FEBRUARY 2025

Western Wetlands Protected Areas Conservation Management Plan *2025 – 2029*

Aruba Conservation Foundation

Together for *Nature.*

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Foreword

The **Aruba Conservation Foundation (ACF)** is an independent, non-profit conservation management organization (CMO), mandated by the government of Aruba through a service level agreement (SLA) to manage the legally designated terrestrial and marine protected areas, associated ecosystems, biodiversity, and habitats. ACF works together with the public and private sectors and our diverse community of stakeholders, taking an integrated approach to delivery of our mandate of protecting, preserving, and restoring the island's natural heritage and broader goals of contributing to the sustainable development of Aruba.

ACF protects, preserves, and restores Aruba's valuable heritage, seen from an ecological, environmental, geological, cultural, archaeological, and historical perspective, with the ultimate aim to secure a measurable improvement in the overall biodiversity, health, and (climate) resilience of Aruba's terrestrial, coastal, and marine ecosystems.

As a custodian of the protected areas of Aruba and the biodiversity they harbor, ACF promotes sustainable practices that integrate environmental, social, cultural, and economic objectives, and that address long-term concerns in meaningful ways, to ensure that our natural resources remain relevant for present and future generations. Whenever and wherever necessary, ACF applies the Precautionary Principle (a principle of environmental law) as a strategy to cope with possible risks and potential harm to nature, where scientific understanding is yet incomplete - as is still largely the case for Aruba.

ACF operates within the national and international legal frameworks and environmental policies, and according to the principles of Biodiversity Conservation and Ecosystem-Based Management (EBM), applying best practices and the Conservation Standards (Theory of Change) to deliver high conservation performance and tangible results.

ACF's Multi Annual Corporate Strategy 2023 – 2032 (ACF MACS 2023 – 2032) articulates a clear ambition and direction for the organization in its transition from a traditional park management organization to a modern conservation management organization. Guiding the development of conservation management and action plans is ACF's Protected Areas Conservation Management Framework 2025 – 2034, which lays a strong foundation for stability and growth of biodiversity and ecosystem-based conservation, and ecological sustainability, within a broader context of the sustainable development goals (SDGs) and biodiversity conservation priorities for the protected areas, as indicated in the ACF MACS 2023 – 2032. As such, ACF has clustered the protected areas according to ecosystems, associated biodiversity and habitats, resulting in three Protected Areas Conservation Management Plans (PACMPs), each following a 5-year cycle as of 2025: a Terrestrial PACMP, a Coastal PACMP, and a Marine PACMP.

This document was developed through a process of field observations, literature research and extensive stakeholder engagement with key stakeholders, including nature experts and NGOs, authority representatives, tourism representatives, tour operators, government representatives, institutions and social NGOs.

As ACF applies adaptive management as a systematic approach to decision-making and planning in nature conservation, ACF emphasizes flexibility, learning, and continuous improvement. This involves monitoring the outcomes of conservation actions, assessing their effectiveness, and adjusting management strategies based on new information and changing circumstances. This entails that priorities and actions may be revised annually, also based on available resources.

Executive summary

The Western Wetlands of Aruba are vital ecosystems that support biodiversity, enhance climate resilience, and provide essential ecological services, including water retention, sediment trapping, and habitat connectivity. Comprising five saliñas—Druif, Malmok, Cerca, Palm Beach, and Bubali—these wetlands are key to the island's natural heritage and play a crucial role in sustaining migratory and resident bird populations, protecting endangered species, and fostering eco-tourism opportunities. However, the wetlands face significant pressures, including water pollution, urban encroachment, habitat fragmentation, invasive species, and climate change.

This **Western Wetlands Protected Areas Conservation Management Plan 2025-2029** presents a comprehensive strategy to restore, protect, and sustainably manage these unique ecosystems through adaptive, evidence-based approaches. This plan integrates stakeholder-derived objectives with overarching conservation goals to address key challenges and enhance the long-term ecological integrity of the wetlands. Key objectives include:

- **Restoration of Water Flow and Biodiversity:** By 2029, reconnect the saliñas to their natural hydrological systems and restore 50% of historical biodiversity through collaboration with stakeholders, government agencies, and research institutions.
- **Conservation of Habitat and Wildlife:** Protect critical habitats for waterbirds, migratory species, and native flora by mitigating pollution, managing invasive species, and implementing habitat restoration initiatives.
- **Sustainable Tourism Development:** Develop a targeted tourism strategy to position the Western Wetlands as a hub for non-impacting, wildlife-focused eco-tourism, generating sustainable revenue while minimizing environmental impacts.
- **Community Engagement and Education:** Foster local stewardship through educational programs, outreach initiatives, and community-driven conservation activities that emphasize the cultural and ecological value of the wetlands.
- **Strengthened Legal Frameworks:** Establish clear legal protections, enforce regulations, and enhance monitoring and evaluation systems to ensure effective management and compliance.

The plan also includes robust Monitoring and Evaluation (M&E) frameworks to assess the effectiveness of conservation actions, track ecosystem health, and adaptively respond to emerging threats. Biodiversity, hydrology, visitor impacts, and socio-economic benefits will be systematically monitored to guide management decisions.

Recognizing the interconnected nature of the saliñas, the plan emphasizes restoring ecological corridors and buffer zones to enhance habitat connectivity with the Caribbean Sea and Aruba's green hinterland. Targeted actions tailored to each saliña—such as preventing complete drying of Saliña Druif during critical seasons and prioritizing natural habitat protection in Malmok and Cerca—are integrated within the broader conservation framework.

This management plan positions the Western Wetlands as a model for nature-inclusive development in Aruba, balancing ecological integrity with sustainable economic growth. Through collaborative efforts between government entities, NGOs, research institutions, and local communities, the Western Wetlands can thrive as interconnected, resilient ecosystems that support biodiversity, climate adaptation, and eco-tourism for generations to come.

Acknowledgements

This Management Plan was developed by Natural Dialogue, collaboration with René Henkens of Wageningen Research, the Aruba Conservation Foundation, through stakeholder consultation sessions, and funded by the Dutch Caribbean Nature Alliance (DCNA).

This Plan has been approved by the Minister of Nature and is published through the official government channel *Landscourant* and on the website of the Aruba Conservation Foundation.

1. Introduction

1.1 The Ramsar Imperative

On November 10, 2023, the scope of protected wetland areas under the Ramsar Convention of Wetlands significantly expanded in Aruba[1]. The Aruban Minister of Nature announced the official designation of four new Ramsar sites, and an extension of Spaans Lagoen. The total area now safeguarded under the Ramsar Convention is 14,408 hectares and all of the sites contain coastal components.

Under the terms of the Ramsar Convention (Article 3.1) contracting parties shall formulate and implement their planning so as to promote conservation of the wetlands included in the list, as well as promoting the wise use of all the wetlands in their territory. Furthermore (according to resolution 5.7 and resolution VIII.14), there is a call "for management plans for all Ramsar sites, with appropriate support and funds for implementation and training of staff, and including a monitoring program with indicators on the sites ecological character".

Figure 1: Aruba's Ramsar sites, showing the location of the Western Wetlands.

The Western Wetlands is one of the four new sites (https://rsis.ramsar.org/ris/2528). This site is a complex of five coastal saliñas, or coastal wetlands, which are non-tidal and influenced by sporadic mixing of seawater and freshwater: Saliña Druif; Saliña Malmok; Saliña Cerca; Saliña Palm Beach; and Saliña Bubali.

[1] Summary of Ramsar legislation: https://www.dcceew.gov.au/water/wetlands/ramsar

Figure 2: Map of the Western Wetlands (the Ramsar-delineation covers 392 hectares).

The development of a management plan for the Western Wetlands is a fundamental requirement of the Ramsar Convention and has been accompanied by extensive stakeholder engagement and consultation, input of field observations, and literature research. The plan should have as its objectives: the maintenance of the ecological character of the site; and the integration of various activities, termed "technological developments, pollution or other human interference". It is vital that the 'activities' represented by technological developments, pollution or other human interference referred to above are listed and categorised in the management.

1.2 Additional Protected Area Status

Since 1995, these areas have been protected and managed under the framework of Aruba's Spatial Development Plan (ROP, Ruimtelijk Ontwikkelingsplan) and the Nature Conservation Ordinance - Landsverordening Natuurbeheer (Government of Aruba 1995, most recently amended to enhance the protection of native flora and fauna in 2017). These regulations establish the legal basis for safeguarding Aruba's natural heritage and ensure that land use and development align with conservation priorities.

Figure 3: The coastal saliñas 2, 3, 4 and 5 are protected under the national ordinance referenced above.

Two of the sites are also designated as Important Bird Areas – IBA (BirdLife International, 2008). Specifically, Bubali Wetlands (https://datazone.birdlife.org/site/factsheet/bubali-wetlands-iba-aruba-(to-netherlands)), and Tierra del Sol Saliña[2] (https://datazone.birdlife.org/site/factsheet/tierra-del-sol-salina-iba-aruba-(to-netherlands)) which is part of Saliña Druif. Both of these sites are also Key Biodiversity Areas (https://www.keybiodiversityareas.org/about-kbas).

1.3 Objective, General Context & Further Information

The following objective is derived from the stakeholder workshop (held in October 2024) and a more overarching perspective based on resolving the issues set out in the chapters below:

> ***By 2029, restore the connection of water flow to and from the saliñas through collaboration with local stakeholders, government (DFW/DIP), and research institutions; thereby restoring 50% of historical biodiversity. This will be achieved by protecting and sustainably managing the saliñas as interconnected ecosystems that support biodiversity, enhance climate resilience, and provide sustainable recreational and educational opportunities. Key challenges such as water pollution, habitat degradation, invasive species, and urban pressures will be addressed through evidence-based management, community engagement, and strengthened legal frameworks.***

The Western Wetlands are crucial wetlands that play a key role in the island's hydrology, biodiversity, and ecosystem services. Historically, they have supported seasonal fluctuations in water levels and salinity, fostering dynamic plant and animal communities adapted to these demanding conditions. Recent research and meta-analysis have significantly advanced understanding and management of the Western Wetlands, including their history, their hydrology

[2] It should be noted that the area marked on the IBA map for Tierra del Sol Saliña may have been drawn in error, as it does not correspond to an obvious wetland area and is some hundreds of metres away from Saliña Druif.

and watersheds, water quality, botanical composition and overall biodiversity value, encompassing birds, aquatic fauna and invertebrates. For example, Mücher et al. (2024) analysed historical land cover changes since 1900, providing a comprehensive view of land use trends and their implications, complimented by De Freitas et al (2023) who published a landscape ecological vegetation map of Aruba. Verweij et al. (2024) explored sustainable scenarios for balancing human and ecological needs. Together, these studies offer critical perspectives for addressing the complexities of land use and conservation in Aruba.

Most relevant to this management plan is the recently-published report *Western Wetlands of Aruba; Baseline study of the pressures, threats and biodiversity values of the (former) saliñas at Bubali, Palm Beach, Cerca, Malmok, and Druif,* (Henkens et al., 2024). The report brings together expert knowledge, scientific reports and publications and citizen science have been brought together are referenced to provide a comprehensive assessment of the history and development of the five sites, their underlying geology and hydrological properties and their current biological interest. Stakeholder interviews, aimed at developing an understanding of the 'unpublished' knowledge about the development of the Western Wetlands, were held in September 2023 with relevant representatives from the government, conservation and tourism sectors in Aruba. A baseline study on the water quality and wetland ecology was carried out in February-March 2024. Vegetation maps and watershed maps were developed as part of a larger study carried out by Wageningen Environmental Research since 2021. The report also reviews the pressures and threats on the site, brought together under six main headings: 1) Water pollution; 2) Urbanisation, soil erosion and sedimentation; 3) Ecological fragmentation; 4) Visitor impacts: disturbance and trampling; 5) Invasive species; and 6) Climate change. It concludes with a set of management recommendations, all of which are particularly important reference points for this plan.

Finally, a *Coastal Protected Areas Conservation Management Plan 2025-2029* (ACF, in preparation) is presently under review. It was stakeholder driven (see Appendix 1) and the document has provided generic coastal and specific saliña-related context, reference material and content, pressures and threats, conservations actions and targets.

2. Site Descriptions

Natural saliñas, such as those at Malmok and Cerca, exemplify the typical seasonal variability of these wetlands, with their saline waters hosting species like the seagrass *Ruppia maritima*, amphidromous fish such as the Lyre Goby (*Evorthodus lyricus*) and Fat Sleeper (*Dormitator maculatus*), Mountain Mullet (*Agonostomus monticola*), and the range-restricted Molly (*Poecilia vandepolli*), as well as crustaceans including fiddler and land crabs, freshwater shrimp and brine shrimp. These habitats are vital for resident and migratory birds, reptiles, and mammals, including the endemic Aruba cat-eyed snake (*Leptodeira bakeri*) and native bat species.

However, many of the saliñas have been significantly altered by human activities. Their origin is a factor in decision-making over their present and future management. The first comprehensive illustrated depiction of these areas is provided by the island topographic map of 1912 (Werbata and Jonckheer, 2012). From this map it is clear to see that on the western coast there are two main saliñas, a northern area that comprises the modern saliñas of Malmok and Cerca (the whole area then called 'Salinja Cerká') and a southern area comprising Palm Beach and Bubali (at that time referred to as Keitoe). At that time, Druif is depicted as what appears to be a boca, with a small, raised sandbar in its mouth.

In more recent times, Bubali, Palm Beach, and Druif have experienced decades of effluent discharge from the Bubali wastewater treatment plant, which has struggled with capacity issues (Directie Natuur en Milieu, 2022). This has led to year-round freshwater conditions and high nutrient loads, particularly at Bubali. These altered conditions have fostered dense growth of *Typha dominguensis* and invasive species such as Water Hyacinth (*Eichhornia crassipes*), while supporting invasive fauna like Nile Tilapia (*Oreochromis mossambicus*) and Red-eared Slider turtles (*Trachemys scripta*). Despite these changes (and partly due to), these saliñas remain essential habitats for migratory and breeding birds, with Bubali alone hosting over 200 bird species.

The differences between natural and altered saliñas underscore their ecological complexity. While natural saliñas exhibit seasonal salinity cycles and support specialized communities, effluent-fed wetlands have become freshwater-dominated systems, hosting flora and fauna foreign to Aruba's ecosystems. Yet, both types are vital, offering resources for various species and contributing to Aruba's natural and cultural heritage. Restoration projects under the Western Wetlands initiative aim to reconnect saliñas to their natural hydrology and improve ecological health through adaptive management and community involvement (Henkens et al., 2024).

The following site descriptions are based mainly on Henkens, et al. (2024), with additional information based on observations from site visits and stakeholder input. Appendices 2 and 3 have the full species lists of plants and birds, by saliña, also from Henkens et al. (2024).

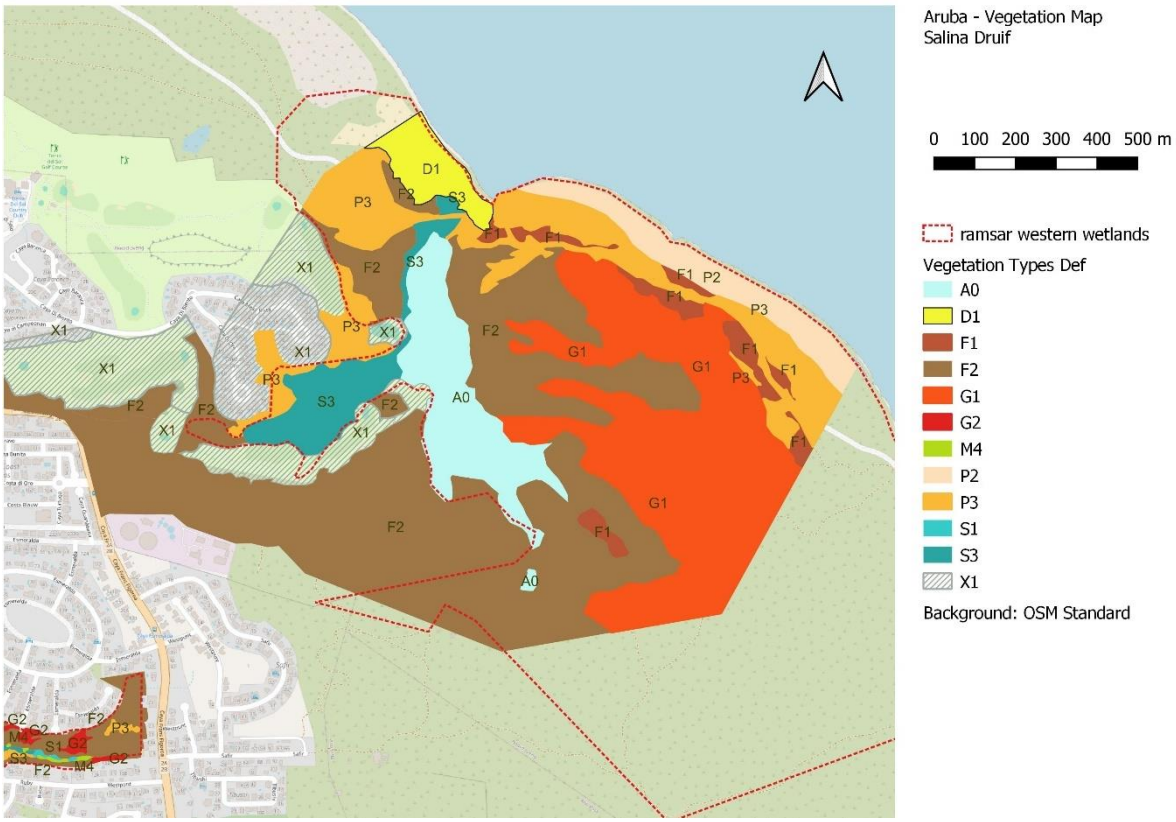
2.1 Saliña Druif

Saliña Druif (Figure 4) consists of a slightly degraded wetland, with indications of eutrophication (illustrated by the occurrence of the *Lemna valdiviana*-vegetation type), but also rather extended patches of *Sporobolus virginicus* and *Sesuvium portulacastrum* vegetation. Along the entrance of the saliña, dry coastal dune vegetation is found, which is a relatively rare ecosystem of the Leeward Islands. The dry parts south and east of saliña Druif are covered by a mosaic of open grassland (type G1) and shrubland (F2), with limestone pioneer communities at the coast. Most parts of saliña Druif are heavily overgrazed by free-roaming goats. Its relatively undisturbed characteristics, in spite of the golf course (which actually acts as a buffer) and regular ATV-UTV traffic on the road across the mouth of the saliña, give it great value for waders and waterfowl and feeding migrants. It also has value for invertebrates, especially in the shallow lagoon area within the golf course, which is also valuable for waders and other birds.

On the 1912 map, Druif is depicted as what appears to be a boca, with a small, raised sandbar in its mouth. Aerial photographs of 1948 show Druif with a more obvious sandbar blocking its entrance to the sea; (in one conversation with a local stakeholder it was suggested that this entrance was more permanently blocked with the construction of a road that crossed the entrance in the 1960s – L. Jones-Walters, pers. comm.). Combined with the 1912 map, the implication is that the entrance was slowly closing due to sand deposition that was most likely a result of the prevailing currents. A set of pipes are visible, embedded in the road at the mouth of the saliña, now crushed, which indicate that there was once some sort of control over water levels.

This saliña receives effluent piped directly from Bubali which, at certain times when the wastewater treatment plant (WWTP) capacity is exceeded, means that this results in high nutrient levels and low dissolved oxygen levels. This is a critical management issue for saliña Druif; water is important for water birds and waders and for the aquatic invertebrates such as dragonflies and damselflies. At present there are no 'safe' levels for wildlife defined and these are a necessary requirement for deciding when to halt (or allow) water to flow from Bubali. Furthermore, if there

was a through flow of water, linked to the now defunct pipes, it might have helped to mitigate the current problem of pollution and eutrophication in Druif.
Figure 4: Vegetation map of Saliña Druif.



2.2 Saliña Malmok

Together with Saliña Cerca (below), Saliña Malmok (Figure 5) is one of the two (relatively) well-preserved saline saliñas on the island and consists largely of a shallow wetland with gradual transitions towards grassland and shrubby vegetation on the shores and edges. The eastern edge in particular has been highly modified by human impact from the adjacent built-up area, with several constructions reaching into the saliña. The amount of well-developed, low saliña vegetation is high, (for instance, if compared to the islands Bonaire and Curaçao). *Ruppia* maritima-vegetation is present on a few locations. As this type is rare in Aruba, it's presence on Saliña Malmok is important. The mangrove patches of *Avicennia germinans* are also of interest, as such mangroves are only found elsewhere on the island at Spanish Lagoon.

Malmok hosts diverse waterbirds including the Caribbean Coot and migratory shorebirds. The fringing mangrove is important for providing breeding and roosting habitat for night herons *(Nycticorax spp.)*, egret and Roseate Spoonbill *(Ajaia ajaia)*. Its mangrove and associated scrubby vegetation acts as a barrier to disturbance on the eastern edge of the saliña and encourages large flocks of waders such as Black-necked Stilt (*Himantopus himantopus*) which can occur in large numbers, often with flocks of over 100 birds.

From the 1912 map it is clear to see that on the western coast there are two main saliñas, the northern area, then called 'Salinja Cerká', now comprises the modern saliñas of Malmok and Cerca. Both of the western saliñas have a brief legend stating 'Na regen onder water' – under water when it rains. The western saliñas were still fully intact in 1948 and these low-lying areas

likely contained much less accumulated sediment from erosional run-off and may have permanently had shallow water of fluctuating salinity throughout most of the year. Based on the historical maps and aerial photograph, it therefore appears that Cerca and Malmok are natural saliñas that sit within a protective curtain provided by the fossilised coral revetment. There may be one area through which seawater could enter (for instance at surge tides between Hadikoerari and Basiroeti) but it is likely that most of the water feeding them at that time came in the form of saline groundwater. Furthermore, such areas would have become seasonally inundated with freshwater run-off and may have been filled from the sea during hurricane events due to wash-over from the sea.

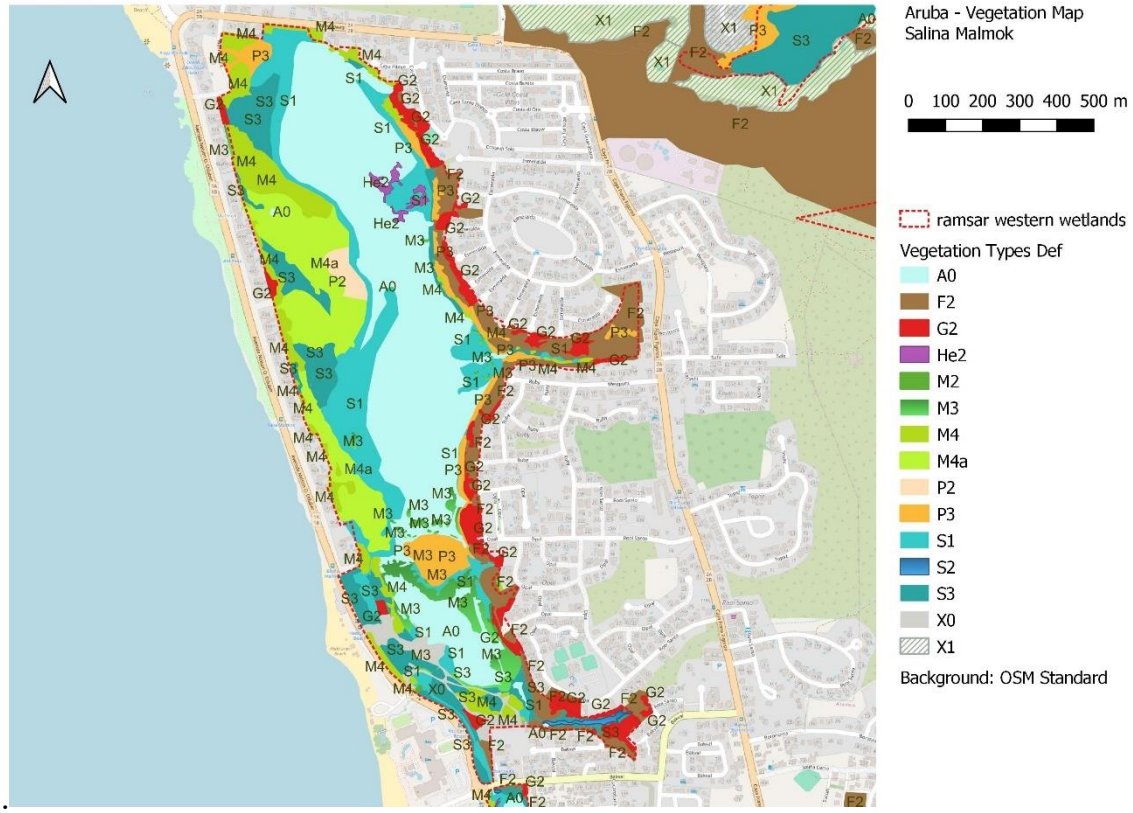


Figure 5: Vegetation map of Saliña Malmok.

Even 20 years ago, there was still relatively little close urban development and many of the roads still appear to be dirt tracks. Today, however, Malmok has retained some of its previous area but is almost completely closed-in by development along the eastern edge. The dry rivers are still visible and, are still feeding water during the periods of rainfall. However, they are impeded by roads and in some cases housing development. The coastal strip has a major road and linear housing development along most of its length.

The southern end was also deepened in preparation for a marina development that, eventually, did not take place. This may have helped with absorbing some of the sediment load but that would have to be resolved through research. Any plans for deepening Cerca and this saliña should take into account that the current depth of much of the pan. When there is abundant water in the wetland, the depth is ideal for waders and if areas are deepened it will be too deep for them to feed. Furthermore, Malmok has been the site of many archaeological findings from the pre-Columbian period and care should be taken to avoid these in any plans for deepening.

2.3 Saliña Cerca

Linked to Malmok and sharing the same history (given above), Saliña Cerca (Figure 6) is the second (relatively) well-preserved saline saliña on the island. Similar to saliña Malmok, it also consists largely of a shallow water body with gradual transitions from low wetland vegetation towards grassland and shrubby vegetation on the shores and edges. Also here, the eastern edge is disturbed by human impact from the adjacent built-up area and even constructions built into the saliña. Similarly, the catchment area to the east is rather disturbed, being enclosed by the surrounding buildings. The amount of well-developed low saliña vegetation is high, similar to saliña Malmok. The rare *Ruppia maritima*-vegetation (type A2) is here more widespread than in saliña Malmok.

Whilst Malmok has retained some of its previous area, Cerca has been most affected by development and is hemmed in on all sides. The rooijs - dry rivers are also still visible and, as for Malmok, continue to feed water during the periods of rainfall. However, they are also impeded by roads and in some cases housing development.

The scrubby vegetation on the eastern side, bordering the road, provides breeding and foraging habitat for birds such as migratory warblers, and the fringing habitat gives perches for territorial dragonflies and plant architecture for spiders to build their webs. The north-south 'neck' of Cerca has a variety of depth and microtopography, and is particularly valuable for foraging waterfowl and waders.

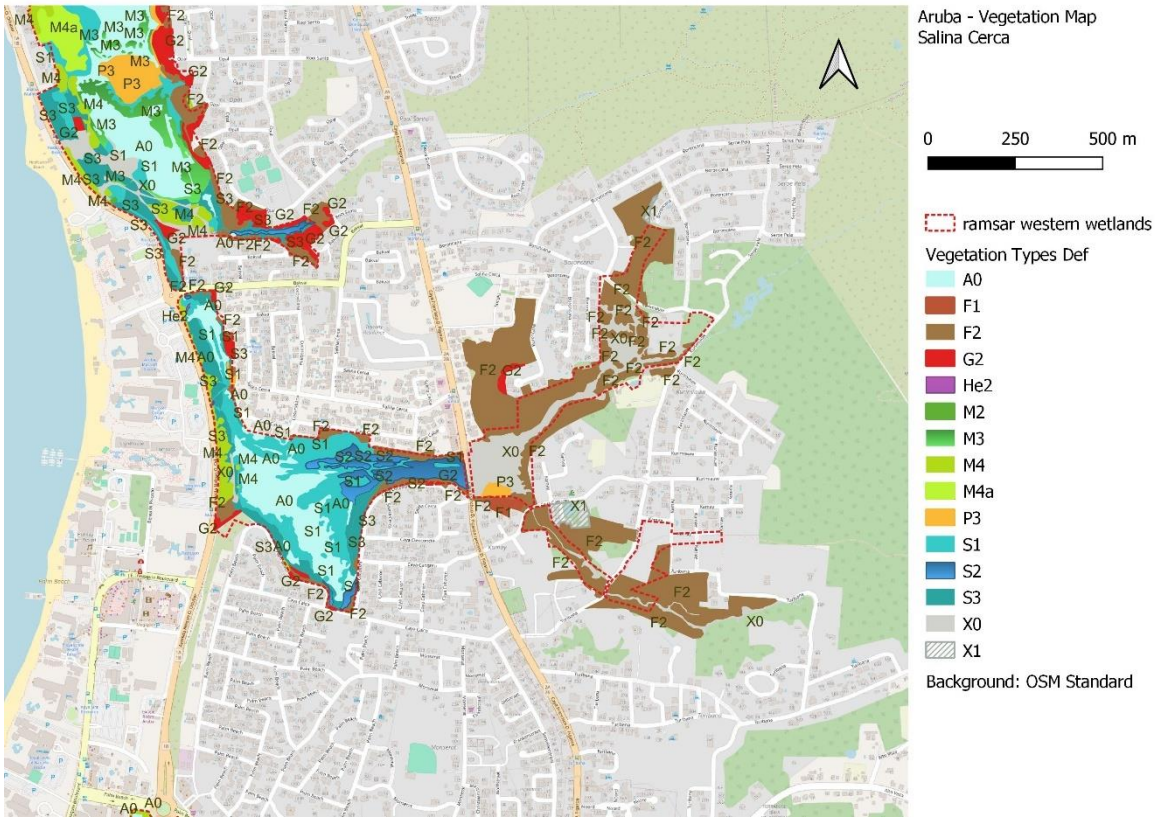


Figure 6: Vegetation map of Saliña Cerca

Both Malmok and Cerca offer good opportunities for low-impact birdwatching.

2.4 Saliña Bubali and saliña Palm Beach

From the 1912 map it is clear that of the two main saliñas depicted on the western coast, the southern area, at that time referred to as Keitoe, now comprises Palm Beach and Bubali. At the southern end of Keitoe (meaning “quiet”) there is a small area of ‘zoutpannen’ - salt pans, man-made areas set aside for salt production. At the time of the 1912 map, they were therefore clearly more natural and were frequently inundated by seawater, as evidenced by the salt pans which were most likely fed by the gap in the coral revetment that was identified on the map as ‘Poos Chikitoe’. Both of the western saliñas have a brief legend stating ‘Na regen onder water’ – under water when it rains.

However, Bubali and Palm Beach (Figure 7) have been more significantly modified than any of the other Western Wetland saliñas. A number of factors have driven this change. In the present day, all the natural connections between Bubali and the sea have been closed off with the exception of an articificial channel, controlled by a weir. Roads, on raised embankments, and the solid structures of hotels now surround the site creating a ‘basin’ effect, trapping all water. At the same time the uncontrolled influx of large quantities of heavily nutrient-enriched and polluted water into Bubali originating from the neighbouring, malfunctioning Bubali Waste Water Treatment Plant – WWTP provides a second major source of disturbance.

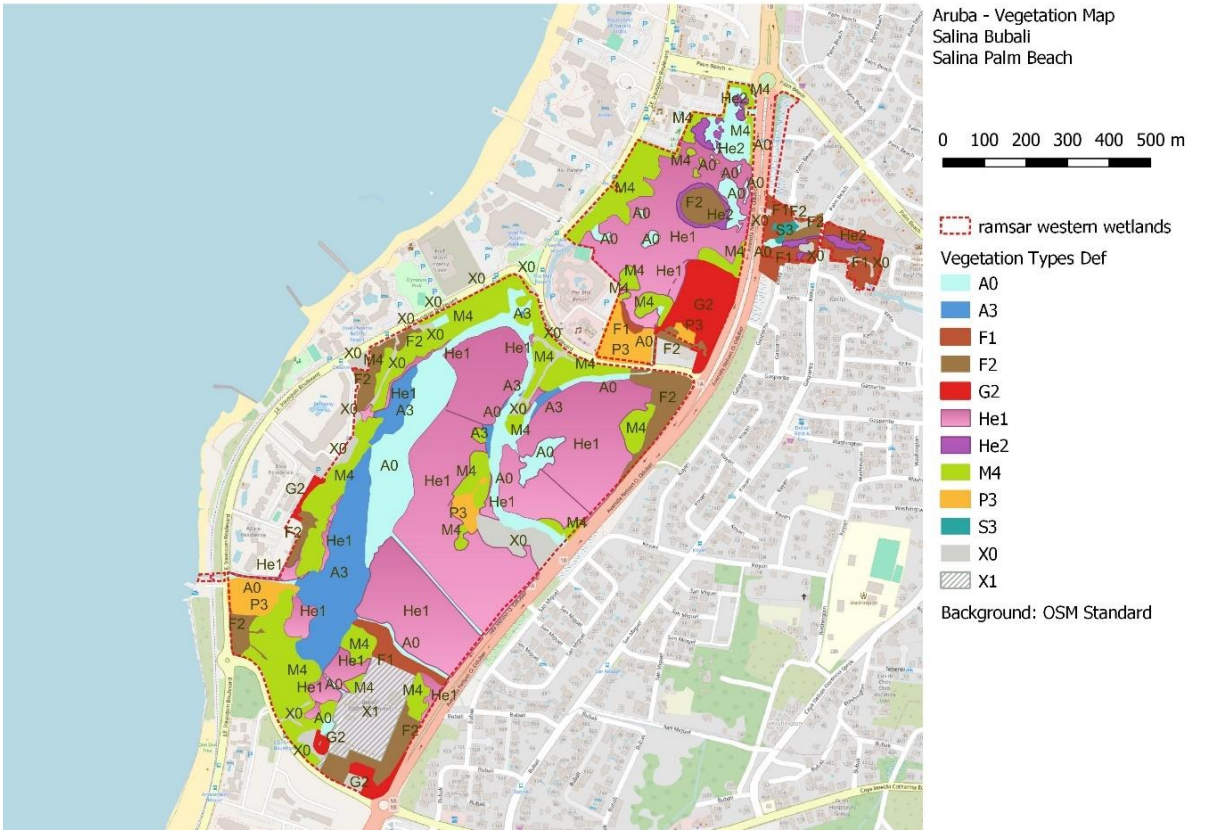


Figure 7: Vegetation map of Saliña Palm Beach (north) and Saliña Bubali (south).

The combination of infrastructure development in the form of roads and hotels that have effectively created embankments around the site, and the continuous influx of wastewater has resulted in the development of a freshwater lake (Bubaliplas). The hyper-rich water feeds massive fields of tall helophytes and water bodies overgrown with Water hyacinth (Eichhornia crassipes). The edges, transitioning to the higher limestone terrace are covered mostly with high Conocarpus

associated mangroves. Bubali is therefore no longer a saliña in the true sense, since it has permanent fresh water and extensive reed beds.

This saliña receives effluent piped directly from Bubali which, at certain times when the wastewater treatment plant (WWTP) capacity is exceeded, means that this results in high nutrient levels and low dissolved oxygen levels. Palm Beach has also lost most of its previous characteristics and is heavily vegetated with less area that could be termed 'saliña'.
In general, saliña Palm Beach is slightly more botanically diverse, but it is also much smaller, and more strongly disturbed by human impact from the surrounding buildings and roads. During the construction of at least one of the adjacent hotels it received large quantities of spoil, which raised its level and made it much less prone to flooding, although it still holds water during periods of high rainfall. Its elevation is therefore slightly higher than Bubali, however, water is still actively pumped into Palm Beach to prevent Bubali from overflowing and, as already stated above, Saliña Druif also receives effluent piped directly from Bubali which results in high nutrient levels and low dissolved oxygen levels.

Bubali is also plagued by alien species. Whilst many of the alien plants tend to be located around the periphery of both sites, the water hyacinth (Eichhornia crassipes) has the potential to completely cover the open water of Bubali. There are also many invasive animal species in Bubali (Buurt and Debrot, 2012). Of these, the Red-eared slider (Trachemys scripta subsp. elegans) is a freshwater terrapin that is considered one of the world's worst invasive species. A second invasive terrapin found in the saliñas in the Yellow-bellied slider (Trachemys scripta subsp. scripta), which is another opportunistic omnivore that is likely to impact a host of plant and animal species. Once established, both species are expensive to control and almost impossible to eliminate completely. Other invasives at Bubali include the Tilapia, Oreochromis mossambicus, which can alter the local habitats, outcompete local and generally disrupt the balance within these delicate ecosystems. They are very difficult to control once established, electrofishing being one of the options, but at Bubali they do provide food for fish predators such as Osprey (Pandion haliaetus).

In spite of its problems, the combination of open freshwater and extensive reed beds and surrounding habitats, including those at Palm Beach, Bubali remains extremely rich for both birds and invertebrates. Almost all of the more than 200 bird species recorded on Aruba have been found there. It has value for fish and aquatic invertebrates. Aruba has 16 dragonfly species of which most are present at Bubali (Paulson, de Haseth, and Debrot, 2014). Dragonfly larvae are aquatic, requiring water bodies with the variation in depth and vegetation architecture in which they hunt and feed. The adults rely on emergent vegetation for perching, territorial behaviour and roosting.

2.6 Species

To date citizen-science[3] data reveal the (ir)regular presence of 216 native migratory and resident bird species in the Western Wetlands. Recent scientific research also reveals the presence of 21 vegetation types, 146 native flora species and 32 new species for Aruba (probably non-native species escaped from gardens). No less than 23 of these bird and plant species are registered on the protected species list of Aruba (Landsbesluit AB 2017 no. 48). Future inventories and monitoring research on other species groups (e.g. butterflies, dragonflies, spiders) will undoubtedly reveal the presence of further species to be included on the protected species list. Many of these species will be largely restricted to the wetland and terrestrial habitat of the

[3] Involving citizens in scientific research is called Citizen Science. Citizen Science has been evolving rapidly in recent years supported by the increasing digitisation of science.

saliñas. It can therefore be concluded that the conservation and restoration of the Western Wetlands is crucial for safeguarding the biodiversity values of Aruba.

3. Pressures and threats

Aruba's saliñas face numerous interconnected pressures that jeopardize their ecological integrity. Nutrient overloading from wastewater discharge remains a persistent issue, especially at Bubali and Druif, where nutrient-rich effluent has fundamentally altered ecosystem dynamics. Invasive species, such as the Nile Tilapia and Water Hyacinth, threaten native biodiversity, while urban development and infrastructure expansion fragment habitats and impede the natural flow of water between saliñas and the sea. These pressures are compounded by climate change, with rising temperatures and altered precipitation patterns intensifying droughts and disrupting saliña hydrology. Additionally, poorly planned road and urban infrastructure have exacerbated erosion and disrupted water movement, accelerating water runoff and reducing the natural filtration and retention functions of the wetlands, as seen at Malmok and Cerca. Balancing the growing demand for development with the need for ecological restoration presents a major challenge. Comprehensive management strategies, regulatory frameworks, and community engagement are essential to address these threats and safeguard the saliñas for future generations. The distinct ecological characteristics of these two wetland types (Bubali, Palm Beach and Druif on one side and Cerca and Malmok on the other), present different management challenges.

Based on the stakeholder workshop, the threats and pressures subsequently listed in the Coastal Management Action Plan (ACF, in prep.), the Aruba government-appointed Western Wetlands Working Group and Henkens et al. (2024) a number of generic and site-specific pressures and threats can be identified:

Table 1: Key Pressures, Threats, and Drivers for the Saliñas.

Pressure/Threat	Description	Driver
Water Pollution/ quality	Nutrient-rich effluent from the Bubali wastewater treatment plant (WWTP) has degraded water quality in Bubali, Palm Beach, and Druif, potentially contaminating sediment with heavy metals, chemicals, and biological agents. Restoration requires WWTP upgrades and preventing effluent from affecting natural saliñas.	Capacity issues at the WWTP and lack of proper waste treatment infrastructure.
Urbanisation, Soil Erosion, and Sedimentation	Urban development and poor land-use practices in saliña watersheds increase erosional runoff, accelerating siltation and decreasing water absorption. This raises flood risks and impacts saliña ecosystems. Increased soil erosion from runoff and widening of roois degrades saliñas and contributes to sedimentation.	Unregulated urbanisation, poor land-use practices, and lack of watershed management. Poor erosion control and lack of natural vegetation acting as a filtration system.
Ecological Fragmentation/ buffer zone management	Historically connected saliñas have become increasingly isolated. Connectivity restoration, such as ecological corridors and effective buffer zone management, is essential to enable flora and fauna movement across the Western Wetlands.	Infrastructure development, habitat disruption, and lack of buffer zone management.
Visitor Impacts: Disturbance and Trampling	Recreational and tourism activities in saliñas can cause ecological damage through trampling and disturbance. Visitor infrastructure such as boardwalks and bird hides can mitigate impacts while promoting sustainable use.	Increased tourism and insufficient visitor management strategies.
Invasive Species	Species like Water Hyacinth, Red-eared Slider, Cane Toad, Boa Constrictor, and Tilapia disrupt native ecosystems. These species thrive due to nutrient enrichment and lack of effective invasive species control.	Introduction of non-native species and lack of invasive species management and awareness.

Pressure/Threat	Description	Driver
Climate Change	Rising temperatures, altered precipitation patterns, more intense droughts, and rising sea levels threaten saliña ecosystems. Without adaptive management, climate change may lead to saliña loss or drastic alterations.	Global greenhouse gas emissions and inadequate local climate adaptation strategies.
Habitat Degradation	Loss of native vegetation and habitat due to human activities disrupts ecological conditions and reduces the capacity of saliñas to support biodiversity.	Inadequate protection and restoration of critical wetland vegetation.
Biodiversity Decline	Habitat quality for species like terns, amphibious fish, and native crustaceans is reduced due to nutrient overloading, invasive species, and habitat fragmentation.	Combination of pollution, habitat fragmentation, and invasive species presence.
Hydrological Disruption	Poorly planned urban infrastructure and invasive vegetation reduce water retention and filtration capacity, altering natural hydrology in saliñas.	Lack of integrated water management and unregulated urban planning.
Unregulated Development	Construction projects near saliñas, such as Malmok, Cerca, and Spaans Lagoen, impact their ecological and hydrological integrity.	Insufficient enforcement of environmental regulations.
Research and Monitoring	There is a lack of comprehensive data on the saliñas' ecological health, including water quality, biodiversity, and the impacts of restoration measures. Many species groups, especially invertebrates and migratory birds, remain under-studied, providing limited understanding of ecological conditions and trends, and making it difficult to assess the effectiveness of management actions.	Insufficient baseline data, limited long-term monitoring programs, and reliance on citizen science without integration of systematic research efforts.

4. Conservation actions and targets

Based on the above, it is possible to identify a number of generic and site specific threats, pressures, drivers and to link these to a set of conservation actions and targets, which are set out below. These provide the basis for a focussed action plan in which actions are prioritised.

4.1 Key Generic Conservation Actions and Targets

Table 2: Key Generic Conservation Actions and Targets for the Western Wetlands

Conservation Focus Area	Summary	5-Year Operational Target	Action	Key Stakeholders/Partners
Water Pollution	Nutrient-rich effluent from the Bubali WWTP degrades water quality and affects biodiversity and public health, particularly in Bubali, Palm Beach, and Druif saliñas.	Reduce nutrient inflow into all saliñas by improving wastewater treatment at Bubali WWTP.	Upgrade the Bubali WWTP, monitor water quality regularly, and enforce regulations to prevent illegal discharges.	Government of Aruba, environmental agencies, WWTP operators, local authorities.
Urbanisation, Soil Erosion, and Sedimentation	Urban development, loss of vegetation, and widening of roois lead to excessive sedimentation, erosion, and decreased saliña water retention capacity.	Reduce runoff and sedimentation rates by 50% across watersheds, and restore natural vegetation in degraded areas.	Reforest watersheds, stabilize roois, remove accumulated sediment, and regulate urbanisation to minimize impacts.	Urban planners, land-use regulators, hydrologists, local communities, NGOs.
Ecological Fragmentation	Saliñas are at risk of ecological isolation	Establish green corridors and	Design wildlife corridors using	Conservation biologists, NGOs, infrastructure

Conservation Focus Area	Summary	5-Year Operational Target	Action	Key Stakeholders/Partners
and Buffer Zones	in urban areas. Green corridors and buffer zones can enhance connectivity for flora and fauna across the Western Wetlands.	buffer zones for all saliñas and mitigate key ecological bottlenecks.	roois and roadsides, create underpasses for ground-dwelling species, and enforce protection of buffer zones.	developers, local communities.
Visitor Impacts: Disturbance and Trampling	Tourism and recreation may harm the ecological integrity of the saliñas, especially sensitive areas like Malmok and Cerca.	Implement visitor management strategies to minimize disturbance while enhancing public awareness.	Develop a visitor center (e.g., Cheng Building), build boardwalks and bird hides, and restrict access to sensitive saliñas with controlled paths.	Tourism boards, conservation NGOs, local businesses, and recreation managers.
Community Engagement	Foster local stewardship and public awareness of the importance of conserving coastal ecosystems.	Engage 75% of local communities in conservation initiatives.	Develop educational programs, organize community clean-ups, and establish citizen science projects.	Schools, NGOs, ACF, local businesses, cultural heritage groups.
Invasive Species	Invasive species, such as Water Hyacinth, Boa Constrictor, and Cane Toad, disrupt native ecosystems and compete with endemic flora and fauna.	Eradicate new invasive species and reduce the presence of established species by 80% in critical areas.	Implement invasive species management plans, monitor for new introductions, and raise awareness about invasive impacts.	Environmental agencies, invasive species specialists, local communities, public awareness groups.
Climate Change	Climate change impacts such as rising temperatures, altered precipitation, and sea-level rise threaten saliña ecosystems and increase flood risks.	Integrate climate adaptation strategies across the Western Wetlands to protect ecosystems and reduce flood risks.	Enhance watershed vegetation, restore mangroves and seagrass beds, build sediment traps, and explore "blue carbon" research for saliñas.	Climate scientists, government planners, NGOs, international climate adaptation funds.
Habitat Degradation	Loss of vegetation and habitat due to urbanisation and invasive species reduces biodiversity and ecosystem health.	Restore 50% of degraded habitat in saliñas and prevent further habitat loss.	Reforest native vegetation, remove invasive species, and restore degraded areas, particularly dry habitats such as Druif.	Forestry experts, NGOs, local government, and restoration specialists.
Biodiversity Decline	Habitat quality has reduced for key species, including migratory birds and rare terrestrial birds, due to pollution, invasive species, and habitat loss.	Develop habitat action plans and enhance habitat quality for key species in all saliñas by 30%.	Conduct species-specific habitat restoration (e.g., breeding islands for birds), continue monitoring, and strengthen partnerships with ornithological groups.	Conservation biologists, birding groups, universities, and NGOs.

Conservation Focus Area	Summary	5-Year Operational Target	Action	Key Stakeholders/Partners
Hydrological Disruption	Urban infrastructure and invasive vegetation reduce water retention, connectivity, and natural hydrology in the saliñas.	Restore natural hydrology and improve water retention in all saliñas by removing disruptions and restoring flow.	Redesign infrastructure to restore hydrological connectivity, remove invasive vegetation, and implement sediment traps to control siltation.	Hydrologists, engineers, environmental agencies, and infrastructure planners.
Sustainable Recreation	Sustainable recreation can foster deeper connections between visitors and nature while reducing ecological impacts.	Establish sustainable visitor facilities in the Western Wetlands and minimize recreation impacts.	Build safe and educational infrastructure (e.g., boardwalks, hides), limit recreation in sensitive areas, and modernize existing visitor facilities.	Tourism authorities, local businesses, conservation NGOs, and visitor centre operators.
Legal and Regulatory Frameworks	Strengthen legal protections and enforcement mechanisms to safeguard coastal ecosystems.	Establish clear legal status and enforce regulations for 100% of Western Wetlands saliñas.	Develop new legislation, increase enforcement capacity, and conduct regular monitoring.	Government of Aruba, ACF, legal experts, international conservation organizations.
Research and Monitoring	A comprehensive understanding of the saliñas' ecological conditions and trends is essential for effective conservation management. Long-term monitoring and targeted research will support data-driven decisions, improve restoration efforts, and ensure compliance with international conservation commitments.	Establish and maintain long-term monitoring programs for water quality, biodiversity (including birds, invertebrates, and vegetation), and restoration outcomes across all saliñas.	Develop and implement standardized research and monitoring protocols, collaborate with universities and conservation organizations, conduct periodic ecological surveys, and integrate citizen science data with systematic studies. Use findings to assess the effectiveness of restoration measures and refine management plans.	Universities (e.g., Wageningen University, University of Aruba), ornithological organizations, conservation NGOs, local experts, citizen science platforms, and government agencies.

4.2 Key Site-Specific Conservation Actions and Targets

Table 3: Key Site Specific Conservation Actions and Targets for the Western Wetlands

Saliña Druif

Conservation Focus Area	Summary	5-Year Operational Target	Action	Key Stakeholders/Partners

Water Quality Management	Improve water quality and reduce pollution affecting the saliña ecosystem.	Reduce nutrient inflow by 30% through improved waste management.	Enhance wastewater treatment infrastructure and enforce pollution controls.	Government of Aruba, ACF, Utilities Aruba, local developers.
Effluent Monitoring	Establish safe levels of effluent discharge from Bubali WWTP and set thresholds for action.	Define threshold levels for effluent beyond which pumping is stopped.	Develop effluent monitoring system, establish threshold levels, and enforce emergency shutdowns.	Utilities Aruba, Government of Aruba, ACF, local communities.
Habitat Hydrology	Ensure the saliña retains adequate water levels to sustain ecological functions.	Prevent complete drying out during critical ecological periods.	Monitor hydrology, develop seasonal water retention plans, and avoid excessive drainage practices.	Wageningen University, ACF, DOW Aruba, local conservation groups.
Wildlife Conservation	Protect habitats for waterbirds and migratory species from urban encroachment.	Increase bird population diversity by 20%.	Establish buffer zones, monitor bird populations, and manage invasive species.	BirdLife International, ACF, local conservation groups.
Terrestrial Habitat Restoration	Protect and restore terrestrial habitat for native bird species and prevent overgrazing.	Remove 90% of free-roaming goats and restore degraded vegetation.	Collaborate with stakeholders to fence off areas, remove goats, and monitor vegetation recovery.	Tierra del Sol, ACF, NGOs, local government.

Saliña Malmok

Conservation Focus Area	Summary	5-Year Operational Target	Action	Key Stakeholders/Partners
Mangrove Restoration	Restore mangroves and salt flats to support biodiversity and stabilize habitats.	Rehabilitate 60% of degraded mangrove and salt flat areas.	Replant mangroves, manage sedimentation, and protect archaeological findings.	ACF, DOW Aruba, UNEP, archaeologists.
Tourism Management	Mitigate the impacts of tourism on sensitive habitats.	Limit tourism impacts in 70% of vulnerable areas.	Implement visitor access restrictions, establish eco-tourism practices, and provide education.	ACF, Aruba Tourism Authority, local businesses.
Trampling Impacts	Address intensive trampling around degraded areas, including Skydive Aruba.	Restore 70% of degraded vegetation.	Protect and restore impacted dry zones, install fencing where needed, and replant native species.	ACF, DOW Aruba, local communities.

Saliña Cerca

Conservation Focus Area	Summary	5-Year Operational Target	Action	Key Stakeholders/Partners
Ecosystem Connectivity	Protect interconnected saliña ecosystems from	Maintain 80% connectivity	Implement land-use zoning, replant native vegetation, and	ACF, DOW Aruba, local NGOs.

	fragmentation and degradation.	between saliñas.	control invasive species.	
Pollution Mitigation	Reduce contamination affecting saliña flora and fauna.	Achieve a 25% reduction in pollutant levels.	Monitor water quality, enforce waste regulations, and engage communities in clean-ups.	Government of Aruba, ACF, Utilities Aruba.
Visitor Impacts	Minimize disturbance to bird populations and sensitive vegetation.	Restrict access to 50% of sensitive areas.	Install designated paths and bird hides, restrict public access, and educate visitors.	Aruba Tourism Authority, ACF, local businesses.

Saliña Palm Beach

Conservation Focus Area	Summary	5-Year Operational Target	Action	Key Stakeholders/Partners
Habitat Restoration	Restore mangrove forests and wetlands to enhance biodiversity and ecological functions.	Restore 50% of degraded wetland areas.	Conduct mangrove planting, manage hydrology, and reduce habitat fragmentation.	ACF, DOW Aruba, Wageningen University, local communities.
Sustainable Tourism	Manage tourism to minimize its impact on critical habitats.	Ensure 75% compliance with sustainable tourism guidelines.	Establish visitor guidelines, restrict access to sensitive areas, and promote eco-tourism.	Aruba Tourism Authority, local tourism operators, ACF.

Saliña Bubali

Conservation Focus Area	Summary	5-Year Operational Target	Action	Key Stakeholders/Partners
Wastewater Management	Reduce nutrient loading from wastewater to protect water quality and biodiversity.	Decrease nutrient influx by 40% through improved treatment systems.	Upgrade Bubali wastewater treatment plant and monitor effluent quality.	Utilities Aruba, ACF, DOW Aruba, local government.
Biodiversity Protection	Protect migratory bird habitats and enhance ecological connectivity.	Increase migratory bird populations by 25%.	Establish buffer zones, monitor key species, and implement habitat restoration.	BirdLife International, ACF, Aruba National Park Foundation.
Visitor Facilities	Improve visitor safety and engagement through better facilities.	Modernize the Bubali watchtower and build one new boardwalk.	Upgrade infrastructure for visitor safety and experience, ensuring minimal ecological disturbance.	Aruba Tourism Authority, local businesses, DOW Aruba.

5. Stakeholder Roles and Responsibilities

Effective governance is critical to the success of this plan, as it ensures that all stakeholders are aligned, responsibilities are clearly defined, and efforts are coordinated efficiently. The roles and responsibilities of each stakeholder, along with clear mechanisms for coordination, will ensure that no overlaps occur, and the program is managed effectively. The roles and responsibilities of stakeholders in the plan are therefore outlined below. This includes details on their specific duties, areas of contribution, and associated funding sources to promote transparency and avoid duplication of efforts.

Table 4: Stakeholder Roles and Responsibilities

Stakeholder	Role & Responsibility	Funding Sources
Government (National/Regional)	Provide overall policy direction, regulatory frameworks, and coordination across different sectors. Ensure local implementation of programs, resource allocation, and community engagement.	National budget, international aid, EU funding
Private Sector	Facilitate technology transfer, investments, and innovation in sustainable practices.	Private investments, corporate partnerships
NGOs and Civil Society	Support community-based initiatives, advocacy, and capacity-building for sustainable practices.	Donations, grants, partnerships
Academia & Research Institutions	Conduct research, provide expertise, and monitor the effectiveness of implemented strategies.	Research grants, academic funding
International Organizations	Provide technical assistance, capacity-building, and potential funding support for large-scale projects.	Multilateral funding, donor agencies

To ensure effective coordination and avoid overlapping roles or duplication of efforts, the following mechanisms for Stakeholder Coordination will be implemented:

1. **Western Wetlands Sounding Board**: The current group includes representatives from each stakeholder group. This group will meet twice a year to assess progress, address any challenges, and advice changes to the implementation strategies as needed.
2. **Clear Communication Channels**: Regular workshops, meetings, and a shared online platform will be used to ensure that all stakeholders are well-informed about developments, funding opportunities, and responsibilities.
3. **Annual Review Process**: An annual review of the governance structure and stakeholder roles will be conducted to ensure that coordination remains efficient and that roles are still relevant to the program's goals.
4. **Conflict Resolution Mechanism**: A conflict resolution protocol will be established to address any disputes regarding roles, responsibilities, or resource allocation, ensuring that all stakeholders can voice concerns and find solutions in a timely manner.

A clear transition phase is crucial to ensure stakeholders are informed and prepared for the implementation of new regulations. The transition plan includes:

- **Stakeholder Consultations**: Engage with local communities, tourism operators, and other relevant stakeholders through workshops and meetings to discuss proposed zoning and enforcement measures.
- **Public Awareness Campaigns**: Launch educational programs to inform the public about the importance of Coastal ecosystems and protected areas, the benefits of conservation, and the specifics of any regulations.
- **Feedback Mechanisms**: Establish channels for stakeholders to provide feedback and express concerns, ensuring their perspectives are considered in finalizing the plan.

- **Implementation Support**: Offer resources and support to help stakeholders adapt to new regulations, including training programs and assistance with compliance.

6. Monitoring and evaluation

Regular monitoring and evaluation are critical to understanding the effectiveness of conservation actions, tracking changes in ecosystem health and biodiversity, and identifying emerging threats specific to the Western Wetlands of Aruba. To support this Management Plan, a robust Monitoring and Evaluation (M&E) framework will be tailored to the unique characteristics of Aruba's saliñas and associated ecosystems. This framework will integrate clearly defined indicators, methodologies, and data collection tools specifically suited to the Western Wetlands' ecological, physical, and socio-economic dynamics. The structured approach is outlined below:

Table 5: Monitoring and Evaluation Framework for the Western Wetlands

Biodiversity Monitoring

Indicator	Methodology	Data Collection Tools
Species Richness and Abundance	Conduct regular biodiversity surveys in saliñas, roois, and vegetated areas using standardized transects and plots.	Field surveys, camera traps, eDNA sampling.
Population Trends of Key Species	Implement mark-recapture studies and population modelling for waterbirds, migratory species, and invertebrates.	GPS tagging, acoustic monitoring, photo ID.
Habitat Condition and Coverage	Perform habitat mapping and quality assessments for saliñas, roois, and buffer zones using field and remote sensing methods.	GIS mapping, drone surveys, vegetation indices.

Physical Characteristics

Indicator	Methodology	Data Collection Tools
Water Retention Efficiency	Measure water flow and retention in saliñas, roois, and tankis during rainfall events.	Flow meters, soil moisture sensors, visual inspection.
Water Quality	Test for pollutants, sedimentation, and nutrient levels in saliñas.	Water testing kits, spectrophotometers, turbidity meters.
Habitat Connectivity	Monitor habitat connectivity between saliñas and adjacent ecosystems, focusing on green corridors and buffer zones.	Field surveys, satellite imagery, species movement tracking.

Visitor Use and Urban Encroachment

Indicator	Methodology	Data Collection Tools
Visitor Numbers and Behaviour	Conduct visitor surveys and install counters at saliña access points and birdwatching areas.	Visitor counters, questionnaires, tracking apps.
Urban Encroachment	Measure changes in land use and their impacts on saliñas and buffer zones.	GIS mapping, land-use change analysis.
Impact on Sensitive Habitats	Assess physical damage and disturbances from visitor activities on saliñas and adjacent habitats.	Habitat condition assessments, drone imagery.

Socio-Economic Assessments

Indicator	Methodology	Data Collection Tools
Community Involvement	Evaluate the level of local participation in saliña conservation activities.	Surveys, participation records, stakeholder interviews.
Economic Benefits of Nature	Measure economic contributions from eco-tourism, birdwatching, and related activities in the Western Wetlands.	Economic surveys, financial records.
Local Perceptions	Assess awareness and attitudes toward the conservation of the Western Wetlands.	Pre- and post-outreach program surveys.

Management Actions and Enforcement

Indicator	Methodology	Data Collection Tools
Compliance with Regulations	Conduct regular patrols and inspections within and around the saliñas.	Patrol logs, compliance checklists.
Effectiveness of Restoration	Monitor ecological indicators before and after restoration efforts, focusing on biodiversity and habitat quality.	Baseline and post-restoration vegetation surveys.
Outreach Impact	Evaluate the success of educational campaigns targeting local and tourist populations.	Attendance records, feedback forms.

Threat Identification and Adaptive Management

Indicator	Methodology	Data Collection Tools
Invasive Species Presence	Conduct surveys to identify and track invasive species in saliñas and surrounding areas.	Camera traps, field surveys, eDNA sampling.
Climate Change Impacts	Analyse long-term data on pollution, water quality, precipitation, and vegetation changes specific to the Western Wetlands.	Weather stations, climate models, satellite data (also measures listed under physical characteristics, above).
Adaptive Management Effectiveness	Review and adapt management actions to address new threats and enhance effectiveness.	Performance reviews, stakeholder consultations.

7. Supporting strategies

Tourism Strategy for the Western Wetlands

A well-developed tourism strategy will position the Western Wetlands as a premier destination for non-impacting, wildlife-focused tourism, generating sustainable revenue while promoting conservation. This strategy will be designed in collaboration with the Aruba Tourism Authority, conservation organizations, and local businesses to create eco-tourism opportunities that showcase the wetlands' unique biodiversity, particularly migratory and resident bird species. Key initiatives will include:

- Establishing guided wildlife tours, birdwatching events, and educational activities that celebrate the ecological significance of the wetlands.
- Developing visitor infrastructure, such as boardwalks, bird hides, and interpretive signage, to facilitate responsible tourism while minimizing environmental impacts.
- Marketing the Western Wetlands as a key attraction within Aruba's eco-tourism portfolio, emphasizing their role as a protected area and a hub of biodiversity.
- Training local guides and businesses to deliver engaging, nature-based experiences, reinforcing community involvement in sustainable tourism.
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This strategy ensures that tourism contributes directly to the preservation and appreciation of the Western Wetlands while creating economic opportunities for the local community.

Research & Monitoring

Research and monitoring will focus on continuously gathering data on the biodiversity, habitat conditions, and species health of the Western Wetlands. This strategy will emphasize regular assessments of water quality, hydrology, and key species populations, such as migratory birds and invertebrates, to inform adaptive management practices. By tailoring monitoring efforts to the unique dynamics of the Western Wetlands, this strategy ensures progress tracking, early detection of emerging threats, and evidence-based decision-making to enhance conservation efforts. Collaboration with universities, NGOs, and citizen science platforms will be integral to its success.

Communications & Advocacy (Including Sustainable Land Management)

Effective communication and advocacy will highlight the importance of conserving the Western Wetlands, fostering a deeper understanding and appreciation for their unique biodiversity. This strategy will promote sustainable land-use practices, habitat connectivity, and ecosystem protection through targeted campaigns and partnerships with local stakeholders. Advocacy efforts will influence local and international policies to support the protection of these critical ecosystems, with a particular focus on minimizing urban encroachment, promoting sustainable tourism, and enhancing watershed management. Engaging the tourism industry will ensure practices align with conservation goals while providing eco-conscious opportunities for visitors to experience the wetlands responsibly.

Learning & Outreach

Learning and outreach programs will aim to raise awareness about the value and fragility of the Western Wetlands. This strategy will target schools, local communities, and tourists through tailored workshops, guided tours, and interactive educational campaigns. By engaging the public in biodiversity conservation efforts, these initiatives will foster environmental stewardship and inspire community-driven action to protect the wetlands. Programs will highlight the cultural and ecological significance of the Western Wetlands, encouraging collective responsibility for their long-term sustainability.

8. Resources

Effective implementation of this Plan will require a strong foundation of human and financial resources to support its objectives. The resources required to protect and manage the Western Wetlands encompass not only technical skills and expertise but also robust financial mechanisms that can sustain conservation actions over time. By addressing existing gaps in staffing, skills, and funding, at a strategic, organisation-wide level, the ACF aims to strengthen the foundation for adaptive management, stakeholder engagement, and community outreach—core pillars of the plan's success.

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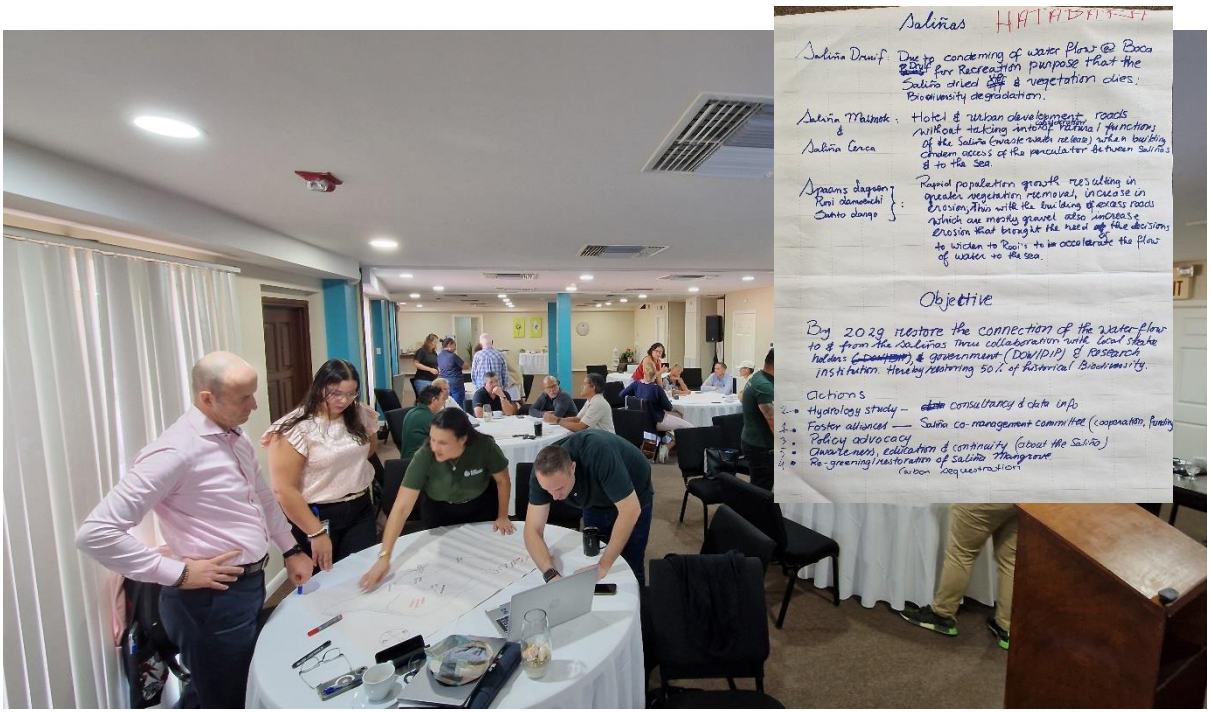
Appendix 1: Coastal Stakeholder Workshop - Outcomes

A stakeholder workshop was held on the island (xx/November/2024) to develop an overall vision for coastal habitats, set out in section 1 of the report, and to define specific objectives for the key habitats identified by the group, associated issues and potential actions. The priority ecosystems identified by the stakeholders included Saliñas, and these specific outcomes are set out below.



Saliñas		
Objective	**Issues**	**Actions**
By 2029 restore the connection of the water flow to and from the saliñas years, through collaboration with local stakeholders and government (DFW/DIP) and research institutions; thereby restoring 50% of historical biodiversity.	Saliña Druif Due to blocking of water flow at Boca Druif, for recreational purposes, the saliña dries up and vegetation dies, leading to biodiversity degradation.	No site-specific actions were proposed; however, a list of five prioritised general actions were put forward: 1. Foster alliances - saliña Cope management committee (cooperation, funding) 2. Hydrology study - consultancy and data information 3. Policy advocacy 4. Re-greening/restoration of saliña mangrove, also to increase carbon sequestration
	Saliña Malmok and Saliña Cerca Hotel and urban development, and associated road infrastructure takes/has taken place without taking into account the natural functions of the saliñas (management of water); causing the movement of water between saliñas and the sea to be impeded and/or blocked.	
	Spaans Lagoen, Rooi Damoenchi and Santo Largo Rapid population growth resulting in greater vegetation removal, increase in erosion; this with the building of access roads and other transport infrastructure, which are mostly gravel, also increases erosion, resulting in decisions to widen the roois in order to accelerate the flow of water to the sea.	

Appendix 2: Plant species (inventory 2021-2023)

This list of plant species per salina is the result of field inventories in the period 2021-2023. Several species are protected under the Article 1 or 2 of the Landsbesluit Fora en Fauna (Landsbesluit AB 2017 no. 48). Some species found during the field inventories were not known from Aruba before (Van Proosdij, 2012), although some have been cultivated in gardens for a long time already.

Species	Druif	Malmok	Cerca	Palm Beach	Bubali	New to Aruba*	Landsbesluit AB 2017 no. 48
Achyranthes aspera	.	.	x	.	.		
Acrostichum danaeifolium	.	.	.	.	x	x	
Aloe vera	.	x	x	.	.		
Alternanthera halimifolia	.	.	x	x	x		
Amaranthus dubius	.	x	x	.	.		
Amaranthus viridis	.	x	.	.	.		
Ammannia latifolia	.	.	.	x	.		
Ammannia species	.	.	.	.	x		
Anthephora hermaphrodita	x	.	.	.	.		
Antigonon leptopus	.	.	x	.	.		
Aristida adscensionis	x	x	x	.	.		
Arivela viscosa	.	x	x	.	x		
Avicennia germinans	x	x	.	.	.		Art. 2
Azadirachta indica	.	x	x	x	.		
Bastardia viscosa	.	.	x	x	.		
Batis maritima	.	x	x	.	.		
Bidens cynapiifolia	.	x	.	.	.		
Boerhavia coccinea	x	x	x	x	.		
Boerhavia erecta	.	.	.	x	.		
Boerhavia scandens	x	.	.	.	.		
Bothriochloa pertusa	.	.	x	.	.		
Bouteloua aristidoides	x	.	x	.	.		
Bouteloua repens	x	x	.	.	.		
Calotropis procera	.	x	.	.	x		
Capraria biflora	x	x	x	x	x		
Cardiospermum halicacabum	.	x	.	.	.	x	
Cenchrus ciliaris	x	x	x	x	x		
Cenchrus echinatus	x	x	x	.	.		
Cenchrus pilosus	.	.	.	.	x		
Cereus repandus	x	x	x	.	.		Art. 2
Chamaecrista nictitans	.	x	x	.	.		
Chara species	x	.	.	.	.	x	
Chloris barbata	x	x	x	x	x		
Chloris virgata	.	x	.	.	x		

Species	Druif	Malmok	Cerca	Palm Beach	Bubali	New to Aruba*	Landsbesluit AB 2017 no. 48
Cienfuegosia species	.	.	.	x	.	x	
Cnidoscolus urens	x	x	x	.	.		
Coccoloba uvifera	.	x	.	.	.		
Commelina erecta	.	.	x	.	.		
Conocarpus erectus	x	x	x	x	x		Art. 2
Conocarpus erectus var. sericeus	.	x	x	.	.		
Corchorus hirsutus	x	x	.	.	.		
Cordia bullata	.	.	x	.	.		
Cordia curassavica	x	x	.	.	.		
Cordia sebestena	.	.	x	.	.	x	
Crossopetalum rhacoma	.	x	.	.	x		
*Croton conduplicatus***	x	x	x	.	.		
Croton ovalifolius	x	x	x	.	.		
Cryptostegia grandiflora	.	.	.	x	.		
Cyanthillium cinereum	.	x	x	x	.		
Cylindropuntia tunicata	.	.	x	.	.	x	
Cynodon dactylon	.	.	.	x	.		
Cyperus confertus	.	x	x	.	x		
Cyperus esculentus	.	.	.	x	x		
Cyperus ligularis	x	x	x	x	x		
Cyperus odoratus	.	x	x	x	x		
Cyperus oxylepis	.	x	x	x	x		
Cyperus planifolius	.	x	.	.	x		
Cyperus rotundus	.	x	x	x	.		
Dactyloctenium aegyptium	x	x	x	.	x		
Datura inoxia	x	x	x	.	x		
Desmanthus virgatus	x	x	x	x	x		
Desmodium incanum	.	.	x	.	.	x	
Digitaria ciliaris	.	.	x	.	.		
Diodella apiculata	.	.	x	.	.		
Ditaxis argothamnoides	x	x	x	.	.		
Echinochloa colona	.	x	.	x	x		
Eclipta prostrata	x	x	.	.	.		
Egletes prostrata	x	x	.	.	.		
Eichhornia crassipes	.	.	.	x	x		
Eleocharis geniculata	.	.	.	.	x		
Eleocharis mutata	x	x	x	x	x		
Eragrostis ciliaris	.	x	x	.	.		
Eragrostis pilosa	.	.	x	x	.		
Eragrostis tenella	.	.	x	.	.	x	
Eragrostis urbaniana	.	x	.	.	.		

Species	Druif	Malmok	Cerca	Palm Beach	Bubali	New to Aruba*	Landsbesluit AB 2017 no. 48
Eriochloa punctata	.	.	.	x	x		
Euphorbia dioeca	.	x	x	x	.		
Euphorbia hirta	.	.	x	x	.		
Euphorbia lactea	.	x	.	.	.	x	
Euphorbia mesembryanthemifolia	x	.	.	.	.		
Euphorbia prostrata	x	.	.	.	.	x	
Euphorbia serpens	x	.	.	.	.	x	
*Euphorbia thymifolia***	x	.	.	.	.		
Evolvulus convolvuloides	x	x	x	x	.		
Fimbristylis cymosa	x	x	x	x	x		
Gossypium hirsutum	x	.	.	.	.		
Guaiacum officinale	x	x	x	x	x		
Heliotropium angiospermum	.	x	x	.	.		
Heliotropium curassavicum	x	x	x	.	x		
Hymenocallis caribaea	.	x	.	.	.	x	
Ipomoea aquatica	x	.	.	x	x	x	
Ipomoea nil	.	x	x	.	.		
Ipomoea pes-caprae	x	.	.	.	.		
Ipomoea wrightii	.	x	x	x	.		
Jatropha gossypiifolia	x	x	x	.	.		
Kalanchoe x houghtonii	.	x	.	.	.		
Laguncularia racemosa	.	x	.	.	.		Art. 2
Lantana camara	x	.	x	.	.		
Launaea intybacea	x	x	x	.	x		
Lemna valdiviana	.	.	.	x	x	x	
Leucaena leucocephala	x	.	x	.	.		
Lipocarpha micrantha	x	.	.	.	.		
Lithophila muscoides	x	x	x	.	x		
Ludwigia erecta	.	.	.	x	x		
Ludwigia octovalvis	.	.	.	.	x	x	
Mallotonia gnaphalodes	x	.	.	.	.		
Matelea rubra	x	x	x	.	x		
Megathyrsus maximus	.	.	.	.	x	x	
Melicoccus bijugatus	.	.	x	.	x	x	
Melocactus macracanthos	x	x	x	.	.		Art. 2
Melocactus species	x	.	x	.	.		
Melocactus stramineus	x	x	x	.	x		Art. 2
Melochia parvifolia	.	x	.	.	.	x	
Melochia tomentosa	.	.	x	x	.		
Mentzelia aspera	.	.	x	.	.		
Mollugo verticillata	.	.	x	.	.		

Species	Druif	Malmok	Cerca	Palm Beach	Bubali	New to Aruba*	Landsbesluit AB 2017 no. 48
Neptunia plena	x	x	x	x	x		
Oldenlandia corymbosa	.	.	.	x	.	x	
Opuntia boldinghii	.	x	.	.	.	x	
Opuntia caracassana	x	x	x	x	x		Art. 2
Opuntia curassavica	.	.	x	.	.		Art. 2
Panicum species	.	.	.	x	.		
Parkinsonia aculeata	.	.	.	.	x		
Paspalidium geminatum	x	.	.	x	.		
Paspalum bakeri	x	.	.	.	.		
Paspalum species	x	.	.	.	.		
Paspalum vaginatum	x	.	.	.	.	x	
Passiflora foetida	x	x	x	.	x		
Passiflora suberosa	.	x	x	.	x		
Pennisetum species	.	x	.	x	.	x	
Phyla nodiflora	x	.	.	x	x		
Phyllanthus niruri	.	.	x	x	.	x	
Physalis pubescens	.	.	x	.	.		
Pilosocereus lanuginosus	.	.	x	.	.		Art. 2
Physostemon stenophyllum	.	.	.	x	.		
Pistia stratiotes	.	.	.	.	x		
Pithecellobium unguis-cati	.	x	.	.	.		
Portulaca elatior	.	.	x	.	.		
Portulaca halimoides	.	x	x	x	.		
Portulaca oleracea	x	x	x	x	.		
Priva lappulacea	.	.	x	.	.		
Prosopis juliflora	x	x	x	x	x		
Quadrella odoratissima	x	x	x	.	.		
Rhynchosia minima	x	x	x	x	x		
Ricinus communis	.	.	.	x	.		
Ruellia nudiflora	x	.	.	.	.	x	
Ruellia simplex	.	x	.	.	.	x	
Ruellia tuberosa	.	.	x	x	.		
Ruppia maritima	.	x	x	.	.		Art. 1
Salvinia molesta	.	.	.	x	.	x	
Scaevola taccada	x	.	.	.	.	x	
Scoparia montevidensis	.	x	.	.	.		
Senna italica	x	x	x	.	.		
Sesbania bispinosa	.	x	.	.	.	x	
Sesuvium portulacastrum	x	x	x	x	x		Art. 2
Sida ciliaris	x	.	x	x	x		
Sida salviifolia	x	.	x	.	.		
Solanum agrarium	x	.	.	.	.		

Species	Druif	Malmok	Cerca	Palm Beach	Bubali	New to Aruba*	Landsbesluit AB 2017 no. 48
Solanum americanum	.	x	x	x	x		
Sporobolus jacquemontii	.	x	.	.	x	x	
Sporobolus pyramidatus	x	x	x	x	x		
Sporobolus virginicus	x	x	x	x	x		
Stachytarpheta boldinghii	.	x	x	x	.		
Stemodia maritima	x	x	x	.	.		
Stenocereus griseus	x	x	x	.	x		Art. 2
Stylosanthes hamata	x	x	x	x	.		
Suriana maritima	x	.	.	.	.		
Tephrosia cinerea	x	.	x	.	.		
Thespesia populnea	.	.	x	.	x		
Thymophylla tenuiloba	.	.	x	.	.	x	
Tragus berteronianus	x	.	.	.	.		
Trianthema portulacastrum	.	x	x	x	x		
Tribulus cistoides	x	x	x	x	x		
Tridax procumbens	.	x	x	x	.		
Typha domingensis	.	.	.	x	x		
Urochloa reptans	x	.	x	.	.	x	
Vachellia tortuosa	x	x	x	x	x		
Washingtonia robusta	x	.	x	x	x	x	
Total: 178	80	95	104	64	61	32	12

*** The species is not included in Van Proosdij (2012), but has been known for long from gardens**

**** In Van Proosdij (2012) as *Croton flavens***

***** In Van Proosdij (2012) as *Euphorbia maculata***

Appendix 3: Bird species

The bird list below represents citizen-science data of species observed and registered at eBird (www.eBird.org). Observation points had to be combined to complete the list per salina[4]. Some species are protected by the Landsbesluit Flora en Fauna (Landsbesluit AB 2017 no. 48). Status as breeding, migratory, resident or vagrant in Aruba has been based on Peterson & Peterson-Bredle (2016) and confirmed by Aruba Birdlife Conservation.

Species	Scientific name	Breeding	Migratory	Resident	Vagrant	Bubali	Palm	Cerca	Malmok	Druif	Landsbe-sluit 2017
Waterfowl											
Black-bellied whistling-duck	*Dendrocygna autumnalis*	O	O	O		X	X	X	X	X	
Fulvous whistling-duck	*Dendrocygna bicolor*				O	X	.	.	.	.	
White-faced whistling-duck	*Dendrocygna viduata*		O			X	.	.	.	.	
Swan goose	*Anser cygnoides*				P	X	.	.	.	.	
Comb duck	*Sarkidiornis sylvicola*				O	X	.	.	.	.	
Muscovy duck	*Cairina moschata*				P	X	X	X	X	X	
Blue-winged teal	*Spatula discors*		O			X	X	X	X	X	
Northern shoveler	*Spatula clypeata*		O			X		X	X	X	
American wigeon	*Mareca americana*		O			X	X	X	X	X	
Mallard	*Anas platyrhynchos*				O	X	.	.	.	.	
White-cheeked pintail	*Anas bahamensis*	O	O	O		X	X	X	X	X	
Northern pintail	*Anas acuta*		O			.	.	X	.	X	
Green-winged teal	*Anas crecca*		O			X	.	X	X	X	
Ring-necked duck	*Aythya collaris*		O			X	.	X	X	X	
Greater scaup	*Aythya marila*		O			X	.	X	X	.	
Lesser scaup	*Aythya affinis*		O			X	X	X	X	X	
Masked duck	*Nomonyx dominicus*				O	X	.	.	.	.	
Grouse, Quail, and Allies											
Crested bobwhite	*Colinus cristatus*	O		O		X	.	X	X	X	Art. 1
Red junglefowl	*Gallus gallus*				P	X	.	.	.	.	
Flamingos											
American flamingo	*Phoenicopterus ruber*		O			X	X	.	X	X	Art. 1
Grebes											
Least grebe	*Tachybaptus dominicus*	O	O	O		X	X	.	X	X	

[4] Combination of observation locations in eBird: Bubali = Bubali Bird Sanctuary + Aruba Butterfly Farm; Palm Beach = Mill Resort Salina; Cerca = Mariott's Salina; Malmok = Aruba Salina; Druif = Tierra del sol Golf Course + Pond east of Tierra del sol golf course.

Species	Scientific name	Breeding	Migratory	Resident	Vagrant	Bubali	Palm	Cerca	Malmok	Druif	Landsbe-sluit 2017
Pied-billed grebe	*Podilymbus podiceps*	O	O	O		X	X	X	X	X	
Storks											
Wood stork	*Mycteria americana*				O	X	.	.	.	.	
Rails, Gallinules, and Allies											
Sora	*Porzana carolina*		O			X	X	X	X	.	
Common gallinule	*Gallinula galeata*	O	O	O		X	X	X	X	X	
American coot	*Fulica americana*	O	O	O		X	X	X	X	X	
Purple gallinule	*Porphyrio martinica*	O	O	O		X	X	.	X	X	
Limpkin											
Limpkin	*Aramus guarauna*				O	X	.	.	.	.	
Shorebirds											
Black-necked stilt	*Himantopus mexicanus*	O	O	O		X	X	X	X	X	
American oystercatcher	*Haematopus palliatus*	O		O		X	X	X	X	X	
Black-bellied plover	*Pluvialis squatarola*		O			X	X	X	X	X	
American golden-plover	*Pluvialis dominica*		O			X	X	X	X	X	
Killdeer	*Charadrius vociferus*	O	O	O		X	X	X	X	X	
Semipalmated plover	*Charadrius semipalmatus*		O			X	X	X	X	X	
Southern lapwing	*Vanellus chilensis*	O	O	O		X	X	X	X	X	
Collared plover	*Anarhynchus collaris*		O			X	X	X	X	X	
Snowy plover	*Anarhynchus nivosus*		O			.	.	.	.	X	
Wattled jacana	*Jacana jacana*		O			X	.	.	.	.	
Upland sandpiper	*Bartramia longicauda*		O			X	.	.	.	X	
Whimbrel	*Numenius phaeopus*		O			X	X	X	X	X	
Hudsonian godwit	*Limosa haemastica*		O			X	.	X	X	.	
Short-billed dowitcher	*Limnodromus griseus*		O			X	X	X	X	X	
Long-billed dowitcher	*Limnodromus scolopaceus*		O			X	.	.	X	X	
Wilson's plover	*Anarhynchus wilsonia*		O			.	.	.	.	X	
Wilson's snipe	*Gallinago delicata*		O			X	X	X	X	X	
Wilson's phalarope	*Phalaropus tricolor*		O			.	.	X	X	.	
Spotted sandpiper	*Actitis macularius*		O			X	X	X	X	X	
Solitary sandpiper	*Tringa solitaria*		O			X	X	X	X	X	
Lesser yellowlegs	*Tringa flavipes*		O			X	X	X	X	X	
Willet	*Tringa semipalmata*		O			X	X	X	X	X	
Greater yellowlegs	*Tringa melanoleuca*		O			X	X	X	X	X	
Ruddy turnstone	*Arenaria interpres*	O	O	O		X	X	X	X	X	
Baird's sandpiper	*Calidris bairdii*		O			X	.	.	.	.	

Species	Scientific name	Breeding	Migratory	Resident	Vagrant	Bubali	Palm	Cerca	Malmok	Druif	Landsbe-sluit 2017
Red knot	*Calidris canutus*		O			X	.	.	X	.	
Ruff	*Calidris pugnax*		O			X	.	.	X	.	
Stilt sandpiper	*Calidris himantopus*		O			X	X	X	X	X	
Buff-breasted sandpiper	*Calidris subruficollis*		O			X	.	.	.	.	
Sanderling	*Calidris alba*		O			X	X	X	X	X	
White-rumped sandpiper	*Calidris fuscicollis*		O			X	X	X	X	X	
Least sandpiper	*Calidris minutilla*		O			X	X	X	X	X	
Pectoral sandpiper	*Calidris melanotos*		O			X	X	X	X	X	
Western sandpiper	*Calidris mauri*		O			X	X	X	X	X	
Semipalmated sandpiper	*Calidris pusilla*		O			X	X	X	X	X	
Gulls, Terns, and Skimmers											
Laughing gull	*Leucophaeus atricilla*	O	O	O		X	X	X	X	X	
Franklin's gull	*Leucophaeus pipixcan*		O			X	.	.	.	.	
Lesser black-backed gull	*Larus fuscus*		O			X	.	.	.	.	
Black skimmer	*Rynchops niger*		O			X	X	X	X	X	
Brown noddy	*Anous stolidus*	O	O			X	.	.	X	.	
Sooty tern	*Onychoprion fuscatus*	O	O			X	X	.	X	.	
Bridled tern	*Onychoprion anaethetus*	O	O			X	.	.	X	.	
Least tern	*Sternula antillarum*	O	O			X	X	X	X	X	Art. 1
Gull-billed tern	*Gelochelidon nilotica*		O			X	.	X	X	X	
Caspian tern	*Hydroprogne caspia*		O			X	.	X	X	.	
Black tern	*Chlidonias niger*		O			X	.	.	.	X	
Common tern	*Sterna hirundo*	O	O	O		X	X	X	X	X	
Roseate tern	*Sterna dougallii*	O	O			X	X	.	X	X	Art. 1
Sandwich tern	*Thalasseus sandvicensis*	O	O			X	X	X	X	X	
Elegant tern	*Thalasseus elegans*		O			.	.	.	X	.	
Royal tern	*Thalasseus maximus*	O	O	O		X	X	X	X	X	
Frigatebirds, Boobies, and Gannets											
Magnificent frigatebird	*Fregata magnificens*	O	O	O		X	X	X	X	X	
Red-footed booby	*Sula sula*				O	X	.	.	.	.	
Brown booby	*Sula leucogaster*		O			X	.	X	X	.	
Masked booby	*Sula dactylatra*				O	X	.	.	.	.	
Cormorants and Anhingas											
Neotropic cormorant	*Nannopterum brasilianum*	O	O	O		X	X	X	X	X	
Pelicans											

Species	Scientific name	Breeding	Migratory	Resident	Vagrant	Bubali	Palm	Cerca	Malmok	Druif	Landsbe-sluit 2017
Brown pelican	*Pelecanus occidentalis*	O		O		X	X	X	X	X	
Herons, Ibis, and Allies											
Least bittern	*Ixobrychus exilis*	O	O	O		X	.	.	.	.	
Yellow-crowned night heron	*Nyctanassa violacea*	O		O		X	X	X	X	X	
Black-crowned night heron	*Nycticorax nycticorax*	O		O		X	X	X	X	X	
Whistling heron	*Syrigma sibilatrix*		O			X	X	X	.	.	
Little Blue heron	*Egretta caerulea*	O	O	O		X	X	X	X	X	
Tricolored heron	*Egretta tricolor*	O	O	O		X	X	X	X	X	
Reddish egret	*Egretta rufescens*		O			X	X	X	X	X	
Snowy egret	*Egretta thula*	O	O	O		X	X	X	X	X	
Striated heron	*Butorides striata*				O	X	.	.	.	.	
Green heron	*Butorides virescens/striata*	O		O		X	X	X	X	X	
Western cattle egret	*Bubulcus ibis*	O		O		X	X	X	X	X	
Great egret	*Ardea alba*	O	O	O		X	X	X	X	X	
Great blue heron	*Ardea herodias*		O			X	X	X	X	X	
White ibis	*Eudocimus albus*		O			X	X	X	X	.	
Scarlet ibis	*Eudocimus ruber*		O			X	X	X	.	X	
White-faced ibis	*Plegadis chihi*		O			X	.	.	.	.	
Glossy ibis	*Plegadis falcinellus*		O			X	X	X	X	X	
Roseate spoonbill	*Platalea ajaja*		O			X	X	X	X	X	
Kingfishers											
Ringed kingfisher	*Megaceryle torquata*		O			X	.	.	.	.	
Belted kingfisher	*Megaceryle alcyon*		O			X	X	X	X	X	
Amazon kingfisher	*Chloroceryle amazona*		O			X	.	X	.	.	
Vultures, Hawks, and Allies											
Osprey	*Pandion haliaetus*		O			X	X	X	X	X	
Northern harrier	*Circus hudsonius*				O	X	.	.	.	.	
Owls											
Burrowing owl	*Athene cunicularia arubensis*	O		O		X	X	X	X	X	Art. 1
Falcons and Caracaras											
Crested caracara	*Caracara plancus*	O		O		X	X	X	X	X	Art. 1
Yellow-headed caracara	*Daptrius chimachima*	O		O		X	.	.	.	.	
American kestrel	*Falco sparverius*	O		O		X	X	X	X	X	
Merlin	*Falco columbarius*		O			X	.	X	X	X	

Species	Scientific name	Breeding	Migratory	Resident	Vagrant	Bubali	Palm	Cerca	Malmok	Druif	Landsbe-sluit 2017
Peregrine falcon	*Falco peregrinus*		O			X	X	X	X	X	Art. 1
White-tailed hawk	*Geranoaetus albicaudatus*		O			.	.	.	.	X	
Parrots, Parakeets, and Allies											
Rose-ringed parakeet	*Psittacula krameri*				P	X	X	X	.	X	
Orange-winged parrot	*Amazona amazonica*				P	.	.	X	.	.	
Budgerigar	*Melopsittacus undulatus*				P	X	.	.	.	.	
Rosy-faced lovebird	*Agapornis roseicollis*				P	X	.	.	.	.	
Yellow-shouldered parrot	*Amazona barbadensis*	O		O		X	.	.	.	.	Art. 1
Green-rumped parrotlet	*Forpus passerinus*				P	X	.	.	.	.	
Brown-throated parakeet	*Aratinga pertinax arubensis*	O		O		X	X	X	X	X	Art. 1
Scarlet-fronted parakeet	*Psittacara wagleri*				P	X	.	.	.	.	
Tyrant Flycatchers: Elaenias, Tyrannulets, and Allies											
Small-billed elaenia	*Elaenia parvirostris*	O		O		X	.	.	.	.	
Caribbean elaenia	*Elaenia martinica*	O		O		X	.	.	X	.	
Tyrant Flycatchers: Pewees, Kingbirds, and Allies											
Olive-sided flycatcher	*Contopus cooperi*				O	X	.	.	.	.	
Eastern wood-pewee	*Contopus virens*				O	X	.	.	.	.	
Willow flycatcher	*Empidonax traillii*				O	X	.	.	.	.	
Northern scrub-flycatcher	*Sublegatus arenarum*	O		O		X	X	X	X	X	
Brown-crested flycatcher	*Myiarchus tyrannulus*	O		O		.	.	.	.	X	
Swainson's flycatcher	*Myiarchus swainsoni*		O			.	.	.	.	X	
Vermilion flycatcher	*Pyrocephalus rubinus*		O			X	.	.	.	.	
Piratic flycatcher	*Legatus leucophaius*				O	X	.	.	.	.	
Variegated flycatcher	*Empidonomus varius*				O	X	.	.	.	.	
Crowned Slaty flycatcher	*Empidonomus aurantioatrocristatus*				O	X	.	.	.	.	
Tropical kingbird	*Tyrannus melancholicus*		O			X	.	.	.	.	
Cattle tyrant	*Machetornis rixosa*		O			.	.	.	X	X	
Gray kingbird	*Tyrannus dominicensis*	O		O		X	X	X	X	X	
Fork-tailed flycatcher	*Tyrannus savana*		O			X	X	X	X	.	
Vireos											
Yellow-throated vireo	*Vireo flavifrons*		O			X	.	.	.	.	
Philadelphia vireo	*Vireo philadelphicus*		O			X	.	.	.	.	

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Red-eyed vireo	*Vireo olivaceus*		O			X	.	.	.	.	
Chivi vireo	*Vireo chivi*		O			X	.	.	.	.	
Black-whiskered vireo	*Vireo altiloquus*		O			X	.	.	.	.	
Martins and Swallows											
Bank swallow	*Riparia riparia*		O			X	X	X	X	X	
Purple martin	*Progne subis*		O			X	.	X	.	.	
Cuban martin	*Progne cryptoleuca*		O			X	.	.	.	.	
Caribbean martin	*Progne dominicensis*		O			X	.	X	X	X	
Gray-breasted martin	*Progne chalybea*		O			X	.	.	.	.	
Brown-chested martin	*Progne tapera*		O			X	.	.	.	.	
Southern rough-winged swallow	*Stelgidopteryx ruficollis*		O			X	X	.	.	.	
Barn swallow	*Hirundo rustica*		O			X	X	X	X	X	
Cliff swallow	*Petrochelidon pyrrhonota*		O			X	X	X	X	X	
Cave swallow	*Petrochelidon fulva*		O			X	.	.	.	.	
Starlings and Mynas											
Common myna (exotic)	*Acridotheres tristis*				P	X	.	.	.	.	
European starling	*Sturnus vulgaris*				O	X	.	.	.	.	
Catbirds, Mockingbirds, and Thrashers											
Tropical mockingbird	*Mimus gilvus*	O		O		X	X	X	X	X	
Thrushes											
Veery	*Catharus fuscescens*		O			X	.	.	.	.	
Gray-cheeked thrush	*Catharus minimus*		O			X	.	.	.	.	
Wood thrush	*Hylocichla mustelina*		O			X	.	.	.	.	
Old World Sparrows											
House sparrow	*Passer domesticus*	O		O		X	X	X	X	X	
New World Sparrows											
Rufous-collared sparrow	*Zonotrichia capensis*	O		O		X	.	.	.	.	
Blackbirds											
Bobolink	*Dolichonyx oryzivorus*		O			X	.	X	X	X	
Oriole blackbird	*Gymnomystax mexicanus*		O			X	.	.	.	.	
Venezuelan troupial	*Icterus icterus*	O		O		X	X	X	X	X	
Yellow oriole	*Icterus nigrogularis*	O		O		X	X	X	X	.	
Baltimore oriole	*Icterus galbula*		O			X	.	.	.	.	
Shiny cowbird	*Molothrus bonariensis*	O		O		X	X	X	X	X	
Great-tailed grackle	*Quiscalus mexicanus*		O			X	.	X	X	.	
Carib grackle	*Quiscalus lugubris*		O			X	X	X	X	X	

Species	Scientific name	Breeding	Migratory	Resident	Vagrant	Bubali	Palm	Cerca	Malmok	Druif	Landsbe-sluit 2017
Yellow-hooded blackbird	*Chrysomus icterocephalus*		O			X	.	X	.	.	
Wood-Warblers											
Ovenbird	*Seiurus aurocapilla*		O			X	.	.	.	.	
Worm-eating warbler	*Helmitheros vermivorum*		O			X	.	.	.	.	
Louisiana waterthrush	*Parkesia motacilla*		O			X	.	.	.	.	
Northern waterthrush	*Parkesia noveboracensis*		O			X	X	X	X	X	
Black-and-white warbler	*Mniotilta varia*		O			X	.	.	.	.	
Prothonotary warbler	*Protonotaria citrea*		O			X	.	.	.	.	
Tennessee warbler	*Leiothlypis peregrina*		O			X	.	.	.	.	
Connecticut warbler	*Oporornis agilis*		O			X	.	.	.	.	
Mourning warbler	*Geothlypis philadelphia*		O			X	.	.	.	.	
Common yellowthroat	*Geothlypis trichas*		O			X	.	.	.	X	
Hooded warbler	*Setophaga citrina*		O			X	.	.	.	.	
American redstart	*Setophaga ruticilla*		O			X	X	X	X	X	
Cape may warbler	*Setophaga tigrina*		O			X	.	.	.	.	
Northern parula	*Setophaga americana*		O			X	.	X	.	X	
Magnolia warbler	*Setophaga magnolia*		O			X	.	.	.	.	
Bay-breasted warbler	*Setophaga castanea*		O			X	.	.	.	.	
Blackburnian warbler	*Setophaga fusca*		O			X	.	.	.	.	
Yellow warbler	*Setophaga petechia*	O	O	O		X	X	X	X	X	
Chestnut-sided warbler	*Setophaga pensylvanica*		O			X	.	.	.	.	
Blackpoll warbler	*Setophaga striata*		O			X	X	X	X	.	
Black-throated blue warbler	*Setophaga caerulescens*		O			X	.	.	.	.	
Palm warbler	*Setophaga palmarum*		O			X	.	.	.	X	
Yellow-rumped warbler	*Setophaga coronata*		O			X	.	.	.	.	
Prairie warbler	*Setophaga discolor*		O			X	.	.	.	.	
Black-throated green warbler	*Setophaga virens*		O			X	.	.	.	.	
Canada warbler	*Cardellina canadensis*		O			X	.	.	.	.	
Cardinals, Grosbeaks, and Allies											
Summer tanager	*Piranga rubra*		O			X	.	.	.	.	
Scarlet tanager	*Piranga olivacea*		O			X	.	.	.	.	
Rose-breasted grosbeak	*Pheucticus ludovicianus*		O			X	.	.	.	.	
Blue grosbeak	*Passerina caerulea*		O			X	.	.	.	.	

Species	Scientific name	Breeding	Migratory	Resident	Vagrant	Bubali	Palm	Cerca	Malmok	Druif	Landsbesluit 2017
Indigo bunting	*Passerina cyanea*		O			X	.	.	.	.	
Dickcissel	*Spiza americana*		O			X	.	.	.	.	
Tanagers and Allies											
Saffron finch	*Sicalis flaveola*	O		O		X	X	.	.	.	
Yellow-bellied seedeater	*Sporophila nigricollis*		O			X	.	.	.	.	
Bananaquit	*Coereba flaveola*		O			X	X	X	X	X	
Black-faced grassquit	*Melanospiza bicolor*		O			X	X	X	X	X	
Pigeons and Doves											
Rock pigeon	*Columba livia*	O		O		X	X	X	X	X	
Bare-eyed pigeon	*Patagioenas corensis*	O		O		X	X	X	X	X	
Common ground dove	*Columbina passerina*	O		O		X	X	X	X	X	
White-tipped dove	*Leptotila verreauxi*	O		O		X	X	X	X	.	
Eared dove	*Zenaida auriculata*	O		O		X	X	X	X	X	
Skuas and Jaegers											
Pomarine jaeger	*Stercorarius pomarinus*		O			X	.	.	.	.	
Cuckoos											
Greater ani	*Crotophaga major*		O			X	.	.	X	X	
Smooth-billed ani	*Crotophaga ani*		O			X	X	.	X	X	
Groove-billed ani	*Crotophaga sulcirostris*	O		O		X	X	X	X	X	
Yellow-billed cuckoo	*Coccyzus americanus*		O			X	.	X	X	X	
Mangrove cuckoo	*Coccyzus minor*		O			X	.	.	.	X	
Nightjars											
Common nighthawk	*Chordeiles minor*	O		O		X	.	.	.	.	
Antillean nighthawk	*Chordeiles gundlachii*	O		O		X	.	.	.	.	
White-tailed nightjar	*Hydropsalis cayennensis*	O		O		X	.	X	X	X	
Swifts											
Black swift	*Cypseloides niger*		O			X	.	.	.	.	
White-collared swift	*Streptoprocne zonaris*		O			X	.	.	.	.	
Gray-rumped swift	*Chaetura cinereiventris*		O			X	.	.	.	.	
Chimney swift	*Chaetura pelagica*		O			X	.	.	.	.	
Vaux's swift	*Chaetura vauxi*		O			X	.	.	.	.	
Chapman's swift	*Chaetura chapmani*		O			X	.	.	.	.	
Fork-tailed palm swift	Tachornis squamata		O			.	.	.	X	.	
Hummingbirds											
Ruby-topaz hummingbird	*Chrysolampis mosquitus*	O		O		X	X	X	X	X	Art. 2

Species	Scientific name	Breeding	Migratory	Resident	Vagrant	Bubali	Palm	Cerca	Malmok	Druif	Landsbe-sluit 2017
Blue-tailed emerald	*Chlorostilbon mellisugus*	O		O		X	X	X	X	X	Art. 2
Total	**243**	**64**	**167**	**58**	**27**						**11**