

Ecological Assessment of Long Pond, Barbados, for Waterbirds and Shorebirds



Lani Edghill

The Land Conservancy Barbados Inc.

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Cover photo: The lagoon at Long Pond (photo credit Dr. Robin Mahon)

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1 Introduction

This report explores the value and potential of the proposed Long Pond Conservation Area, St Andrew, Barbados, for the conservation of waterbirds and shorebirds (see Appendix 1). Long Pond has long been recognized as important coastal wetland in Barbados, and its conservation has been pursued for decades. This report first explores previous efforts at conservation of Long Pond and then examines the habitats, fauna and flora that make it important and unique. The threats to the Long Pond ecosystem are outlined next, followed by next steps for its establishment.

2 Past, Current and Next Steps for the operationalisation of Long Pond as a Natural Heritage Conservation Area

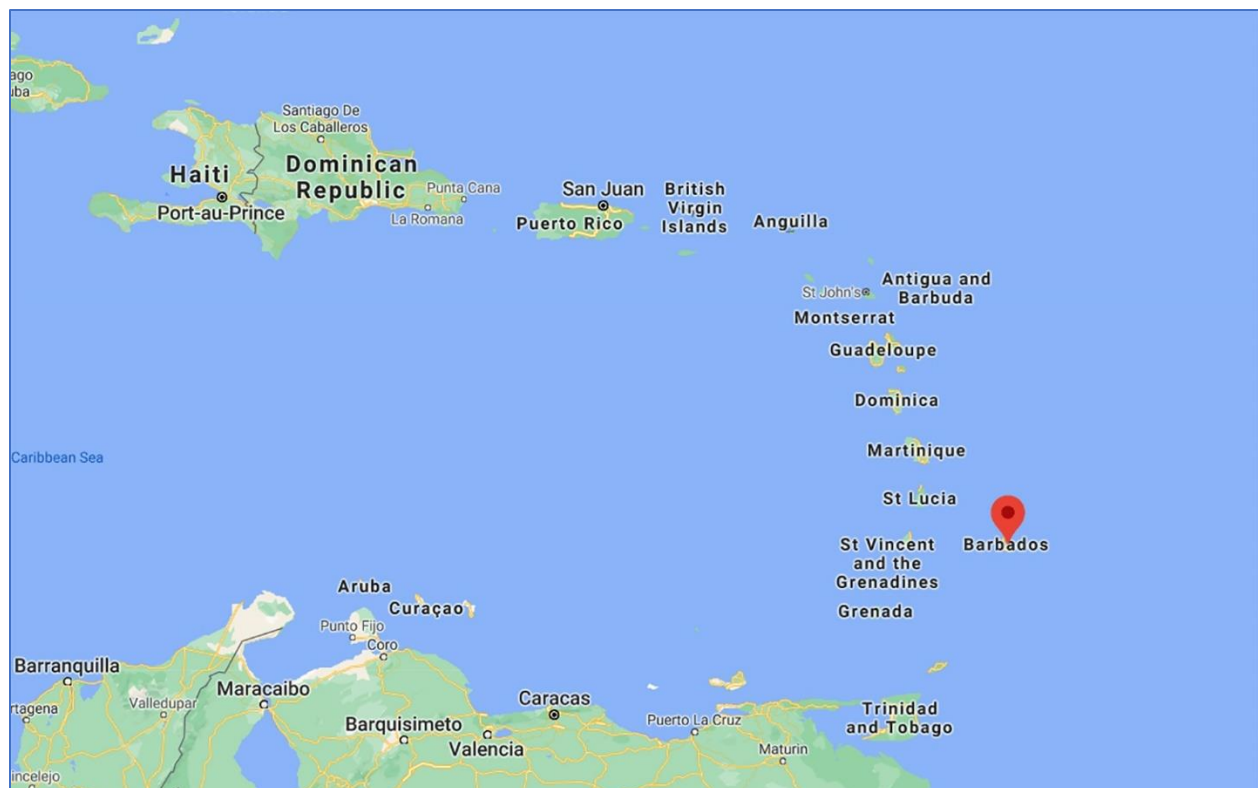


Figure 1 – Location of Barbados (Google Maps)

Long Pond is located in Barbados the most easterly island in the Lesser Antilles (figure 1). It is located on the East Coast of the island in the parish of St Andrew adjacent to the town of Belleplaine (Figure 2). As currently defined by the Barbados Coastal Conservation Programme the proposed Long Pond Conservation Area (LPNHCA) covers 66.5 hectares of coastal pond (6%), beach (8%), grassland (25%), dunes (12%) and woodland (48%). It is bounded to the north by Walkers Reserve, the east by the sea, the west by Belleplaine and the south by private lands along the East Coast Road (Alleyne, 1999).

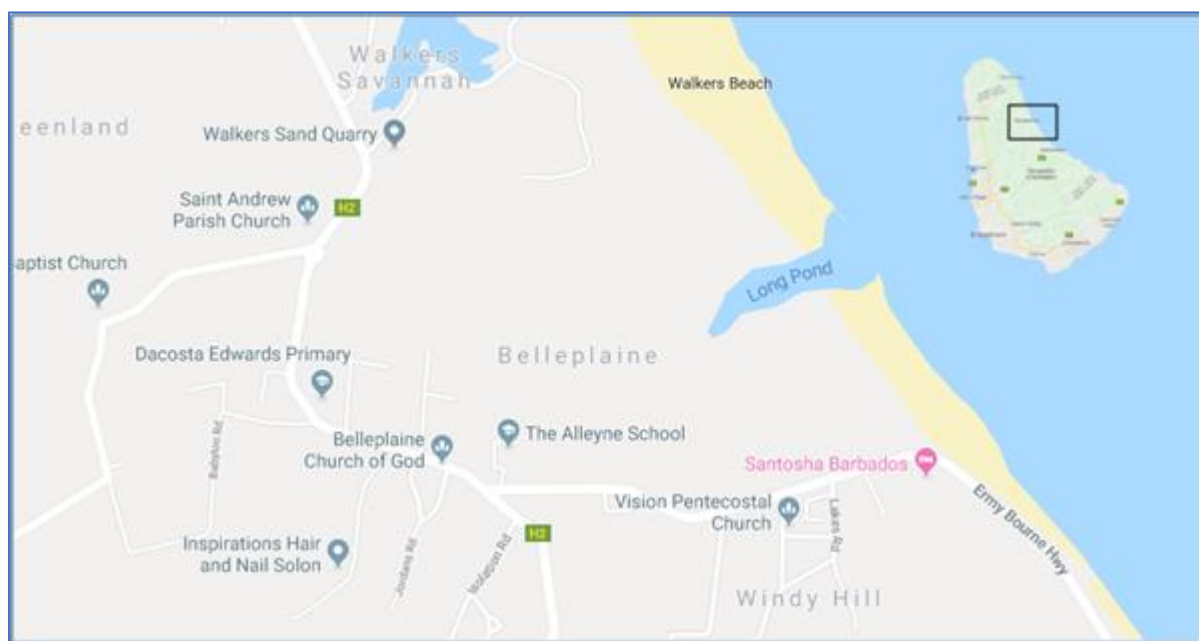


Figure 2 – Location of Long Pond on a map of Barbados (Alleyne 1999)

Long Pond is one of the three largest coastal natural wetland habitat systems along the south, east and north coasts of Barbados: Graeme Hall Swamp, Chancery Lane and Long Pond. Other smaller coastal wetlands such as River Bay and Green Pond are also valuable coastal wetland habitats (Mahon et al. 2023). Long Pond a unique ecosystem and is an unmatched feature on the Barbadian and Eastern Caribbean landscapes. The area is characterised by a silica sand beach, and a complex system of sand dunes, which act as a divide between the coastal marine waters and the waters in the estuarine lagoon itself. The two extensive tributaries of Long Pond, the Bruce Vale River and Walkers River, together with the pond are a feature of the unique geology and physiography of the area (Alleyne, et al. 1999). Long Pond is recognized for its outstanding natural beauty and is considered to be a valuable asset to the island's biodiversity. The sand dunes found in this area protect the coast from high energy wave activity which predominates in that area (Charlemagne, et al. 2006).

Reference to Long Pond as a conservation area is first formally noted in the Barbados Physical Development Plan (PDP) 2003 (GoB 2003) and associated National Park Plan (GoB 1998). The PDP lays out System of Parks and Open Space which comprises seven OS categories:

OS1 – The Barbados National Park	IUCN Category 5 Protected Landscape/Seascape applies to entire area of the National Park. Wide range of land use activities, from forestry and conservation to tourism, resource extraction and village settlements and includes many unique and wild landscapes.
OS2 – Natural Heritage Conservation Areas	Features and locations that are important to the natural heritage of the island. The essential goal of this designation is to retain, protect and enhance these features for future generations. This designation encompasses both terrestrial and marine environments.

OS3 – Coastal Landscape Protection Zone	Two coastal areas outside of the National Park which still exhibit a natural character and have unique physical attributes.
OS4 – Public Parks and Open Spaces	Sites that have been specifically designed to function as open space and recreation areas for the community.
OS5 – National Attractions	Attractions which are used for public enjoyment and as part of the tourism industry.
OS6 – Barbados National Forest Candidate Sites	State-owned sites which are predominantly covered in mature or emerging forests. Some of these areas contain the last remaining original forest cover in Barbados.
OS7 – Shore Access Points	Locations of existing pedestrian access points to the sea which must be protected to ensure accessibility to Barbados’ public beaches for all

The National Park encompasses the Scotland District of Barbados and extends from Conset Bay in the South, around North Point to Archer’s Bay in the northwest. Within the National Park several sites from various OS categories are identified. From a natural heritage conservation perspective, the most notable of these are five OS6 National Forest Sites and a large area running along the coast from Lakes Beach around north point to Archer’s Bay proposed as an OS2 Natural Heritage Conservation Area. Much of this proposed NHCA is privately owned, and it has been recognized that establishing the entire area as an NHCA all at once would be challenging. Subsequently, proponents have noted that it may be more feasible to establish smaller NHCAs within the larger proposed area with the long-term aim of creating a mosaic of NHCAs that might coalesce into the single large one envisaged in the 2003 PDP.

Given its unique natural heritage and aesthetic value Long Pond has been seen as the starting point of this mosaic and was first targeted by the Barbados Coastal Conservation Programme (Phase 1), Demonstration Projects on Participatory coastal zone management in Barbados (Almerigi et al. 1999, Alleyne et al. 1999a) In that project an inventory of plants and animals (both aquatic and terrestrial) was carried out (Alleyne et al. 1999a Technical Annex). Over the one-year duration of the project there were several activities aimed at community engagement including participatory strategic and action planning. The output of the project was a handbook of flora and fauna (Alleyne et al. 1999b) and a proposal for the establishment of Long Pond as a community-based NHCA. This proposal was never followed up and the situation remained dormant until 2008 when the Centre for Resource Management and Environmental Studies (CERMES), University of the West Indies, Barbados took up the cause. The idea was that in establishing the NHCA, Long Pond could become a research focus for UWI. An MSc project on mapping the area was completed (Charlemagne et al. 2006). CERMES also sought the endorsement on the Ministry of Environment for the approach developed in the Barbados Coastal Conservation Programme. Endorsement was forthcoming, organized by then Minister of Environment Ambassador Elizabeth Thompson. Once again, the initiative stalled, this time due to inability to find funding.

Plans for Long Pond remained dormant until the 2017 PDP was prepared when it again appeared as a proposed NHCA with reference to the 1998 National Park Plan. In December 2023 the 2017 PDP was amended, was passed by parliament and became policy.

In 2022 The Land Conservancy Barbados (TLC) was established and selected operationalisation of a NHCA at Long Pond as its primary initial focus. TLC prepared a proposal for the development of LPNHCA.

This was submitted to the Natural Heritage Department of the Ministry of Environment and Beautification seeking their endorsement. This was received in November 2023.

TLC is in the process of securing grants to start the first phase of the project, a capacity building exercise with a main focus on facilitating a model of community based natural resource management. The approach proposed by TLC builds on previous work. The proposed approach is to establish a self-sustaining, community-based conservation area that will support local livelihoods and preserve the unique ecosystems of the area for future generations while contributing to the operationalization of the National Park. It comprises five components:

- Engaging the community and building capacity to participate effectively in, and ultimately lead, the operationalization of this conservation area
- Engaging relevant government departments
- Scoping landownership and developing a land acquisition plan
- Preparing a plan for developing and operationalizing the LPNHCA
- Preparing an outlined planning proposal for submission to the Planning Department

Land ownership is perhaps the knottiest issue for establishing the Long Pond NHCA as the area comprised of over 25 privately owned plots, many of which a relatively small, but three of which a large.

3 National or International Status of the Area

In the National Wetland Inventory Long Pond is considered a wetland of national importance and a key biodiversity area (Mahon et al. 2003). This inventory was conducted in April 2023 by the Government of Barbados in fulfillment of obligations under the Ramsar Convention who have urged parties to prioritize the creation of National Wetland Inventories.

Long Pond is located within the Barbados National Park, as defined in the 2003 Amendment to the Physical Development Plan and draft 2017 Amendment to the Physical Development Plan. The National Park is considered an IUCN Category V Protected Area, i.e., a lived-in working landscape “where the interaction of people and nature over time has produced an area of distinct character with significant aesthetic, ecological and/or cultural value, and often with high biological diversity” (Phillips 2002).

It is hoped that with completion of the Barbados Wetland Inventory along with the various supporting documents mentioned in the reference section of this report there is enough data and information to create a case for Long Pond to now be considered as an Important Bird Area by Bird Life International. Long Pond has also been discussed within various government departments involved in biodiversity conservation as a place that should be promoted as a Ramsar site.

3.1 Habitats Available for Migratory Birds and Potential Threats

Habitats Types & Vegetation

According to the National Wetland Inventory there are six main habitats within the Long Pond Conservation Area (Figure 3).

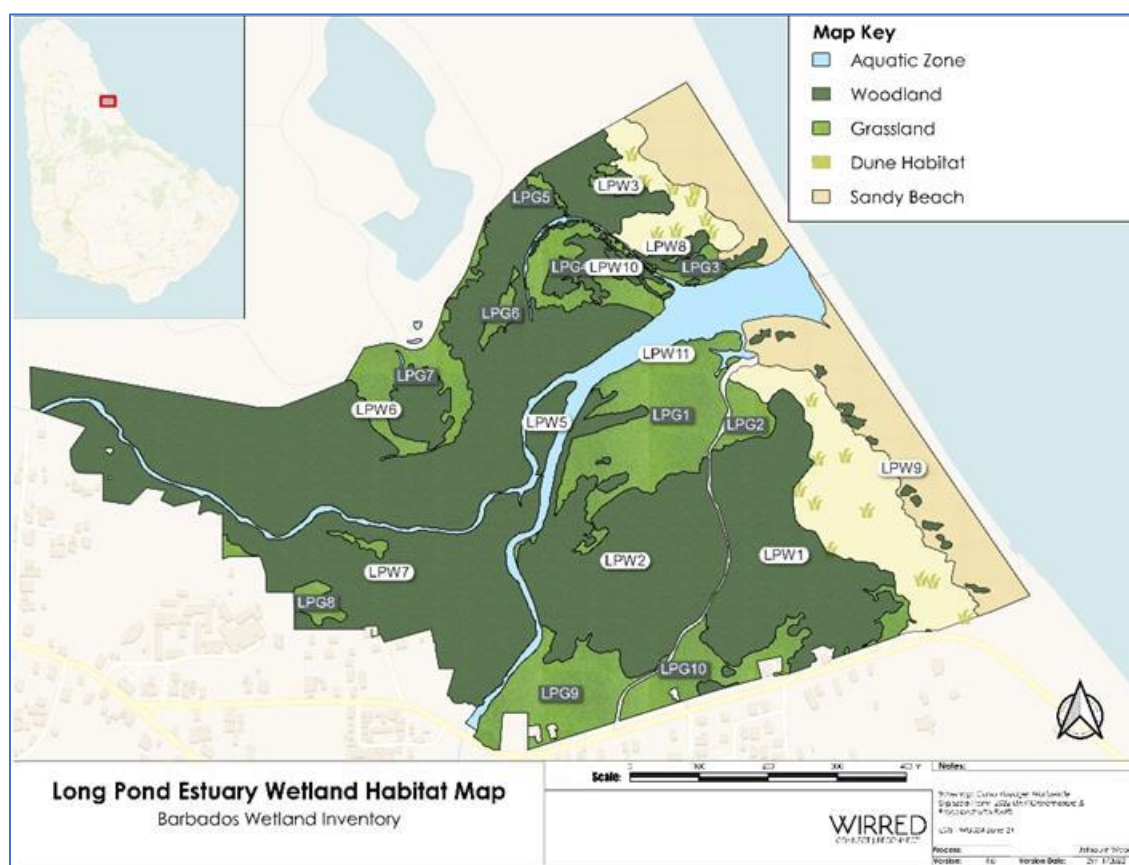


Figure 3 - Long Pond Wetland Habitat Map (National Wetland Inventory)

3.1.1 The Lagoon

The aquatic area (Figure 3) comprises the lagoon, the two rivers that feed into it and some lateral pools. The lagoon and its tributaries are primarily sand and mud substrate with vegetated banks that are overhung by grass and shrubs for most of the length. The lateral ponds fill and empty as water levels change and are bordered by grassland. The northern arm of the lagoon, which was originally the main channel has a steep bank to the north and is overhung by trees and shrubs.

3.1.2 The Woodland

The woodland shown in Figure 3 occurs to the north and south of the lagoon and the main tributary of the lagoon, the Bruce Vale River. In the north eastern section of the proposed conservation area, the woodland abuts the Alleyne School to the west and the lagoon to the south and east. In the north western section of the project area, abutting Walker's Reserve, this woodland is divided by the meandering, seasonal Walker's River that runs through it. The Southern Woodland in the south eastern section of the project area adjacent to the Ermy Bourne Highway is categorized by larger more mature trees dominated mostly by manchineel, clammy cherry and almond which are prime habitat for the golden warbler

3.1.3 Floodplain Grassland

In the middle of the project area between the surrounding woodland and the Long Pond lagoon, there is a large grassland space. The grassland is dominated by pitted bluestem (*Bothriochloa pertusa*), zoysia (*Zoysia tenuifolia*) in the middle section and crabgrass (*Sporobolus virginicus*) along the riverbank. Other species include khus khus grass (*Vetiveria zizanioides*), devil grass (*Cynodon dactylon*), green summer grass (*Urochloa subquadrifida*), and buffalo grass (*Stenotaphrum secundatum*).

3.1.4 The Dunes

Coastal scrub plant communities were identified in the dune habitat zone located between the beach and woodland areas (Figure 3). Coastal scrub was dominated by low lying sea grape (*Coccoloba uvifera*) and fat pork (*Chrysobalanus icaco*), forming dense, impenetrable thickets. Other less dominant species included hoop wood (*Dalbergia ecastaphyllum*), french cotton (*Calotropis procera*).

3.1.5 The Beach

The area between the dune zone and the high tide line was designated as the beach zone. Goatsfoot yam (*Ipomoea pes-caprae*), seaside bean (*Canavalia rosea*), and crabgrass dominated the coastal zone (*Sporobolus virginicus*). The coastal spurge (*Sesuvium portulacastrum*), *Blutaparon vermiculare*, and seaside samphire are other species (*Euphorbia mesembrianthemifolia*) present. They represent the classical plant zonation from the sea to the dune crest described by Gooding (1942). Individual, dispersed, or grouped coconut trees (*Cocos nucifera*) are common, particularly towards the inland margin.

3.1.6 Coconut Grove

Coconut groves are here defined as clusters of at least five mature coconut trees (*Cocos nucifera*). These clusters are scattered at various locations across the area, mainly between the beach and dune zones (Mosaic Eco Consult. 2022) and are not shown in Figure 3.

3.1.7 Shorebird and waterbird habitats

Shorebirds and waterbirds generally frequent the beach, the lagoon and adjacent wetland habitats. According to Charlemagne et al. (2006) in 1991 the Long Pond wetland extended much further south along the beach providing a shallow wading habitat for shorebirds and wading birds (Figure 3). This area was reportedly eliminated by human intervention with heavy machinery to allow better access to the beach from the Long Pond lagoon area. After this intervention Long Pond empties directly into the sea opposite the lagoon. This southern arm of Long Pond, if restored, would provide more shallow wading habitats for shorebirds.



Figure 4 - Long Pond 1991 (Charlemagne et al. 2006)

The grassland area historically also would have, in high rainfall years, been inundated with water acting as an extension of the lagoon creating an additional shallow wading environment for waterbirds.

4 Threats

There are several threats to these ecosystems. The entire area has undergone several man-made transformations. The pond used to be much larger, running south along the beach at the foot of the dunes before entering the sea (Figure 4). The entrance to the sea was reshaped directly opposite the main lagoon to facilitate access to the beach. The dunes and their biota are vulnerable. Four-wheel vehicles often drive on them. They also compact the beach destroying sea turtle nests. The rivers entering the pond are polluted with agricultural and urban waste. Very high coliform levels were observed in Long Pond. Bird hunters shoot migratory shorebirds in the area. There is a lot of seaborne plastic on the beach and the wind often blows this back into the pond. Plastic waste also comes down the rivers. There have been several development applications for the area, including for a shrimp farm.

Long Pond is fed by two catchments, the Bruce Vale River watershed, which is the second largest in Barbados, and the Walkers River watershed, which is the third largest. The health of Long Pond is partially dependent on the use and abuse of the lands in these watersheds. Ideally, an attempt at conservation of Long Pond will include watershed management for these two watersheds.

4.1 Water Quality Threats

The water quality at Long Pond is significantly impacted by two main threats: sewage contamination and erosion. These factors can adversely affect the health of waterbird and shorebird populations by degrading their habitat quality and potentially affecting the food chain.

4.1.1 Sewage Contamination

The presence of high levels of fecal coliform and fecal streptococci bacteria, which exceed the acceptable limits set by the U.S. Environmental Protection Agency (1000 colonies per 100 ml), poses a major concern for Long Pond's water quality. These elevated bacterial counts are likely a result of wastewater discharges, potentially originating from nearby urban or agricultural areas and traveling overland into the pond (Alleyne, 1999). Sewage contamination can not only degrade water quality but also lead to the spread of disease among avian populations, particularly species that rely on water for feeding or breeding. The presence of harmful pathogens can disrupt the ecosystem and pose a direct threat to both resident and migratory bird populations by contaminating water and food sources.

4.1.2 Erosion and Sedimentation

Erosion in the surrounding watershed is another significant threat to water quality in Long Pond. High levels of dissolved solids, primarily consisting of soil particles from foliage removal and land degradation, have been observed in the water. As soil and sediment are washed into the pond, they increase turbidity, which can disrupt foraging behaviors of waterbirds and shorebirds, especially those that rely on clear, shallow waters for feeding. Additionally, excessive sedimentation can smother aquatic vegetation, which provides crucial habitat for both birds and other wildlife (Alleyne, 1999). The loss of vegetative cover due to erosion exacerbates these issues by reducing the pond's ability to filter out pollutants and by decreasing the available habitat for species like waterfowl and shorebirds that depend on healthy wetland ecosystems.

4.2 Pollution Threats

In addition to sewage contamination and erosion, pollution from waste accumulation in the tributaries, lagoon, and beach areas presents significant threats to Long Pond's ecosystem. This pollution can negatively impact the habitat's suitability for both waterbirds and shorebirds, particularly by introducing hazardous materials into the environment.

4.2.1 Tributaries and Lagoon Pollution

In 1998, students from the Alleyne School conducted an assessment of the waste found within the tributaries and lagoon feeding into Long Pond. The survey identified 56 different types of waste, including plastics, glass, rubber, Styrofoam, and miscellaneous objects (Alleyne, 1999). The accumulation of these materials, particularly plastics and Styrofoam, poses several threats to aquatic life and bird populations. Not only can these pollutants obstruct natural processes like water filtration, but they can also be ingested by waterbirds and shorebirds, leading to poisoning, injury, or even death. Furthermore, the breakdown of plastics into microplastics can enter the food web, potentially affecting the health of birds that feed on small invertebrates or fish.

4.2.2 Beach Pollution

Marine debris is another significant pollution source affecting Long Pond, particularly on the eastern beach (Figure 5a). The prevailing southeast winds bring in marine garbage, including plastics and other debris, which accumulate on the beach throughout the year. While the local community conducts annual cleanups to minimize waste, the persistence of marine garbage remains a constant threat to wildlife. Shorebirds, especially those that feed along the tideline, can be directly impacted by ingesting or becoming entangled in debris. In addition to the physical dangers posed by waste, the accumulation of debris can also alter the natural structure of the beach, reducing available foraging and nesting sites for shorebirds. As marine pollution continues to be a global issue, it is crucial to recognize the local impacts on the pond's ecosystems and the birds that depend on them.

4.2.3 Recommendations for Managing Pollution Threats

To manage pollution at Long Pond and protect its ecosystem, a comprehensive approach is needed. This includes regular cleanups (Figure 6), improved waste disposal infrastructure, and public education on pollution prevention. Efforts should focus on habitat restoration, protecting bird nesting areas, and enforcing stricter waste disposal regulations. Additionally, continuous environmental monitoring, microplastic research, and promoting sustainable tourism are key. Collaboration with local governments, NGOs, and community involvement in citizen science can strengthen these efforts, ensuring the long-term health of the pond and its wildlife.



Figure 5 - Beach garbage at Long Pond- Lani Edghill



Figure 6 - Kiwani's Club of Barbados cleans up Long Pond - Kiwani's Club Facebook Page

4.3 Threats from Off-Road Vehicle Use

Off-road vehicle (ORV) use is another significant threat to Long Pond's ecosystem. Historically, off-roading has been a popular activity in Barbados, which has a strong car and off-road culture. However, the impacts of these activities on the environment, particularly on wildlife and habitat integrity, cannot be overlooked. Off-road vehicles can cause substantial damage to both the physical environment and the fauna that depend on it.



Figure 7 - Off road vehicle use at Long Pond compaction damage - Lani Edghill

Off-road vehicles can directly disturb and harm wildlife, particularly species of waterbirds and shorebirds that rely on quiet, undisturbed environments for feeding, breeding, and resting. The noise, movement, and presence of these vehicles can scare birds away from critical habitat areas, leading to abandonment of feeding sites or nesting grounds. In some cases, the physical presence of off-road vehicles can even cause injury or death to smaller wildlife species, either through direct collisions or by trampling nests and young birds. Additionally, off-road vehicle activities can have a severe impact on the pond's vegetation, which serves as both habitat and food for numerous species. The vehicles can crush or uproot plants, particularly in sensitive areas like the pond's marshlands or coastal vegetation. This degradation of plant life leads to reduced food sources for herbivorous species and affects the overall health of the ecosystem.

Off-road vehicles can contribute to erosion and soil compaction in sensitive areas surrounding Long Pond (Figure 7). The repeated passage of vehicles through wetland soils can disturb the soil structure, making it more prone to erosion and runoff. This increases the sediment load in the pond, contributing to the already-present issues of high levels of dissolved solids and sedimentation, which harm the water quality and further degrade bird habitats. Erosion also leads to the loss of crucial vegetative cover, which helps stabilize the shoreline and filter out pollutants.

4.3.1 Recommendation for Management of Off-Road Vehicle Use

To protect Long Pond's delicate ecosystem, it is essential that off-road vehicle use be strictly controlled. Such activities should be prohibited in sensitive areas unless they are undertaken for official or approved purposes, such as ecological monitoring, conservation efforts, or controlled management activities. Clearly marked boundaries and restrictions should be established, and enforcement measures should be in place to prevent unauthorized off-road activities. Additionally, public awareness campaigns can help educate local residents and visitors on the negative impacts of off-roading on wildlife and habitats, promoting more sustainable recreation options.

4.4 Impact of Crabbing on Ecosystem and Wildlife

Crabbing is a traditional cultural activity in Barbados, particularly in the Belleplaine East Coast area, where the local community holds an annual "Crab Night" event to catch, cook, and enjoy crabs (Mahon Pers. Comm) (Figure 8). While this practice is an important part of local heritage, unmanaged crabbing activities could lead to unintended ecological consequences, particularly for crab populations and the surrounding ecosystem.

Over time, if crabbing activities continue without regulation, there is a risk that the local crab populations could be overexploited. As crabs are removed from their habitats, the reproductive cycle could be disrupted, leading to a decline in crab numbers over time. Additionally, the selective harvesting of larger crabs could affect the genetic diversity of the population and hinder the ability of the species to recover.

The practice of crabbing often requires individuals to dig up burrows and search for crabs in sensitive areas of the ecosystem that should ideally remain undisturbed. By digging into these habitats, crabbing can damage the soil structure, displace native plants, and disturb the balance of the local fauna. The disturbance to the soil can increase erosion, leading to higher sediment levels in the pond and other water bodies, which in turn affects water quality and the health of aquatic habitats.

Additionally, the excavation of crab burrows can disrupt other species that rely on these areas for shelter or feeding, further destabilizing the ecosystem. In areas near the water, crabbing could also lead to the destruction of important wetland vegetation, which serves as a vital food source and habitat for waterbirds and shorebirds.



Figure 8 - Crab Night annual event - visitbarbados.org

4.5 Inappropriate Use of Space

Inappropriate use of space around Long Pond is a growing concern for wildlife conservation. The recreational flying of drones has been disturbing shorebirds, causing them to flee from their natural habitats. Parties with loud music and crowds also disrupt the peaceful environment, frightening wildlife and altering their natural behaviors. Additionally, people walking dogs off-leash are a threat, as the dogs chase birds, causing further stress and disruption to the ecosystem. To address these issues, it would be important to implement clear regulations prohibiting drone use, restricting parties in sensitive areas, and enforcing leash laws for dogs. Designated areas for recreational activities and public education on respecting wildlife could also help reduce these disturbances and ensure the area remains a safe haven for birds and other animals.

4.6 Patchy Ownership

The ownership structure around Long Pond adds a layer of complexity to its management and conservation efforts. The eastern part, owned by Walkers Institute for Regenerative Research and Design (WIRRED), represents a local initiative focused on regenerating a sand quarry and establishing an educational and research hub. This could provide a valuable opportunity for research and public awareness about the pond's ecosystem. The Government of Barbados controls a significant portion near the beach, which could facilitate coordinated conservation actions. However, the patchwork of private ownership, including parts of the pond itself, may present challenges in ensuring consistent and unified conservation practices across the entire area. Effective management will require collaboration between government, WIRRED, private landowners, and local communities to implement cohesive conservation strategies and protect the pond's ecosystem from further degradation.

4.7 Grazing

The presence of cows grazing in the floodplain grasslands and along the edge of the pond poses significant environmental challenges. Their grazing can damage native vegetation, disturb habitat areas for wildlife, and contribute to soil erosion, which further degrades the landscape. Additionally, their waste can pollute the water, lowering water quality and negatively affecting both plant and animal life. To mitigate these impacts, it's essential to manage livestock grazing by setting up designated grazing areas, implementing controlled access to sensitive zones, and possibly fencing off parts of the pond and floodplain to protect habitats and prevent erosion. This would help preserve the integrity of the ecosystem while allowing for sustainable land use practices.



Figure 9 - cows grazing in grassland habitat at Long Pond - Lani Edghill

5 Water Depth and Site Hydrology

Long Pond is a permanent water body that is seasonally dynamic based on watershed fluctuations and tidal surges. The pond is fed by two rivers: the Bruce Vale and the Walkers Rivers. In the height of the

rainy season the berm that separates the pond and the ocean can be breached from either flood waters from above or high seas breaking the berm to allow for inflow and outflow making Long Pond a brackish water wetland ranging from 3 ppt to 10 ppt due to seasonal changes (Callender, 2019). There is an increase in salinity and a decrease in temperature closer to the ocean.



Figure 10 - of berm break and connection to the sea established

The size of the pond can vary significantly before the berm is breached (Figure 9). A study conducted in 2006 shows the changes over time of the pond, tributaries and layout. The pond has changed significantly over time, it was at its largest in 1951. Generally, from 1951 to 1964, there was a significant decrease of 65,306 m² of the surface area of the pond (Figure 3.10). From 1964 to 2004, the surface area of the pond fluctuated with a peak in 1997, and then declined to its lowest level in 2004 of 38,948 m² (Charlemagne et al., 2006).

The pond is shallow, < 2 m, and is seasonally dynamic, emptying several times a year when the beach bar is breached by flood waters (Alleyne et al., 1999). The bathymetry of Long Pond when full in July 1998 is shown in Figure 14 of Alleyne et al. (1999). The maximum depth recorded was 170 cm. The depths shown are to the surface of the mud substrate (Alleyne et al., 1999).

6 Threats to migratory shorebirds and waterbird, based on the International Union for the Conservation of Nature (IUCN) threats classification

The International Union for Conservation of Nature (IUCN) lists several threats to migratory shorebirds and waterbirds, including:

- Habitat loss and degradation
- Climate change
- Hunting
- Pollution
- Invasive species

6.1 Habitat Loss

Barbados once had numerous wetlands along its west and south coasts. However, since colonization in 1627 there has been a constant and well documented reduction of wetlands due to an increase in development. These areas were filled in to create more usable and developable land space leaving a small patchwork of habitat for wintering and resident birds alike (Watson, pers comm).

According to the National Wetland Inventory, Long Pond is now only one of four major Nationally Important Wetlands and key biodiversity areas. The effort over the years to protect it is apparent in all the documents cited in the reference section and the work that has been done to get to this stage where Barbados can now begin to conserve what little we have left.

6.2 Climate Change

Climate change poses several risks for Long Pond that can affect its ability to be an effective conservation area for the protection of waterbirds and shorebirds.

6.2.1 Water temperature increases

With temperatures increasing globally and countries experiencing record breaking temperatures annually caused by climate change the increase in water temperature of water bodies is becoming an issue. Temperature increases along with increased nutrient loads can lead to hypoxia, algal domination and fish kills. Long Pond has not been experiencing this kind of climate change impact yet however other wetlands and swamps in Barbados have, such as Graeme Hall Swamp which is also a sump at the bottom of the watershed for water collection and subsequent release into the ocean. It will be important to monitor water quality and temperature to ensure that an environment is not being created that could harm biota and cause ecosystem imbalances that could lead to further degradation of the ecosystem rendering it unusable for conservation.

6.2.2 More Intense Hurricanes

One of the Caribbean's most threatening climate change impacts is the increased intensity of hurricanes and storms that it has been experiencing. These severe weather events can result in washout flooding and major sand movement, leading to habitat loss for shorebirds and other wildlife that rely on stable beaches and coastal areas. Additionally, hurricanes often bring large amounts of debris, which can pollute the beach and waterway, exacerbating existing waste issues and further harming aquatic life and birds. The powerful storms also increase the likelihood of bird mortality due to harsh weather conditions, particularly for species that rely on the area for nesting and foraging.

6.3 Hunting

Since colonization, hunting has been a pastime for the socially elite in Barbados and as a result, it has not been declared illegal. Unfortunately, the island is known for high bird hunting counts which have been managed more recently by bag limits loosely implemented by local birders working with hunters through Bird Life International through the efforts of Wayne Burke, a leading bird conservation enthusiast in Barbados. Though the exact data are not available, the number of birds killed by the most active shooting swamps on the island ranges between 15,000-30,000 between July and October. Information from hunters in the five shooting swamps in the northern parish of St. Lucy varies. One informant thought that the five swamps shot a combined total of 15,000 birds in 2005 and that was a mere 10% of the birds passing. Another thought that 12,000 shot was a more realistic figure but did not venture to estimate the total number passing. Information from another swamp is more exact; 2,400 birds shot in 2004 and 3,000 in 2005. An informant at this swamp estimated the total number of birds passing in season at 25,000. Target species are black-bellied plover, American golden plover, pectoral sandpiper, greater yellowlegs, and lesser yellowlegs (Burke, 2007).

According to the National Wetland Inventory there are five existing and functioning shooting swamps on island. Two of them, Hannay's and Brighthall/Alaska, in the north of the island in St. Lucy. The other three, Searles, Hampton and Golden Pond, are located in St. Phillip; Long Pond is located on the East coast almost in the middle of these two parishes and could provide a refuge for birds in order to avoid the shooting swamps.

The correlation between the birds that are hunted for sport and those that have been recently designated near threatened or vulnerable status by IUCN in their most recent Red List Report is clear. Three out of the five birds that are targeted by hunters are now under threat or vulnerable with their populations. In fact, according to the National Audubon Society Barbados is the last place that the Eskimo curlew (*Numenius borealis*) was seen alive and was shot dead by a hunter. This example shows how critical places like Long Pond are to the conservation of these shorebirds, that are being hunted on island and help to ensure more habitat is available for them and their conservation.

7 Summary of Migratory Shorebird and Waterbird Usage of Long Pond

Long Pond provides a variety of habitats for waterbirds and shorebirds. Most of these are migratory, passing through Barbados on their way to, or from, their overwintering grounds to the south and their summer breeding areas to the north. Several species overwinter in Barbados, some even staying for most of the year. According to Ebird, 25 species of waterfowl, 50 species of shorebirds and 23 species of

'herons, ibis, and allies, have been seen in Barbados. Of these, 19 migratory waterbirds and 22 species of shorebirds have been observed at Long Pond since 1964 (Ebird up to Jan 2025, Hutt 1985) (See Appendix 2). Although not all species of migratory shorebirds known to visit Barbados have been seen at Long Pond, it is likely that at some time all have visited pond, beach, river and mudflats and could potentially be seen there (Alleyne, 1999).

The diversity of waterbirds and shorebirds found at Long Pond underscores the wetland's ecological significance. These species rely on the pond's various habitats, such as its mudflats, shallow waters, beach, and surrounding vegetation, for food, shelter, and breeding. Long Pond's role as a stopover site for migratory birds is critical to their survival, providing them with essential rest and resources during their long migrations.

Recent assessments from the International Union for Conservation of Nature (IUCN) have highlighted a troubling trend: no fewer than fourteen species of shorebird that breed in Canada are now considered more at risk of extinction. This shift in status, reflected in the **IUCN Red List update of October 2024**, is largely due to the accelerating declines observed in North American shorebird populations, particularly among species that rely on Arctic and other sensitive breeding grounds.

Among the shorebirds affected by these assessments are several species that already face significant threats to their populations, including the Hudsonian godwit, lesser yellowlegs, and short-billed dowitcher, all of which have already been listed as Threatened or Endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). In addition, many Arctic-breeding species—such as the buff-breasted sandpiper, white-rumped sandpiper, stilt sandpiper, dunlin, black-bellied plover, and ruddy turnstone—are now facing heightened risks. These species rely on critical breeding habitats in the Arctic, which are increasingly threatened by climate change, habitat degradation, and human activity.

The presence of endangered and threatened species, such as the lesser yellowlegs and short-billed dowitcher, highlights the importance of Long Pond as a critical habitat for migratory birds. However, several other species that use the area, including the ruddy turnstone, black-bellied plover, white-rumped sandpiper, and greater yellowlegs, are now facing heightened risks due to factors like pollution, habitat destruction, and climate change. Protecting these species requires immediate attention to the preservation of their habitats, including safeguarding the pond's shoreline and floodplain, minimizing disturbances from human activity, and addressing pollution. Additionally, creating safe spaces for breeding, foraging, and migration, along with monitoring bird populations, will be essential in mitigating further threats and supporting the recovery of these vulnerable species (see Appendix 2).

The declines in shorebird populations are largely driven by a combination of factors. These include habitat loss due to development, industrialization, and agriculture; climate change, which disrupts migratory patterns and breeding conditions; and the degradation of wetland habitats that are crucial for feeding and resting during migration. For many species, these pressures have compounded over decades, and their breeding and migratory habitats are rapidly disappearing.

For migratory species like the lesser yellowlegs and others, habitat loss during migration is particularly concerning. Wetlands such as Long Pond provide essential stopover sites where birds can rest and feed to build energy for continued migration. However, as wetlands face increasing threats, the species that depend on them face a precarious future. Given the increasing number of shorebird species facing extinction, it is crucial that conservation efforts focus on protecting key habitats, particularly breeding and migration sites. Continued monitoring and research are essential for tracking population declines and understanding the specific needs of these species.

Efforts to safeguard wetlands like Long Pond and associated coastal habitats are vital for the conservation of migratory shorebirds. These habitats not only provide important feeding and resting sites but also serve as refuges for birds during critical times in their life cycles. It is equally important to address broader issues such as climate change, pollution, and habitat destruction to ensure the survival of these iconic and ecologically important species.

In conclusion, the IUCN Red List update highlights the urgent need to protect shorebirds and their habitats, especially in the face of ongoing environmental challenges. Ensuring the preservation of wetlands and other key habitats will be vital in preventing further declines and fostering the recovery of species like the lesser yellowlegs and short-billed dowitcher and others that rely on these environments.

7.1 Shorebirds

7.1.1 Lesser yellowlegs (*Tringa flavipes*)

Status – vulnerable (IUCN Redlist Report 2024)

The lesser yellowlegs (*Tringa flavipes*) is a medium-sized shorebird that breeds primarily in Canada's boreal region and migrates through the United States and Caribbean before wintering predominantly in South America. Despite its wide range, the species has experienced significant population declines in both the short and long term. Recent data, including the Breeding Bird Survey, indicates a decline of approximately 25% over the past three generations (12 years), while International Shorebird Surveys estimate a greater than 50% drop over the last decade. These troubling trends suggest that the Lesser Yellowlegs is at increasing risk of further population reductions unless immediate conservation measures are taken.

7.1.1.1 Key Threats to the lesser yellowlegs

7.1.1.1.1 5.1.2.1.1 Loss of Wetland and Intertidal Habitat

A major concern for the lesser yellowlegs is the destruction of the wetland and intertidal habitats used during migration and wintering. These habitats, which provide crucial feeding and resting sites, are being lost due to land development, pollution, and climate change. Wetland ecosystems are particularly sensitive to human activity, and as coastal areas are developed or altered, shorebirds lose the essential habitats they rely on for survival during migration.

7.1.1.1.2 Hunting for Sport and Subsistence

Hunting, both for sport and subsistence, has long been a significant threat to shorebird populations, including the lesser yellowlegs. Although hunting has been reduced in certain regions, it remains a persistent concern, particularly in areas where regulations are not strictly enforced. In some parts of the world, hunting continues to contribute to population declines such as in Barbados, especially during critical migration and wintering periods when birds are most vulnerable.

7.1.1.1.3 Climate Change and Emerging Threats

Climate change presents additional threats to the lesser yellowlegs, exacerbating existing challenges. Increased temperatures, altered precipitation patterns, and changes in the timing of seasonal events (such as migration) could disrupt the bird's migratory patterns and breeding success. Drought in breeding areas, particularly in Canada's boreal region, could reduce the availability of suitable nesting

sites. Additionally, coastal flooding and more intense hurricanes during the fall migration could further threaten the survival of migrating birds by damaging the habitats they depend on.

7.1.1.2 Projected Continued Declines

The combination of habitat loss, hunting pressures, and climate change is expected to continue driving declines in lesser yellowlegs populations. As wetlands and intertidal zones become more scarce, these shorebirds will have fewer places to stop, rest, and feed during their long migratory journey. The species' reliance on specific habitats at critical points in their life cycle makes it particularly vulnerable to these environmental and anthropogenic threats.

7.1.1.3 5.2.2.7 Conservation Action Needed

Given these ongoing and emerging threats, immediate conservation action is required to ensure the survival of the lesser yellowlegs. Efforts should focus on protecting and restoring key wetland and intertidal habitats, particularly those used during migration and wintering such as Long Pond. This includes ensuring that coastal and wetland areas are preserved from development and degradation, and advocating for stricter enforcement of hunting regulations. Additionally, addressing climate change through both mitigation and adaptation strategies will be critical for maintaining the species' long-term viability. This may involve protecting and managing habitat areas that are resilient to climate impacts, such as wetlands that are less susceptible to flooding and drought such as Long Pond.



7.1.2 Greater yellowlegs (*Tringa melanoleuca*)

Status - Near threatened (IUCN Red List Report 2024)

The greater yellowlegs (*Tringa melanoleuca*) is a large shorebird that breeds in North America's boreal forests and tundra regions, migrating through the United States, Caribbean, and other parts of the Americas during the non-breeding season. Despite its widespread distribution, this species has faced significant population declines in recent years, with the IUCN Red List identifying it as Near Threatened. This decline is largely attributed to a combination of habitat loss, hunting pressures, and emerging climate-related threats that impact its migratory and breeding patterns.

7.1.2.1 Key Threats to the greater yellowlegs

5.3.1.1. Loss of Wetland and Coastal Habitats

Wetlands and coastal ecosystems, which the greater yellowlegs relies on during migration and wintering, are increasingly under threat. These critical habitats are being lost or degraded due to urbanization, agriculture, pollution, and coastal development. As these habitats disappear, the shorebirds lose essential feeding and resting sites during migration, making it more difficult for them to complete their long-distance journey.

7.1.2.2 Disturbance from Human Activity

Human activities, including recreation (e.g., boating, hiking) and industrial development, can disturb the feeding and breeding behaviors of greater yellowlegs. These disturbances, particularly during migration and nesting periods, can lead to stress, reduced reproductive success, and an overall decline in population numbers.

7.1.2.3 Hunting Pressure

Hunting for sport and subsistence has historically been a significant threat to shorebirds, including the greater yellowlegs. Although hunting regulations have been implemented in many regions to protect migratory birds it is not illegal in Barbados, illegal hunting and unsustainable hunting practices persist in other areas, particularly in the bird's wintering habitats. These activities continue to pose a threat, especially during critical migratory periods when the birds are more vulnerable.

7.1.2.4 Climate Change

Climate change is an emerging and significant threat to the greater yellowlegs, as it can disrupt their migratory patterns, alter the timing of their arrival at breeding or wintering grounds, and impact the availability of food. Warmer temperatures can also cause sea level rise and increased flooding, which could damage wetland habitats. Additionally, extreme weather events, such as droughts, hurricanes, and storm surges, may increasingly threaten breeding grounds in the boreal and tundra regions.

7.1.2.5 Shifting Migration Patterns

As climate change affects the timing of seasonal changes, the greater yellowlegs could face challenges in adjusting its migratory timing to match the availability of suitable habitats. If migration is out of sync

with peak food availability or environmental conditions, the species may struggle to find enough resources during critical phases of migration.

7.1.2.6 Population Trends and Conservation Needs

Population estimates for the greater yellowlegs indicate a decline in numbers, with some studies suggesting a decrease of up to 25% over the past few decades. While it is not currently considered at risk of extinction, the continued loss of vital habitats, ongoing hunting pressure, and climate-related threats may drive the species to further declines if left unaddressed.

7.1.2.7 Conservation Strategies

To halt or reverse the decline of the greater yellowlegs, several key conservation strategies must be implemented. First, habitat protection and restoration are essential, focusing on safeguarding wetland and coastal habitats such as Long Pond, including critical migration stopovers and breeding sites, from further degradation. Conservation programs aimed at restoring degraded wetland areas and establishing new protected zones are vital for ensuring suitable habitats for future generations of greater yellowlegs. Second, stricter enforcement of hunting regulations, especially in wintering and migration areas, is needed to reduce hunting pressures on the species. In regions where hunting remains a significant threat, conservationists should advocate for stronger laws to protect the birds during key periods. Third, addressing climate change through global efforts to reduce greenhouse gas emissions and locally adapting wetland habitats is crucial.

Restoration of coastal ecosystems resilient to rising sea levels such as Long Pond, will help protect these habitats from the long-term impacts of climate change. Lastly, continued monitoring and research on population trends, migratory routes, and habitat use are vital to inform and refine conservation strategies. Advanced bird banding and satellite tracking can provide valuable data on the greater yellowlegs' needs and the pressures it faces across its range, helping guide future conservation efforts.

Monitoring and Research: Continued monitoring of population trends, migratory routes, and habitat use is essential to inform conservation strategies. By tracking the greater yellowlegs through advanced bird banding and satellite tracking, researchers can gain a better understanding of its needs and the pressures it faces throughout its range.



Figure 12 - Greater yellowlegs - Ebird - Caleb Putnam

7.1.3 Short billed dowitcher (*Limnodromus griseus*)

Status – vulnerable (IUCN Red List Report 2024)

The short-billed dowitcher (*Limnodromus griseus*) is a medium-sized shorebird known for its long, straight bill and distinctive foraging behavior. Breeding primarily in the boreal regions of North America, this species migrates along both coasts of the United States and into Central America for winter. Despite its wide distribution, the short-billed dowitcher has experienced significant population declines, making it a species of concern for conservationists and birdwatchers alike.

7.1.3.1 Key Threats to the short-billed dowitcher

7.1.3.1.1 Habitat Loss and Degradation

The short-billed dowitcher relies heavily on coastal wetlands, estuaries, and mudflats for both breeding and migratory stopovers. Long Pond, with its critical wetland habitat, plays a key role in providing such areas for these birds. However, these essential habitats are increasingly threatened by urban development, industrial pollution, agriculture, and rising sea levels due to climate change. The loss and degradation of habitats like Long Pond mean that species such as the short-billed dowitcher have fewer places to rest, feed, and nest during their long migrations. To protect this migratory bird, it is crucial to

prioritize the conservation of habitats like Long Pond, reduce pollution, and implement climate-adaptive strategies to safeguard these vital areas. By focusing on habitat conservation, we can help ensure the short-billed dowitcher continues to thrive and find refuge during its migration.

7.1.3.1.2 Disturbance from Human Activities

Human activities, such as recreation, boating, and coastal development, disturb the delicate balance of wetland ecosystems. Disturbances during critical periods of migration or breeding can lead to increased stress, reduced reproductive success, and displacement of birds from preferred habitats.

7.1.3.1.3 Climate Change

Climate change poses a growing threat to the short-billed dowitcher. Rising sea levels and more frequent extreme weather events (such as storm surges, flooding, and droughts) could further erode essential wetland habitats. Additionally, climate-induced shifts in migration timing and the availability of food resources may negatively impact the species, making it more difficult for them to successfully breed and migrate.

7.1.3.1.4 Hunting Pressure

In some regions, the Short-billed Dowitcher has been hunted for sport and subsistence, particularly in the wintering grounds. While hunting has been restricted in some areas, it still remains a threat in certain parts of its range, particularly during migration.

7.1.4 Conservation Needs and Strategies

To ensure the survival of species like the **short-billed dowitcher and greater yellowlegs**, effective conservation strategies are essential, particularly at critical habitats like Long Pond. These strategies should focus on protecting and restoring wetland areas, preventing degradation from urban development, pollution, and agricultural activities. Habitat preservation must be prioritized, along with the establishment of protected zones that limit human disturbance, particularly during breeding and migration periods. Addressing climate change through local adaptation measures—such as restoring coastal ecosystems that are resilient to rising sea levels—will be crucial for long-term habitat stability. Additionally, stricter enforcement of hunting regulations, pollution control, and active monitoring of bird populations and migratory routes are necessary to reduce pressures on these species. By implementing these conservation strategies, we can help protect the essential habitats that support migratory shorebirds like the Short-billed Dowitcher and ensure their continued survival.



Figure 13 - Short-billed dowitcher - Ebird

7.1.5 Ruddy Turnstone (*Arenaria interpres*)

Status - Vulnerable (IUCN Red List Report)

The ruddy turnstone (*Arenaria interpres*) is a small, migratory shorebird recognized for its distinctive behavior of flipping over stones and other debris to find food. This species has a broad distribution, breeding in the Arctic and migrating through North America, Europe, and South America during the non-breeding season. However, the ruddy turnstone has experienced population declines in certain regions, raising concerns about its long-term survival.

7.1.5.1 Key Threats to the ruddy turnstone

5.451.1 Habitat Loss and Degradation

Coastal wetlands, rocky shorelines, and intertidal zones provide critical feeding and nesting habitats for the ruddy turnstone. These areas are increasingly threatened by urban development, tourism, pollution, coastal erosion, and sea-level rise due to climate change. The destruction and degradation of these habitats, particularly along migratory stopovers, can limit access to essential food resources and safe resting sites.

7.1.5.1.1 Disturbance from Human Activity

The ruddy turnstone is particularly vulnerable to disturbances from human activities, especially during migration and breeding. Recreational activities, such as beach tourism, boating, and fishing, can disturb the birds, disrupting their feeding and breeding behaviors. These disturbances can lead to stress, decreased reproductive success, and displacement from preferred habitats.

7.1.5.1.2 Climate Change

Climate change poses significant risks to the ruddy turnstone, with increasing sea levels, coastal flooding, and extreme weather events affecting critical habitats. In addition, the warming climate may lead to changes in the timing and availability of food resources along migratory routes and wintering grounds. Storms and hurricanes may damage nesting sites and disrupt migratory routes.

7.1.5.1.3 Human Harvesting and Hunting

In some regions, shorebirds, including the ruddy turnstone, have been hunted for food or sport, particularly during migration. Although hunting has been regulated in many areas, illegal hunting and unsustainable practices continue to pose a threat to the population, particularly in wintering areas.

7.1.5.2 Conservation Needs and Strategies

7.1.5.2.1 Habitat Protection and Restoration

Conserving and restoring critical coastal and intertidal habitats is key to the ruddy turnstone's survival. Ensuring protection for nesting and feeding areas, particularly along migratory stopover sites, is essential. Restoration projects aimed at rebuilding damaged coastal ecosystems and wetlands such as Long Pond will provide crucial habitats for this species and other migratory shorebirds.

7.1.5.2.2 Minimizing Human Disturbance

Human disturbance in critical habitats can be minimized through better management practices, such as limiting access to nesting areas during breeding season, promoting ecotourism, and enforcing wildlife protection laws. Education and outreach programs that raise awareness about the importance of these habitats can also help reduce human impact.

7.1.5.2.3 Climate Change Adaptation

Addressing climate change is essential for the long-term protection of ruddy turnstone populations. Conservation strategies must include protecting and enhancing the resilience of coastal ecosystems, such as wetlands and estuaries like Long Pond, which act as natural buffers against the effects of rising sea levels and storm surges. Additionally, global efforts to combat climate change will reduce long-term risks to the species.

7.1.5.2.4 Research and Monitoring

Ongoing research and monitoring of the ruddy turnstone population, including its migratory patterns, breeding success, and habitat use, are essential to better understand the factors affecting its decline. Tracking migration routes through satellite telemetry can provide valuable data to inform conservation actions and identify key habitats that need protection.

7.1.5.2.5 Reducing Pollution

Addressing coastal pollution, particularly oil spills and plastic waste, is crucial for safeguarding the ruddy turnstone's habitat. Efforts to clean up oil spills quickly and limit plastic pollution along coastlines will help protect the birds' feeding grounds and ensure their access to clean resources.



Figure 14 - Ruddy turnstone – Ebird

7.1.6 Least sandpiper (*Calidris minutilla*)

Status - Near threatened

The least sandpiper (*Calidris minutilla*) is the smallest shorebird in North America, known for its distinctive foraging behavior along muddy shores and beaches. Despite its widespread distribution, particularly along the coasts of North America, the species has faced increasing challenges to its survival. Migrating from its breeding grounds in the Arctic and sub-Arctic regions, the least sandpiper encounters numerous threats during its long journey and at its wintering grounds.

7.1.6.1 Key Threats to the least sandpiper

7.1.6.1.1 Habitat Loss and Degradation

Coastal habitats, including mudflats, wetlands, and salt marshes, are crucial for the least sandpiper to feed and rest during migration and winter. However, these ecosystems are increasingly threatened by urbanization, coastal development, agriculture, and pollution. Dredging, draining wetlands for agriculture, and construction of infrastructure (such as seawalls and ports) significantly reduce available habitat for migratory shorebirds like the least sandpiper.

7.1.6.1.2 Disturbance from Human Activity

Human activities, particularly recreational activities such as beach tourism, boating, and fishing, can disturb shorebird habitats. Foraging birds can be displaced by human presence, leading to reduced access to food resources and potential physical harm. High levels of disturbance, especially during migration and breeding periods, can negatively affect the birds' survival rates.

7.1.6.1.3 Climate Change

Climate change presents multiple challenges to the least sandpiper, including rising sea levels, increased frequency and intensity of storms, and shifting weather patterns. Changes in the timing of seasonal events, such as migration and food availability, could disrupt the species' life cycle. Rising temperatures could also affect the breeding success of the species in the Arctic and sub-Arctic regions, while altered coastal ecosystems may impact food resources along migratory routes and wintering grounds.

7.1.6.1.4 Pollution

Coastal pollution, particularly from oil spills, plastics, and heavy metals, poses a serious threat to the least sandpiper. Oil contamination can damage feeding grounds by polluting mudflats and wetlands, making it harder for the birds to find food. Plastic debris and pollutants in the water can lead to ingestion and poisoning. Additionally, pollutants can degrade the quality of habitats, making them less hospitable for shorebirds.

7.1.6.1.5 Predation and Competition

While the least sandpiper is relatively small and nimble, it faces threats from natural predators, such as birds of prey and mammals. Furthermore, competition for food with other shorebird species and invasive species may affect its ability to thrive in crowded habitats.

7.1.6.1.6 Over-exploitation

In certain regions, shorebirds, including the least sandpiper, are vulnerable to hunting pressures, either for sport or subsistence. Although hunting of shorebirds is now regulated in many areas, illegal hunting or unsustainable practices remain a concern, particularly in wintering areas.

7.1.6.2 5.6.2 Conservation Needs and Strategies

7.1.6.2.1 Habitat Protection and Restoration

Protecting critical coastal habitats, such as salt marshes, mudflats, and wetlands such as Long Pond is vital to ensure the least sandpiper has access to the resources it needs to survive. Conservation efforts

should focus on preserving and restoring these habitats from development, pollution, and human disturbance. Establishing protected areas along migratory routes and wintering grounds will help safeguard critical stopover points for the species.

7.1.6.2.2 Minimizing Human Disturbance

Reducing human disturbance in key coastal habitats is essential to protect foraging and resting sites. Limiting access to breeding and migratory habitats during critical periods, such as nesting and migration, will help reduce stress and allow the species to feed and rest without disruption. Educating the public and promoting responsible ecotourism can help raise awareness and minimize human impact on coastal ecosystems.

7.1.6.2.3 Climate Change Mitigation and Adaptation

Efforts to mitigate the impacts of climate change on the least sandpiper are necessary to preserve its coastal habitats and migration patterns. This includes reducing greenhouse gas emissions, as well as adapting conservation strategies to account for changes in weather patterns, sea level rise, and habitat loss. Restoration projects that increase the resilience of coastal ecosystems will also benefit the species in the long run.

7.1.6.2.4 Pollution Control and Cleanup

Addressing pollution in coastal areas through cleanup efforts, regulations on waste disposal, and policies to limit plastic use will help protect shorebird habitats. Quick response teams for oil spill cleanups and stricter enforcement of anti-pollution laws are necessary to prevent environmental contamination and ensure safe, clean habitats for the least sandpiper.

7.1.6.2.5 Monitoring and Research

Ongoing research and monitoring are crucial to understanding the least sandpiper's population trends, migratory routes, and habitat needs. Data on migration timing, breeding success, and habitat use can inform targeted conservation efforts and help identify areas most in need of protection.

7.1.6.2.6 Public Awareness and Advocacy

Raising public awareness about the least sandpiper and other migratory shorebirds is important to foster greater support for conservation initiatives. Community engagement, citizen science programs, and outreach efforts can help build a coalition of advocates for shorebird protection and habitat preservation.



Figure 15 - Least sandpiper - Ebird

7.1.7 Black-bellied plover (*Pluvialis squatarola*)

Status – Vulnerable (IUCN Red List Report)

The black-bellied plover (*Pluvialis squatarola*) is a medium-sized shorebird known for its distinctive black belly during the breeding season and its striking migratory patterns. This species is found in coastal habitats across North America, South America, and parts of Europe and Asia. While the black-bellied plover has a relatively wide distribution, it faces several significant conservation challenges that threaten its population, particularly during its migration and wintering phases.

7.1.7.1 Key Threats to the Black-bellied Plover

5.7.1.2 Habitat Loss and Degradation

Coastal wetlands, mudflats, and beach habitats are critical for the black-bellied plover during migration and wintering. These habitats are increasingly threatened by urbanization, coastal development, recreational activities, and pollution. The destruction of these ecosystems not only reduces the available foraging and resting areas for the species but also leaves them vulnerable to storms and sea-level rise. As key habitats are lost or degraded, the birds face increased competition for limited resources.

7.1.7.1.1 Disturbance from Human Activity

Like many shorebirds, the black-bellied plover is highly sensitive to human activity. Recreational activities on beaches, such as tourism, boating, and fishing, can disturb the birds during critical periods, such as migration and wintering. Human presence can cause birds to flee from their feeding areas, leading to energy depletion and reduced chances of survival. Disturbances can also disrupt the birds' breeding and foraging behaviors, impacting their reproductive success.

7.1.7.1.2 Climate Change

Climate change presents a significant threat to the black-bellied plover, as rising sea levels and storm surges increase the vulnerability of coastal habitats. Changes in the timing of seasonal events, such as migration and food availability, could impact the species' ability to meet its energy needs. Altered weather patterns could affect breeding success in the Arctic and sub-Arctic regions, while changes in the availability of intertidal food resources along migratory routes could disrupt the birds' ability to replenish energy reserves.

7.1.7.1.3 Pollution

Pollution in coastal ecosystems, including oil spills, plastic debris, and heavy metals, can significantly impact the black-bellied plover. Oil spills, for example, contaminate feeding grounds, making it difficult for the birds to find clean food. Plastic ingestion and other forms of contamination can harm the birds' health or even cause death. Pollution also negatively impacts the quality of habitats, making them less suitable for shorebird populations.

7.1.7.1.4 Predation and Competition

As a migratory species, the black-bellied plover faces natural threats from predators such as birds of prey and domestic animals. Additionally, it faces competition from other shorebird species for food and space along migratory stopover sites. This competition, especially during the migration and wintering seasons, can place further stress on the species' population.

7.1.7.1.5 Hunting

Although hunting of the black-bellied plover is now regulated in many countries it is still legal in Barbados. The bird is sometimes hunted for sport or food during migration, particularly in areas where it passes through in large numbers.

7.1.7.2 Conservation Needs and Strategies

7.1.7.2.1 Protection of Coastal Habitats

The black-bellied plover relies on coastal ecosystems such as mudflats, beaches, and wetlands for feeding and rest. Habitat protection is therefore one of the most important conservation actions. Establishing conservation areas such as Long Pond Conservation Area, wildlife refuges or migratory bird reserves, will help ensure that these critical habitats are preserved from development, pollution, and other human activities. Additionally, habitat restoration efforts should focus on repairing degraded coastal ecosystems to improve their suitability for shorebirds.

7.1.7.2.2 Minimizing Human Disturbance

Managing human activities on beaches and coastal areas is essential to protect the black-bellied plover. Limiting access to nesting and feeding areas during critical times, such as breeding and migration, can

help reduce disturbance. Local governments and conservation organizations can work together to create rules and regulations that restrict human activities in important bird areas. Furthermore, raising public awareness about the impacts of disturbance on shorebirds is important for encouraging more sustainable practices and responsible ecotourism.

7.1.7.2.3 Climate Change Adaptation

Adapting to climate change is essential for the survival of the black-bellied plover. Efforts to mitigate climate change by reducing greenhouse gas emissions are vital, as are strategies to adapt to rising sea levels and extreme weather events. Conservation projects that restore coastal habitats, such as salt marshes and beach dunes, can help buffer the effects of sea-level rise and coastal flooding. Additionally, increasing the resilience of key habitats to the changing climate will improve the species' ability to thrive in the face of these challenges.

7.1.7.2.4 Pollution Control and Cleanup

Reducing pollution, particularly plastics and oil spills, is crucial for maintaining the quality of coastal habitats. Strict enforcement of pollution regulations, quicker responses to oil spills, and public education about the harmful effects of plastic waste will help reduce contamination in shorebird habitats. Environmental clean-up efforts, such as coastal litter removal programs, will further protect feeding areas from pollutants.

7.1.7.2.5 Monitoring and Research

Monitoring populations of the black-bellied plover and conducting research on its breeding, migration, and habitat use are critical for understanding its ecological needs. Data collected on migration routes, timing, and food availability can inform conservation efforts and help identify priority areas for protection. Satellite tracking and other technologies are useful tools for gathering data on the species' migratory patterns and identifying key habitats that require protection.

7.1.7.2.6 Public Education and Advocacy

Public education plays a key role in shorebird conservation. Raising awareness about the importance of the Black-bellied Plover and other migratory species can help build support for conservation measures. Efforts to engage local communities, particularly those living near coastal habitats, in conservation activities will help promote stewardship and sustainable land-use practices. Public outreach programs, such as bird-watching events and volunteer-based monitoring, can also foster a deeper connection to nature.



Figure 16 - Black-bellied Plover - Ebird

7.1.8 Conclusion

In conclusion, the conservation of migratory shorebirds such as the lesser yellowlegs, greater yellowlegs, short-billed dowitcher, ruddy turnstone, least sandpiper, and black-bellied plover requires immediate and focused action, especially in critical habitats like Long Pond. This vital wetland serves as an important stopover for many of these species during migration, and its protection and restoration are essential for their survival. Efforts should include safeguarding these habitats from urban development, pollution, and degradation, while also addressing the impacts of climate change, such as rising sea levels and more frequent storms. Additionally, enforcing stricter hunting regulations, reducing human disturbances, and implementing climate-adaptive management strategies will be crucial in preserving these species. By prioritizing conservation at Long Pond and other key habitats, we can help ensure the continued survival of these remarkable shorebirds, securing their future as part of North America's diverse migratory community. With coordinated and sustained conservation efforts, we can stabilize populations, restore habitats, and protect these vital species for generations to come.

7.2 Waterbirds

Waterbirds are a diverse group of birds adapted to life in aquatic environments, including lakes, rivers, wetlands, and coastal regions. They possess specialized features such as webbed feet for swimming,

long legs for wading, or sharp beaks for catching fish. Some, like ducks and swans, are strong swimmers, while others, like herons and egrets, use their long legs to stalk prey in shallow waters. Seabirds such as pelicans and gulls are skilled fliers and often rely on oceans for food. Waterbirds play a crucial role in ecosystems by maintaining aquatic food chains and indicating the health of their habitats. Their ability to thrive in both freshwater and marine environments makes them an important and fascinating group of birds.

Unlike shorebirds, waterbirds do not experience the same significant population declines due to hunting, although they are still hunted, just in smaller numbers and certainly not like shorebirds are hunted in the Caribbean. Waterbirds rely on the same vital wetland habitats for migration, breeding, and feeding, and their survival is increasingly threatened by the same threats of habitat loss, human disturbance, pollution, and the growing impacts of climate change. To ensure their survival, immediate action is required to protect and restore key wetland areas, enforce stricter hunting regulations, and reduce human disturbances. Additionally, prioritizing climate change adaptation and mitigation strategies is crucial to protect waterbirds from rising sea levels, extreme weather, and changing migratory patterns. By focusing on habitat preservation and implementing effective conservation measures, we can ensure the long-term survival of waterbirds, safeguard biodiversity, and maintain the ecological integrity of vital wetland ecosystems like Long Pond. Through collaboration, ongoing research, and community involvement, we can help ensure these species continue to thrive for generations to come.

Below there is some information on some of the most notable waterbirds to date that have been seen at Long Pond.

7.2.1 American coot (*Fulica americana*)

The American coot (*Fulica americana*) is a medium-sized waterbird found across North America, known for its distinctive appearance and adaptability to various aquatic habitats. Despite resembling a duck, the coot belongs to the rail family (*Rallidae*). It has a dark gray to black body, a white bill with a reddish frontal shield, and lobed toes instead of webbed feet, which aid in swimming and walking on soft, marshy surfaces.

American coots are highly social birds, often seen in large flocks on lakes, ponds, and wetlands. They are omnivorous, feeding on aquatic vegetation, small invertebrates, and algae. Coots are also known for their aggressive territorial behavior during breeding season, which takes place in freshwater marshes where they build floating nests among dense vegetation.

This species is widely distributed and adaptable, but it faces threats from habitat loss and water pollution. Conservation of wetlands is essential to maintaining healthy populations of American coots and other water-dependent species.



Figure 17 - American Coot - Ebirds

7.2.2 Little blue heron (*Egretta caerulea*)

The little blue heron (*Egretta caerulea*) is a medium-sized wading bird native to wetlands and coastal areas across the Americas, including the Caribbean. Known for its striking coloration, adult little blue herons have slate-blue plumage and a purplish head and neck, while juveniles are entirely white, gradually transitioning to their darker adult feathers during their second year.

These herons are often found in freshwater marshes, estuaries, mangroves, and the edges of lakes and ponds. They forage by wading through shallow waters, using their sharp, pointed bills to catch a variety of prey, including fish, crustaceans, amphibians, and insects.

The little blue heron is a solitary feeder but may nest in mixed-species colonies, building platform nests in trees or shrubs near water. Their breeding season varies by region but generally occurs during the warmer months when food is abundant.

While the species is listed as of Least Concern by the IUCN, habitat destruction, pollution, and wetland drainage pose significant threats to its populations. Conservation efforts to protect and restore wetland habitats like Long Pond are crucial for ensuring the survival of the little blue heron and other wading bird species.



Figure 18 - Little Blue Heron - Ebird

7.2.3 Pied-billed grebe (*Podilymbus podiceps*)

The pied-billed grebe (*Podilymbus podiceps*) is a small, stocky waterbird widely distributed across North and South America. Known for its adaptability to a variety of aquatic habitats, this grebe is commonly found in freshwater ponds, marshes, and slow-moving rivers, but it can also inhabit brackish water.

The pied-billed grebe is easily identified by its compact body, brown plumage, and distinctive thick, pale bill marked with a black band during the breeding season. It is an excellent swimmer and diver, often using its lobed toes to propel itself underwater while foraging for small fish, crustaceans, insects, and other aquatic prey.



Figure 19 - Pied-billed grebe - Ebird

7.3 Other Important Biodiversity Components at Long Pond

Long Pond is not only a temporary home for migrating waterbirds and shorebirds but home to a significant population of resident birds (See Appendix 3) and other species such as crabs, fish, mollusks, crustations, microbiota, trees, shrubs, insects, gastropods and sea turtles. Some of these taxa are noteworthy because of their own unique story.

7.3.1 Black mangroves (*Avicennia germinans*)

Long Pond is a natural estuarine system that contains brackish water. It is the site of an emergent population of black mangroves (*Avicennia germinans*). Long Pond boasts the only black mangrove (*Avicennia germinans*) known to exist in Barbados, a single grove lies across the water on the southwestern bank of the lagoon. These mangroves have characteristic pneumatophores, aerating roots which grow up from the mud and allow the plant to breathe air in the waterlogged soil. Long Pond is also home to the red mangrove (*Rhizophora mangle*) and the white mangrove (*Laguncularia racemosa*) which are both found at other wetlands around the island.



Figure 20 - Black Mangrove at Long Pond - Lani Edghill

7.3.2 Golden warbler (*Setophaga petechia petechia*)

The golden warbler is a unique subspecies of the Yellow Warbler, specifically identified as *Setophaga petechia petechia*. This small, vibrant bird the subspecies of which is endemic to Barbados, meaning it can be found nowhere else in the world. The golden warbler favors wetland environments, particularly areas rich in mangrove trees. Unfortunately, due to ongoing habitat loss on the island, this species has faced significant challenges in sustaining its population. As one of only two endemic bird species in Barbados—alongside the Barbados bullfinch (*Loxigilla barbadensis*)—the golden warbler's survival is closely tied to the preservation of its habitat. Despite its current presence at sites like Long Pond, continuous conservation efforts are crucial to ensure its future. The golden warbler stands as a symbol of Barbados' unique biodiversity. Protecting its habitat and raising awareness of its plight are vital steps in conserving this species.



Figure 21 - Golden Warbler - Ebird

7.3.3 Barbados bullfinch (*Loxigilla barbadensis*)

The Barbados bullfinch is a small, endemic bird species found exclusively in Barbados. It is known for its distinctive appearance and is an important part of the island's avian biodiversity. The Barbados bullfinch typically inhabits various environments, including forests, urban areas, and shrubby regions. It tends to prefer areas with dense vegetation, where it can find food and nesting sites. This bird primarily feeds on fruits, seeds, and flowers, showcasing a preference for the local flora. Its diet plays a vital role in seed dispersal, contributing to the health of the island's ecosystems. Barbados bullfinches are often seen in pairs or small groups. They are known for their melodious songs and can be quite vocal, particularly during the breeding season.

As one of only two endemic bird species on the island, the Barbados bullfinch is subject to threats such as habitat destruction and competition with invasive species. Conservation efforts are essential to preserve its population and habitat. The Barbados bullfinch is a key species in the island's ecosystem. Protecting its habitat and ensuring the sustainability of natural spaces in Barbados are crucial for the survival of this unique bird. Both of these endemic species the Barbados bullfinch and the golden warbler are found a large numbers in the Long Pond area (Ebird).



Figure 22 - Barbados bullfinch - Ebird

7.3.4 Sea Turtles

The Long Pond beach and adjoining nearshore area, according to the National Wetland Inventory, have been recorded as nesting grounds for leatherback turtles (*Dermochelys coriacea*), assessed as Endangered on the IUCN Red List and as foraging grounds for green turtles (*Chelonia mydas*) assessed as Endangered on the IUCN Red List (Horrocks 1992).

7.3.4.1 Leatherback Turtles (*Dermochelys coriacea*)

Long Pond Beach is recognized as an important nesting site for leatherback turtles, the largest species of sea turtle in the world. These remarkable, ancient, iconic creatures are known for their long migrations, often traveling thousands of miles across oceans to return to the very beaches where they hatched — a behavior known as natal homing. This instinctual journey demonstrates the turtles' incredible navigational abilities, guided by environmental cues and possibly even Earth's magnetic fields.

Leatherback turtles play a vital role in marine ecosystems, such as helping to maintain healthy jellyfish populations, their primary food source. However, they are listed as Endangered on the IUCN Red List, reflecting the severe threats they face globally. Habitat loss due to coastal development and human activity disrupts their nesting sites, while bycatch in fishing gear poses a significant risk during their long

migrations. Additionally, marine pollution, particularly the ingestion of plastic debris mistaken for jellyfish, contributes to declining populations.

Conservation efforts are critical to the survival of leatherback turtles. Protecting nesting sites like Long Pond beach, enforcing sustainable fishing practices, and reducing plastic pollution are essential measures to ensure survival of these sea turtles.



Figure 23 - Leatherback sea turtle - Nature Canada

7.3.5 Green Turtles (*Chelonia mydas*)

The marine area adjacent to Long Pond area is also recognized as an essential foraging ground for green turtles, a species that plays a crucial role in maintaining the health of marine ecosystems. Green turtles primarily feed on seagrass and algae, and their grazing helps to promote the growth and health of seagrass beds, which are vital habitats for many marine species. The abundance of food in these foraging grounds is critical for the survival and well-being of green turtles, as it provides the necessary energy for their long migrations and reproductive activities. These foraging grounds are often located near coasts, making them vulnerable to human activities such as coastal development, pollution, and overfishing, which can disrupt the delicate balance of these ecosystems.

Green turtles are listed as Endangered on the International Union for IUCN Red List, highlighting the severe threats they face worldwide. Habitat destruction, including the degradation of nesting and foraging sites, poses a significant risk to their populations. Illegal hunting for their meat, shells, and eggs continues to threaten their numbers despite conservation efforts and legal protections. Additionally,

climate change exacerbates their vulnerability by rising sea levels, which erode nesting beaches, and by altering ocean temperatures, which can affect the availability of their food sources.

Conservation measures, such as protecting critical habitats, regulating fishing practices to reduce bycatch, and addressing climate change, are essential to ensure the survival of green turtles. By safeguarding their foraging grounds and nesting sites, we not only help preserve this iconic species but also support the broader health and resilience of marine ecosystems.



Figure 4 - Green Turtle - NOAA Fisheries

7.3.6 Conclusion

The dual role of this area as a nesting ground for leatherback turtles and a foraging area for green turtles highlights its ecological significance. These habitats are critical for the survival of these vulnerable species, providing them with the resources necessary for breeding, feeding, and reaching maturity. Protecting such areas ensures that these essential life stages are supported, contributing to the stability of marine ecosystems.

Given the Endangered status of both leatherback and green turtles, robust conservation efforts are imperative. These include protecting habitats like Long Pond beach, mitigating human-induced threats such as poaching, bycatch, and marine pollution, and maintaining the health of the marine environment to secure sustainable food sources.

In summary, Long Pond beach and its surrounding waters serve as habitats for leatherback and green turtles, underscoring the need for dedicated conservation measures. By prioritizing the protection and

restoration of these areas, we can contribute significantly to the long-term survival of these iconic and ecologically important species.

7.3.7 Crabs

The Updated checklist of semi-terrestrial and estuarine crabs (Crustacea: Decapoda: Brachyura) of Barbados (Parasram, 2021) is the definitive reference for crabs in Barbados. It provides detailed information about the crab species in Long Pond and their ecological and cultural significance in the area.

There are 13 species of crabs in Barbados. Among these, 10 species have been found in Long Pond, highlighting its importance as a critical habitat for crab populations. Long Pond serves as a hotspot for brachyuran crabs, a group that includes well-known species such as the blue crab (*Callinectes sapidus*) and ghost crab (*Ocypode quadrata*).

Some of the notable species found in Long Pond include the red crab (*Gecarcinus lateralis*), *Goniopsis cruentata*, *Armases ricordi*, *Cyclograpsus integer*, and *Minuca burgersi* (fiddler crab). Additionally, several species of swimming crabs, such as *Callinectes danae*, *Callinectes bocourti* (commonly known as "shagga"), and *Callinectes sapidus* (the blue crab), have been identified in this habitat.

The ecological significance of Long Pond cannot be overstated, as it provides essential resources such as shelter and feeding grounds for these crab species. Protecting this habitat is vital for maintaining the biodiversity of crabs in Barbados, supporting not only the crabs themselves but also the broader ecosystems that depend on their presence.

7.3.7.1 The Bocourt swimming crab, *Callinectes bocourti* "shagga"

Callinectes bocourti, locally known as 'shagga', is particularly abundant in Long Pond, where its behavior and distribution reflect its ecological adaptation to the area. At night, these crabs congregate in large numbers along the pond's edges, making them easier to catch. During this time, they actively feed on juvenile *Palaemon pandaliformis* (American grass shrimp) and *Oreochromis mossambicus* (tilapia). In contrast, their daytime activity is more subdued, with smaller numbers found along the edges of Long Pond and the nearby Green Pond coastal wetlands. The rainy season further influences their distribution, as the overflow from Long Pond creates smaller, shallower ponds around 0.3 meters deep, which become habitats for juvenile *C. bocourti*. Additionally, Long Pond serves as an important breeding site for this species, as evidenced by the observation of three mating pairs during a February 2020 night survey (Parasram, 2021). These behaviors underscore the ecological importance of Long Pond in supporting the life cycle of *C. bocourti*.



Figure 25 - Shagga - iNaturalist

7.3.7.2 Blue land crab (*Cardisoma guanhumi*) "Swampy"

The blue land crab (*Cardisoma guanhumi*) is widespread throughout Barbados and can be found in the mudflats of rivers and **wetlands** and on beaches. They are mainly active at night and during the day stay in their burrows. In heavy rain events they vacate their burrows and head for dryer ground because while they like to live in wet environments, they cannot live underwater (Parasram, 2021).

The blue land crab is locally referred to as "swampy," and it holds significant cultural and economic value in Barbados, particularly in subsistence **harvesting**. This species is the centerpiece of the bi-annual "crabbing" event, a vibrant cultural tradition where local communities come together to catch and consume these crabs. During this event, *Cardisoma guanhumi* is harvested in large numbers, reflecting its importance as a food source and its role in sustaining local livelihoods. This tradition not only highlights the crab's ecological presence but also its integral connection to the cultural heritage of Barbados (Parasram, 2021).



Figure 26 - Blue Land Crab - Barbados.org

7.3.7.3 Fiddler crab (*minuca burgersi*)

Fiddler crabs are small, semi-terrestrial crabs found in coastal areas such as mangroves, mudflats, and sandy shores. In Long Pond, you will find them along the shore of the pond where there is considerable mud or on the side arms where there is more mud than sand. They love to dig their burrows in the swampy mud, Fiddler crabs are indicator species and much like birds they can show us the health of the ecosystem just through observation of their population trends. When walking through the trails that follow the meandering stream of the Walkers River one can observe the constant wave of fiddler crabs. Their name comes from the way they wave their large claw, resembling a person playing a fiddle or waving at you.

They are best known for the extreme size difference between their claws—males have one oversized claw, which they use for attracting mates and defending territory, while females have two smaller, equal-sized claws. These crabs are scavengers, feeding on organic material in the mud or sand, which helps maintain the health of their ecosystem. They are also skilled burrowers, digging tunnels to escape predators and regulate moisture levels. Fiddler crabs play an essential role in coastal food webs, serving as prey for birds, fish, and other predators. Their name comes from the way they wave their large claw, resembling a person playing a fiddle.



Figure 25 - fiddler crab - Adobe stock images

8 Conclusions

Long Pond is a valuable asset to the island's biodiversity as one of the last remaining coastal wetlands in Barbados. It is recognised for its outstanding natural beauty and is a wetland of National Importance and Key Biodiversity area. Long Pond wetland habitat is essential to the survival of resident, migratory and wintering waterbirds (Burke, 2007). Many shore and waterbirds pass through Barbados on their annual journey between their breeding grounds to the north and overwintering areas to the south. Long Pond serves as a key stopover site, offering vital resting and feeding opportunities for these birds. Several species of migratory shorebirds also overwinter in Barbados, with some remaining on the island for extended periods.

Birds are important indicators of the state of nature: they occur almost everywhere, their behaviors and ecology often mirror other groups of species, they are extremely well studied, and they are responsive to environmental change. With one in eight bird species threatened with extinction and 60% of bird species in decline globally (IUCN Red List 2024), diminishing bird populations signal ecosystems in crisis. Many migratory birds follow specific routes called flyways, stopping at various sites along the way to rest and feed. This makes them especially at risk from threats like habitat loss and climate change (Birdlife International, 2024).

According to Birds Caribbean, December 2024 issue "Sounding the Alarm for Shorebirds" there are 3 bird species whose populations have declined between 20-50-% in just three generations. These three shorebirds are The lesser yellowlegs, short billed dowitcher and black-bellied plover. These birds have all been seen at Long Pond by citizen scientists through Ebird, see Appendix 2. Shorebird populations are in crisis due to a number of causes such as habitat loss, climate change and other factors. They cite coastal

habitat wetland loss as the main factor in population decline. They go on to say that coastal wetlands are vital to shorebird and migratory bird populations.

As previously stated, Barbados has a culture of bird hunting and while interest in this sport has declined over the last generation there are still five active Shooting swamps on the island that have reported shooting between 15,000-30,000 birds in one season (Burke, 2007). Three of the swamps are located in St. Phillip (the most southerly parish of Barbados) and the other two are located in St. Lucy (the most northerly parish). Long Pond lies to the east between these two parishes and could act as a safe haven for migratory birds in the midst of existing hunting regimes.

Although not all species of migratory shorebirds sighted in Barbados have been recorded at Long Pond, it is highly probable that, over time, all species have visited the pond, its surrounding beach, river, and mudflats. These areas provide critical resources for birds during their migratory journeys, and future sightings of additional species are likely (Alleyne, 1999). In addition to migratory birds, Long Pond is also home to resident bird species that inhabit the area year-round, contributing to the site's rich biodiversity (see Appendix 2). Barbados historically has been known for incidences of vagrants and other bird sightings because of its location it often is a safe harbor for birds who have flown off their normal path or encountered bad weather and have been blown off course. There is much documentation on this as early as 1934 (Peterkin, 1934) this phenomenon has also been observed by this author.

8.1 Ecological Significance of Long Pond

Long Pond stands out as a critical biodiversity hotspot in Barbados, hosting 11 of the island's 13 identified crab species, both of its two endemic bird species, 4 vulnerable species of migratory shorebird, 4 species of near threatened shorebirds, 1 near threatened and 1 vulnerable waterbird species. In addition it hosts 20 species of migratory shorebirds during migration and 17 species of waterbirds it is also home to 21 species of resident birds and 3 species of migratory seabirds. This makes it an essential habitat for conservation.

8.2 Conservation Concerns

Despite its ecological and economic potential, Long Pond faces significant threats from unregulated human activities which poses risks to the broader ecosystem. Although plans to protect Long Pond have been included in the Draft Barbados Physical Development Plan 2017 which have designated it an OS2 Conservation Area no attempt of management or operationalization of the area has happened on the ground. Without concrete measures, this vital wetland remains vulnerable, highlighting the urgent need for action to safeguard its biodiversity and ecological functions for future generations.

Long Pond faces numerous threats including habitat loss, pollution (solid & liquid) and the impact of human activities such as unregulated crabbing, grazing and off-road vehicle use. Given its critical role in supporting both migratory and resident species, it is essential to assess these challenges and implement effective conservation strategies.

8.3 Recommendations for Conservation and Sustainable Management

To ensure the long-term protection of this valuable natural resource there will need to be a major conservation effort for the area. There have been several attempts by professionals to make recommendations on how this could be done. Charlemagne et al. (2006) proposed a holistic approach to the management of the Long Pond area. They highlight that water contamination from sources upriver

are a significant threat to the health of the ecosystem and maintain that this area should be managed with a watershed approach. They also maintain that before a conservation area can be established, a resource assessment and classifying of resources must be at the forefront. Information which should be useful for a resource assessment are species composition, assessment of rare; threatened and endangered species, identification of important support systems and ecological processes and delineation of critical areas (e.g. spawning, mating or feeding) for important species and assessment of cultural and historic resources (Charlemagne et al. 2006).

In 1999, based on the Barbados Coastal Conservation Programme project at Long Pond, the St. Andrew Parish Independence Committee proposed a community-driven plan for the development and management of Long Pond, emphasizing conservation, community ownership, sustainable revenue generation, recreation, and education (Alleyne et al., 1999). Concurrently, the Barbados Coastal Conservation Programme proposed an Action Plan, which included raising watershed awareness, establishing a community-based management plan, promoting sustainable economic activities, enforcing regulations on waste disposal, and rehabilitating Walkers Savannah. However, successful implementation of these initiatives hinges on resolving legal access and land tenure issues as many of the pieces of land that make up what would be LPNHCA are privately owned, highlighting the need for administrative action to support conservation and sustainable use.

8.4 Next Steps

The Land Conservancy Barbados Inc. has been applying for grants to start the process of capacity building with stakeholders and creating a feasibility study that would support the operationalisation of the LPNHCA. Recommendations on next steps are;

- Engage the community in Belleplaine and adjacent areas through a stakeholder assessment with the aim of establishing an organization and building its capacity to participate effectively in, and ultimately lead, the operationalization of this conservation area.
- Engage the numerous relevant government departments that have a stake in this area (e.g. Natural Heritage Department, Coastal Zone Management Unit, Soil Conservation Unit, National Conservation Commission).
- Scope landownership in the proposed area and develop a land acquisition plan that uses a variety of mechanisms as appropriate to the particular situation.
- Engaging the major landowners to determine their willingness to participate.
- Prepare a plan for developing and operationalizing the Long Pond Conservation Area, that includes infrastructure envisaged, financial sustainability and site management.
- Prepare an outline planning proposal for submission to the Department of Planning and Development.
- Fundraising for the purchase of privately owned lands.
- Fundraising for development (surveying, access road, parking area, trails, interpretation Centre and signage).

One of the primary actions is to engage the community in Belleplaine and surrounding areas through a stakeholder assessment. This will help establish a local organization and build its capacity to actively participate in and eventually lead the conservation efforts. Additionally, collaboration with relevant government departments, including the Natural Heritage Department, Coastal Zone Management Unit,

Soil Conservation Unit, and National Conservation Commission, will be essential to ensure alignment with national conservation policies and land-use planning strategies.

Understanding land ownership in the proposed conservation area is another critical step. A land acquisition plan will be developed, utilizing various mechanisms such as purchases, leases, or conservation easements, depending on the specific circumstances of each property. Engaging with major private landowners to assess their willingness to participate in conservation efforts will be key to securing the land necessary for the LPNHCA.

To facilitate the sustainable development of the LPNHCA, a detailed plan will be prepared, outlining necessary infrastructure, financial sustainability strategies, and site management. This plan will include provisions for an access road, parking area, trails, an interpretation center and appropriate signage. As part of the regulatory process, an outline development plan will be submitted to the Department of Planning and Development to determine the feasibility of the proposed plan.

In addition to land acquisition, TLC is planning to raise funds from corporate Barbados to secure privately owned lands in Long Pond through purchase, lease, or other arrangements. Fundraising efforts will also support the development of necessary infrastructure and conservation initiatives.

A key component of this initiative is a community-based educational program, which will be operated by a local organization from the Belleplaine community. This program aims to educate and sensitize residents on their role in conserving Long Pond as a Natural Heritage Conservation Area. It will focus on wildlife protection, ecosystem integrity, watershed conservation and best practices for human behaviour in protected areas.

Alongside these plans and educational efforts, a meeting of landowners—both private and public—will be necessary to discuss the legal framework for placing the land into public ownership in perpetuity. Management and ownership arrangements must be established through agreements among all landowners. This includes determining the appropriate mechanism to hold the land in trust, whether under government ownership or a private trust, with legal advice and best practices guiding the decision-making process.

Finally, a community-based natural resource management plan will be developed in tandem with development proposals. This plan will integrate visitor amenities with guided tours for both locals and tourists. Ensuring that the local community remains actively involved in the long-term management and conservation of the area will be critical to the success and sustainability of the LPNHCA.

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Appendix 1: Terms of Reference

Scope

Environment and Climate Change Canada requires the services of a Contractor to assess the ecological value of Long Pond for migratory shorebirds and waterbirds, and document the abundance of these species, the habitats available and the current threats to migratory birds.

Tasks

The Contractor must perform the following tasks:

1. Summarize past, current and next steps for the nomination of Long Pond as a Natural Heritage Conservation Area.

2. Assess and describe the following:

a) Other national or international status of the area (such as a wetland site designated to be of international importance under the Ramsar Convention, Important Bird Area, etc.)

b) Habitats available for migratory birds and potential threats within the area considered for Long Pond Natural Heritage Conservation Area:

– Habitat types, such as vegetation composition, water depth and hydrology of the site.

– Threats to migratory shorebirds and waterbird, based on the International Union for the Conservation of Nature (IUCN) Threats classification.

3. Summarize the migratory shorebirds and waterbird usage of the area considered for Long Pond Natural Heritage Conservation Area by consulting available data sources, such as (but not limited to) local observers, eBird and the Caribbean Waterbird Census:

a) Identify and search data sources

b) Summarize seasonal species abundance and diversity, such as identifying key period of the year for migratory shorebirds

4. Highlight other important biodiversity components (i.e. other species and taxa).

5. Prepare a draft report for the Project Authority's review, including the following elements:

- Summary of Long Pond Natural Heritage Conservation Area history and nomination process
- Habitats description
- Threat assessment
- Map of the area considered for Long Pond Natural Heritage Conservation Area nomination
- A table of species abundance and diversity

Appendix 2:

Migratory shorebirds and waterbirds of Long Pond, Barbados

Table						
	Scientific Name	Common Name	Recorded by	High Count/Date (Ebird)	Status (IUCN)	Dates Recorded (Ebird)
	Waterbirds					
1	<i>Fulica americana</i>	American coot	Ebird	20 /Oct 21st 2024	Least concern	July - Feb
2	<i>Gallinula galeata</i>	American moorhen, common gallinule	Ebird	20/Oct 21st 2024	Least concern	Jan - Dec
3	<i>Nycticorax nycticorax</i>	Black-crowned night heron	Ebird	1/ 21st Aug 2024	Least concern	July - Oct
4	<i>Rynchops niger</i>	Black skimmer	Ebird	1/ 8th Aug 2009	Least concern	Insufficient data
5	<i>Cypseloides niger</i>	Black swift	Ebird	4/ 3rd Aug 2020	Vulnerable (IUCN)	April - Aug
6	<i>Vireo altiloquus</i>	Black whiskered vireo	Ebird	3/ 12th July 2020	Least concern	April - Aug
7	<i>Spatula discors</i>	Blue winged teal	Ebird	2/ 23rd Nov 2024	Least concern	Dec
8	<i>Megaceryle alcyon</i>	Belted kingfisher	Ebird	1/ 23rd Nov 2024	Least concern	Oct - Feb
9	<i>Ardea herodias</i>	Great blue heron	Ebird	1/ 24th Sept 2024	Least concern	Jan - Sept
10	<i>Ardea cinerea</i>	Gray heron	Ebird	1/ 29th July 2023	Least concern	July

11	<i>Egretta caerulea</i>	Little blue heron	Hutt 1985, Ebird	5/ 8th Sept 2024	Least concern	Jan - Dec
12	<i>Anas platyrhynchos</i>	Mallard	Ebird	1/ 2nd Feb 2023	Least concern	Feb
13	<i>Cairina moschata</i>	Muscovy duck	Ebird	1/ 8th April 2021	Least concern	April - June
14	<i>Pandion haliaetus</i>	Osprey	Ebird	1/ 14th Jan 2021	Least concern	Jan - Dec
15	<i>Oressochen jubatus</i>	Orinoco goose	Ebird	4/ 14th March 1995	Near threatened (IUCN)	Insufficient data
16	<i>Falco peregrinus</i>	Peregrine falcon	Ebird	1/ 20th Jan 2024	Least concern	Nov - Jan
17	<i>Podilymbus podiceps</i>	Pied-billed Grebe	Ebird	8/ 3rd Aug 2020	Least concern	June - Nov
18	<i>Nyctanassa violacea</i>	Yellow-crowned Night Heron	Ebird	1/ 21st Aug 2024	Least concern	Aug - Sept
19	<i>Setophaga petechia</i>	Yellow warbler	Ebird	5/ 15th Aug 2015	Least concern	April - Nov
20	<i>Progne dominicensis</i>	Caribbean martin	Ebird	120/ 27th March 2024	Least concern	Jan - Sept
	Shorebirds					
1	<i>Pluvialis dominica</i>	American golden plover	Ebird	3/ 10th Sept 2023	Least concern	Sept
2	<i>Pluvialis squatarola</i>	Black-bellied Plover	Hutt 1985	22/ 22nd Aug 2024	Vulnerable (IUCN)	May - Oct
3	<i>Charadrius collaris</i>	Collared plover	Ebird	1/ 18th Jan 2017	Least concern	June

4	<i>Calidris minutilla</i>	Least sandpiper	Ebird	30/ 10th Dec 2023	Near threatened (IUCN)	Feb - Dec
5	<i>Calidris melanotos</i>	Pectoral sandpiper	Ebird	12/ 2nd Sept 2023	Least concern	Aug - Oct
6	<i>Charadrius hiaticula</i>	Ring-necked Plover, Common Ringed Plover	Hutt 1985	1/ 18th June 2017	Least concern	Insufficient data
7	<i>Arenaria interpres</i>	Ruddy turnstone	Ebird	55/ 18th Dec 2024	Near threatened (IUCN)	Feb - Oct
8	<i>Calidris melanotos</i>	Pectoral sandpiper	Ebird	12/ 2nd Sept 2022	Least concern	Aug - Oct
9	<i>Calidris alba</i>	Sanderling	Hutt 1985, Ebird	200/ 10th March 2024	Least concern	Jan - Dec
10	<i>Charadrius semipalmatus</i>	Semipalmated Plover	Hutt 1985, Ebird	100/ 10th Sept 2023	Least concern	
11	<i>Calidris pusilla</i>	Semipalmated sandpiper	Hutt 1985, Ebird	100/ 10th Sept 2023	Near threatened	Jan - Nov
12	<i>Limnodromus griseus</i>	Short-billed Dowitcher	Ebird	9/ 5th Sept 2023	Vulnerable (IUCN)	July - Sept
13	<i>Tringa solitaria</i>	Solitary sandpiper	Ebird	3/ 3rd Sept 2022	Least concern	Jan - Dec
14	<i>Actitis macularius</i>	Spotted sandpiper	Hutt 1985, Ebird	12/ 10th Sept 2023	Least concern	Jan - Dec
15	<i>Calidris himantopus</i>	Stilt sandpiper	Ebird	6/ 5th Sept 2023	Near threatened (Ebird)	Sept

16	<i>Calidris mauri</i>	Western sandpiper	Hutt 1985	1/ 2nd Sept 2023	Least concern	Sept
17	<i>Numenius phaeopus</i>	Whimbrel	Hutt 1985, Ebird	16/ 21st Aug 2024	Least concern	March - Dec
18	<i>Calidris fuscicollis</i>	White-rumped Sandpiper	Ebird	35/ 24th Sept 2024	Vulnerable (IUCN)	Aug - Nov
19	<i>Tringa semipalmata</i>	Willet	Hutt 1985, Ebird	2/ 21st Aug 2024	Least concern	Aug - Oct
20	<i>Gallinago delicata</i>	Wilson's snipe	Ebird	1/ 22nd March 2022	Least concern	Feb - April
21	<i>Tringa melanoleuca</i>	Greater yellowlegs	Ebird	5/ 2nd Sept 2023	Near threatened (IUCN)	March - Oct
22	<i>Tringa flavipes</i>	Lesser yellowlegs	Ebird	11/ 10th Sept 2023	Vulnerable (IUCN)	July - Oct
	Seabirds					
1	<i>Onychoprion anaethetus</i>	Bridled Tern	Ebird	3/ 1st Sept 2023	Least concern	Sept
2	<i>Sternula antillarum</i>	Least tern	Ebird	4/ 1st Sept 2023	Least concern	May - Sept
3	<i>Sterna dougallii</i>	Roseate tern	Ebird	4/ 16th July 2023	Least concern	May - Oct
4	<i>Leucophaeus atricilla</i>	Laughing gull	Ebird	4/ 13th May 2023	Least concern	May
	<i>Thalasseus maximus</i>	Royal tern	Ebird	3/ 2nd Oct 2022	Least concern	Oct - Jan
	Swallows					

1	<i>Hirundo rustica</i>	Barn swallow	Ebird	30/ 1st Sept 2023	Least concern	April - Sept
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Appendix 3:

Resident Bird Species at Long Pond

	Scientific Name	Common Name	Recorded	Status
1	<i>Loxigilla barbadensis</i>	Barbados Bullfinch	Ebird	Least concern
2	<i>Quiscalus lugubris</i>	Carib Grackle	Ebird	Least concern
3	<i>Gallinula galeata</i>	Common Gallinule	Ebird	Least concern
4	<i>Sicalis luteola</i>	Grassland Yellow Finch	Ebird	Introduced
5	<i>Egretta thula</i>	Snowy Egret	Ebird	Least concern
6	<i>Tyrannus dominicensis</i>	Gray Kingbird	Hutt 1985, Ebird	Least concern
7	<i>Ardea ibis</i>	Western Cattle Egret	Ebird	Least concern
8	<i>Streptopelia decaocto</i>	Eurasian Chollard Dove	Ebird	Introduced
9	<i>Melospiza bicolor</i>	Black faced Grass Quit	Ebird	Least concern
10	<i>Columba livia</i>	Rock Pigeon	Ebird	Least concern
11	<i>Molothrus bonariensis</i>	Shiny Cowbird	Ebird	Least concern
12	<i>Elaenia martinica</i>	Caribbean Elaenia	Ebird	Least concern
13	<i>Coereba flaveola</i>	Bananaquit	Ebird	Least concern
14	<i>Patagioenas squamosa</i>	Scaley Naped Pigeon	Ebird	Least concern
15	<i>Zenaida aurita</i>	Zenadia Dove	Ebird	Least concern
16	<i>Egretta garzetta</i>	Little Egret	Ebird	Least concern
17	<i>Eulampis holosericeus</i>	Green Throated Carib	Ebird	Least concern
18	<i>Orthorhyncus cristatus</i>	Antillean Crested Hummingbird	Ebird	Least concern
19	<i>Columbina passerina</i>	Common Ground Dove	Ebird	Least concern
20	<i>Fregata magnificens</i>	Magnificent Frigate Bird	Ebird	Least concern

21	Setophaga petechia petechia	Golden Warbler	Ebird	Least concern
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