**INTRODUCTION**

Barbados is situated in the Atlantic, east of the Windward Islands towards the southern end of the Lesser Antilles. It is the most easterly of the Lesser Antilles, lying 165 km east of St Vincent and 220 km north-north-east of Tobago. The island is teardrop shaped, 31 km long from north to south, and 22 km east to west at its widest (in the south). Barbados is divided into 11 parishes with Bridgetown, the capital, in the south-western parish of St Michael. It is densely populated. In contrast to the older, mountainous volcanic islands of the Lesser Antilles, Barbados is a geologically-recent, low-lying, coral island. The majority of the island (85%) rises in a series of raised coral limestone terraces. Two of these old sea cliffs run north–south inland of the west coast, and another runs east–west inland of the south coast. The oldest and highest ridge (over 300 m) overlooks the island’s east coast. The limestone in this part of the island is fractured in places by an extensive network of gullies up to 30 m deep. The remainder of the island, on the north-east coast (north and east of Hackleton’s Cliff, in the parishes of St Andrew, St Joseph and St John) is eroded into irregular topography with sharp ridges and steep valleys exposing older sedimentary rock. This rolling, rugged landscape is known as the Scotland District and is the least populated part of the island. The coast of Barbados is primarily sandy beach, but sea cliffs (some up to 35 m high) dominate in the south-east and at the northern end of the island.

Barbados’ climate is tropical marine with a dry season characterised by north-east trade winds between November and May. Average annual precipitation is 1,400–1,500 mm, falling mainly during June to October. The deciduous and semi-deciduous forest that once covered the island was almost entirely removed for cultivation (especially for sugar cane) within c.60 years of British settlement in 1627. Relict woodlands persist on steep slopes at Turner’s Hall Woods (c.20 ha), and the under-cliff woodland in the Scotland District is regenerating. Mature woodland also survives in the gullies that cross the coral surface of the island—c.250 km of the total gully system is wooded. Surface water is scarce on the limestone island. The wetland of greatest significance is the 33-ha Graeme Hall Swamp on the south coast. This wetland supports areas of fresh water with sedges, and others of brackish water with red *Rhizophora mangle* and white *Laguncularia racemosa* mangroves. The smaller, seasonal Chancery Lane Swamp is also a very important wetland. Much of the former sugar cane land has been, or is being converted to golf courses. Though these are mostly “green deserts”, their irrigation ponds do offer some habitat for waterbirds.
Conservation

The 1907 Wild Birds Protection Act provides a measure of protection to most resident birds and some migrants. It is currently being reviewed, and proposals have been made to include the Vulnerable West Indian Whistling-duck *Dendrocygna arborea* and the island endemic Barbados Bullfinch *Loxigilla barbadensis*. Unfortunately, the only migratory shorebirds listed are Upland Sandpiper *Bartramia longicauda*, Buff-breasted Sandpiper *Tryngites subruficollis*, Hudsonian Godwit *Limosa haemastica* and Ruff *Philomachus pugnax*. Habitat protection is afforded under various designations such as the Graeme Hall Swamp Nature Preserve and Bird Sanctuary (given legal protection after it was designated a Ramsar site); Chancery Lane Swamp “special study area” (a poor second-best to the stricter protection suggested for this area by Captain Maurice Hutt); the Scotland District “protected landscape” (a poor second-best to the proposal by Hutt to make this area a national park); and the under-cliff woodlands of St John and St Joseph at Hackelton’s Cliff and Joe’s River, and Turner’s Hall Wood which are now listed as “national forest candidates”. If the endemic Barbados racer *Lioptis perfuscus* still survives it will most likely to be found in these under-cliff woodlands.

Initiatives focused on Graeme Hall Swamp have been at the forefront of conservation in Barbados. Captain Hutt started efforts to protect the swamp in the 1970s, and Dr Karl Watson (University of the West Indies, UWI), continued these efforts. However, Peter Allard finally seized the opportunity to purchase the western portion of the swamp in 1994, and opened the Graeme Hall Nature Sanctuary (GHNS) in May 2004 with a mandate for conservation, environmental education and nature tourism. The whole 33-ha Graeme Hall Swamp was designated a Ramsar site in 2005 (and a proposal to government to make the area a national park is pending). Over 11,000 school children have now visited GHNS on discounted tours from the island’s secondary and primary schools. GHNS has also sponsored celebrations of World Wetlands Day to raise awareness (among invited school children and UWI students) of the numerous benefits of wetland conservation. Karl Watson also works tirelessly to educate the public and students about the need for conservation measures. A regular water sampling regime is conducted for GHNS by the Centre for Resource Management and Environmental Studies (CERMES) of UWI. CERMES, through its affiliation with Caribbean Coastal Marine Productivity (CARICOMP), also conducts regular monitoring of the health of the swamp’s mangrove ecosystem. GHNS staff record daily observations of bird life in the sanctuary, but throughout the rest of the island there is no formal bird conservation work being implemented, although a network of dedicated birdwatchers keeps detailed records of the island’s avifauna.

Threats to birds and habitats on the island stem from a single root cause: the pressures of commercial and residential development on a small, densely populated island. The proposed construction of a “wind farm” in St Lucy by Barbados Light and Power is just one of many such development projects, which in this case could add to the mortality of migrant shorebirds in the parish. There is an urgent need for wise management of the inevitable encroachment of new developments (e.g. housing estates, golf courses etc.) on existing woodlands or indeed agricultural land. The pressure is enormous and the resistance limited. The threat to woodlands could be mitigated by a low-cost tree planting scheme (using native tree species) implemented on tracts of government-owned land in the Scotland District. Secondary school environmental groups could play an active part in such a scheme, keeping costs low and returns high.

The complex issue of bird shooting on the island also needs to be addressed. This is not to argue for elimination of the “sport” but for regulation based on accurate data concerning numbers of each species being shot. With greater transparency and a more accurate picture of numbers, informed decisions about species-specific bag limits could be set, thus protecting the most vulnerable birds (such as American Golden Plover *Pluvialis dominica* which has a global population estimated at just 200,000 individuals). The artificially maintained shooting swamps provide habitat for many non-target waterbirds for at least part of the year and some that are maintained throughout the year provide year-round habitat. These swamps are important components of the island’s wetland network, and they exist solely as a result of shooting-specific management actions. Even with regulated hunting, the ideal would be for the maintenance of two “no-shooting” wetlands (one in the north and one in the east) to offer sanctuary for migratory shorebirds. This, combined with the preservation of Chancery Lane Swamp IBA (BB005), would provide necessary refuge. Unfortunately, such projects are severely constrained by lack of funding.

Birds

Typical of oceanic islands the breeding avifauna of Barbados is depauperate with just 28 species breeding. However, Barbados’ position east of the main island chain makes it a first landfall for wandering migrants (e.g. trans-Atlantic species) resulting in over 33% of the island’s recorded species (75 of 230) being considered vagrants. This is reflected in the occurrence of globally threatened birds on the island. The Near Threatened Piping Plover *Charadrius melodus* is known from a single record (of a bird shot) in 1957; four West Indian Whistling-ducks *Dendrocygna arborea* (Vulnerable) were present at Graeme Hall Swamp in 1961; two Black-capped Petrels *Pterodroma hasitata* (Endangered) 10–12 km south-west of Barbados in April 2003 were the first island records; and Caribbean Coot *Fulica caribaea* (Near Threatened) started breeding on the island in 1999. The Critically Endangered Eskimo Curlew *Numenius borealis* was once a regular autumn passage migrant (into the late nineteenth century) but the last certain record on Barbados (and indeed anywhere) was of a single bird shot in September 1963.
Barbados is a geologically young island compared with its neighbouring Antillean islands and, as a result, levels of endemism are low. The Barbados Bullfinch *Loxigilla barbadensis*, which is common in all habitats, has recently been recognised as a species distinct from the Lesser Antillean Bullfinch *L. noctis*. It is the only island endemic, and it occurs alongside three other Lesser Antilles Endemic Bird Area restricted-range birds, namely Green-throated Carib *Eulampis holosericeus*, Antillean Crested Hummingbird *Orthorhyncus cristatus* and Caribbean Elaenia *Elaenia martinica*. The two hummingbirds are common in woodlands and gardens. Two more restricted-range species are known from the island, but are not considered to sustain viable populations. The Scaly-breasted Thrasher *Margarops fuscus* was last recorded in the 1920s and is now almost certainly extirpated from the island, and the Pearly-eyed Thrasher *M. fuscatus* is known from just a few sightings (possibly of vagrants) over the last two years.

Barbados is most important for its waterbirds. The network of natural and (in the case of the shooting swamps) artificially maintained wetlands provides critical habitat for an increasing number of waterbird species. In recent decades, a range of waterbirds have been added as breeding species to the Barbados avifauna. For example, Little Egret *Egretta garzetta* first nested in 1994 (representing the first breeding record of this species in the New World); Snowy Egret *E. thula* also nested for the first time in 1994; Pied-billed Grebe *Podilymbus podiceps* in 2004; Black-bellied Whistling-duck *Dendrocygna autumnalis* in 2002; and Masked Duck *Nomonyx dominicus* in 1990. These, and other waterbirds, rely on a functioning network of wetlands to provide their various feeding and breeding requirements throughout the year.

It is as a staging post for Arctic-nesting Neotropical migratory shorebirds that Barbados stands out as of global importance. Adverse weather conditions in the Atlantic can cause large flights of shorebirds to put down in Barbados’ wetlands. Unfortunately, many of these birds are shot at privately-owned wetlands designed and maintained specifically to attract the flocks. Though exact data are not available, the number of birds killed by the 10 active shooting swamps on the island ranges between 15,000 and 30,000 each July-to-October shooting season. Information from hunters in the five shooting swamps in the northern parish of St Lucy suggests that between 2,400–3,000 birds are shot at each swamp, and that a combined total of 12,000–15,000 birds are shot each year in this parish. The same hunters have suggested that the number of birds shot represents “just” 10% of the total number of birds passing (although this estimate comes with obvious biases), indicating that 150,000–300,000 shorebirds could be using the island’s wetlands each autumn. Pectoral Sandpiper *Calidris melanotos* and Lesser Yellowlegs *Tringa flavipes* make up 70–75% of the birds shot, and 10% are American Golden Plovers *Pluvialis dominica*. It is worth noting that the last confirmed record of *Numenius borealis* was of a bird killed at a shooting swamp in St Lucy in 1963.
**Important Bird Areas**

Barbados’ seven IBAs—the island’s international priority sites for bird conservation—cover 185 ha (including marine areas), but only 0.1% of the island’s land area. Three of the IBAs have some form of protective designation, representing 74% of the area covered by the IBAs, although some of these designations do not alleviate the threat of development. The IBAs have been identified on the basis of 11 key bird species (listed in Table 1) that variously trigger the IBA criteria. These species include all four restricted-range species, and seven congregatory waterbirds/seabirds. The IBAs are wetland focused, and together they form an important national network of sites for the waterbird species that rely on them. The occurrence of the various restricted-range birds is mostly incidental with three of these species being widespread and common in most habitats. However, in terms of the IBA network, the Caribbean Elaenia Elaenia martinica is found only in Graeme Hall Swamp IBA (BB003). If either of the restricted-range Margarops thrashers were found to be breeding on the island again, it would be appropriate to identify woodland IBA supporting populations of all of the restricted-range birds. No globally threatened species occur on the island in numbers significant for IBA identifications. However, the small, recently established population of the Near Threatened Caribbean Coot Fulica caribaea should be monitored as it grows.

Threats to the IBAs are essentially those that are outlined above (see Conservation), namely pressure from developments. Ironically, Graeme Hall Swamp IBA (BB003), Barbados’ best protected area, faces probably the greatest threats, especially related to the maintenance of water quality. There is measureable mild biocide runoff into the swamp from surrounding agricultural land, including from government-owned agricultural land inside the swamp watershed. More concerning though is the South Coast Sewerage Project (SCSP) treatment plant which is situated in the government-owned eastern section of the wetland. In the event of a plant failure, there is a plan to discharge raw sewerage directly into the wetland. This occurred in July 2005 with a small discharge that resulted in a limited fish-kill and blue-green algal bloom. However, a major discharge of untreated sewerage would result in serious eutrophication.

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. Monitoring the status of the key bird species (listed in Table 1) at each IBA will be an important component of this broader site-monitoring process. Constant vigilance is needed to ensure that Bird Rock IBA (BB001) remains rat free, and that the Audubon’s Shearwater Puffinus lherminieri colony is allowed to thrive.

**Key references**


Fielden, H. W. (1889) On the breeding of the Audubon’s Coot (Fulica lherminieri) at each IBA will be an important component of of this broader site-monitoring process. Constant vigilance is needed to ensure that Bird Rock IBA (BB001) remains rat free, and that the Audubon’s Shearwater Puffinus lherminieri colony is allowed to thrive.

**Acknowledgements**

The author would like to thank Kerryn Branford (GHNS), Ryan Chenery (GHNS), Martin Frost, Renata Goodridge (CERMES and CARICOMP), Lorna Innis (Coastal Zone Management Unit), Ed Massiah and Shontelle Wellington (Ministry of Energy and Environment) for their generous contributions to and reviews of this chapter. Also, Captain Hutt (1919–1998), on whose observations and records modern field ornithology in Barbados has been built.
**BB001 Bird Rock**

**Site description**
Bird Rock IBA lies offshore at the northernmost tip of Barbados. The coastline comprises cliffs and boulder-strewn shores, and the 0.5-ha Bird Rock is c.30 m from this shoreline. A narrow footpath leads to a small sandy beach almost opposite Bird Rock, but at the present, no human settlement encroaches on the rock or the immediately adjacent coast. The IBA includes all marine areas up to 1 km from the island.

**Birds**
This IBA is significant for its breeding population of Audubon’s Shearwater *Puffinus lherminieri*. “Considerable numbers” were recorded in the late nineteenth century. More recently (1996) counts of birds coming to the site after sunset suggested a population of 50–100 pairs. No other seabirds are known to breed on Bird Rock.

**Other biodiversity**
Nothing recorded.

**Conservation**
Bird Rock IBA is within a Natural Heritage Conservation Area that extends down the east coast of Barbados. It is also within the study area for a Coastal Zone Management Plan. Building is restricted within 400 m of the cliff along this section of coastline. However, any coastal development that permitted security lighting near the cliff would likely result in disturbance and disorientation of the shearwaters breeding on Bird Rock. No rats are present, but Bird Rock should be monitored for this and other potential predators.

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**BB002 St Lucy Shooting Swamps**

**Site description**
The St Lucy Shooting Swamps IBA comprises five separate wetlands, each less than 2 ha in extent, in the northernmost parish of St Lucy. The wetlands are all on private lands and are artificially created and maintained for the express purpose of providing habitat to lure migrating Neotropical shorebirds down so they can be shot. Generally, the immediate environs of these wetlands are farmed for cattle pasture or sugarcane.

**Birds**
This IBA is critical for Neotropical migratory shorebirds migrating south between July and October. It is reported that a collective total of 10,000–15,000 Nearctic nesting shorebirds (70–75% of which are Pectoral Sandpipers *Calidris melanotos* and Lesser Yellowlegs *Tringa flavipes*) are shot each year in the swamps of this IBA. The number of birds shot is an unknown percentage of the total numbers using the wetlands, but could be c.10% or more. Numbers of birds stopping (and thus the numbers shot) vary from year to year as a result of weather conditions. More birds stop when affected by adverse weather associated with tropical Atlantic depressions and storms. These wetlands also provide useful year-round habitat for non-target wetland birds, and three (of the four) Lesser Antilles EBA restricted-range birds occur. The last confirmed record of Eskimo Curlew *Numenius borealis* was shot at Fosters Swamp in this IBA.

**Other biodiversity**
The endemic lizard *Anolis extremus* occurs.

**Conservation**
Each of the individual shooting swamps is privately-owned and managed for shooting. Swamp management by the shooting clubs includes water being pumped onto them in the wet (shooting) season. A ban or restriction on hunting would result in the cessation of swamp management and the gradual drying out of the wetlands. Of particular concern are the numbers of American Golden Plovers *Pluvialis dominica* being shot (10% of the total bag from this IBA)—depending on the year this can be up to 0.6% of the global population shot solely within this IBA. Setting bag limits for this species and establishing “no-shooting” swamps within St Lucy would be desirable conservation goals, as would the pumping of water during the dry season to maintain habitat for other waterbirds.
Important Bird Areas in the Caribbean – Barbados

BB003 Graeme Hall Swamp

**Site description**
Graeme Hall Swamp IBA is in south-west Barbados, 5 km east of Bridgetown, just inland from the coast. Residential and commercial tourism development surrounds the swamp along the southern, eastern, western and north-western boundaries. The coast road (Highway 7) runs between the swamp and the sea to the south, and agricultural lands border the swamp in the north-east. The IBA supports the largest body of inland water on the island. The swamp is divided into a freshwater marsh (eastern section) and a brackish lake (western section) by a north–south, man-made roadway and drainage canal (the swamp’s only connection to the sea).

**Birds**
This IBA is one of only two documented breeding sites for Little Egret *Egretta garzetta* in the Western Hemisphere, with up to 24 birds counted on their favoured mangrove island in the brackish lake. The wetlands support a wide diversity of waterbirds (residents, migrants and vagrants) although not the numbers of shorebirds that used to occur when it was managed as a shooting swamp. Populations of all four Lesser Antilles EBA restricted-range birds occur in this IBA. The mangroves support the highest density of resident Yellow Warblers *Dendroica petechia* on the island.

**Other biodiversity**
Graeme Hall Swamp IBA supports the largest remaining stands of red and white mangrove woodland on the island. Introduced green monkeys and mongooses occur.

**Conservation**
The brackish western sector of this IBA is privately-owned and managed by the Graeme Hall Nature Sanctuary, and has been the focus of restoration activities. The eastern sector of the IBA is government-controlled and has not undergone any significant restorative effort, being managed by the Ministry of Health for mosquito control. This control consists of clearing vegetation, removing obstructing mangroves and intensive thermal fogging with Malathion. Increased protection is required for this IBA although a proposed plan for a national park describes the significant reduction of suitable waterbird habitat in preference to human recreational use. Invasive alien species are presumably impacting the avifauna. Increasing noise and light pollution from events at Graeme Hall Nature Sanctuary is a concern for nesting egrets. Further manipulation or modification of this already heavily modified wetland must be careful not to disrupt or disturb its attractiveness for birds in favour of human recreation.

BB004 East Point Pond

**Site description**
East Point Pond IBA is in south-eastern Barbados, c.3 km inland (south-west) of the coast at St Marks, and south of Highway 4. This small pond is artificially maintained and surrounded by grazing land. It forms part of a complex of wetland and contiguous pastureland that exists throughout the St Philip Shooting Swamps IBA (BB006).

**Birds**
This IBA is significant as a feeding area for the Little Egret *Egretta garzetta* (21 were counted in 2007) that breed at Graeme Hall Swamp IBA (BB003). It is also the only documented nesting site for the Near Threatened Caribbean Coot *Fulica caribaea* on the island, with about 3–4 pairs breeding. Populations of three (of the four) Lesser Antilles EBA restricted-range birds occur, namely Green-throated Carib *Eulampis holosericeus*, Antillean Crested Hummingbird *Orthorhyncus cristatus* and the island-endemic Barbados Bullfinch *Loxigilla barbadensis*.

**Other biodiversity**
Nothing recorded.

**Conservation**
East Point Pond IBA is privately owned (on the lands of East Point House) and not formally protected. It is artificially maintained with water pumped into it (although as at June 2008 pumping appears to have stopped). It is not currently threatened, although any change in land use or management regime (such as the cessation of pumping) would have a profound and damaging impact on the waterbirds, many of which rely on this IBA as part of an island-wide network of wetlands that is needed to satisfy their annual feeding and breeding requirements.
Birds Site description
Chancery Lane Swamp IBA is on the south coast of Barbados. It is a seasonal, coastal wetland comprising an irregular mosaic of shallow open water, mudflats and grassy areas. This natural wetland IBA is behind a well developed coralline sand-dune system bound by a vegetated berm to seaward, pasture and an inland cliff. Residential development is encroaching towards the western end of the marsh from Fairy Valley Rock and Chancery Lane.

Birds This IBA is a critical refuge for Neotropical migratory (and vagrant) shorebirds but is significant as a feeding area for the Little Egrets *Egretta garzetta* (>20) that breed at Graeme Hall Swamp IBA (BB003). Populations of three (of the four) Lesser Antilles EBA restricted-range birds occur, namely Green-throated Carib *Eulampis holosericeus*, Antillean Crested Hummingbird *Orthorhyncus cristatus* and the island-endemic Barbados Bullfinch *Loxigilla barbadensis*.

Other biodiversity
Chancery Lane is the only place in Barbados known to support stands of buttonwood *Conocarpus erectus*. The coastal wetlands are rare in terms of the island’s ecosystems. The beach is an important nesting site for globally threatened sea-turtles (especially the Critically Endangered hawksbill *Eretmochelys imbricata* and [possibly] leatherback *Dermochelys coriacea* turtles).

Conservation
Chancery Lane Swamp IBA is privately owned but has been designated a Natural Heritage Conservation Area and a Special Study Area. It also embraces an important archaeological site. The Chancery Lane beach and surroundings are a popular recreation area for local residents and tourists who stay in hotels and guesthouses nearby. A large portion of the land in the Special Study Area has been approved for development. Any commercial or residential development that does not leave it intact or does not allow an adequate buffer zone will degrade the wetland, and severely damage the landscape value. A permanent protective status preventing development encroachment and enabling appropriate water management are essential for the long-term survival of Chancery Lane Swamp IBA. This IBA forms part of an island-wide network of wetlands that the waterbirds of Barbados rely on to satisfy their annual feeding and breeding requirements.

Other biodiversity
The endemic lizard *Anolis extremus* occurs.

Conservation
These four shooting swamps are privately-owned and managed for shooting. Swamp management by the shooting clubs includes water being pumped onto them during the wet (shooting) season. A ban or restriction on hunting would likely result in the cessation of swamp management and the gradual drying out of the wetlands. Of particular concern are the numbers of American Golden Plovers *Pluvialis dominica* being shot (10% of the total bag from this IBA)—depending on the year this can be up to 0.6% of the global population shot solely within this IBA. Setting bag limits for this species and establishing “no-shooting” swamps within St Philip would be desirable conservation goals, as would pumping water onto the swamps in the dry season to maintain habitat for waterbirds. Pressure from residential development is a constant and real threat in this parish—any such developments adjacent to the swamps would likely result in the abandonment of management.
**BB007 Bayfield Pond**

**Site description**
Bayfield Pond IBA is a small, permanent pond situated in the village of Bayfield, on the south-east coast of Barbados. The near circular pond is surrounded on all sides by houses with just a narrow strip of herbaceous vegetation and some trees between the waters edge and the residential roads. Floating aquatic plants cover a significant portion of the pond’s surface.

**Birds**
This IBA is important for Masked Duck *Nomonyx dominicus* which is resident although numbers increase up to 30 individuals during the dry season suggesting this pond is of national importance for the species, and emphasising the reliance of some waterbirds on an island-wide network of wetlands to satisfy their annual feeding and breeding requirements. Populations of three (of the four) Lesser Antilles EBA restricted-range birds occur, namely Green-throated Carib *Eulampis holosericeus*, Antillean Crested Hummingbird *Orthorhyncus cristatus* and the island-endemic Barbados Bullfinch *Loxigilla barbadensis*.

**Other biodiversity**
Nothing recorded.

**Conservation**
Bayfield Pond IBA is privately owned and not formally protected. Being surrounded by housing it is subject to human disturbance, the affects of pollution, changes in aquatic vegetation and exotic introductions (such as invasive plants and also exotic fish).