

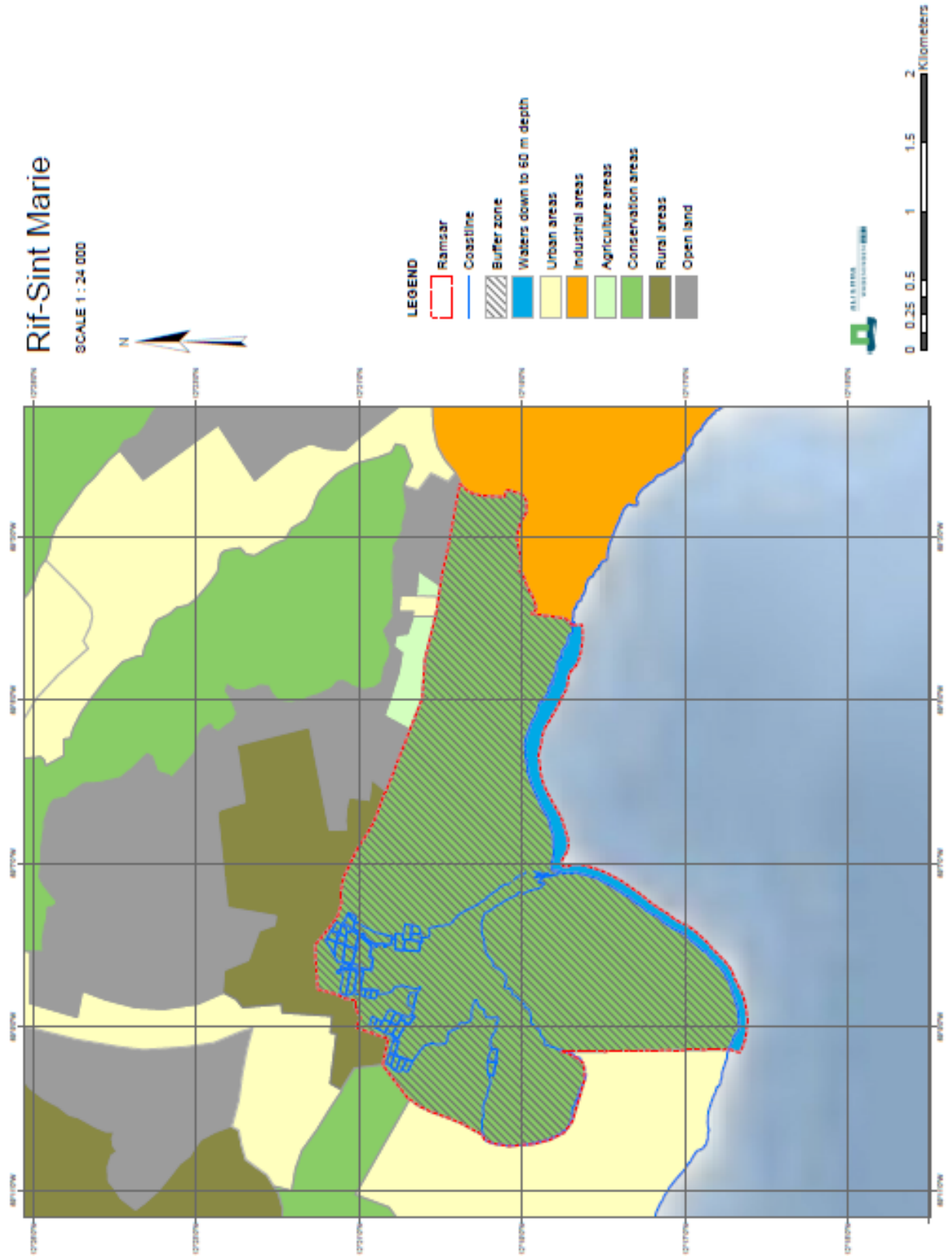
Curaçao

Proposed Ramsar area “Rif-Sint Marie”

Photographic impressions and map of the proposed Ramsar Area

1. Overview of the salina near St. Willibrordus which is included in this proposal.
2. The salina of Rif-Sint Marie is crucial to maintain viable populations of the Caribbean flamingo during the dry season when the larger wetlands of Venezuela (where part of the population forages) run dry.
3. Coral cover on these reefs locally exceeds that of the earliest historic baselines for Caribbean reef systems.
4. Old remnants of salt crystallizers that were used until the 1960's are still present inside this salina.
5. Overview across the salina near St. Willibrordus.
6. Large numbers of critically endangered Elkhorn coral (*Acropora palmata*; Koral kachu grandi) are abundant on the reefs that are found in front of the salina. Such healthy reefs provide the topographical complexity that attracts a large variety of fish species.
7. The salina is a foraging habitat for flamingos and several waterbirds, including osprey's that are shown here.
8. The shallow part (0 to 5 m depth) of the fringing coral reef in front of Rif St. Marie supports large colonies of the Elkhorn coral (*Acropora palmata*, Koral kachu grandi) and fields of Staghorn coral (Koral kachu di biná, *Acropora cervicornis*), both listed as Critically Endangered species under IUCN Red list.





Information Sheet on Ramsar Wetlands (RIS) – 2009-2012 version

Available for download from http://www.ramsar.org/ris/key_ris_index.htm.

Categories approved by Recommendation 4.7 (1990), as amended by Resolution VIII.13 of the 8th Conference of the Contracting Parties (2002) and Resolutions IX.1 Annex B, IX.6, IX.21 and IX. 22 of the 9th Conference of the Contracting Parties (2005).

Dr. Mark J.A. Vermeij (Science Director)
Valérie F. Chamberland (MSc.)
Carmabi Foundation
Piscaderabaai z/n, P.O. Box 2090
Willemstad, CURAÇAO
Phone: + (5999) 510 3067, Fax: + (5999) 462 7680
E-mail: m.vermeij@carmabi.org

FOR OFFICE USE ONLY.

DD MM YY

--	--	--

Designation date

--	--	--	--	--	--

Site Reference Number

2. Date this sheet was completed/updated: November 11 2012

3. Country: Curaçao, Kingdom of the Netherlands

4. Name of the Ramsar site: Rif-Sint Marie

5. Designation of new Ramsar site or update of existing site:

This RIS is for (tick one box only):

- a) Designation of a new Ramsar site ; or
b) Updated information on an existing Ramsar site

7. Map of site:

a) A map of the site, with clearly delineated boundaries, is included as:

- i) a **hard copy** (required for inclusion of site in the Ramsar List): ;
ii) an **electronic format** (e.g. a JPEG or ArcView image) ;
iii) a **GIS file providing geo-referenced site boundary vectors and attribute tables** .

b) Describe briefly the type of boundary delineation applied: The area of Rif-Sint Marie was designated as a conservation area in 1995 by means of the island zoning plan, locally known as the EOP ("Island Development Plan") (A. B. 1995, no.36). The Ramsar site follows the same delineations on its south eastern part, and ends just before Sint Willibrordus, a nearby town on its north western side. Adjacent sea waters, from Bullenbaai to Cap Sint Marie, down to a depth of 60 m depth are included in this proposal to include the well developed coral reefs that are found in this area.

8. Geographical coordinates: Approximate centre of the area: Latitude: 12°12'16"N, Longitude: 69°03'16"W

9. General location: Curaçao is an oceanic island in the Southern Caribbean Ecoregion. It lies approximately 70 km north of Venezuela and is part of the Leeward Antilles. The proposed Ramsar area Rif-Sint Marie is located on the southern side of the island, west from Bullenbaai and approximately 16 km west from Willemstad, the capital city of Curaçao that has 149.679 inhabitants (Central Bureau of Statistics Curaçao, 2011).

10. Elevation: Minimum: 0 m, Maximum: approximately 80 m (ASL)

11. Area (in hectares): 666.7

12. General overview of the site: The area of Rif-Sint Marie is relatively undisturbed and undeveloped and comprises a salina of approximately 130 ha, surrounded by mud flats, shrub land and forests. The salina is a foraging habitat for flamingos and several waterbirds. The coral reef of Rif-Sint Marie is well developed and shelters several threatened coral species (*Acropora* spp.).

13. Ramsar Criteria:

1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9

14. Justification for the application of each Criterion listed in 13 above:

Criterion 1: A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.

Corals (*Scleractinia*)- The shallow part (0 to 5 m depth) of the fringing coral reef in front of Rif-Sint. Marie supports large colonies of the Elkhorn coral (*Acropora palmata*, Koral kachu grandi) and fields of Staghorn coral (Koral kachu di biná, *Acropora cervicornis*), both listed as Critically Endangered species under IUCN Red list. Prior to the 1980's, Elkhorn and Staghorn coral dominated shallow reefs across the Caribbean until their population declined in the early 1980's due to a Caribbean wide mortality event caused by an unknown disease. Since then, they have declined further throughout the Caribbean due to outbreaks of white-band disease (WBD), a pathogen responsible for rapid and complete degradation of their tissue (Gladfelter 1982). Although quantitative data on the former distribution and abundance of these two endangered coral species are scarce, declines in abundance are estimated to more than 97% at a Caribbean wide scale (*Acropora* Biological Review Team 2005). Fields of the Vulnerable Pillar coral (*Dendrogyra cylindrus*) are commonly found between depths of 5 to 8 m, in front of Rif St. Marie. Two Endangered species, listed under the IUCN Red List, the Boulder Star coral (*Montastraea annularis*, Koral strea pilá) and the Mountainous Star coral (*Montastraea faveolata*, Koral strea seru) cover large areas of the forereef in this proposed Ramsar Area (Vermeij MJA, unpubl. data) (MJA Vermeij & VF Chamberland, pers. obs.). Coral cover on these reefs locally exceeds that of the earliest historic baselines for Caribbean reef systems (Vermeij MJA, unpubl. data). See also point 20.

Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.

Birds (Aves)- The salina of Rif-Sint Marie is an important foraging area for the Caribbean flamingo (*Phoenicopterus ruber*, Chochogo) which is listed as Conserved Through Agreements under appendix II of the Convention for Migratory Species (CMS) (Cuppens & Vogels 2004; Smelter 2005).

Table 1 provides an overview of all Migratory, Threatened, Vulnerable, Endangered, and Critically Endangered marine species that can be encountered in the area (International Union for Conservation of Nature (IUCN), Convention on International Trade in Endangered Species (CITES), Convention on Migratory Species (CMS)).

Table 1. Curaçaoan species listed under the IUCN Red List, CITES and CMS

Critically endangered (IUCN Red List)

Elkhorn coral (*Acropora palmata*) (CITES II)
 Staghorn coral (*Acropora cervicornis*) (CITES II)
 Leatherback sea turtle (*Dermochelys coriacea*) (CITES I)
 Hawksbill sea turtle (*Eretmochelys imbricata*) (CITES I)
 Goliath grouper (*Epinephelus itajara*)

Vulnerable (IUCN Red List)

Pillar coral (*Dendrogyra cylindrus*) (CITES II)
 Lamarck's Sheet coral (*Agaricia lamarcki*) (CITES II)
 Elliptical Star coral (*Dichocoenina stokesii*) (CITES II)
 Olive Ridley sea turtle (*Lepidochelys olivacea*) (CITES I)
 Mutton snapper (*Lutjanus analis*)
 Cubera snapper (*Lutjanus cyanopterus*)
 Yellowmouth grouper (*Mycteroperca interstitialis*)
 Snowy grouper (*Epinephelus niveatus*)
 Queen triggerfish (*Balistes vetula*)
 Hogfish (*Lachnolaimus maximus*)

Endangered (IUCN Red List)

Boulder Star coral (*Montastraea annularis*)
 Mountainous Star coral (*Montastraea faveolata*)
 Green sea turtle (*Chelonia mydas*) (CITES I)
 Loggerhead sea turtle (*Caretta caretta*) (CITES I)
 Nassau grouper (*Epinephelus striatus*)

Migratory species (CMS)

Leatherback sea turtle (*Dermochelys coriacea*) (App. I/II)
 Hawksbill sea turtle (*Eretmochelys imbricata*) (App. I/II)
 Olive Ridley sea turtle (*Lepidochelys olivacea*) (App. I/II)
 Green sea turtle (*Chelonia mydas*) (App. I/II)
 Loggerhead sea turtle (*Caretta caretta*) (App. I/II)
 Spinner dolphin (*Stenella longirostris*) (App. II)
 Humpback whale (*Megaptera novaeangliae*) (App. I)

CITES only

Queen conch (*Strombus gigas*) (CITES II)

Criterion 4: A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.

The salina of Rif-Sint Marie is crucial to maintain viable populations of the Caribbean flamingo during the dry season when the larger wetlands of Venezuela (where part of the population forages) run dry (Debrot & de

Freitas 1999). Furthermore, the increased abundance of flamingos on Curaçao since the early 90's suggests that the (growing) breeding population on the nearby island of Bonaire (up to 1,300 pairs nesting in Pekelmeer Saltworks IBA/Breeding Reserve/Ramsar site (Wells & Debrot 2008)) is spreading out and has started colonizing suitable habitats on neighboring islands, such as Curaçao (Debrot & de Freitas 1999). The salina of Rif-Sint Marie provides important food sources for these flamingos and is part of a network of feeding sites for this species, not only on Curacao itself, but also within the Southern Caribbean Ecoregion.

Criterion 8: A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.

The shallow reefs (0 to 4 m depth) of the proposed Ramsar site harbor dense populations of the Elkhorn coral (*Acropora palmata*, Koral kachu grandi) and large stands of Fire coral (*Millepora complanata*, Brantkoral), which both provide complex structural habitats for specific reef fish species that are crucial for these species as hiding places and nursery habitats (Nagelkerken 1974). Especially juveniles of the Smallmouth grunt (*Haemulon chrysargyrum*, Traki traki), Mahogany snapper (*Lutjanus mahogany*, Kalala), Blue tang (*Acanthurus coeruleus*, Kleinfeshi blou), Ocean surgeonfish (*Acanthurus bahianus*, Kleinfeshi blanku) and Sergeant Major (*Abudefduf saxatilis*, Katabòli) depend on the habitat provided by these (hydro)corals as critical nursery habitat (Nagelkerken et al. 2000a).

15. Biogeography

a) biogeographic region: Realm: Tropical Atlantic, Province: Tropical North-western Atlantic, Ecoregion: Southern Caribbean.

b) biogeographic regionalisation scheme: Marine Ecoregions of the World (MEOW) (Spalding et al. 2007).

16. Physical features of the site:

Geology & Geomorphology- Rif-Sint Marie and its surroundings are partly sitting on the Tertiary Middle Curaçao Formation and on the Cretaceous Diabase Lava Formation. The coastal area is rimmed by Quaternary Limestone Terraces, including a Lower Terrace, a Middle Terrace and a Higher Terrace. Small recent coral shingle, and beach rock lie on both sides of the opening of the Boka Sint Marie (De Buissonjé 1974).

The salina lays inland from a coral reef-fringed bay and is a former inland bay that had no direct connection to the open ocean (Boekschoten 1982). The total surface area of the salina is approximately 130 ha and it has an average depth of only a few meters. A man made canal now cuts through the barrier of coral debris and connects the salina with the open sea. The salina's salinity level is only slightly higher than sea water as a result of the man-made connection to the sea. Mean salinity lies around 40 ppt but varies spatially within the salina depending on the distance to the opening to the sea (Cuppens & Vogels 2004). Dissolved oxygen concentrations and mean temperature of the water inside the salina average around 8.6 mg/L and 31 °C respectively. Water clarity varies through time depending on precipitation and ranges between 9 and 150 cm. The soil of the salina consists mostly of clay but also includes silt, sand, gravel and small calcite crystals (Cuppens & Vogel 2004). The fringing coral reefs in the area are characterized by a narrow submarine terrace (<150 m wide) which gradually slopes from the shore to a drop-off at approximately 7 to 12 m depth. At the

drop-off, the reef slopes off steeply, sometimes interrupted by a small second terrace at 50 to 60 m, and ends in a sandy plain at 80 to 90 m (Bak 1975).

Climate- Based on the mean annual rainfall (573 mm), the climate on the island qualifies as semi-arid. Annual variations in temperature are small and average around 28 °C. Precipitation levels differ throughout the year and in the period between October and January rainfall is higher than all other months and generally referred to as the wet season (Meteorological Services of the Netherland Antilles and Aruba 2008).

Hydrology- Environmental parameters inside the lagoon such as temperature, salinity, pH and turbidity fluctuate heavily throughout the year and foremost dependent on the level of rainfall. The communities inside the lagoon change with changing water conditions that range from brackish conditions after heavy rainfall to hyper-saline conditions after prolonged drought. Curaçao's daily tidal range is small (30 cm), only during strong winds the tidal range can be bigger with a maximum of about 70 cm (de Haan & Zaneveld 1959).

17. Physical features of the catchment area: see previous sections

18. Hydrological values:

Dense thickets of Elkhorn coral sustain major ecological processes as gross community calcification and nitrogen fixation. Dense populations of this branching species dissipate wave energy and thus protect the coast (Mumby et al. 2008).

19. Wetland Types

a) presence:

Marine/coastal: **A** • B • C • D • E • F • G • H • I • J • K • Zk(a)

Human-made: 1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • Zk(c)

b) dominance: J-H-G-C-A-D-E-5

20. General ecological features:

Saliña- The marine life inside the Saliña Rif-Sint Marie includes the seagrass *Ruppia maritima*, marine invertebrates, along with a wide variety of fish species (mainly Cyprinodontids, Mullidae, Gerridae, Centropomidae, Albulidae and Elopidae), tunicates and jellyfish. In the sediments, oligochaetes and amphipodes are most commonly found while copepods are most abundant in the water column. Food sources for the flamingos that forage inside the Saliña primarily consist of small cyprinodontid, oligochaetes, snails and amphipodes. The mean biomass of all these potential food sources combined is on average 2.90 mg/dm³ (dry weight) (Cuppens & Vogel 2004). Since the water saliña is only slightly elevated in salinity relative to seawater, the Brine shrimp (*Artemia saliña*) is nearly absent while the Brine fly (*Ephydra cinerea*) is completely absent. Annual fluctuations in salinity levels of the saliña related to varying precipitation levels causes corresponding changes in the composition of the marine communities inside the bay (Cuppens & Vogel 2004). The saliña of Rif-Sint Marie rests on the Curaçao Lava formation which harbors three different vegetation types in the area. A *Sesuvium salina* vegetation type is commonly found on the north and west sides

of the salina, where it is subjected to limited flooding and consists of low herb vegetation consisting of mainly halophilic species (Beers et al. 1997).

Shrub land and forests - A *Bouyeria-Acacia tortuosa* escarpment is present in the south east section of the proposed Ramsar area together with an *Acacia tortuosa-Prosopis* vegetation type. The Limestone Terraces of the area are covered by two different vegetation types: a *Haematoxylon-Bourrea* dominated terrace on the south west and a *Coccoloba-Erihalis* dominated terrace on the south east. These vegetation types are respectively characterized by relatively dense thorny vegetation and species-rich and well developed vegetation including trees and low to medium-sized shrubs (Beers et al. 1997). Columnar cacti (*Stenocereus griseus* and *Subpilocereus repandus*) are very common in the area. All aforementioned vegetation types are of great importance to sustain local populations of birds, iguanas and pollinating bats.

Coral reef- The reef flat adjacent to Boka Sint Marie shelters luxurious coral communities which cover more than 50% of the bottom (MJA Vermeij & VF Chamberland, pers. obs.). Furthermore, the coral reefs included in this proposal shelter dense thickets of Elkhorn coral that sustain major ecological processes as gross community calcification and nitrogen fixation. Dense populations of this branching species dissipate wave energy and thus protect the coast (Mumby et al. 2008). Elkhorn coral also ensure healthy and productive reefs by providing shelter to an enormous amount of other reef organisms (Gladfelter & Gladfelter 1978), including both adult fish and their juveniles (Nagelkerken 1974). The deeper fore-reef near Boka Sint Marie is characterized by high coral cover and coral communities are dominated by species of the *Montastraea* species complex. *Montastraea* dominated fore-reefs provide shelter numerous other reef species, including herbivores, planktivores and predatory fish (Mumby et al. 2008) and are involved in biogeochemical and physical processes, such as community calcification, nitrogen fixation and wave energy dissipation.

21. Noteworthy flora: The *Sesuvium salina* vegetation type found on both the north and west sides of the salina is rare on islands in the southern Caribbean. Less than 400 ha of this vegetation type are currently found on Curaçao and is strictly associated to lower central parts of salinas (Beers et al. 1997).

22. Noteworthy fauna: The area is used by several noteworthy bird species, such as the rare endemic Curaçao Barn owl (*Tyto alba*, Palabrua), the Scaly-naped pigeon (*Columba squamosa*, Blauduif), the Crested caracara (*Polyborus plancus*, Warawara) which is listed under CITES Appendix II, the biome-restricted Bare-eyed pigeon (*Columba corensis*, Ala blanca), the American kestrel (Kinikini *Falco sparverius*), the Curaçaoan subspecies of the Caribbean parakeet (*Aratinga pertinax pertinax*, Prikichi) and several herons and egrets (F Mercelina, Uniek Curaçao, pers. comm.). The salina of Rif-Sint Marie is crucial to maintain viable populations of the Caribbean flamingo during the dry season when the larger wetlands of Venezuela (where part of the population forages) run dry (Debrot & de Freitas 1999).

23. Social and cultural values: Ruins of the old plantation house Rif-Sint Marie are found on the western part of the area. The salina was used for salt extraction until the 1960s and salt pans are still present. A statue was erected near Rif-Sint Marie in memory of a slave revolt held in August 1795 on Curaçao. The area is currently used for recreational purposes (hiking, biking) but receives guided eco-tours. It is considered of high scenic value by the local population.

24. Land tenure/ownership¹:

- a) **within the Ramsar site:** Rif-Sint Marie is under state ownership.
- b) **in the surrounding area:** in the surroundings of the area are private properties.

25. Current land (including water) use:

- a) **within the Ramsar site:** Rif-Sint Marie was given the “Conservation” status in the island’s zoning plan locally known as the EOP (“Island Development Plan”; AB 1995 no. 36), which became effective on May 23, 1997. The conservation destination is attributed to areas with a scientific, historic, cultural or scenic value.
- b) **in the surroundings/catchment:** The surroundings of Rif-Sint Marie are partly conservation, industrial, rural and urban areas. The population of Sint Wilibrordus, the closest town, consists of 113 inhabitants. An oil terminal lies approximately 2km east of the proposed Ramsar site and was built in 1974 to facilitate transshipment of crude oil.

26. Factors (past, present or potential) adversely affecting the site’s ecological character, including changes in land (including water) use and development projects:

- a) **within the Ramsar site:** Small-scale salt harvesting used to take place in the Rif-Sint Marie salina, by means of the construction of small crystallizers. In the mid 1960s, salt harvesting was no longer profitable, and the crystallizers were left abandoned (Debrot & de Freitas 1999). In the past, a canal was dug through the coral barrier thus connecting the salina directly to the sea. Because of this man-made channel, salinity levels inside the salina dropped below 130 ppt, allowing predatory fish to survive causing the (near)absence of Brine shrimp (*Artemia salina*) and the Brine fly (*Ephydra cinerea*), which are preferred food species for flamingos. Therefore, this channel had a direct negative influence on the quality of this foraging habitat for the Caribbean flamingo (Debrot 1999; Cuppens & Vogel 2004). The outflow of turbid freshwater through the same canal during heavy rainfall imposes potential stress to coral reefs of the area. However, occasional inflow of sea water to the salina is necessary to prevent complete evaporation of the lagoon. A system of sluices could be a good compromise to manage the salinity of the salina (Debrot 1999). Presently, a major threat to the area is uncontrolled recreational access by hikers who bring dogs and disturb the flamingos. A few fishermen occasionally use nets to catch bait fish in the area.
- b) **in the surrounding area:** Development of touristic habitations in the western side of the area represents the largest threat to the ecological integrity of the Ramsar site. Removal of vegetation during construction could lead in an increase of mud runoff into the salina. Leaching from septic tanks of these habitations has also been proposed as a possible future threat to the area. Oil contamination from the oil terminal at Bullenbaai represents the main threat to coral reefs in the area (Debrot 1999).

27. Conservation measures taken:

- a) The area has been recognized as a key conservation area for many years (Debrot & de Freitas 1991). It was designated as a conservation area in 1995 in the Island Development Plan of Curaçao, which was ratified by the Island Government in 1997. In addition, the same area was designated as Important Bird Area
- b) If appropriate, list the IUCN (1994) protected areas category/ies which apply to the site (tick the box or boxes as appropriate):
none
- c) Does an officially approved management plan exist; and is it being implemented?

¹ needs formal confirmation from Curaçaoan planning department (DROV)

In 1998, the central government of the Netherlands Antilles ordered each island to develop policies and a legal framework to sustainably manage and protect its natural marine and terrestrial resources (P.B. 1998, no. 49, amended in 2001, P.B. 2001, no. 41). This decision came into effect on February 1st 1999 (“Landsverordening grondslagen natuurbeheer en –bescherming”, P.B. 1999, no. 24). Specifically, this meant that islands were expected to establish nature parks and take measures to protect certain species listed in the appendices of international treaties undersigned by the former government of the Netherlands Antilles. The national legal framework for nature management and conservation, enacted in 1998 exists (Landsverordening Grondslagen Natuurbeheer), but requires implementation at present. A memorandum between the Ministry of Health and Environment (VOMIL) of the former Netherlands Antilles and the Dutch Ministry of Agriculture, Nature Conservation and Fisheries (LNV) have been signed an memorandum of agreement for cooperation in the preparation of an Integrated Coastal Zone Management (ICZM) Plan, but so far, work on the ICZM Plan has yet to begin.

d) Describe any other current management practices:

The area is partly managed by Uniek Curaçao. This nonprofit organization’s goal is to maintain and improve the physical and social environment of the island and secure the livability of Curaçao for both locals and visitors. Uniek Curaçao’s mission is to promote the island in the most ecological and sustainable way. They prepare educational tools as information booklets, videos and presentations and also offer guided tours in the area. See also Appendix “An overview of specific rules and regulations to protect Curacao’s marine life”

28. Conservation measures proposed but not yet implemented: A management plan needs to be prepared and implemented following the designation of the area as a Ramsar site.

29. Current scientific research and facilities: Few research studies have been conducted by staff and visiting scientists of the Carmabi Foundation in the past decades, mostly regarding the ecology of the salina.

30. Current communications, education and public awareness (CEPA) activities related to or benefiting the site: The area is managed by Uniek Curaçao. This nonprofit organization’s goal is to maintain and improve the physical and social environment of the island and secure the livability of Curaçao for both locals and visitors. Uniek Curaçao’s mission is to promote the island in the most ecological and sustainable way. They prepare educational tools as information booklets, videos and presentations and also offer guided tours in the area. Once designated as a Ramsar site, this area will be included in Uniek Curaçao’s educational and public awareness programs.

31. Current recreation and tourism: Recreational activities consist foremost of hiking and mountain biking.

32. Jurisdiction: The Ramsar area is under the territorial jurisdiction of the Curaçao Government; the functional jurisdiction falls under the Minister of Public Health, Environment and Nature of Curaçao.

33. Management authority:

Foundation Uniek Curaçao

Theo van der Giessen

Westwerf z/n, P.O. Box 2031, Willemstad, Curaçao

Email address: uniekcur@cura.net

Telephone: +5999 462 8989

Carmabi Foundation
Paul Stokkermans
Director, Carmabi Foundation
Piscaderabaai z/n, P.O. Box 2090, Willemstad, Curaçao
+ 5999 462 4242, Fax: + 5999 462 7680
info@carmabi.org

Department of Environment and Nature of the Ministry of Health
Environment and Nature
Mr. Paul Burgos
Acting Director of the Department
Klein Kwartier 33, Willemstad, Curaçao
+5999 737 0288
paul.burgos@gobiernu.cw

34. Bibliographical references:

- Acropora Biological Review Team (2005). *Atlantic Acropora Status Review Document*. Report to National Marine Fisheries Service, Southeast Regional Office, 152 pp.
- Bak RPM (1975) Ecological aspects of the distribution of reef corals in the Netherlands Antilles. *Bijdr Dierk*, 45: 181-190.
- Beers CE, de Freitas J & Ketner P (1997) Landscape ecological vegetation map of the island of Curaçao, Netherlands Antilles. Publications foundation for scientific research in the Caribbean region. No. 138. Amsterdam, The Netherlands. 51pp.
- Boekschoten B (1982) Geology, general introduction. *STINAPA*, 23: 22-24.
- Cuppens M & Vogels J (2004) Characterization of foraging areas of the Caribbean Flamingo *Phoenicopterus ruber* on Curaçao (Netherlands Antilles): the relationship between abiotic factors, food abundance and flamingo density. Neijmegen: Radboud University/CARMABI. (Unpublished thesis).
- Debrot AO (1999) A conservation assessment of an open connection between salina of Rif-Sint Marie and the sea. CARMABI report, 12 pp.
- Debrot AO & de Freitas JA (1991) Wilderness areas of exceptional conservation value in Curaçao, Netherlands Antilles. *Nederlandse Commissie voor Internationale Natuurbescherming, Meded*, 26: 1-25.
- Debrot AO & de Freitas JA (1999) Avifaunal and botanical survey of the Jan Thiel lagoon conservation area, Curaçao. CARMABI (Unpublished report).
- De Buissonjé PH (1974) Neogene and Quaternary geology of Aruba, Curaçao and Bonaire. Uitgaven Natuur Wetenschappelijke Studiekkring Voor Suriname en de Nederlandse Antillen, No. 78, Utrecht.
- de Haan D & Zaneveld JS (1959) Some notes on tides in Annabaai harbour, Curaçao, Netherlands Antilles. *Bull Mar Sci Gulf Carib*. 9: 224-236.
- Gladfelter WB (1982) White-band disease in *Acropora palmata*: implications for the structure and growth of shallow reefs. *Bull. Mar. Sci.*, 32, 639-643.
- Gladfelter WB & Gladfelter EH (1978) Fish community structure as a function of habitat structure on West Indian patch reefs. *Rev Biol Trop*, 26: 65-84.
- Meteorological Services of the Netherlands Antilles and Aruba (2008) Climatological report 2008. Retrieved from www.meteo.an on 10/01/2012.*
- Nagelkerken WP (1974) On the occurrence of fishes in relation to corals in Curaçao. *Stud. Fauna Curaçao Caribb. Isl.*, 45: 118-141.

- Mumby PJ, Broad K, Brumbaugh DR, Dahlgren CP, Harborne AR, Hastings A, Holmes KE, Kappel CV, Micheli F & Sanchirico JN (2008) Coral Reef Habitats as Surrogates of Species, Ecological Functions, and Ecosystem Services. *Conservation Biology*, 22(4): 441-451.
- Nagelkerken WP (1974) On the occurrence of fishes in relation to corals in Curaçao. *Stud. Fauna Curaçao Caribb. Isl.*, 45: 118-141.
- Nagelkerken I, Kleijnen S, Klop T, Van den Brand RACJ, Cocheret de la Morinière E. & Van der Velde G (2000a). Dependence of Caribbean reef fishes on mangroves and seagrass beds as nursery habitats: a comparison of fish faunas between bays with and without mangroves/seagrass beds. *Mar. Ecol. Prog. Ser.*, 214: 225-235.
- Smelter M (2005) Food-web structure, and dispersion of food items of flamingos, in hyper-saline lakes in Curaçao, Netherlands Antilles. Nijmegen: Radboud University/CARMABI (Unpublished thesis).
- Spalding MD et al. (2007) Marine ecoregions of the world: bioregionalization of coastal and shelf areas. *Bioscience*, 57(7): 573-583.
- Strawbridge J & Sybesma J (1989) The Curaçao Underwater Park management guide 1990-1995. *STINAPA*, 96 pp.
- Wells J & Debrot AO (2008) Bonaire. In: Wege D & Anadon V (eds) Important Bird Areas in the Caribbean: key areas for conservation: 95-102. Cambridge, U.K.: BirdLife International.

Please return to: **Ramsar Convention Secretariat, Rue Mauverney 28, CH-1196 Gland, Switzerland**
Telephone: +41 22 999 0170 • Fax: +41 22 999 0169 • e-mail: ramsar@ramsar.org