservation areas distributed around the island amounting to c.3,000 ha of terrestrial and lagoonal habitat (primarily within North-east Curaçao parks and coastal IBA, AN015) and 600 ha of coral reefs (in the Curaçao Underwater Park on the leeward side of the island). The 2001 draft nature management plan for Curaçao identifies the need to update and expand all island level protective legislation. However, the plan still awaits ratification by the island council. Government funding for environmental protection and management remains sparse and often non-structural in spite of the recognised importance of the environment to sustainable tourism. In 2006, funding to the island park service (CARMABI Foundation) was cut by 70%. Limited institutional capacity due to insufficient funding has been identified as a key bottleneck to environmental management and conservation in the Netherlands Antilles.

Since 1988 when *Defensa Ambiental* (Environmental Defense) was founded, the local environmental NGO movement has grown significantly. A number of organisations are currently active, including *Amigu di Tera* (Friends of the Earth), *Reef Care and Kids for Corals* (with a focus on coral reefs), *Uniek Curaçao* (focusing on awareness and guided tours), *Korsou Limpi i Bunita* (clean ups), and the *Stichting Dierenbescherming* (animal cruelty and welfare). All of these organisations contribute to general environmental awareness, but none have a significant focus on the island's avifauna. The CARMABI Foundation is the only organisation that has conducted or supported (albeit intermittent) studies on priority birds, and organised birding excursions and workshops.

At present, urbanisation through real estate and tourist development, coastal development and disturbance (especially due to tourist-oriented recreational activity) are the principal threats to remaining habitat areas on Curaçao. These factors pose a major threat to the future integrity of the legally designated conservation areas, and the resultant habitat fragmentation (and disturbance) threatens a number of sensitive species such as nesting terns (*Sterna* spp.), Scaly-naped Pigeon *Patagioenas squamosa*, Curaçao Barn Owl *Tyto alba bargei* and White-tailed Hawk *Buteo albicaudatus*. An

antiquated ordinance dating from 1926 provides limited legal protection to some native bird species (including some terns), but enforcement remains totally lacking.

■ Birds

Of the 215 species of bird that have been recorded from Curaçao only 57 are resident (current or former) breeding species, the vast majority being migrants, winterers, and occasional vagrants. Most of the migrants are Neotropical migrants (especially warblers) from breeding grounds in North America, although many are vagrants (recorded on average less than once a year). Little is known about the significance of the island habitats to these migrant birds. The rainy season usually begins (September–October) just in time to yield peak insect swarms for migrants such as swallows and warblers. A small number of Curaçao's species are of South American origin, representing either dispersing individuals or austral migrants overshooting their northern South American wintering grounds having originated from breeding grounds further south or west.

As with Aruba and Bonaire, due to the proximity of the islands to the mainland of South America and the general mobility of birds, there are no island endemic bird species. Nevertheless, the islands have been sufficiently separated from other sources of interbreeding such that at least 16 subspecies have been described from Aruba, Bonaire and Curaçao. Eleven of these species breed on Curaçao, and two are totally restricted to the island, namely the Brown-throated Parakeet *Aratinga pertinax pertinax* and the Barn Owl *Tyto alba bargei*. A subspecies of Grasshopper Sparrow *Ammodramus savannarum caribaeus* found only on Curaçao and Bonaire appears vocally distinct from other North American and Caribbean forms. Similarly, vocalisations of White-tailed Nightjar *Caprimulgus cayennensis insularis* from Curaçao and Bonaire are distinct from mainland forms, but further taxonomic research is needed on all of these subspecies. Curaçao's resident avifauna is a rather unique, with species of West Indian origin mixed with those of South American origin. This is demonstrated by the presence of a Northern South America biome-restricted bird, the Bare-eyed Pigeon *Patagioenas corensis* as well as a number of more wide ranging South American species. Caribbean Elaenia *Elaenia martinica*, the only restricted-range bird on the island (part of the Netherlands Antilles secondary Endemic Bird Area), is one of the West Indian birds found on the island.

Klein Curaçao IBA, globally significant for nesting Least Terns. (PHOTO: ADOLPHE DEBROT)





Jan Thiel Lagoon IBA. (PHOTO: ADOLPHE DEBROT)

All of the IBAs have urgent management requirements if the populations of the birds for which they are internationally important are to thrive. However, securing disturbance free zones around the tern nesting colonies appears to be one of the greatest needs. If implemented effectively, the tern populations would increase dramatically (as seen at the protected colonies on Aruba) and perhaps some of the 1,200 pairs of “Cayenne” Tern *S. sandvicensis eurygnatha* that used to breed (pre-1962) at Jan Thiel Lagoon IBA might return.

Monitoring the populations of the terns and waterbirds should be used for the assessment of state, pressure and response variables at each of Curaçao’s IBAs in order to provide an objective status assessment as well as to highlight management interventions that might be required to maintain these internationally important biodiversity sites.

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AN015 North-east Curaçao parks and coast		National Park/Protected Conservation Area	
<p>COORDINATES 12°21'N 69°06'W ADMIN REGION Curaçao AREA 13,555 ha ALTITUDE 0–375 m HABITAT Coast, sea, inland wetland, woodland, mangrove</p>	  <p>Least Tern</p>	<p>THREATENED BIRDS 0</p> <p>RESTRICTED-RANGE BIRDS 1</p> <p>BIOME-RESTRICTED BIRDS 1</p> <p>CONGREGATORY BIRDS ✓</p>	

Site description

North-east Curaçao parks and coastal IBA extends along coast from Westpunt and Noordpunt at the northern end of island around the northern tip and east along coast through Playa Grandi and ending near Hato airport. At the northern end of the island it extends inland from the 100-ha coastal Shete Boka National Park to include the 2,000-ha Christoffel National Park. The area comprises coastal limestone terraces and inland hills supporting evergreen woodland, coastal lagoons with sea grass beds and mangroves, and dry deciduous shrubland on volcanic soils. Christoffel National Park supports one of largest contiguous blocks of shrubland remaining on island.

Birds

This IBA is regionally significant for its breeding colony of 500+ Least Terns *Sterna antillarum*. There is a Brown Booby *Sula leucogaster* roosts of c.12 birds within the IBA, and just offshore are important feeding areas for this species and the terns. The Netherlands Antilles secondary EBA restricted-range Caribbean Elaenia *Elaenia martinica*, and the Northern South America biome-restricted Bare-eyed Pigeon *Patagioenas corensis* are both numerous. The shrubland is important for the endemic subspecies of Brown-throated Parakeet *Aratinga pertinax pertinax*. In total, 10 (of the 11) Leeward Netherlands


Antilles endemic subspecies of birds breed in this IBA which is also important for large numbers of Neotropical migrants.

Other biodiversity

The Shete Boka National Park is a nesting area for three globally threatened sea-turtle species. The Christoffel National Park supports c.50 rare plant species (that are found almost entirely within the park boundaries) and seven rare mammal species. The Hato area is home to c.55 Leeward Netherlands Antilles endemics or near-endemics.

Conservation

This IBA is largely state owned. The Shete Boka and Christoffel national parks are managed by the CARMABI Foundation, and the rest is legally designated as Protected Conservation Area but is unmanaged. Extensive research on all aspects of the ecology, biology and geology of this area has been carried out by CARMABI and visiting scientists. The tern colonies are threatened by disturbance from humans, and disturbance and predation from feral dogs and cats. Free-ranging goats have impacted the shrubland in Christoffel National Park, but eradication measures have led to a recovery in vegetation. Elsewhere, illegal livestock rearing is increasing, as is illegal dumping, and effective management is urgently needed.

AN016 Malpais–St Michiel		Unprotected	
<p>COORDINATES 12°09'N 68°59'W ADMIN REGION Curaçao AREA 1,100 ha ALTITUDE 0–105 m HABITAT Inland wetland, shrubland, salina</p>	  <p>Brown-throated Parakeet</p>	<p>THREATENED BIRDS 1</p> <p>RESTRICTED-RANGE BIRDS 1</p> <p>BIOME-RESTRICTED BIRDS 1</p> <p>CONGREGATORY BIRDS ✓</p>	

Site description

Malpais–St Michiel IBA is on the southern side of central Curaçao. It is an area of basalt rock over-capped by coralline limestone hills. Malpais is a former plantation, just north of St Michiel Bay. The IBA is diverse, including: two freshwater lakes (created by a dam) which retain at least some water during most dry seasons; a hyper-saline lagoon at St Michiel (on the south coast c.5 km north-west of Willemstad, lying inland from the coral reef-fringed bay); dry deciduous vegetation (on the volcanic soils); and a well developed *Coccoloba swartzii*–*Erithal fruticosa* woodland habitat on the limestone. The island’s increasingly large dumpsite is just north and upstream of the Malpais freshwater ponds.

Birds

This IBA is significant for the Near Threatened Caribbean Coot *Fulica caribaea* which breeds at Malpais (numbers regularly exceed 100). The shrubland is important for the Netherlands Antilles secondary EBA restricted-range Caribbean Elaenia *Elaenia martinica*, and the Northern South America biome-restricted Bare-eyed Pigeon *Patagioenas corensis* (up to 600 roost below Malpais dam, along with c.165 Brown-throated Parakeets *Aratinga pertinax*). The St Michiel lagoon supports a globally important population (15 pairs) of Common Tern *Sterna hirundo*, and is one of a network

of sites supporting Curaçao’s Caribbean Flamingos *Phoenicopterus ruber*.

Other biodiversity

The endemic freshwater fish *Poecilia vandepolli* is present in the lakes. Endemic land-snails are present, as are a number of endemic plant species. The IBA is floristically important.

Conservation

Malpais–St Michiel IBA is under mixed (private and state) ownership. The Malpais area is managed as part of a conservation area and has excellent well-signed and designated hiking trails which are maintained by the local conservation organisation Uniek Curaçao. The dumpsite (and pig farm) near the Malpais ponds pose a potential threat of wetland contamination. Uncontrolled recreational access by hikers (and dog walkers) is a threat to birds and other fauna. Poor maintenance of the dam may result in one of the two lakes drying out during prolonged dry seasons, significantly decreasing the area’s value for waterbirds and the endemic fish. The main threat at St Michiel is uncontrolled public access that disturbs the flamingos (the nesting terns are located on the less disturbed west side of the lagoon). The CARMABI Foundation and Zoological Museum of Amsterdam have carried out research in this IBA.

AN017 Muizenberg		Parkland
<p>COORDINATES 12°09'N 68°55'W ADMIN REGION Curaçao AREA 65 ha ALTITUDE 5–10 m HABITAT Artificial wetland, shrubland</p>		 <p>Caribbean Coot</p>
		<p>THREATENED BIRDS <input checked="" type="checkbox"/></p> <p>RESTRICTED-RANGE BIRDS <input type="checkbox"/></p> <p>BIOME-RESTRICTED BIRDS <input type="checkbox"/></p> <p>CONGREGATORY BIRDS <input checked="" type="checkbox"/></p>

Site description

Muizenberg IBA comprises an intermittent shallow lake/wetland in the northern suburbs of Willemstad, central Curaçao. The wetland has been created by the damming of a stream that drains the surrounding low hills. It is bounded on all sides by busy roads (on the west side the roads abut the wetland). On the north-east side the area is flanked by agricultural lands with small farms. The wetland typically retains some water for more than six months each year (and in wetter years water can be present year-round). Periodically inundated grassland and shrubland surround the wetland. A separate small pond (Kaya Fortuna) is situated 200 m west of Muizenberg.

Birds

This IBA is significant for its population of Near Threatened Caribbean Coot *Fulica caribaea*. The species is a resident breeder, with congregations of up to 800 birds during the wet season.

Caribbean Flamingos *Phoenicopterus ruber* occasionally feed in the wetlands, with flocks of up to 170 birds recorded. Many other waterbirds (both residents and migrants) are supported within this IBA.

Other biodiversity

The endemic freshwater fish *Poecilia vandepolli* is present in this wetland.

Conservation

Muizenberg IBA is state owned and legally designated as protected parkland, although it is not being actively managed. Although it is one of Curaçao’s two most important and rare freshwater areas, no biological conservation or research projects are known to have been implemented at the site apart from the Zoological Museum of Amsterdam’s 2006 inventory of waterbirds and freshwater fish. The IBA is threatened by the unregulated dumping of garbage, pollution, drainage of surrounding wetlands and recreational disturbance.

AN018 Jan Theil Lagoon		Conservation Area
<p>COORDINATES 12°05'N 68°53'W ADMIN REGION Curaçao AREA 430 ha ALTITUDE 0–25 m HABITAT Inland wetland, shrubland, woodland</p>		 <p>Caribbean Flamingo</p>
		<p>THREATENED BIRDS <input type="checkbox"/></p> <p>RESTRICTED-RANGE BIRDS <input type="checkbox"/></p> <p>BIOME-RESTRICTED BIRDS <input type="checkbox"/></p> <p>CONGREGATORY BIRDS <input checked="" type="checkbox"/></p>

Site description

Jan Thiel Lagoon IBA is on the south coast of southern Curaçao, east of Willemstad. The site comprises 80 ha of hyper-saline lagoons (with islands) surrounded by c.228 hectares of dry deciduous woodlands and (on the limestone) evergreen shrubland. The vegetation near the margins of the lagoon is characterised by water and salt-tolerant tree species. There is also one spring and several abandoned dams within the IBA which support fresh water during the rainy season, significantly increasing the diversity of habitats. Hotels and resorts surround the lagoon.

Birds

This IBA’s population of Common Tern *Sterna hirundo* (75 pairs) is globally significant, while the fluctuating population of 10–60 pairs of Least Tern *S. antillarum* is regionally so. Up to 1,200 pairs of Sandwich Tern *S. sandvicensis* used to breed (pre-1962) but disturbance has reduced numbers to insignificant levels. The lagoon is an important foraging area for the 200–300 Caribbean Flamingo *Phoenicopterus ruber* that occur on the island. The IBA is also important for migratory shorebirds, other migrants, and for resident populations of at least 10 (of the 11) Leeward Dutch Antilles endemic subspecies of birds that breed on Curaçao.

Other biodiversity

Reptiles and land snails endemic to the Leeward Dutch Antilles are well represented in the IBA. Plants include the extremely rare *Vitex cymosa*—known from less than 10 trees on the island, and rare evergreen species such as *Croton niveus*, *Maytenus tetragona*, *Schoepfia schreberi* and *Adelia ricinella*.

Conservation

Jan Thiel Lagoon is a part state- and part privately-owned conservation area. A management plan developed by the CARMABI Foundation has been approved by the government, but implementation has not been financed. Uncontrolled public recreational access has resulted in a c.90% reduction of breeding terns. With adequate protection, tern (and flamingo) abundance will certainly recover. In 1999, the government proposed to build a road through the conservation area, but the plans were successfully contested in court (by the local environmental group Defensa Ambiental). An abandoned, unsealed landfill bordering the lagoon is an unquantified threat.

AN019 Klein Curaçao

COORDINATES 11°59'N 68°39'W
ADMIN REGION Curaçao
AREA 1,130 ha
ALTITUDE 0–3 m
HABITAT Sea, shrubland

**Unprotected**

THREATENED BIRDS

RESTRICTED-RANGE BIRDS

BIOME-RESTRICTED BIRDS

CONGREGATORY BIRDS

1

**Site description**

Klein Curaçao IBA is a small (c.170 ha), flat, offshore reef island about 10 km south-east of the south-easternmost point of Curaçao. The island was originally well-vegetated but was extensively mined for phosphate in the late nineteenth and early twentieth centuries and overgrazed by livestock since the 1800s. As a consequence, the island has been devoid of all trees and bushes for more than 100 years. Up until 2000 the vegetation consisted of a few small herbs and grasses but since a highly successful restoration project, the native flora has grown and landscape changes are taking place rapidly.

Birds

This IBA is significant for its breeding population of Least Tern *Sterna antillarum*, 286 of which nested in 2002, making this globally important. Historically, far greater numbers of terns bred at this IBA. Bare-eyed Pigeon *Patagioenas corensis*—the only Northern South America biome-restricted species occurring in Curaçao—has been recorded on this island. House Sparrow *Passer domesticus* colonised in the 1990s.

Other biodiversity

Klein Curaçao is the most important sea turtle nesting beach

within Curaçao's jurisdiction, with Endangered loggerhead *Caretta caretta* and green *Chelonia mydas*, and Critically Endangered hawksbill *Eretmochelys imbricata* turtles nesting. The island was historically important for the now extinct Caribbean monk seal *Monachus tropicalis*. The island is surrounded by a luxuriant reef system.

Conservation

The island is state owned, legally designated as “open land”, and thus has no protected status (in spite of requests for such by the CARMABI Foundation). Feral goats were eradicated from the island in 1996 by the Curaçao Agriculture and Animal Husbandry and Fishery Service. Feral cats were eliminated by CARMABI in 2004. These two successful eradications have paved the way for ecological recovery which has been assisted (since 2000) by CARMABI through the planting of drought and salt resistant native trees, shrubs, herbs and grasses. These plants are now spreading naturally over the island. Based on the vegetation recovery attained, the first native land bird (Bananaquit *Coereba flaveola*) was reintroduced from Curaçao in 2005 and has since been breeding. The island's main threat is now disturbance from uncontrolled recreational access by over 600 visitors per week (in 2006).

SABA

LAND AREA 13 km² ALTITUDE 0–887 m
HUMAN POPULATION 1,420 CAPITAL The Bottom
IMPORTANT BIRD AREAS 1, totalling 20 km²
IMPORTANT BIRD AREA PROTECTION 65%
BIRD SPECIES 87
THREATENED BIRDS 0 RESTRICTED-RANGE BIRDS 8



NATALIA COLLIER AND ADAM BROWN
(ENVIRONMENTAL PROTECTION IN THE CARIBBEAN)



Saba coastline at Spring Bay. (PHOTO: BERT DENNEMAN)

INTRODUCTION

Saba is small, round island in the northern Lesser Antilles. It is situated c.45 km south-west of St Maarten, and c.25 km north-west of St Eustatius, and together these three islands form the Windward Islands of the Netherlands Antilles¹. Saba is an extinct volcanic peak, rising steeply to 887 m at the top of Mount Scenery, and with a coastline dominated by agglomerate cliffs. Coral reefs surround most of the island. Saba's climate is generally dry, with an average of 1,000 mm of rain falling predominantly between August and November. Vegetation in the interior of the island comprises scrub and grassland which transitions to secondary rainforest and tree-fern brakes at mid elevations, and ultimately elfin woodland at the top of the mountain. There are no terrestrial wetlands on the island. Ecotourism is a significant part of Saba's economy: scuba-diving on the island's reefs and hiking up Mount Scenery are among the primary reasons for tourists to visit the island.

¹ At some point in the near future the "Netherlands Antilles" will be dissolved. St Maarten and Curaçao will become separate countries within the Kingdom of the Netherlands (similar to the status currently enjoyed by Aruba). The islands of Bonaire, Saba and St Eustatius will be linked directly to the Netherlands as overseas territories.

Conservation

The Netherlands Antilles have a draft Island Nature Protection Ordinance which must be approved by each island's government in order to facilitate the creation of island-specific conservation legislation. This process is ongoing within the Saba government, but at the present time there is no legislation in place for the designation of terrestrial protected areas or for the conservation of species. However, legislation does exist for marine areas and the 1,300-ha Saba National Marine Park was legally established in 1987. The park encompasses areas (including the seabed and overlying waters) from the high-tide mark to a depth of 60 m around the entire island. The park is administered by the NGO Saba Conservation Foundation, and is one of the few self-sustaining marine parks anywhere in the world, with revenue raised through visitor fees, souvenir sales, and donations.

No terrestrial areas on Saba are legally protected. However, there is *de facto* (and government-recognised) conservation management at a number of sites. The Saba Conservation Foundation, by way of a donation from the Thissell family, owns 35 ha of land on the north side of the island at the former sulphur mine, and manages this as a park. The island government provides an in-kind subsidy to support the management of this area, as well as for the Saba



Seabird signage along one of the trails managed by the Saba Conservation Foundation. (PHOTO: BERT DENNEMAN)



Red-billed Tropicbird. (PHOTO: BRENDA AND DUNCAN KIRKBY)

Conservation Foundation’s other responsibility, namely the maintenance and repair of the public hiking trail system. A management plan has been prepared for “Thissell Park” and legislation to formally designate the area as a National Land Park will be submitted to the island government as soon as the Island Nature Protection Ordinance has been prepared. The “Elfin Forest reserve” is an 8.6 ha plot of montane cloud-forest at the top of Mount Scenery that the island government intends to claim title to by prescriptive rights, and in due course designate as a National Land Park (also to be managed by the Saba Conservation Foundation).

Other than the management of areas outlined above, conservation actions on Saba have included a feral cat sterilisation program (that has sterilised at least 200 cats), and a government sponsored rodent control program (active in localised areas). However, it is not clear if either of these efforts is having a positive conservation impact. A multi-year Red-billed Tropicbird *Phaethon aethereus* nest productivity and site/mate fidelity study at a colony near the Fort Bay landfill was undertaken by Martha Walsh McGehee of the NGO Island Conservation Effort (which is no longer active on Saba). Environmental Protection in the Caribbean (EPIC) has continued checks of the tropicbird study area when possible, and has also conducted searches for Audubon’s Shearwater *Puffinus lherminieri*. Ethan Temeles (Amherst College, USA) has recently studied the Purple-throated Carib *Eulampis jugularis* and its *Heliconia*-based diet.

The primary threats to Saba’s birds, particularly the burrow-nesting seabirds, are alien invasive species. Evidence of rats has been found in areas reported to be shearwater nesting sites, and feral cats are also a serious concern. Goats roam freely, trampling nests and possibly consuming unattended eggs, as well as impacting the vegetation through uncontrolled grazing. Current eradication efforts are too limited to reduce the populations of these invasive animals. However, the Exotic Species Ordinance and Ordinance on the Identification and Registration of Livestock and Domestic Animals represent positive legislative efforts to recognise and control these threats.

■ Birds

Of the 87 species of bird recorded from Saba, just 26 breed, and 36 are regular Neotropical migratory birds (although Saba is too small to hold significant populations of these migrants). Eight (of the 38) Lesser Antilles EBA restricted-range birds occur on the island, although none of these is endemic to Saba. A ninth restricted-range species, the Antillean Euphonia *Euphonia musica* has not been recorded on the island since

Table 1. Key bird species at the Important Bird Area in Saba.

Key bird species	Criteria	National population	Saba IBA AN006	
			Criteria	
Audubon’s Shearwater <i>Puffinus lherminieri</i>	■	1,000	■	1,000
Red-billed Tropicbird <i>Phaethon aethereus</i>	■	2,250–3,000	■	2,250–3,000
Bridled Quail-dove <i>Geotrygon mystacea</i>	■		■	✓
Purple-throated Carib <i>Eulampis jugularis</i>	■		■	✓
Green-throated Carib <i>Eulampis holosericeus</i>	■		■	✓
Antillean Crested Hummingbird <i>Orthorhyncus cristatus</i>	■		■	✓
Caribbean Elaenia <i>Elaenia martinica</i>	■		■	✓
Scaly-breasted Thrasher <i>Margarops fuscus</i>	■		■	✓
Lesser Antillean Bullfinch <i>Loxigilla noctis</i>	■		■	✓

All population figures = numbers of individuals.
Restricted-range birds ■. Congregatory birds ■.

1952 and is probably extirpated. The Bridled Quail-dove *Geotrygon mystacea* may also be heading for extinction on the island, having declined dramatically over the last 10 years as a result of hurricane impacts and predation.

It is for the breeding seabirds—Red-billed Tropicbird *Phaethon aethereus* and Audubon’s Shearwater *Puffinus lherminieri*—that Saba is most noted (see Table 1 for national population estimates). *Puffinus lherminieri* is the national bird of Saba and is familiar to residents across the island, although predation from rats and cats could be significantly impacting the population (as it could be with the population of *Phaethon aethereus*). Assessing the population of the shearwater on the island is difficult due to the extent of breeding habitat, the lack of an obvious peak breeding season (birds are known to be present between at least December and May) and the nature of the terrain (e.g. steep dirt “cliffs” that are unsuitable for rope work). The use of monitoring technology, such as autonomous audio recorders, may provide more consistent and unbiased data than nest searches or the call/playback method.

IMPORTANT BIRD AREAS

The Saba coastline IBA (AN006)—the island’s site priority for bird conservation—has been identified on the basis of nine key bird species (listed in Table 1) that variously trigger the IBA criteria. The IBA covers 2,000 ha of critical terrestrial and marine habitats that support the entire island’s population of breeding seabirds, and also the full complement of the restricted-range birds that still occur on the island. The lack of any legal protection for terrestrial areas is a concern that must be addressed to facilitate pro-active conservation of Saba’s terrestrial biodiversity (including breeding seabirds).

At present, it seems that the globally significant populations of Audubon’s Shearwater *P. lherminieri*, Red-billed Tropicbird *P. aethereus* and the restricted-range Bridled Quail-dove *G. mystacea* in the IBA are declining (or are at least limited) as a result of predation from cats and rats (exacerbated by trampling and grazing from goats). Saba is small enough that complete eradication of some invasive species may be feasible, given sufficient funding, time and local support. In anticipation of both formal protection of terrestrial habitats within the IBA, and a possible eradication program, there is an urgent need to determine the population of *P. lherminieri* and *G. mystacea*, and to continue monitoring the population of *P. aethereus*. Monitoring these populations within the IBA should be used to inform the assessment of state, pressure and response variables at each IBA in order to provide objective status assessments and inform management decisions (such as the necessity for invasive species control) that might be required to maintain this internationally important biodiversity site.



Rainforest Ravine at “Thissell Park”.
(PHOTO: BERT DENNEMAN)



Figure 1. Location of the Important Bird Area in Saba.

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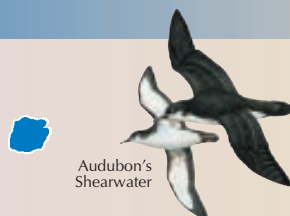
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AN006 Saba coastline

COORDINATES 17°38'N 63°14'W
 ADMIN REGION Saba
 AREA 2,000 ha
 ALTITUDE 0–887 m
 HABITAT Rocky areas, grassland, shrubland



Audubon's Shearwater

Marine Park/Unprotected

THREATENED BIRDS	
RESTRICTED-RANGE BIRDS	7
BIOME-RESTRICTED BIRDS	
CONGREGATORY BIRDS	<input checked="" type="checkbox"/>

■ Site description

Saba coastline IBA includes all land areas from the coast to 400 m inland around the perimeter of this small island, and all sea areas up to 1 km from the coast. It also includes the rainforest ravine at “Thissell Park” (site of a former sulphur mine) and the Elfin Forest reserve at the top of Mount Scenery. The coastline comprises rocky cliffs, 100-m high and over. The only human settlements along the coast are at Fort Bay, where a dock, several buildings, a rock quarry, and landfill exist.

■ Birds

This IBA is significant for all seven of the Lesser Antilles EBA restricted-range birds that occur in the vegetated ghauts, the rainforest ravine and elfin forest. However, it is the seabirds that best characterise this IBA. A population of 750–1,000 pairs of Red-billed Tropicbird *Phaethon aethereus* nest around the island in coastal cliffs and xeric, rocky hills. The nesting population of Audubon's Shearwater *Puffinus lherminieri* in the IBA is thought to be c.1,000 individuals although this is very hard to estimate with accuracy. “Thissell Park” is the only confirmed, current breeding site.

■ Other biodiversity

The Critically Endangered hawksbill *Eretmochelys imbricata* and Endangered green *Chelonia mydas* turtles occur, as does the Endangered red-bellied racer *Alsophis rufiventris* (endemic to Saba and St Eustatius). The island endemic lizard *Anolis sabanus* occurs, as does a restricted-range gecko *Sphaerodactylus sabanus*. The bat *Natalus stramineus stramineus* is endemic to Saba.

■ Conservation

This IBA is a mix of state and private ownership. A proposed National Land Park would encompass the 35-ha Saba Conservation Foundation-owned land at “Thissell Park”. It would also include the Elfin Forest reserve, but legislation is not yet in place to allow for legal protection of these terrestrial areas. Saba National Marine Park covers 1,300 ha of sea around the entire coast. Saba Conservation Foundation oversees the management of these areas. Free roaming goats cause erosion and trample seabird nesting burrows. Introduced predators (rats and cats) consume nest contents and attack fledged seabirds. A multi-year tropicbird study (by the NGO Island Conservation Effort) at a colony near the Fort Bay landfill recently concluded. EPIC has continued to monitor the study area when possible, and has also searched for nesting shearwaters.

ST EUSTATIUS

LAND AREA **21 km²** ALTITUDE **0–802 m**
HUMAN POPULATION **3,000** CAPITAL **Oranjestad**
IMPORTANT BIRD AREAS **2, totalling 14.86 km²**
IMPORTANT BIRD AREA PROTECTION **100%**
BIRD SPECIES **54**
THREATENED BIRDS **0** RESTRICTED-RANGE BIRDS **8**



NATALIA COLLIER AND ADAM BROWN
(ENVIRONMENTAL PROTECTION IN THE CARIBBEAN)



The Quill from Boven hill, with St Kitts in the distance. (PHOTO: NICOLE ESTEBAN)

INTRODUCTION

St Eustatius (or Statia) is a small, volcanic island in the northern Lesser Antilles. It is situated c.13 km north-west of St Kitts and Nevis and c.25 km south-east of Saba. Together with Saba and St Maarten (which is c.45 km to the north) these three islands form the Windward Islands of the Netherlands Antilles¹. Statia is saddle-shaped: the 602-m high Mount Mazinga (locally called “the Quill”) is a young volcano at the south-east end of the island, and a denuded, dormant volcano—the “Northern Hills” comprising Signal Hill, Little Mountain and Boven Mountain—is at the north-west end. Between these two volcanic formations is a low sloping plain (where the majority of the island’s population lives) with a sand beach on the north-east and a rocky beach on the south-east coasts. The remainder of the coastline is steep cliffs or xeric vegetated slopes. Coral reef surrounds much of the island. The interior vegetation of Statia is composed primarily of

thorn woodland and grassland, but secondary evergreen and elfin forest are found within the volcanic caldera of the Quill. There are no ponds or other terrestrial wetlands on Statia. The climate is generally dry with an average of 986 mm of rain falling predominately between August and November.

Conservation

The Statia government developed the National Nature Conservation Ordinance (based on the draft Netherlands Antilles Island Nature Protection Ordinance) during the mid-1990s which provided the legislative framework to designate protected areas and develop a national parks system. Three parks were designated in 1997–1998, the management authority for which was delegated to a local NGO, St Eustatius National Parks Foundation (STENAPA). The St Eustatius Marine Park encompasses 27.5 km² (including the seabed and overlying waters) from the high-tide mark to a depth of 30 m around the entire island, within which are no-take and no-anchor zones. Scuba-diving and mooring fees support the administration and management of the park. The major terrestrial park (the Netherlands Antilles first) is the Quill–Boven National Park which consists of two sub-sectors that equate to the terrestrial parts of the two Statia IBAs and cover 41% (865 ha) of Statia’s land area. The Quill is actively managed by STENAPA, but

¹ At some point in the near future the “Netherlands Antilles” will be dissolved. St Maarten and Curaçao will become separate countries within the Kingdom of the Netherlands (similar to the status currently enjoyed by Aruba). The islands of Bonaire, Saba and St Eustatius will be linked directly to the Netherlands as overseas territories.



Antillean Crested Hummingbird and Green-throated Carib—two of Statia’s restricted-range birds. (PHOTOS: BRENDA AND DUNCAN KIRKBY)

the Boven sub-sector, while legally protected is currently the subject of a land dispute and is unmanaged.

There is no direct bird conservation work underway in Statia although STENAPA has facilitated a number of repeat bird surveys since 2003. STENAPA is also sponsoring school educational programs (with a focus on marine ecosystems) that are increasing environmental awareness among the island’s youth.

Although historically a major point of trade prior to the 1800s, Statia is not currently under threat of major tourist developments, possibly due to its lack of calm, sandy beaches. However, other threats are having an impact on the island’s ecosystems. Severe overgrazing has resulted in large areas denuded of vegetation, and proper management and containment of livestock will be needed to reduce the resultant desertification. Enforcement of an animal registry program has begun and (at least within the Quill) should decrease grazing pressure. The island’s refuse landfill is within a coastal ravine, meaning that during storm surges and high winds this trash is dispersed across the coastal zone, possibly resulting in entanglement or consumption of debris by seabirds and other marine life. A sanitary refuse disposal site is urgently needed. Oiling of wildlife is a concern during spills from the oil transfer

station which needs to improve its oil spill monitoring and response efforts. Statia’s biodiversity is also at risk from introduced predators including dogs, cats, rats and mice.

■ Birds

Statia’s 54 recorded bird species comprise 26 breeding species and 28 Neotropical migrants (although Statia is so small it does not hold significant populations of these migrants). Eight (of the 38) Lesser Antilles EBA restricted-range birds occur on the island, although none of these is endemic to Statia. A ninth restricted-range species, the Scaly-breasted Thrasher *Margarops fuscus*, was seen at the Quill in 2003 having gone unrecorded for 76 years. Its status as a breeding species remains to be confirmed. Eurasian Collared-dove *Streptopelia decaocto* was recorded for the first time on the island in 2003.

A population of 100–200 Red-billed Tropicbirds *Phaethon aethereus* was estimated from part of the Boven IBA (AN007) in 2003, suggesting that the island breeding population may be higher. Small numbers of other seabirds including White-tailed Tropicbird *P. lepturus* (<20) and Brown Booby *Sula leucogaster* (c.10) have been recorded in the vicinity of “White Wall” within the Quill IBA (AN008). Audubon’s Shearwater *Puffinus lherminieri* was historically recorded on the island,

Red-billed Tropicbird.
(PHOTO: BRENDA AND DUNCAN KIRKBY)



Table 1. Key bird species at Important Bird Areas in St Eustatius.

Key bird species	Criteria	National population	St Eustatius IBAs	
			AN007	AN008
Red-billed Tropicbird <i>Phaethon aethereus</i>	■	100–200	150	
Bridled Quail-dove <i>Geotrygon mystacea</i>	■			✓
Purple-throated Carib <i>Eulampis jugularis</i>	■			✓
Green-throated Carib <i>Eulampis holosericeus</i>	■		✓	✓
Antillean Crested Hummingbird <i>Orthorhyncus cristatus</i>	■			✓
Caribbean Elaenia <i>Elaenia martinica</i>	■		✓	✓
Pearly-eyed Thrasher <i>Margarops fuscatus</i>	■		✓	✓
Brown Trembler <i>Cinlocerthia ruficauda</i>	■			✓
Lesser Antillean Bullfinch <i>Loxigilla noctis</i>	■		✓	✓

All population figures = numbers of individuals.
Restricted-range birds ■. Congregatory birds ■.

and one resident has reported still hearing them call at night, but no breeding has been confirmed.

IMPORTANT BIRD AREAS

Statia’s two IBAs—the island’s international priority sites for bird conservation—cover 41% of the island’s land area. Both IBAs are formally designated as protected areas—the terrestrial components are covered within the Quill–Boven National Park, and the marine component within the St Eustatius Marine Park. The IBAs have been identified on the basis of nine species that variously trigger the IBA criteria for restricted-range birds and congregatory birds. The Quill IBA (AN008) embraces the island’s forest-dependent species (the restricted-range species), while Boven IBA (AN007) supports nesting habitat for *P. aethereus*.

Resolving the land dispute within Boven IBA appears to be critical to enabling effective management of grazing and thus the successful recovery of vegetation within the park. It would also facilitate the potential control of goats, cats and rats that almost certainly represent limiting factors for the breeding population of *P. aethereus*. Enforcement of an animal

Boven IBA.
(PHOTO: NICOLE ESTEBAN)



registry program within the Quill IBA should decrease the incidence of grazing in the park, but both goats and chickens are often present around and within the volcano and presumably impact the native fauna. Surveys to assess the population of each of the IBA trigger species should be a priority. Such surveys should be combined with annual monitoring of state, pressure and response variables at each IBA to provide an objective status assessment and highlight management interventions that might be required to maintain these internationally important biodiversity sites.

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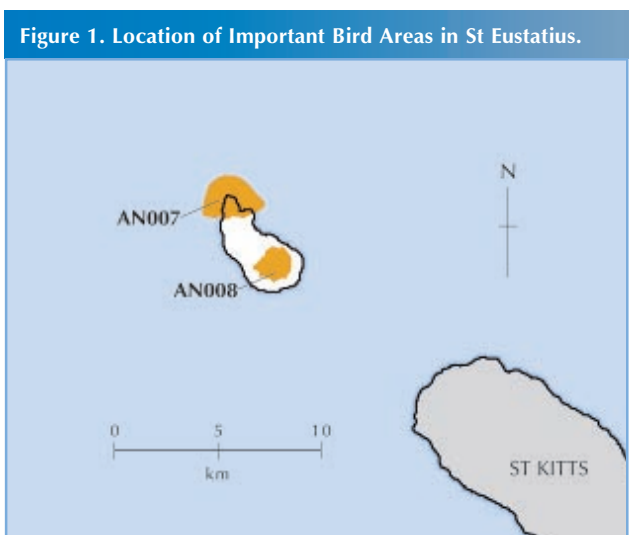
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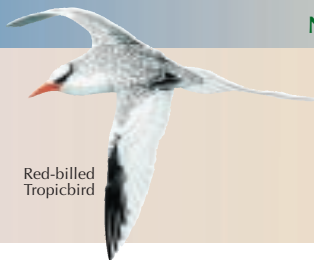
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The authors would like to thank Bert Denneman (Vogelbescherming Nederlands), Nicole Esteban (STENAPA) and Kalli de Meyer (Dutch Caribbean Nature Alliance) for their help in reviewing this chapter.



AN007 Boven	National Park/Marine Park								
<p>COORDINATES 17°31'N 63°00'W ADMIN REGION St Eustatius AREA 1,016 ha ALTITUDE 0–300 m HABITAT Cliff, rocky beach, shrubland, grassland</p>	  <p style="text-align: center; font-size: small;">Red-billed Tropicbird</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: right; font-size: x-small;">THREATENED BIRDS</td> <td style="background-color: #d9d9d9; width: 20px; height: 15px;"></td> </tr> <tr> <td style="text-align: right; font-size: x-small;">RESTRICTED-RANGE BIRDS</td> <td style="background-color: #0072bc; color: white; text-align: center; font-weight: bold;">4</td> </tr> <tr> <td style="text-align: right; font-size: x-small;">BIOME-RESTRICTED BIRDS</td> <td style="background-color: #d9d9d9; width: 20px; height: 15px;"></td> </tr> <tr> <td style="text-align: right; font-size: x-small;">CONGREGATORY BIRDS</td> <td style="background-color: #0072bc; color: white; text-align: center; font-weight: bold;">✓</td> </tr> </table>	THREATENED BIRDS		RESTRICTED-RANGE BIRDS	4	BIOME-RESTRICTED BIRDS		CONGREGATORY BIRDS	✓
THREATENED BIRDS									
RESTRICTED-RANGE BIRDS	4								
BIOME-RESTRICTED BIRDS									
CONGREGATORY BIRDS	✓								

Site description

Boven IBA is an area of xeric, uninhabited rocky hills in the north-west peninsula of St Eustatius that represents about 25% of the island’s land area. Boven, Venus, Gilboa Hill, Signal Hill and Bergje comprise the “Northern Hills”. These receive much less rainfall than the higher Quill IBA (AN008) resulting in a predominance of *Acacia* thorn scrublands and grassland. Rocky outcroppings are scattered through the hills. The coastline of Boven IBA is cliffs and rocky shore, from which this IBA extends 1 km out to sea. Zeelandia beach (and adjacent sandy cliffs) is at the south-east end of the area, and an oil transfer station is situated on the western border.

Birds

This IBA supports a globally significant population of Red-billed Tropicbird *Phaethon aethereus* and is important for four (of the 8) Lesser Antilles EBA restricted-range birds. *Phaethon aethereus* nest at Zeelandia beach and in the hills above the airport. Surveys in 2003 by Environmental Protection in the Caribbean (which did not cover all of the IBA due to access issues and limits on time) resulted in an estimate of 100–200 breeding individuals.

Other biodiversity

Restricted-range reptiles in the IBA include Lesser Antillean iguana *Iguana delicatissima* (Vulnerable), lizards *Ameiva erythrocephala*, *Anolis bimaculatus* and *A. watti*, and geckos *Sphaerodactylus sputator* and *S. sabanus*. The Near Threatened tree bat *Ardops nichollsi montserratensis* has a restricted range, and the endemic Statia morning glory *Ipomoea sphenophylla* can be found growing in the IBA.

Conservation

This mixed-ownership IBA is one sub-sector (525 ha) of the Quill–Boven National Park (the Netherlands Antilles’ first park). The NGO park service, STENAPA, is attempting to manage Boven and limit grazing, although these efforts have met with resistance due to ancestral (disputed) claims to the land. Grazing continues within the protected area although vegetation has recovered from previous periods of clearance for agriculture and cattle rearing. Recreational use of the area has been hampered due to the land disputes, and visitors are rare. *Phaethon aethereus* are threatened by introduced alien predators (rats and cats), trampling of nest burrows by goats, erosion due to overgrazing and potential oiling due to spills from oil transfer station. The St Eustatius Marine Park surrounds the island and includes the 491-ha extension of this IBA.

AN008 The Quill	National Park/Marine Park								
<p>COORDINATES 17°29'N 62°58'W ADMIN REGION St Eustatius AREA 470 ha ALTITUDE 0–601 m HABITAT Shrubland, forest</p>	  <p style="text-align: center; font-size: small;">Bridled Quail-dove</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: right; font-size: x-small;">THREATENED BIRDS</td> <td style="background-color: #d9d9d9; width: 20px; height: 15px;"></td> </tr> <tr> <td style="text-align: right; font-size: x-small;">RESTRICTED-RANGE BIRDS</td> <td style="background-color: #0072bc; color: white; text-align: center; font-weight: bold;">8</td> </tr> <tr> <td style="text-align: right; font-size: x-small;">BIOME-RESTRICTED BIRDS</td> <td style="background-color: #d9d9d9; width: 20px; height: 15px;"></td> </tr> <tr> <td style="text-align: right; font-size: x-small;">CONGREGATORY BIRDS</td> <td style="background-color: #d9d9d9; width: 20px; height: 15px;"></td> </tr> </table>	THREATENED BIRDS		RESTRICTED-RANGE BIRDS	8	BIOME-RESTRICTED BIRDS		CONGREGATORY BIRDS	
THREATENED BIRDS									
RESTRICTED-RANGE BIRDS	8								
BIOME-RESTRICTED BIRDS									
CONGREGATORY BIRDS									

Site description

The Quill IBA is a dormant volcano at the south-eastern end of St Eustatius. Rising to over 600 m—the highest point on the island—it dominates the landscape. The IBA follows the national park boundaries which include the volcanic cone above 250 m (vegetated with thorn scrub transitioning to semi-evergreen seasonal forest on the north-west slope), the crater (which supports evergreen seasonal forest), the rim of the volcano (a small portion of which supports elfin forest), and the “White Wall” (a limestone formation on the southern slope of the volcano that drops down to sea-level). The IBA extends 1 km out to sea. There are no human settlements within the IBA.

Birds

This IBA is significant for supporting populations of all eight Lesser Antilles EBA restricted-range birds found on the island. A Scaly-breasted Thrasher *Margarops fuscus* was observed at the Quill in 2003 for the first time since 1927 although its status as a breeding bird (and thus a potential ninth restricted-range species) is unknown. Seabirds breed on the coast at White Wall, but the numbers are not thought to be significant internationally.

Other biodiversity

The restricted-range Antillean iguana *Iguana delicatissima* (Vulnerable) and red-bellied racer *Alsophis rufiventris* (Endangered), and the island endemic Statia morning glory *Ipomoea sphenophylla* are present in the IBA.

Conservation

This state-owned IBA is one sub-sector (340 ha) of the Quill–Boven National Park (the Netherlands Antilles’ first park). STENAPA—the island’s NGO park service—oversees conservation management for the Quill. Hiking trails are well maintained by volunteers and staff, and botanical interests, such as the endemic Statia morning glory, are protected. Grazing by untended goats has been problematic in the past. However, enforcement of an animal registry program has begun and should decrease the incidence of grazing within the park. The only known recent avian survey of the Quill was conducted by Environmental Protection in the Caribbean in March 2003. However, access to the crater forest was restricted due to trail repairs. The St Eustatius Marine Park surrounds the island and includes the 130-ha marine extension of this IBA.

ST MAARTEN

LAND AREA 33 km² ALTITUDE 0–425 m
HUMAN POPULATION 39,000 CAPITAL Philipsburg
IMPORTANT BIRD AREAS 5, totalling 8.15 km²
IMPORTANT BIRD AREA PROTECTION 55%
BIRD SPECIES 164
THREATENED BIRDS 1 RESTRICTED-RANGE BIRDS 5



NATALIA COLLIER AND ADAM BROWN
(ENVIRONMENTAL PROTECTION IN THE CARIBBEAN)



Great Salt Pond and Fresh Pond in Philipsburg. (PHOTO: JAY HAVISER)

INTRODUCTION

The island of St Martin is situated just 8 km south of Anguilla (to UK) and 20 km west-north-west of St Barthelemy (to France). The northern, French half is called St Martin and is an overseas department of the French Republic. The southern, Dutch half is called St Maarten. St Maarten, Saba and St Eustatius together form the Windward Islands of the Netherlands Antilles¹. The Dutch and the French have shared the island—the smallest land mass in the world to be divided between two governments—for almost 350 years.

The centre of the island (across which the political boundary runs) is composed of a mountainous spine rising to 425 m. The coastal areas are a mixture of flat lands and low hills punctuated by numerous ponds, primarily of high salinity. Coastal shorelines are characterised by sand or rock beaches with cliffs in between. Simpson Bay Lagoon, one of the largest lagoons in the Lesser Antilles, is a dominant feature of the island and a

major yachting centre. The St Maarten side of the lagoon is extremely polluted and the shoreline almost completely developed. The terrestrial vegetation is thorny woodland, dominated by scrub in the lowlands and low forest in the mountains (with small patches of the original semi-evergreen forest on the highest ridges). Average annual rainfall is 1,770 mm, much of which arrives during the hurricane season in late summer and fall. St Maarten is densely populated, and the population increases greatly during the influx of seasonal visitors and tourists which form the base of the economy.

Conservation

Conservation in St Maarten sits within the framework of a number of “ordinances” that provide legislation to: prevent the destruction of valuable flora and fauna (although there is no associated list of species considered valuable); prohibit construction above 200 m; and establish marine protected areas. The government has drafted, but not yet approved, new nature protection legislation (the Marine Park Ordinance). The St Maarten Marine Park (managed by the Nature Foundation of St Maarten, but still not formally designated by government) surrounds the Dutch side of the island from the coastal waters and beaches to the 60-m depth contour. The park includes Pelikan Rock IBA (AN005) and three smaller islets.

¹ At some point in the near future the “Netherlands Antilles” will be dissolved. St Maarten and Curaçao will become separate countries within the Kingdom of the Netherlands (similar to the status currently enjoyed by Aruba). The islands of Bonaire, Saba and St Eustatius will be linked directly to the Netherlands as overseas territories.



Pelikan Rock.
(PHOTO: NATALIA COLLIER)

Environmental Protection in the Caribbean has conducted bird research and monitoring on the island (with a particular focus on wetlands and seabirds) for the past seven years. Research has included pond water quality testing. The Nature Foundation of St Maarten has implemented a program of planting mangroves at Little Bay Pond IBA (AN001) and Fresh Pond IBA (AN002). Awareness of environmental issues is on the increase due to the work of local organisations and the conspicuous loss of natural areas and wildlife. However, the conservation concerns of the general public have not yet translated into government action.

The primary threat within St Maarten is the development of land and ponds. St Maarten is a duty-free island and the “island area” is rapidly developing free of sufficient

environmental legislation. Ponds and lagoons are routinely filled in and altered (e.g. Great Salt Pond IBA—AN003—is being used for landfill and filled to create parking) while building takes place on steep hillsides. Development permits are issued without thorough environmental impact assessments, despite public outcry, and permit restrictions are difficult to impose. Without enforceable legislation, these destructive practices are likely to continue. Other threats include disturbance (which is significant due to the high concentration of residents and tourists) due to watercraft and introduced alien species. There is almost no control of exotic species introductions. Introduced predators include dogs, cats, rats, mice, raccoon *Procyon lotor*, mongoose *Herpestes auropunctatus* and green monkey *Chlorocebus sabaues*. Groups of monkeys have been observed in the higher mountainous areas and could expand to lower elevations (as has happened on St Kitts).

■ Birds

Of the 164 bird species recorded from St Maarten, 39 species are resident (and breed) on the island, although the majority of species are Neotropical migrants (or vagrants). Five (of the 38) Lesser Antilles EBA restricted-range birds occur in St Maarten, none of which is endemic to the country. Three other restricted-range species—Bridled Quail-dove *Geotrygon mystacea*, Purple-throated Carib *Eulampis jugularis* and Scaly-breasted Thrasher *Margarops fuscus*—are found in the montane forests on the St Martin side of the border and probably occur. The country is important for waterbirds (in spite of the severe alteration and destruction of wetland habitats), with 50 species recorded (18 of which breed). This is partly due to the presence of two low-salinity ponds which are unique within the region.

Little Bay Pond. (PHOTO: BEVERLY MAE NISBETH, NATURE FOUNDATION ST MAARTEN)



Table 1. Key bird species at Important Bird Areas in St Maarten.

Key bird species	Criteria	National population	St Maarten IBAs				
			AN001	AN002	AN003	AN004	AN005
Brown Pelican <i>Pelecanus occidentalis</i>	■	285	■	■	■	■	■
Caribbean Coot <i>Fulica caribaea</i>	NT ■	75		■			
Laughing Gull <i>Larus atricilla</i>	■	6,100			■		■
Royal Tern <i>Sterna maxima</i>	■	141					■
Green-throated Carib <i>Eulampis holosericeus</i>	■		✓	✓		✓	
Antillean Crested Hummingbird <i>Orthorhyncus cristatus</i>	■		✓	✓		✓	
Caribbean Elaenia <i>Elaenia martinica</i>	■		✓	✓		✓	
Pearly-eyed Thrasher <i>Margarops fuscatus</i>	■		✓	✓		✓	
Lesser Antillean Bullfinch <i>Loxigilla noctis</i>	■		✓	✓		✓	

All population figures = numbers of individuals.
Threatened birds: Near Threatened ■. Restricted-range birds ■. Congregatory birds ■.



Fort Amsterdam.
(PHOTO: BEVERLY MAE NISBETH, NATURE FOUNDATION ST MAARTEN)

Significant numbers of the Near Threatened Caribbean Coot *Fulica caribaea* breed at Fresh Pond IBA (AN002) and Little Bay Pond IBA (AN001) and sometimes hybridise with American Coot *F. americana*. Studies to determine nesting success, especially of *F. caribaea*, are needed to better understand the primary threats facing wetland species. Similarly, the Brown Pelican *Pelecanus occidentalis* colony at Fort Amsterdam IBA (AN004) should be studied further to determine the factors influencing fluctuations in the breeding population there. National population estimates for these waterbirds are given in Table 1.

IMPORTANT BIRD AREAS

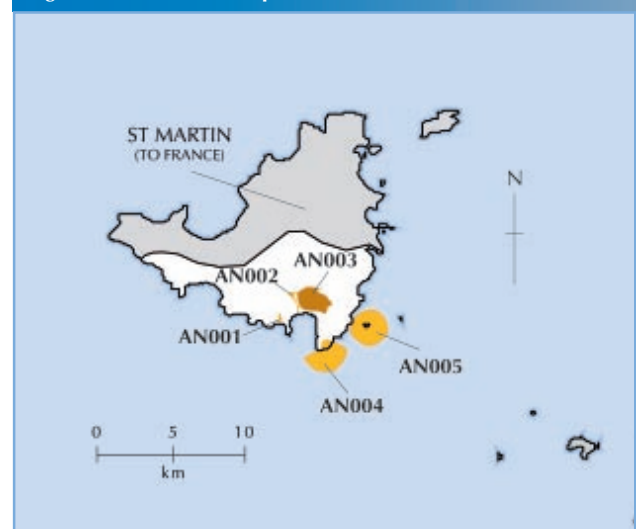
St Maarten's IBAs—the country's international site priorities for bird conservation—cover 815 ha (including marine areas), and about c.36% of the country's land area. Of the five IBAs, Pelikan Rock (AN005) is protected within the St Maarten Marine Park, and Fort Amsterdam (AN004) is protected as a historical site. The IBAs have been identified on the basis of eight key bird species (listed in Table 1) that variously trigger the IBA criteria. They are centred on wetland and marine sites being primarily significant for their populations four congregatory waterbird and seabird species (including the Near Threatened Caribbean Coot *Fulica caribaea*). However, shrublands in three IBAs support populations of the four restricted-range species known to occur in the country. With further targeted field research, three additional restricted-range birds that occur in the montane forest across the border in St Martin would be expected to be found in the semi-evergreen forest remnants on the St Maarten side. Such a discovery could warrant the identification of an additional IBA for these forest dependent species.

The wetland IBAs of Little Bay Pond, Fresh Pond and Great Salt Pond all face similar, multiple threats such as land reclamation for development, inappropriate development, use for landfill, pollution and contamination from runoff and sewage, inappropriate water management (e.g. maintaining water levels by pumping in sea water), alien invasive predators and disturbance. The Nature Foundation of St Maarten and Environmental Protection in the Caribbean (EPIC) have variously planted mangroves, constructed bird observation

towers and installed educational signage at Little Bay Pond and Fresh Pond IBAs, but it is clear that enforced legislation is critical if the biological integrity of these wetlands is to be maintained in the long term.

The protection afforded Fort Amsterdam (Historical Site) and Pelikan Rock (Marine Park) IBAs appears to be preventing site-based threats although factors outside of these areas are having negative impacts such as disturbance to the mainland pelican nesting colony from jet skis, dive boats, and parasail boats. Over-fishing, oil spills, and plastics entanglement are constant threats to the marine-based seabirds and waterbirds. The regular monitoring of the waterbirds at St Maarten's IBAs (e.g. as has been undertaken by EPIC) and the monitoring of the other key bird species should be used to inform the assessment of state, pressure and response variables at each IBA in order to provide objective status assessments and inform management decisions (should the necessary legislation be enacted) that might be required to maintain these internationally important biodiversity sites.

Figure 1. Location of Important Bird Areas in St Maarten.



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AN001 Little Bay Pond

COORDINATES 18°01'N 63°04'W

ADMIN REGION St Maarten

AREA 8 ha

ALTITUDE 0 m

HABITAT Inland wetland, mangrove, shrubland



Caribbean Coot



Unprotected

THREATENED BIRDS 1

RESTRICTED-RANGE BIRDS 5

BIOME-RESTRICTED BIRDS

CONGREGATORY BIRDS

Site description

Little Bay Pond IBA is near the capital city of Philipsburg, in the middle of the south coast of St Maarten. It is c.2.5 km in diameter and has low (4–8 parts per thousand) salinity. It is bordered by aquatic grasses and red, black, and white mangrove trees, with surrounding areas supporting shrubland. A busy road runs along one side of the pond, above which is a residential development. A new development is being built in the corner nearest Little Bay beach. The pond is encircled by a hiking path which connects to the sea at the rocky shore of Little Bay. A small outlet runs from the pond into the ocean.

Birds

This IBA is significant for its population of the Near Threatened Caribbean Coot *Fulica caribaea*. Up to 22 birds have been recorded and some pairs breed. A number of other waterbird species breed at the site. All five Lesser Antilles IBA restricted-range birds occur around Little Bay Pond.

Other biodiversity

Green iguanas *Iguana iguana* occur, but no threatened or endemic species have been recorded.

Conservation

Little Bay Pond IBA has no legal protection. It is owned by a foreign development corporation and is up for sale. Local opposition, inspired by the aesthetic and ecological value of the pond, has so far halted plans to turn the pond into a marina, but a new hotel and condominium development is being built next to Little Bay beach. The legality of owning this pond has been questioned as all ponds are supposed to be public land. Regular waterbird population counts have been conducted each winter (and during spring/summer 2004) since 2001 by Environmental Protection in the Caribbean (EPIC). The Nature Foundation of St Maarten planted mangrove trees at the site which have thrived. EPIC and the Nature Foundation, with funding from Royal Caribbean, constructed a bird observation tower and educational signage along the hiking path. Monthly educational mangrove/bird walks are held in winter. The water is high in nutrients from sewage outflow from surrounding areas, sometimes resulting in eutrophication and fish die-offs. Pollution runoff from adjacent roads is problematic. Predators such as cats, dogs, rats, and mongoose frequent the area.

AN002 Fresh Pond		Unprotected
<p>COORDINATES 18°02'N 63°04'W ADMIN REGION St Maarten AREA 14 ha ALTITUDE 0 m HABITAT Inland wetland, mangrove</p>	 <p>Caribbean Coot</p>	<p>THREATENED BIRDS 1</p> <p>RESTRICTED-RANGE BIRDS 5</p> <p>BIOME-RESTRICTED BIRDS</p> <p>CONGREGATORY BIRDS</p>

Site description

Fresh Pond IBA is within the capital city of Philipsburg and comprises a large pond (c.2.5 km by 1 km) just to the west of Great Salt Pond IBA (AN003). It is a low-salinity pond (2–3 parts per thousand) that is bordered by aquatic grasses and red mangrove trees. Artificial islands at each end of the pond are vegetated with mangroves and coconut trees and provide popular nesting sites for waterbirds. A busy bridge bisects the pond and heavy traffic and development encircle the area.

Birds

This IBA is significant for its population of Near Threatened Caribbean Coot *Fulica caribaea*. Over 50 coots have been recorded, and nesting does occur. All five Lesser Antilles EBA restricted-range birds occur. Fresh Pond IBA also supports populations of many waterbirds including 180+ Snowy Egret *Egretta thula*, Pied-billed Grebe *Podilymbus podiceps*, Great Egret *Casmerodius albus*, White-cheeked Pintail *Anas bahamensis* and Ruddy Duck *Oxyura jamaicensis*.

Other biodiversity

Green iguanas *Iguana iguana* occur, but no threatened or endemic species have been recorded.

Conservation

The open water of Fresh Pond is state-owned and “designated” public space. The surrounding land is privately owned and totally developed. Regular waterbird population counts have been conducted each winter (and during spring/summer 2004) since 2001 by Environmental Protection in the Caribbean (EPIC). The Nature Foundation of St Maarten planted mangrove trees at the site, which have thrived in the low-salinity, high-nutrient waters. EPIC and the Nature Foundation, with funding from Royal Caribbean, constructed a bird observation tower and educational signage. A sewage treatment plant on the shore of Fresh Pond causes concern regarding contamination. The water is high in nutrients from sewage outflow from surrounding areas, sometimes resulting in eutrophication and fish die-offs. Trash is prevalent among the shoreline vegetation. Pollution runoff from adjacent roads is problematic. Predators such as cats, dogs, rats, and mongoose frequent the area, and human disturbance is an issue at this urban location.

AN003 Great Salt Pond		Unprotected
<p>COORDINATES 18°02'N 63°03'W ADMIN REGION St Maarten AREA 188 ha ALTITUDE 0 m HABITAT Inland wetland</p>	 <p>Laughing Gull</p>	<p>THREATENED BIRDS</p> <p>RESTRICTED-RANGE BIRDS</p> <p>BIOME-RESTRICTED BIRDS</p> <p>CONGREGATORY BIRDS ✓</p>

Site description

Great Salt Pond IBA is in south-central St Maarten, on the outskirts of the capital Philipsburg. It is the largest pond on the island and is bordered on all sides by busy roads. Fresh Pond IBA (AN002) lies just to the west. Great Salt Pond is highly saline (27–38 parts per thousand) as a result of which there is little visible vegetation. The borders of the pond comprise roadside grass and urban development. The pond was previously used for salt extraction and remnant rock walls, which are now important roost and nesting areas, still remain. The pond’s primary use now is as landfill and land reclamation.

Birds

This IBA is significant for its population of Laughing Gull *Larus atricilla*. Up to 5,800 gulls congregate at the IBA prior to the breeding season. It is unclear if this congregation occurred historically or if the gulls now assemble to feed from the landfill. About 50 pairs of Black-necked Stilt *Himantopus mexicanus* breed—the only species confirmed to do so within the IBA.

Other biodiversity

Nothing recorded.

Conservation

The open water of Great Salt Pond is state owned and “designated” public space. However, the IBA faces multiple threats. Land “reclamation” is used to create parking areas, carnival grounds, and other facilities within the pond. Trash from the landfill located within the pond and from the town is blown into the pond. Fires at the landfill occur several times a year. Pollution leaching from the landfill has caused ecological collapse, resulting in massive midge infestations which have plagued Philipsburg each year since 2006. The government undertook an intensive six-week pesticide application program to alleviate the infestation. Water levels are artificially controlled using seawater, which has resulted in flooded nests and altered salinity levels. Regular waterbird population counts have been conducted each winter (and during spring/summer 2004) since 2001 by Environmental Protection in the Caribbean.

AN004 Fort Amsterdam		 <p>Brown Pelican</p>	Protected Historical Site
<p>COORDINATES 18°01'N 63°02'W ADMIN REGION St Maarten AREA 278 ha ALTITUDE 0–20 m HABITAT Shrubland</p>			<p>THREATENED BIRDS <input type="checkbox"/></p> <p>RESTRICTED-RANGE BIRDS 5</p> <p>BIOME-RESTRICTED BIRDS <input type="checkbox"/></p> <p>CONGREGATORY BIRDS <input checked="" type="checkbox"/></p>

Site description

Fort Amsterdam IBA is a 2.5-km long peninsula of land in south-east St Maarten. On the top of the peninsula are ruins of a fort (a registered historical site), the slopes below which support 2 m-high thorny *Acacia macracantha* and *A. tortuosa* shrubland. The bay on the east side of the peninsula is a major cruise ship port, and a tourist resort is situated just 500 m away to the north.

Birds

This IBA is significant for Brown Pelican *Pelecanus occidentalis*. The breeding population varies greatly between years, but up to 50 pairs breed on the western side of the point, with 10 pairs on the eastern side making this a regionally important colony. Birds nest as close as 10 m from the fort ruins. All five Lesser Antilles EBA restricted-range birds occur at this IBA.

Other biodiversity

The island-endemic lizard *Anolis pogus* may be present in the IBA.

Conservation

Fort Amsterdam is privately owned and a zoned historical site, which affords it legal protection from development. Public access to the IBA is controlled by the resort’s security checkpoint, and the thorny vegetation restricts visitors from accessing the pelican nesting area. The waters surrounding the peninsula are used heavily (and increasingly) by watercraft (including jet skis, dive boats, and parasail boats) which causes disturbance to the pelican nesting colony. Weekly/monthly population counts of the pelicans have been conducted every winter since 2001 by Environmental Protection in the Caribbean. A nesting success survey was also conducted in 2001.

AN005 Pelikan Rock		 <p>Brown Pelican</p>	Marine Park
<p>COORDINATES 18°01'N 63°01'W ADMIN REGION St Maarten AREA 328 ha ALTITUDE 0–10 m HABITAT Rocky areas, sea</p>			<p>THREATENED BIRDS <input type="checkbox"/></p> <p>RESTRICTED-RANGE BIRDS <input type="checkbox"/></p> <p>BIOME-RESTRICTED BIRDS <input type="checkbox"/></p> <p>CONGREGATORY BIRDS <input checked="" type="checkbox"/></p>

Site description

Pelikan Rock is a small, rocky islet about 1.5 km off the south-east coast of St Maarten. It is about 1.2 ha in size. The shoreline is rocky and difficult to access by sea, with rocky cliffs rising 6–10 m up to a grass- and low shrub-covered plateau. The IBA includes a 1-km seaward extension around the island.

Birds

This IBA is notable for its breeding waterbirds. The population of Laughing Gull *Larus atricilla* (100 pairs) is globally important, while those of Brown Pelican *Pelecanus occidentalis* (35 pairs) and Royal Tern *Sterna maxima* (47 pairs) are regionally so. Bridled Tern *S. anaethetus* also nests (c.15 pairs), and Brown Noddy *Anous stolidus* and Audubon’s Shearwater *Puffinus lherminieri* have both been reported breeding, although surveys by Environmental Protection in the Caribbean in 2004 failed to find any.

Other biodiversity

Nothing recorded.

Conservation

Pelikan Rock is state owned and managed by the Nature Foundation of St Maarten as part of the St Maarten Marine Park. Fishing, anchoring, the use of jet skis and ship traffic is prohibited within the marine park, although moorings have been installed and the area is popular for diving. Access to the islet itself is prohibited and human visitation is rare. There is no evidence of rodents or other predators on the islet. Threats to birds using the IBA are found primarily outside the IBA and include issues such as over-fishing, oil spills, and plastics entanglement. EPIC has conducted weekly or monthly population counts of *P. occidentalis* from the mainland every winter since 2001. A ground-truthing survey was conducted on the islet in June 2004.