

UNITED STATES VIRGIN ISLANDS

INTRODUCTION

by Robert L. Norton

The Virgin Islands are a group of small islands situated between Puerto Rico and the Leeward Islands. Politically they are divided into two groups: the larger western group constituting the U.S. Virgin Islands and the smaller eastern group a British Crown Colony. The U.S. Virgin Islands contain three main islands, St. Thomas, St. John and St. Croix, and a large number of small offshore islets and cays. The total area of the group is 345 km² and the population about 95,000. The islands were purchased from Denmark by the U.S.A. in 1917 and remain a U.S. Territory.

The climate of the islands is dominated by the influence of the trade winds, and average temperatures vary little between winter (25°C) and summer (28°C). The islands have long been developed for tourism and this is now the major industry, particularly on St. Thomas. Agriculture and cattle ranching remain important, especially on St. Croix where there is also some industry, including the largest oil refinery in the Western Hemisphere. St. John, with a population of only about 3,000, remains the least developed of the main islands. About two-thirds of this island is a U.S. National Park.

The topography of the three main islands is hilly, with peaks rising to 474m. The original forests have been almost completely destroyed, and most of the existing forest and scrub is secondary with a large component of introduced species. There are some wetlands on all three of the main islands; most are shallow sea bays or brackish to saline coastal ponds with mangrove swamps, and all are small in size.

Institutional Base for Wetland Conservation and Research

The following institutions are concerned with conservation and/or research in the U.S. Virgin Islands:

- The Division of Fish and Wildlife*, in the Department of Conservation and Cultural Affairs, US Virgin Islands Government; based on St. Thomas, with an office on St. Croix.
- Coastal Zone Management (CZM)*, in the Department of Conservation and Cultural Affairs, with its main office on St. Croix; CZM has jurisdiction over all wetlands.
- The Island Resources Foundation*; a non-governmental organization based on St. Thomas. The Foundation is concerned with improvement of resource management strategies in the islands, and provides special environmental guidelines for development projects.
- The Caribbean Research Institute and Virgin Islands Ecological Research Station*, both connected with the College of the Virgin Islands.
- The West Indies Laboratory of Fairleigh Dickinson University*, on St. Croix.

Progress in Wetland Conservation and Research

Progress to date has been limited to the establishment of island reserves some of which contain wetland habitat. The most notable of these is the Virgin Islands National Park (6,073 ha) on St. John, which incorporates the most important wetland on that island and three other small ponds. The concept that wetlands are protected under the jurisdiction of Coastal Zone Management has been generally accepted, although enforcement of the concept and the laws protecting wetland vegetation and wetlands is lagging behind efforts in the continental United States. Insufficient funding and personnel are operational causes, and lack of public awareness or commitment is the result.

The Division of Fish and Wildlife was granted a contract to survey shorebirds in the U.S. Virgin Islands between 1981 and 1983. However, Federal budget cuts reduced the period of the survey to one year rather than three. Another short project attempted to define some of

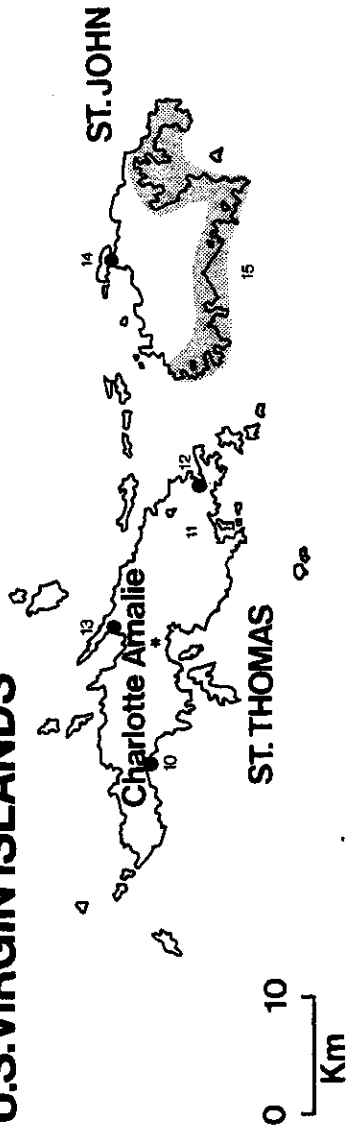
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the characteristics of duck habitat in the islands. The results of both projects are as yet unpublished. A waterfowl banding programme is currently underway to determine the extent of inter-island movements and habitat use. About 100 shorebirds have been banded in the programme to date.

Major Threats to Wetlands and Waterfowl

The major threats to wetlands are filling and/or dredging for commercial ventures by either the local Virgin Islands Government or private business. Waterfowl are subject to loss of habitat and destruction from various sources. The recent dumping of old automobiles on the mudflats of Mangrove Lagoon, St. Thomas, has had a detrimental effect on nesting areas for *Charadrius wilsonius* and *C. vociferus* as well as roosting areas for *Larus atricilla* and migratory shorebirds. The quality of the substrate for the invertebrate fauna of the sand and mudflats has probably also been altered by the drainage of automobile fluids, etc. Waterfowl are also hunted out of season and harassed by stray dogs, cats and perhaps the introduced mongoose *Herpestes auropunctatus*.

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WETLANDS

Site descriptions based on data sheets provided by Robert L. Norton and Fred W. Sladen of the Division of Fish and Wildlife.

Salt River Bay (1)

Location: 17°47'N, 64°45'W; 6 km northwest of Christiansted, St. Croix.

Area: 100 ha.

Altitude: 0m.

Province and type: 8.41.13; 02 & 08.

Site description: A shallow tidal estuarine bay, up to 2m deep, with fringing mangrove swamps; the mouth of the bay is protected by a coral reef. Salinities range from 30-40 p.p.t.

Principal vegetation: Mangrove swamps with *Avicennia germinans* and *Rhizophora mangle*.

Land tenure: Mainly privately owned. The Nature Conservancy owns a section of mangrove swamp with nesting Ardeidae.

Protection: Under the jurisdiction of Coastal Zone Management, U.S. Virgin Islands Government, and designated in 1980 as a National Natural Landmark. A section of the mangrove swamps is protected by the Nature Conservancy.

Land use: Fishing and recreational boating.

Waterfowl: A nesting site for *Nyctanassa violacea*, *Butorides virescens* and *Egretta caerulea*, and a feeding and roosting site for *Pelecanus occidentalis*, five species of Ardeidae and many shorebirds (including *Haematopus palliatus*).

Other fauna: The mangroves constitute a very important feeding area for many species of Parulidae during migration and in winter, and *Dendroica petechia* is a resident breeder. The White-crowned Pigeon *Columba leucocephala* also breeds. The wetland is a major nursery ground for dozens of species of marine fauna.

Threats: The wetland is threatened by the development of two marinas, the construction of private dwellings, and hotel development.

Research and conservation: The wetland was identified by Baker as a priority area for protection. A nearby Marine Hydrolaboratory, incorporating underwater habitat in about 20m of water off the mouth of the bay, is used for research in marine sciences.

References: Baker (1980).

Source: Fred W. Sladen.

Criteria for inclusion: 2b & 3a.

Altona Lagoon (2)

Location: 17°45'N, 64°41'W; 1 km east of Christiansted, St. Croix.

Area: 100 ha.

Altitude: 0m.

Province and type: 8.41.13; 05, 07 & 08.

Site description: A tidal saline lagoon, up to 5m deep, with fringing mangrove swamps. The lagoon lies 100m inland from open sea beaches, and is connected to the sea by a narrow channel. The salinity ranges from 30-40 p.p.t.

Principal vegetation: Mangrove swamps with *Avicennia germinans* and *Rhizophora mangle*.

Land tenure: Unknown, but thought to be mainly privately owned.

Protection: Under the jurisdiction of Coastal Zone Management, U.S. Virgin Islands Government.

Land use: Fishing and harvesting of crabs.

Waterfowl: A breeding site for *Bubulcus ibis*, *Anas bahamensis* and *Himantopus himantopus*, and a roosting and feeding area for eight species of Ardeidae and 19 species of shorebirds, including *Steganopus tricolor*.

Other fauna: A breeding area for *Columba leucocephala* and a wintering area for many species of Parulidae. The channel connecting the lagoon with the sea is one of the major fishing and shrimping areas on St. Croix.

Threats: The channel is silting up, and the wetland is threatened by the encroachment of an existing hotel and golf course, and the proposed construction of a harbour for cruise ships.

Research and conservation: Fever has studied the formation of the lagoon, and the avifauna is well known, but little work has been conducted on the other fauna. A proposal to commence dredging of the channel is currently awaiting approval.

References: Fever (1975).

Source: Fred W. Sladen.

Criteria for inclusion: 3a.

Southgate Pond (3)

Location: 17°45'N, 64°40'W; 4 km northeast of Christiansted, St. Croix.

Area: 16 ha.

Altitude: 0m.

Province and type: 8.41.13; 05, 07 & 08.

Site description: A semi-permanent fresh to brackish pond, up to 1m deep, with mangrove swamps; 100m inland from a sea beach. The pond is fresh when first flooded at the beginning of the rainy season, and becomes brackish by the end of the dry season (salinity up to 15 p.p.t.). The pond periodically dries out during very dry years (about once every five years).

Principal vegetation: Mangrove swamps with *Avicennia germinans* and *Laguncularia racemosa*.

Land tenure: Privately owned.

Protection: Under the jurisdiction of Coastal Zone Management, U.S. Virgin Islands Government.

Land use: Recreation on adjacent beaches. There is a marina nearby.

Waterfowl: An important area for a wide variety of breeding, passage and wintering waterfowl. Breeding species include *Podilymbus podiceps*, *Nycticorax nycticorax*, *Butorides virescens*, *Egretta caerulea*, *Anas bahamensis* (up to 20 during the breeding season and 150 at other times), *Gallinula chloropus*, *Fulica caribaea*, *Charadrius wilsonius*, *C. vociferus*, *Himantopus himantopus* and *Sterna albifrons*. Non-breeding visitors include *Pelecanus occidentalis*, eight species of Ardeidae, a variety of Anatidae (including up to 250 *Anas discors*), *Porzana carolina*, *Fulica americana* and over 20 species of migratory shorebirds. *Rallus longirostris* formerly occurred, but is now believed to be extinct in the area.

Other fauna: A breeding site for *Columba leucocephala* and a wintering area for *Pandion haliaetus*, *Falco peregrinus* and *F. columbarius*. The deer *Odocoileus virginianus* occurs in the area.

Threats: The present owner proposes to dredge the pond and build an extension to an existing marina which is now immediately adjacent to it.

Research and conservation: Southgate Pond is the richest wetland on St. Croix for Anatidae, and one of the most important for Ardeidae and shorebirds. The pond and environs should be protected in a national wildlife refuge.

Source: Fred W. Sladen.

Criteria for inclusion: 2b & 3a.

Coakley Bay Pond (4)

Location: 17°46'N, 64°39'W; 5 km ENE of Christiansted, St. Croix.

Area: 7 ha.

Altitude: 0m.

Province and type: 8.41.13; 05, 07 & 08.

Site description: A semi-permanent fresh to brackish pond, up to 1m deep, with mangrove swamps; 100m inland from a sea beach. The pond fills during the rainy season and shrinks during the dry season, periodically drying out completely (about once in every five years). The salinity ranges from 0-20 p.p.t.

Principal vegetation: Mangrove swamps with *Avicennia germinans* and *Rhizophora mangle*.

Land tenure: Unknown.

Protection: Under the jurisdiction of Coastal Zone Management, U.S. Virgin Islands Government.

Land use: Fishing and harvesting of crabs. Recreation on adjacent beaches.

Waterfowl: A breeding site for *Anas bahamensis*, *Charadrius wilsonius*, *C. vociferus*, *Himantopus himantopus* and *Sterna albifrons*, and a feeding area for *Podilymbus podiceps*, *Pelecanus occidentalis*, eight species of Ardeidae, five species of Anatidae and 19 species of migratory shorebirds.

Other fauna: A breeding site for *Columba leucocephala* and a wintering area for *Pandion haliaetus*. The deer *Odocoileus virginianus* occurs in the area.

Threats: The pond is threatened by development in surrounding areas.

Source: Fred W. Sladen.

Criteria for inclusion: 3a.

Great Pond (5)

Location: 17°43'N, 64°39'W; 4 km southeast of Christiansted, St. Croix.

Area: 50 ha.

Altitude: 0m.

Province and type: 8.41.13; 05, 06, 07 & 08.

Site description: A tidal saline lagoon, up to 1m deep, with fringing mangrove swamps and mudflats; 100m inland from a sea beach. The lagoon receives run-off from a watershed of about 300 ha. The tidal rise and fall is up to 30 cm, and the salinity varies from 20-40 p.p.t.

Principal vegetation: Mangrove swamps with *Avicennia germinans*, *Laguncularia racemosa* and *Rhizophora mangle*.

Land tenure: Unknown.

Protection: Under the jurisdiction of Coastal Zone Management, U.S. Virgin Islands Government.

Land use: Fishing, and harvesting of crabs with nets and traps.

Waterfowl: A particularly important breeding and wintering area for *Anas bahamensis*, and a breeding site for *Nyctanassa violacea*, *Butorides virescens*, *Egretta alba*, *Charadrius wilsonius*, *Himantopus himantopus* and *Sterna albifrons*. Also an important feeding site for *Egretta caerulea*, *E. tricolor*, *E. thula* and *Ardea herodias*, and a passage and wintering area for *Anas discors* and 24 species of migratory shorebirds including *Charadrius melodus*, *Numenius phaeopus*, *Catoptrophorus semipalmatus* and *Calidris bairdii*.

Other fauna: A wintering area for *Pandion haliaetus*, *Circus cyaneus*, *Falco peregrinus* and *F. columbarius*. The lagoon supports many commercially important species of fishes and crabs.

Threats: No information.

Source: Fred W. Sladen.

Criteria for inclusion: 3a.

Cassava Garden (6)

Location: 17°42'N, 64°44'W; 4 km southwest of Christiansted, St. Croix.

Area: 15 ha.

Altitude: 0m.

Province and type: 8.41.13; 04, 05, 07, 08 & 13.

Site description: A complex of saline ponds, up to 1m deep, mangrove swamps and periodically flooded freshwater marshes behind sea beaches and low rocky cliffs. Water levels increase during the rainy season, and salinities decrease.

Principal vegetation: Mangrove swamps with *Avicennia germinans* and *Laguncularia racemosa*.

Land tenure: Under corporate ownership.

Protection: Under the jurisdiction of Coastal Zone Management, U.S. Virgin Islands Government.

Land use: Fishing and harvesting of crabs.

Waterfowl: A breeding site for *Nycticorax nycticorax*, *Bubulcus ibis*, *Butorides virescens*, *Egretta caerulea*, *E. alba*, *Anas bahamensis*, *Gallinula chloropus*, *Charadrius wilsonius*, *Himantopus himantopus* and *Sterna albifrons*. Non-breeding visitors include *Pelecanus occidentalis*, nine species of Ardeidae, *Plegadis falcinellus*, seven species of Anatidae, four species of Rallidae and 23 species of migratory shorebirds (including *Charadrius melodus*).

Other fauna: A breeding site for *Phaethon lepturus* (the only site on St. Croix) and *Columba leucocephala*, and a wintering area for *Pandion haliaetus*, *Falco peregrinus* and *F. columbarius*. Mullet *Mugil* sp occur in the ponds.

Threats: There are plans to fill in the wetland for the construction of a refinery.

Source: Fred W. Sladen.

Criteria for inclusion: 3a.

Krause Lagoon (7)

Location: 17°42'N, 64°46'W; 7 km southwest of Christiansted, St. Croix.

Area: 200 ha.

Altitude: 0-5m.

Province and type: 8.41.13; 03, 05, 06, 07, 08 & 15.

Site description: Formerly a large tidal lagoon, up to 5m deep, with mangrove swamps, sandy beaches and intertidal mudflats. Much of the area has now been industrialized; there are large cooling ponds for sea-water used in an alumina refinery, and a deep water harbour for oil tankers visiting the nearby oil refinery.

Principal vegetation: Mangrove swamps with *Avicennia germinans*, *Laguncularia racemosa* and *Rhizophora mangle*.

Land tenure: Privately owned.

Protection: Under the jurisdiction of Coastal Zone Management, U.S. Virgin Islands Government.

Land use: The area includes a container port, transshipment port, alumina refinery and oil refinery.

Waterfowl: A breeding site for *Nyctanassa violacea*, *Bubulcus ibis*, *Butorides virescens*, *Egretta caerulea*, *E. thula*, *E. alba*, *Anas bahamensis*, *Gallinula chloropus*, *Charadrius wilsonius*, *C. vociferus*, *Catoptrophorus semipalmatus* (the only known breeding site in the U.S. Virgin Islands), *Himantopus himantopus* and *Sterna albifrons*. Non-breeding visitors include *Pelecanus occidentalis*, ten species of Ardeidae, *Phoenicopterus ruber*, *Anas crecca*, *A. discors*, *Porzana carolina*, 26 species of shorebirds and ten species of Laridae. The lagoon is the only regular locality for *Calidris canutus* in the U.S. Virgin Islands, and a variety of uncommon shorebirds have been recorded including *Limnodromus scolopaceus*, *Calidris bairdii* and *C. alpina*.

Other fauna: A breeding site for *Columba squamosa* and *C. leucocephala*, a feeding area for *Fregata magnificens*, and a wintering area for *Pandion haliaetus*, *Falco peregrinus* and *F. columbarius*. The lagoon is rich in marine fishes and crustaceans.

Threats: The lagoon has already been extensively modified. The alumina refinery is up for sale, and it is possible that the new owners may expand operations. If not, the cooling ponds will be drained.

Research and conservation: Despite the disturbance, the area remains very important for waterfowl and is the most important staging area for migratory shorebirds in the U.S. Virgin Islands. Some restoration would be possible and a part of the area could be protected as a wildlife reserve.

Source: Fred W. Sladen.

Criteria for inclusion: 2b & 3a.

Manning Bay (8)

Location: 17°42'N, 64°47'W; 8 km WSW of Christiansted, St. Croix.

Area: 10 ha.

Altitude: 0m.

Province and type: 8.41.13; 01, 03, 05, 06 & 08.

Site description: Shallow inshore waters of the open sea, with many small islands, patches of mangrove swamp, sandy beaches and intertidal mudflats; up to 3m deep and with salinities ranging from 30-40 p.p.t.

Principal vegetation: Mangrove swamps with *Avicennia germinans*, *Laguncularia racemosa*, *Conocarpus erectus*, *Rhizophora mangle* and *Hippomane mancinella*.

Land tenure: Owned by the U.S. Virgin Islands Government.

Protection: Under the jurisdiction of Coastal Zone Management, U.S. Virgin Islands Government.

Land use: Fishing and harvesting of crabs. The wetland lies close to the island's airport.

Waterfowl: A breeding area for *Nyctanassa violacea*, *Bubulcus ibis*, *Egretta caerulea*, *E. thula*, *E. alba*, *Anas bahamensis*, *Charadrius wilsonius*, *Himantopus himantopus* and possibly *Butorides virescens*; and a feeding and roosting site for *Pelecanus occidentalis*, *Ardea herodias*, and many species of migratory shorebirds and Laridae.

Other fauna: The White-crowned Pigeon *Columba leucocephala* is a resident breeding bird, and *Pandion haliaetus*, *Falco peregrinus*, *F. columbarius* and at least 12 species of Parulidae occur on passage and in winter. Hawksbill Turtles *Eretmochelys imbricata* feed in the bay and may nest on nearby beaches. The bay supports a rich marine fauna including many commercially important fishes and crustaceans.

Threats: The bay is threatened by pollution from a nearby oil refinery and an alumina refinery, and a rubbish dump is encroaching on the wetland. Potential port development also poses a threat in the bay.

Research and conservation: According to Baker, in 1980 Manning Bay contained the best example of unspoiled mangrove swamps in the the U.S. Virgin Islands outside St. John. Baker identified the bay as a priority area for protection because of its unspoiled condition, the large number of species present, and the lack of similar areas elsewhere in the islands. Baker's conclusions are still applicable in 1985. Proposals have been submitted for making this area into a Territorial Park, Wildlife Refuge or Natural Wetlands reserve.

References: Yntema (1972); Baker (1980).

Source: Fred W. Sladen.

Criteria for inclusion: 2b & 3a.

Westend Salt Pond (9)

Location: 17°41'N, 64°53'W; 3 km SSW of Frederiksted, at the southwestern tip of St. Croix.

Area: 100 ha.

Altitude: 0-1m.

Province and type: 8.41.13; 05, 07 & 08.

Site description: A saline pond, up to 2m deep, with fringing mangrove swamps and four smaller peripheral ponds; within 30m of open sea beaches. There is no surface connection with the sea and the water level is affected mainly by rainfall, but there may be some subterranean tidal influence.

Principal vegetation: Mangrove swamps with *Avicennia germinans* and *Laguncularia racemosa*. Dry cactus scrub to the east and dune vegetation to the west.

Land tenure: Three-quarters of the area is owned by the U.S. Government; the ownership of the remainder is unknown.

Protection: The area owned by the U.S. Government is included within a National Wildlife Refuge.

Land use: Recreation on the beaches.

Waterfowl: A breeding site for *Anas bahamensis*, *Charadrius wilsonius*, *Himantopus himantopus* and *Sterna albifrons*. Non-breeding visitors include *Podilymbus podiceps*, *Pelecanus occidentalis*, eight species of Ardeidae, *Anas discors*, 21 species of migratory shorebirds and 12 species of Laridae.

Other fauna: A breeding site for *Columba leucocephala* and a wintering area for *Falco peregrinus* and *F. columbarius*. The beaches are a major nesting site for Leatherback Turtles *Dermochelys coriacea*.

Threats: Pollution from domestic sewage and the dumping of rubbish from nearby residential areas. The pond has been proposed as a site for a marina and seaplane landing area.

Research and conservation: The portion of the pond not included within the National Wildlife Refuge should be managed to provide better cover and protection for wildlife.

Source: Fred W. Sladen.

Criteria for inclusion: 3a.

Perserverence Bay Pond (10)

Location: 18°22'N, 64°59'W; on the south coast of St. Thomas, 6 km west of Charlotte Amalie.

Area: 2.8 ha.

Altitude: 1-2m.

Province and type: 8.41.13; 07 & 08.

Site description: An inland mangrove swamp and brackish marshes subject to seasonal flooding and drying out.

Principal vegetation: Mangrove swamps with *Avicennia germinans*, *Laguncularia racemosa* and *Rhizophora mangle*.

Land tenure: No information.

Protection: Under the jurisdiction of Coastal Zone Management, U.S. Virgin Islands Government.

Land use: Some illegal hunting.

Waterfowl: *Podilymbus podiceps*, *Anas bahamensis* and *Gallinula chloropus* probably breed. Depending of the depth of the pond, the shallow sections often attract feeding *Himantopus himantopus* which may also breed. The wetland is used by a variety of migrants including *Anas americana*, *A. discors*, *Tringa melanoleuca*, *T. flavipes* and *Micropalama himantopus*.

Other fauna: No information.

Threats: Disturbance from illegal hunting.

Source: Robert L. Norton.

Criteria for inclusion: 3a.

Mangrove Lagoon and Benner Bay (11)

Location: 18°19'N, 64°52'W; on the southeast coast of St. Thomas, 7 km ESE of Charlotte Amalie.

Area: 345 ha (including 40 ha of mangroves).

Altitude: 0m.

Province and type: 8.41.13; 01, 03, 06, 07 & 08.

Site description: A shallow sea bay (Benner Bay), a saline lagoon, over 2m deep, with wide connection to the sea (Mangrove Lagoon), and several offshore cays including Bovoni, Patricia and Cas Cays; with extensive mangrove swamps, intertidal mudflats and beds of sea grasses. The mangrove swamps and beds of sea grasses have been much reduced by shoaling and pollution. Mangrove Lagoon has a salinity of about 42 p.p.t., and is subject to periodic flooding and drying out.

Principal vegetation: Beds of sea grasses, and mangrove swamps with *Avicennia germinans*, *Laguncularia racemosa* and *Rhizophora mangle*.

Land tenure: Privately owned.

Protection: Under the jurisdiction of Coastal Zone Management, U.S. Virgin Islands Government, but there is little real enforcement.

Land use: The wetland was little disturbed until the late 1960s, but there is now a considerable amount of development and pollution in the area, and parts of the wetland have been filled.

Waterfowl: An important area for a wide variety of breeding, passage and wintering waterfowl. Breeding species include *Nyctanassa violacea*, *Egretta caerulea*, *E. tricolor*, *E. thula*, *E. alba*, *Ardea herodias*, *Anas bahamensis*, *Rallus longirostris*, *Charadrius wilsonius*, *C. vociferus* and *Himantopus himantopus*. *Pelecanus occidentalis* is a common non-breeding visitor. Common passage migrants and winter visitors include *Anas discors*, *Charadrius semipalmatus*, *Tringa melanoleuca*, *T. flavipes*, *Actitis macularia*, *Arenaria interpres*, *Calidris pusilla*, *Micropalama himantopus* and *Larus atricilla*.

Other fauna: The White-crowned Pigeon *Columba leucocephala* is a resident breeder and *Pandion haliaetus*, *Falco peregrinus* and *Ceryle alcyon* occur on passage and in winter. The area was formerly a very important nursery ground for many species of fishes and is still important for juvenile sea turtles, Spiny Lobster *Panulirus argus* and Tarpon *Megalops atlantica*. There are some good quality patch and fringing coral reefs offshore.

Threats: The wetlands are under threat from a variety of sources, and much of the area has already been seriously degraded. The principal threats include: pollution of various kinds; filling and dredging for marina development; nutrient-rich run-off from an overloaded and malfunctioning sewage treatment plant; sewage from boats anchored in Benner Bay; the dumping of rubbish including old automobiles; and increased sedimentation as a result of erosion on nearby slopes.

Research and conservation: Norton has conducted a number of waterfowl surveys, and Raffaele has recently published a bird list for the area. Baker identified Mangrove Lagoon and Benner Bay as a priority area for protection, and the wetlands have been included in a larger area proposed as a National Marine Sanctuary. However, a cleaning up operation would be necessary to restore the seriously disturbed areas.

References: Baker (1980); Raffaele (1983).

Source: Robert L. Norton.

Criteria for inclusion: 2c & 3a.

Vessup Bay Pond (12)

Location: 18°19'N, 64°51'W; near Red Hook, at the eastern end of St. Thomas.

Area: 2.8 ha.

Altitude: 1m.

Province and type: 8.41.13; 07 & 08.

Site description: A shallow coastal pond, up to 2m deep, with mangrove fringe, subject to periodic flooding from nearby upland areas. The beach ridge separating the pond from the bay has recently been broken, allowing free flow of bay water into the pond. Salinities range from almost fresh to hypersaline (38.7 p.p.t. in October 1983).

Principal vegetation: Mangrove swamps with *Avicennia germinans* and *Rhizophora mangle*.

Land tenure: Owned by the Virgin Islands Port Authority, U.S. Virgin Islands Government.

Protection: Under the jurisdiction of Coastal Zone Management, U.S. Virgin Islands Government.

Land use: A major road runs the length of the pond, and there is a parking lot at one end.

Waterfowl: A resting and feeding area for local populations of *Podilymbus podiceps*, *Anas bahamensis*, *Gallinula chloropus* and *Himantopus himantopus*. Migrants include *Egretta caerulea*, *Ardea herodias*, *Anas discors* and *Aythya collaris*.

Other fauna: *Ceryle alcyon* occurs in winter.

Threats: There are government plans to dredge the pond and promote marina development.

Research and conservation: Some waterfowl surveys have been conducted by Norton.

Source: Robert L. Norton.

Criteria for inclusion: 3a.

Magen's Bay Wetland (13)

Location: 18°22'N, 65°55'W; 1 km north of Charlotte Amalie, St. Thomas.

Area: 3.6 ha.

Altitude: 1-2m.

Province and type: 8.41.13; 05, 07 & 08.

Site description: A brackish marsh with mangrove swamps, separated from the sea by a sand barrier and sandy beach.

Principal vegetation: Mangrove swamp with *Laguncularia racemosa* and *Rhizophora mangle*.

Land tenure: Government property (Magen's Bay Authority).

Protection: Under the jurisdiction of Coastal Zone Management, U.S. Virgin Islands Government.

Land use: Public recreation along the beach; development to the south.

Waterfowl: An important area for resident *Nyctanassa violacea*, *Butorides virescens* and *Gallinula chloropus*; and a wintering area for *Gallinago gallinago*.

Other fauna: A major wintering area for migrant passerines, and a roosting area for bats. There is a large colony of *Cardisoma* sp in the muddy substrate, and the eel *Anguilla anguilla* has been collected in the swamp.

Threats: Development of surrounding areas, and the possible draining of the swamp as mosquito control.

Research and conservation: Norton and colleagues have conducted annual bird censuses since 1977. The wetland is presently under the control of the Department of Conservation and Cultural Affairs (DCCA) and Coastal Zone Management, and has been designated by the DCCA as an area of concern.

Source: Robert L. Norton.

Criteria for inclusion: 3a.

Mary Point Pond (14)

Location: 18°22'N, 64°45'W; near Mary Point at the northernmost tip of St. John.

Area: 4.8 ha.

Altitude: 0-1m.

Province and type: 8.41.13; 04, 05, 07 & 08.

Site description: A slightly brackish pond, over 1m deep, with muddy shoreline, fringing mangrove swamps and brackish marshes; and nearby sandy beaches and rocky shores. The pond is subject to periodic flooding and drying out.

Principal vegetation: Red Mangroves *Rhizophora mangle*; secondary forest and scrub with many introduced species in surrounding areas.

Land tenure: Owned by the U.S. National Park Service.

Protection: Within the Virgin Islands National Park (3,644 ha of land and 2,429 ha of sea) established in 1956, and designated a Biosphere Reserve (6,127 ha) in 1976. Under the jurisdiction of the National Park Service in the Federal Government.

Land use: Outdoor recreation; there is public access to a nearby beach and residential development in neighbouring areas. Extensive plantation agriculture in the past destroyed all the native terrestrial vegetation in the area.

Waterfowl: Breeding birds include *Podilymbus podiceps*, *Anas bahamensis*, *Rallus longirostris*, a hybrid population of *Fulica americana* and *F. caribaea*, and *Himantopus himantopus*. *Pelecanus occidentalis* is a common non-breeding visitor, and several species of Ardeidae, *Anas discors* and a variety of shorebirds are common on passage and in winter.

Other fauna: *Pandion haliaetus*, *Falco peregrinus* and *Ceryle alcyon* occur as winter visitors.

Threats: There is residential development in the area, and increased sedimentation as a result of nearby road improvements is causing problems. The introduced mongoose *Herpestes auropunctatus* poses a threat to breeding birds.

References: IUCN (1982); Raffaele (1983).

Source: Robert L. Norton.

Criteria for inclusion: 3a.

Other wetlands on St. John (15)

Location: 18°20'N, 64°45'W; along the south coast and around Coral Bay, St. John.

Area: Seven wetlands totalling 20.8 ha.

Altitude: 0-2m.

Province and type: 8.41.13; 07 & 08.

Site description: Seven small brackish to saline ponds with mangrove swamps: Friis Bay Pond (0.4 ha); Grootpan Bay Pond (9.9 ha); Lameshur Bay Pond (0.8 ha); Calabash Boom Pond (0.4 ha); Europa Bay Pond (6.0 ha); Fortsberg Pond (1.9 ha); and Hart Bay Pond (1.4 ha).

Most are 1-2m deep; salinities range from almost fresh (Lameshur Bay and Hart Bay) to 20-30 p.p.t. (Friis Bay and Europa Bay); all are subject to seasonal fluctuations in water level.

U.S. Virgin Islands

Principal vegetation: All ponds have some mangroves, either *Avicennia germinans* or *Rhizophora mangle* or both.

Land tenure: Grootpan Bay, Lameshur Bay and Europa Bay Ponds are owned by the National Park Service; Fortsberg Pond is privately owned; the ownership of the others is unknown.

Protection: Grootpan Bay, Lameshur Bay and Europa Bay Ponds are within the Virgin Islands National Park (6,073 ha) established in 1956, and Biosphere Reserve (6,127 ha) established in 1976. The other ponds are under the jurisdiction of Coastal Zone Management, U.S. Virgin Islands Government, but there is little real enforcement.

Land use: Hunting and bird-watching at ponds in the National Park. A road runs close to Friis Bay Pond and Fortsberg Pond, and there is residential development and road construction on the slopes above Hart Bay Pond.

Waterfowl: Similar to Mary Point Pond (site 8).

Other fauna: No information.

Threats: Increased sedimentation from nearby road construction and/or housing developments is causing problems at all seven ponds, and there is some disturbance from domestic animals at Fortsberg Pond.

Research and conservation: Shorebird and duck surveys have been carried out by Norton at all ponds except Friis Bay Pond.

Source: Robert L. Norton.

Criteria for inclusion: 3a.