

NETHERLANDS ANTILLES

INTRODUCTION

by Bart A. de Boer

The six islands of the Netherlands Antilles consist of a group of three "Leeward" islands (Aruba, Bonaire and Curacao) and three "Windward" islands (Saba, Sint Eustatius and Sint Maarten). The total area of the six islands is approximately 992 km². The two groups are about 900 km apart and show considerable differences in flora and fauna.

The Leeward group lies about 80 km off the coast of Venezuela, between 11°N and 12°N, and between 68°W and 70°W. The climate is semi-arid, characterized by low precipitation (annual mean on Curacao 560 mm) and high temperatures (annual mean 27°C). The main rainy season is reported to be from October to January and the lesser rainy season in May, but heavy rainfall may occur outside these periods, while the supposedly rainy months may remain dry. The vegetation consists mainly of xerophytic shrubs and cacti. There is little agriculture but goats are abundant and cause considerable damage to the vegetation. The demands on land for housing construction are becoming increasingly great. Curacao is the most densely populated of the three islands (160,000 inhabitants), followed by Aruba (60,000) then Bonaire (8,000). The fauna is a mixture of Caribbean and continental South American. In winter, migrant birds from both North and South America may visit the islands.

The Windward group lies about 250 km east of Puerto Rico, at approximately 17-18°N and 63°W. Rainfall is twice as high as in the Leeward group, and the rainy season, November, is more sharply defined. The annual mean temperature is 26.8°C. In the lowlands, the vegetation has a semi-arid appearance but high in the hills, dense woodlands occur. The islands lie in the hurricane belt. There is little agriculture but here also goats cause extensive damage. St. Maarten is divided into a Dutch and a French part. In the Dutch part, much of the landscape has been damaged by the construction of hotels and villas. The population of the three islands is about 20,000 (St. Maarten 17,500; St. Eustatius 1,500; and Saba 1,000). The fauna of this group is typically Caribbean, with a number of Nearctic migrants occurring on passage and in winter.

There are few wetlands in the Netherlands Antilles. Saba and St Eustatius have none at all, and on Curacao only some small inner bays bordered by mangroves are of any significance. Aruba has a number of reef islands which are important breeding sites for several species of terns Laridae including the Cayenne Tern *Sterna sandvicensis eurygnatha*. Another important site is a freshwater sewage pond (Bubali Pond) with herons and egrets Ardeidae, grebes Podicipedidae, pelicans Pelecanidae, cormorants Phalacrocoracidae and coots Rallidae. Bonaire is famous for its flamingo breeding colony in the midst of a large solar salt industrial complex. The borders of the Lac, a large shallow sea bay, have a dense mangrove fringe which supports numerous herons and egrets. The lakes Goto and Slagbaai, both situated in the Washington-Slagbaai National Park, are highly saline lagoons with good feeding habitat for numerous shorebirds. St. Maarten possesses a few large saline lagoons and various smaller freshwater ponds. There is some good but rather disturbed feeding habitat for herons, egrets, ducks and shorebirds, but few birds breed. Some small cays off the coast provide nesting habitat for the terns *Sterna anaethetus*, *S. fuscata* and *Anous stolidus*, Laughing Gull *Larus atricilla*, and the tropic-birds *Phaethon aethereus* and *P. lepturus*.

In all, sixty-five species of waterfowl have occurred in the islands; twenty breed, twenty-eight occur as winter visitors, and seventeen occur on migration or as vagrants. Of the breeding species, the Caribbean Flamingo *Phoenicopterus ruber ruber* has received the most attention. The flamingo sanctuary on Bonaire constitutes the main if not the only breeding site for the entire south Caribbean population of some 17,000 to 18,000 birds. In years of high rainfall, 3,000 - 4,000 pairs may nest on Bonaire. Outside the breeding season, about 1,000 birds remain on the island. Changes in water flow have had an adverse effect on the food species of the flamingos in the salt pans, and the number of birds feeding in the industrial complex has decreased in recent years.

The local race of the Striated Heron *Butorides virescens curacensis* is the only endemic subspecies of waterfowl in the Netherlands Antilles. It is restricted to the islands of Aruba, Bonaire and Curacao, where it is fairly common. However, there seems to be some interbreeding with birds of the nominate race from South America as adult birds with intermediate plumage have been collected.

Shorebirds are found throughout the islands along the shores of the numerous bays and saline lagoons. In winter, their numbers are swelled considerably with the arrival of migrants from North America. Because of the lack of extensive freshwater habitats, species dependent on these, such as ducks, coots and rails are scarce, and their occurrence is dependent on the presence of temporary pools after heavy rains.

Institutional Base for Wetland Conservation and Research

The organization concerned with conservation in the Netherlands Antilles is the Netherlands Antilles National Parks Foundation (Stichting Nationale Parken Nederlandse Antillen - STINAPA), with its headquarters in Curacao. The research organization is the Caribbean Ecological Institute (Caraibisch Marien-Biologisch Instituut - CARMABI), also in Curacao. Both organizations are non-governmental, although CARMABI is heavily dependent on governmental funding.

Progress in Wetland Conservation and Research

No special legislation exists nor does any programme exist concerning the conservation of wetlands. However, several areas have been designated as bird sanctuaries. On Aruba, the Bubali Pond has been declared a bird sanctuary; on Bonaire, 55 ha in the industrial salt complex were declared a bird sanctuary in 1969, and Slagbaai and Gotomeer are included within the Washington-Slagbaai National Park, established in 1969. As a Contracting Party to the Ramsar Convention, the Dutch Government has designated six sites in the Netherlands Antilles (Lac, Pekelmeer, Little Bonaire, Gotomeer, Slagbaai and Spaans Lagoon) for inclusion in the List of Wetlands of International Importance.

There is no legal exploitation of waterfowl in the Netherlands Antilles, but some illegal egg-collecting for consumption occurs at the tern colonies on Aruba.

Almost all waterfowl research has centred on the flamingo population on Bonaire. This has been the subject of two major investigations. J. Rooth investigated habitat, diet and reproduction of the flamingos in 1959/60, and the author conducted research on the food situation, breeding success and habitat on Bonaire and in Venezuela from 1975 to 1980 (partly a WWF project).

Major Threats to Wetlands

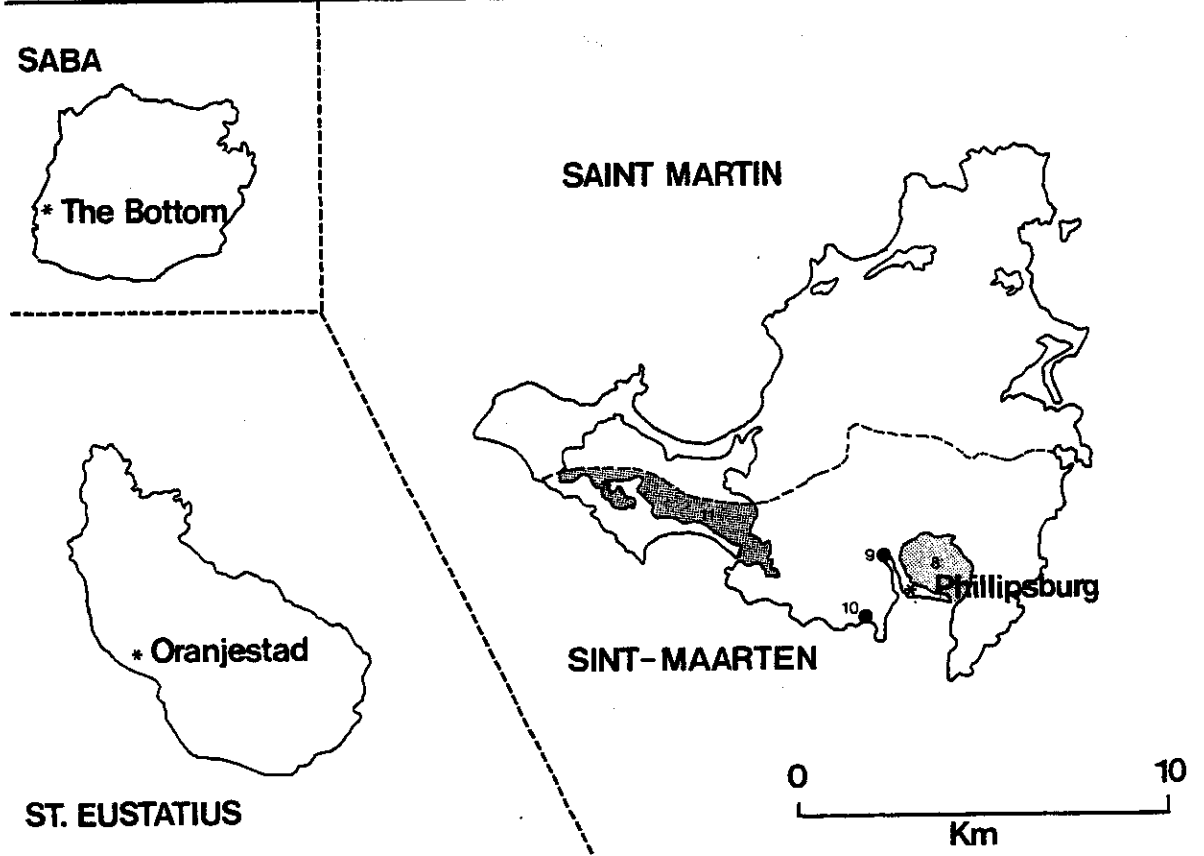
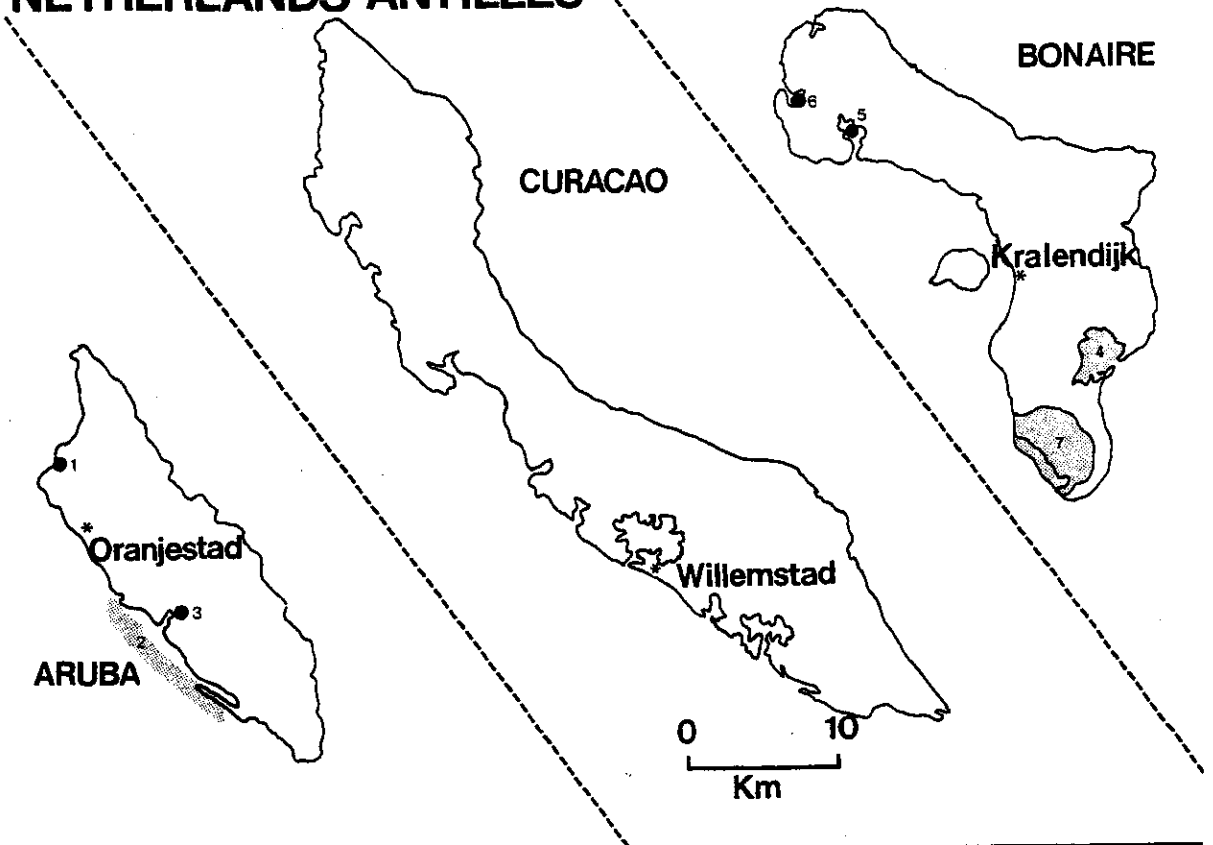
While the threats to wetlands differ somewhat from island to island, the main threat throughout is the destruction of habitat in land development projects for tourism, agriculture and industry.

On Aruba, Bubali Pond gets its water from the sewage outlet of several big hotels. Government plans exist to use this water for agricultural projects, cutting off the water supply to the pond. One of the reef islands on which *Sterna sandvicensis eurygnatha* breeds is polluted by oil from the nearby Lago Refinery. This refinery will, however, close down in March 1985.

On Bonaire, a holiday village is being built near the Lac wetland and parts of the mangroves have been destroyed. In the industrial salt complex, gypsum is settling on the bottoms of the salt condensers. The flamingos are no longer able to get to the brine fly larvae in the mud and have switched to a diet of small snails. It is not clear if the snail population can withstand this predation pressure, and it may be that the flamingos will lose their main food supply on Bonaire.

On the Dutch part of St. Maarten, all the wetlands are being seriously threatened by the rapidly developing tourist industry and the vegetation of most of the lagoons has already been badly damaged.

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WETLANDS

Site descriptions based on data sheets provided by Bart A. de Boer, Vera Rooze and J. Vliegen.

Bubali Pond (1)

Location: 12°34'N, 70°03'W; 5 km north of Oranjestad, Aruba.

Area: 30 ha.

Altitude: 0m.

Province and type: 8.17.4; 07 & 08.

Site description: A shallow slightly brackish lake, up to 1m deep, and brackish marshes created by the discharge of purified domestic sewage into a former saline lagoon; with some mangroves. Salinities range from less than 1 p.p.t. in the lake to 5.8 p.p.t. in the marshes to the east of the lake. The water level fluctuates according to the discharge of sewage, and parts of the marshes in the east dry out in summer.

Principal vegetation: Mangrove swamps with *Avicennia germinans* and *Conocarpus erectus*; marshes with *Typha domingensis* and *Batis maritima*.

Land tenure: Owned by the Island Government of Aruba.

Protection: Declared a Sanctuary, but no special protection measures have been implemented.

Land use: Occasional illegal hunting. There is a hotel and residential area nearby.

Waterfowl: A wide variety of waterfowl have been recorded, particularly Ardeidae and migrant shorebirds. Peak counts have included 200 *Nycticorax nycticorax*, 200 *Egretta thula*, 50 *E. alba*, 50 *Ardea herodias*, 200 *Anas discors* and 100 *Charadrius vociferus*. The area is especially noteworthy for the number of species which occur as occasional passage migrants, but which are rare elsewhere in the islands, e.g. *Plegadis falcinellus*, *P. chihi*, *Eudocimus albus* and *Rynchops niger*.

Other fauna: No information.

Threats: The water supply may be cut off in future as the Government is considering using the treated sewage for agricultural projects. Eutrophication and siltation are causing some problems, and botulism has occurred. A few cases were suspected in 1980 and 1981, but there have been no major outbreaks. There is some illegal hunting of birds and iguanas, and feral dogs destroy some birds' nests.

Research and conservation: Bubali Pond is the only brackish lake in the southern group of the Netherlands Antilles, and has a diverse fauna and flora unique in this group. Regular ornithological surveys were made by Eef Jansen in the 1970s, but little reliable information has been accumulated since then. Being very accessible to nearby hotels, the pond is particularly suitable for nature tourism. STINAPA-Aruba has emphasised the importance of the Sanctuary for tourism, and a proposal has been made to designate the wetland as a Ramsar Site. The Government has been requested to provide funds for an ecological study of the Sanctuary prior to making decisions about future projects using the treated sewage, but there has been no progress to date.

References: Voous (1983).

Source: Vera Rooze.

Criteria for inclusion: 2b.

Reef islands of Aruba (2)

Location: 12°27'N, 69°58'W; 1 km off the southwest coast of Aruba.

Area: c.300 ha.

Altitude: 1-2m.

Province and type: 8.17.4; 03, 05 & 08.

Site description: A chain of nine long thin sandy islands about 1 km off the southwest shore of Aruba Island. There are some mangroves on the islands north of Spanish Lagoon.

Principal vegetation: *Batis maritima*, *Sesuvium portulacastrum* and *Suriana maritima*.

Land tenure: Owned by the Island Government of Aruba.

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Protection: No legal protection, but the islands are patrolled by guards from the nearby oil refinery.

Land use: Public recreation, particularly sailing, and collection of birds' eggs for human consumption.

Waterfowl: The islands near the Lago Refinery are an important breeding area for several species of terns including *Sterna sandvicensis eurygnatha* (1,000-2,500 pairs), *Sterna dougallii* (50 pairs), *Sterna hirundo* (50-70 pairs), and *Sterna albifrons* (10 pairs). The mangrove islands are an important roosting site for *Fregata magnificens* and breeding site for *Pelecanus occidentalis* (20 pairs in 1980).

Other fauna: No information.

Threats: The intensive collection of terns' eggs on the islands near the Lago Refinery has resulted in a decline in the breeding populations. The possibility of oil pollution is considered as only a minor threat, and the refinery is to be closed down in March 1985.

Research and conservation: The islands have been proposed for designation as a Ramsar Site.

References: Jansen *et al* (1982); Voous (1983).

Source: Vera Rooze.

Criteria for inclusion: 2c & 3a.

Spaans Lagoon (Spanish Lagoon) (3)

Location: 12°29'N, 70°00'W; 10 km east of Oranjestad, on the south coast of Aruba.

Area: 70 ha.

Altitude: 0m.

Province and type: 8.17.4; 01, 06 & 08.

Site description: A narrow coastal inlet 2 km long and 200-500m wide, fringed by tidal mudflats and mangrove swamps.

Principal vegetation: Mangroves.

Land tenure: Owned by the Island Government of Aruba.

Protection: Protected as a Conservation Area under the administration of STINAPA. The lagoon was designated as a Ramsar Site in 1980.

Land use: None.

Waterfowl: An important resting and feeding area for a wide variety of water birds.

Other fauna: An important nursery area for species of fishes and crustaceans.

Threats: None known.

References: Kristensen (1980); IUCN (1984).

Source: See references.

Criteria for inclusion: 2c & 3a.

Lac (4)

Location: 12°06'N, 68°14'W; 10 km southeast of Kralendijk, Bonaire.

Area: 800 ha.

Altitude: 0m.

Province and type: 8.17.4; 01 & 08.

Site description: A shallow sea bay, up to 10m deep, with narrow connection to the sea, and some fringing mangrove swamps.

Principal vegetation: Mangrove swamps with *Avicennia germinans* and *Rhizophora mangle*; *Sesuvium portulacastrum* and beds of *Thalassia testudinum*.

Land tenure: Owned by the Island Government of Bonaire.

Protection: Within the Bonaire Underwater Park (6,000 ha) established in 1979. 700 ha of the wetland were designated as a Ramsar Site in 1980.

Land use: Conch fishing, and public recreation.

Waterfowl: The mangroves are an important breeding site for *Butorides virescens curacensis*, *Egretta caerulea*, *E. tricolor* and *E. thula*; and *Pelecanus occidentalis* has attempted to nest. A variety of Nearctic shorebirds occur on passage and in winter.

Other fauna: There was a large population of the Queen Conch *Strombus gigas*, but this was heavily overfished, and efforts are now underway to repopulate the area. The Giant Sea-star *Oreaster reticulatus* also occurs.

Threats: Overfishing of the conch population. The development of a tourist village nearby has resulted in the destruction of some mangroves.

References: Kristensen (1980); IUCN (1982 & 1984).

Source: Bart A. de Boer.

Criteria for inclusion: 3a.

Goto-meer (5)

Location: 12°14'N, 68°22'W; 15 km northeast of Kralendijk, Bonaire.

Area: 400 ha.

Altitude: 0m.

Province and type: 8.17.4; 07.

Site description: A permanent shallow saline lagoon separated from the sea by a bar of coral rubble, and with surrounding salt flats. The salinity varies from 40-80 p.p.t.; and the water level is maintained by seepage of sea-water through the coral bar.

Principal vegetation: Salt flat vegetation with *Batis maritima* and *Suriana maritima*. In a region of dry tropical woodland with *Acacia tortuosa*, *Prosopis juliflora*, *Cereus repodus* and *Lemaireocereus griseus*.

Land tenure: Owned by STINAPA (Netherlands Antilles National Park Foundation).

Protection: Within the Washington-Slagbaai National Park (5,900 ha), established in 1969 and enlarged in 1977. 150 ha of the wetland were designated as a Ramsar Site in 1980.

Land use: Tourism within the National Park.

Waterfowl: An important feeding area for *Phoenicopiterus ruber*, with 100-500 birds regularly present. Several species of Ardeidae including *Nyctanassa violacea*, *Butorides virescens curacensis* and *Egretta tricolor* have nested. Other breeding species include *Anas bahamensis*, *Haematopus palliatus*, *Charadrius alexandrinus*, *C. wilsonius*, *Himantopus himantopus*, *Larus atricilla* and *Sterna albifrons*. The lagoon is very important during the migration seasons for Nearctic shorebirds; common species include *Pluvialis squatarola*, *Charadrius semipalmatus*, *Numenius phaeopus*, *Arenaria interpres*, *Limnodromus griseus*, *Calidris canutus*, *C. alba*, *C. pusilla*, *C. mauri*, *C. minutilla*, *C. melanotos* and *Micropalama himantopus*. Up to 200 *Anas discors* have occurred in winter.

Other fauna: The brine shrimp *Artemia salina* and the brine fly *Ephydra* sp are abundant and constitute a valuable food source for birds.

Threats: There is a potential threat of oil pollution from a nearby oil terminal, and plans exist for the construction of an oil refinery nearby.

Research and conservation: The avifauna of the area has been well documented.

References: de Boer (1979a); Stinapa (1979); Kristensen (1980); Hof & Kristensen (1982); IUCN (1982 & 1984); Jansen *et al* (1982).

Source: Bart A. de Boer.

Criteria for inclusion: 1b & 3a.

Slagbaai (6)

Location: 12°16'N, 68°25'W; 20 km northeast of Kralendijk, Bonaire.

Area: 250 ha.

Altitude: 0m.

Province and type: 8.17.4; 07.

Site description: A permanent shallow saline lagoon, up to 2m deep, separated from the sea by a bar of coral rubble, and with surrounding salt flats. The lagoon is hyperhaline for most of the year (salinity up to 80 p.p.t.), but becomes brackish after heavy rains. Evaporation is partly compensated by a constant seepage of sea-water through the coral bar.

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Principal vegetation: Salt flats with *Batis maritima* and *Suriana maritima*. In a region of dry tropical woodland with *Acacia tortuosa*, *Prosopis juliflora*, *Cereus reponus* and *Lemaireocereus griseus*.

Land tenure: Owned by STINAPA (Netherlands Antilles National Park Foundation).

Protection: Within the Washington-Slagbaai National Park (5,900 ha), established in 1969 and enlarged in 1977. 90 ha of the lagoon were designated as a Ramsar Site in 1980.

Land use: Tourism within the National Park.

Waterfowl: An important feeding area for up to 300 *Phoenicopiterus ruber*, and resting area for up to 50 *Phalacrocorax olivaceus*. Important for a variety of Nearctic shorebirds during the migration seasons.

Other fauna: Brine shrimps *Artemia salina* and brine flies *Ephydra* sp are abundant.

Threats: None.

References: Stinapa (1979); Kristensen (1980); Hof & Kristensen (1982); IUCN (1982 & 1984); Jansen *et al* (1982).

Source: Bart A. de Boer.

Criteria for inclusion: 1b & 3a.

AISCO Complex (7)

Location: 12°02'N, 68°15'W; 10 km south of Kralendijk, at the south end of Bonaire.

Area: 2,000 ha.

Altitude: 0m.

Province and type: 8.17.4; 07.

Site description: A complex of shallow saline lagoons (salt condensers); formerly a natural hyperhaline lagoon (Pekelmeer) separated from the sea by a ridge of recrystallized coral debris (beachrock), but converted into a series of impoundments for the commercial exploitation of salt, and now connected to the sea by a channel at the eastern end. The maximum depth of the lagoons is 5m, and the salinity ranges from 40-200 p.p.t.

Principal vegetation: Only some sparse algal growth.

Land tenure: Owned by the Antillean International Salt Company (AISCO).

Protection: 55 ha within the complex were made into a Flamingo Sanctuary in 1969; the remainder of the area is unprotected. 400 ha, including the Sanctuary, were designated as a Ramsar Site in 1980.

Land use: Exploitation of salt. No visitors are allowed into the Flamingo Sanctuary during the breeding season.

Waterfowl: One of the most important breeding sites for the Caribbean Flamingo *Phoenicopiterus ruber ruber* and the only known regular breeding site of the south Caribbean population. On average, about 1,000 pairs breed each year, but as many as 3,000 pairs have nested at one time. Other breeding species include *Charadrius alexandrinus*, *Himantopus himantopus* and *Sterna* spp. The lagoons are also important as feeding areas for Ardeidae and migratory shorebirds.

Other fauna: No information.

Threats: The settling of gypsum on the bottom of the salt condensers has made it impossible for the flamingos to reach the brine fly larvae which constituted their principal diet. The birds have switched to feeding on several species of snail, but the sudden changes in salinity threaten the snail populations. Disturbance from visitors and aircraft overflying the lagoons have caused problems.

Research and conservation: A considerable amount of research has been conducted on the flamingo population, and attempts have been made to manage the sanctuary for the birds. However, as the feeding conditions in the salt complex have changed, the feeding sites along the Venezuelan coast have become relatively more important to the flamingos, particularly during the breeding season.

References: Rooth (1965, 1975, 1976 & 1982); de Boer (1979a, 1979b & in prep); Kristensen (1980); IUCN (1982 & 1984).

Source: Bart A. de Boer.

Criteria for inclusion: 1c & 2c.

Great Salt Pond (8)

Location: 18°02'N, 63°03'W; north of Philipsburg, Sint Maarten.
Area: 225 ha.
Altitude: 0m.
Province and type: 8.41.13; 07.
Site description: A permanent saline lagoon, up to 10m deep, with salinities ranging from 30-100 p.p.t.; surrounded by shrubland.
Principal vegetation: No information.
Land tenure: Owned by the Island Government of Sint Maarten.
Protection: None.
Land use: Dumping of rubbish.
Waterfowl: A feeding area for Ardeidae (*Nyctanassa violacea*, *Butorides virescens* and *Egretta thula*) and migratory shorebirds.
Other fauna: No information.
Threats: Illegal infilling with rubbish.
Source: J. Vliegen.
Criteria for inclusion: 3a.

Freshpond (9)

Location: 18°02'N, 63°03'W; immediately to the west of Great Salt Pond, north of Philipsburg, Sint Maarten.
Area: 2 ha.
Altitude: 0m.
Province and type: 8.41.13; 13.
Site description: A permanent freshwater pond, up to 3m deep, with some marsh vegetation.
Principal vegetation: No information.
Land tenure: Owned by the Island Government of Sint Maarten.
Protection: None.
Land use: Dumping of rubbish.
Waterfowl: Little information is available; *Gallinula chloropus* breeds and a variety of Ardeidae and shorebirds occur.
Other fauna: No information.
Threats: Illegal infilling with rubbish.
Research and conservation: One of the few permanent freshwater wetlands in the Netherlands Antilles.
Source: J. Vliegen.
Criteria for inclusion: 2b.

Little Bay Pond (10)

Location: 18°01'N, 63°04'W; 1.5 km east of Philipsburg, Sint Maarten.
Area: 2 ha.
Altitude: 0m.
Province and type: 8.41.13; 13.
Site description: A permanent freshwater pond, up to 3m deep, with some marsh vegetation.
Principal vegetation: No information.
Land tenure: Owned by the Island Government of Sint Maarten.
Protection: None.
Land use: In 1981, the area was prepared as a building site, but construction was halted following the bankruptcy of the company involved. The vegetation was totally destroyed, but it is now recovering.
Waterfowl: Little information is available; *Gallinula chloropus* breeds, and a variety of Ardeidae and migratory shorebirds occur.
Other fauna: No information.

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Threats: The area may once again be threatened by development.

Research and conservation: One of the few permanent freshwater wetlands in the Netherlands Antilles.

Source: J. Vliegen.

Criteria for inclusion: 2b.

Simpson Bay Lagoon (11)

Location: 18°03'N, 63°07'W; in the western part of Sint Maarten / Saint Martin.

Area: 1,250 ha.

Altitude: 0m.

Province and type: 8.41.13; 07.

Site description: A large permanent saline lagoon, up to 6m deep, with a relatively stable water level and a salinity of 33 p.p.t. About half of the lagoon lies in the French part of the island (see French Antilles site 10).

Principal vegetation: Formerly mangrove swamps, but these have been destroyed.

Land tenure: Owned by the Island Government of Sint Maarten.

Protection: Designated as a Protected Wetland, but no protective measures have been implemented.

Land use: Public recreation, particularly water sports.

Waterfowl: An important feeding area for a variety of Ardeidae and migratory shorebirds.

Other fauna: No information.

Threats: Excessive disturbance from water sports, and destruction of the shoreline vegetation. The mangroves have already been totally destroyed.

Research and conservation: Much the largest wetland on Sint Maarten and in the northern group of the Netherlands Antilles, and still potentially important for wildlife, but under considerable pressure from tourist development and recreation. The status of Protected Wetland has so far had little effect.

Source: J. Vliegen.

Criteria for inclusion: 3a.