

STATUS OF BIRDS AND THEIR HABITATS IN THE MARINE AND COASTAL ENVIRONMENT OF MADAGASCAR

Foreword

Madagascar has expressed its concerns about the precious richness of the marine and coastal area by ratifying the "Nairobi Convention" in 2001. Madagascar has important marine and coastal biodiversity. It has important concentrations of threatened coastal and marine birds. The coast of Madagascar plays an important role in the life cycle of several migratory birds, and is the end destination for many migratory shorebirds. Many bird species are endemic and resident to the coastal area of Madagascar.

However, the marine and coastal biodiversity is threatened, mainly from disturbance and degradation from Madagascar's human population and development activities associated with coastal communities, as well as direct threats such as harvesting and hunting. Facing these circumstances, the project "*Enhancing the Protection of Birds in the Marine and Coastal Environment of the Nairobi Convention*" was implemented to improve the conservation status of the bird species in the marine and coastal area of Madagascar. It allows national and international experts to consider jointly the status of these species and therefore to give new information related their ecology, their threats and the potential actions needed for their conservation.

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1. Executive Summary

The project “Enhancing the Protection of Birds in the Marine and Coastal Environment of the Nairobi Convention Area” was initiated through the partnership between Birdlife International and Nairobi Convention Secretariat. It will be launched during the 7th COP of the Nairobi Convention to be held in December 2012, the objectives are: to provide up to date information on birds and their habitats; to establish links to the NC Clearing House Mechanism; to identify key actions necessary to enhance bird and biodiversity conservation under this protocol and including the key sites for protection (marine IBAs). Through consultative process, the creation of the National Task Force formed by NC Focal Point, national experts, BirdLife Partner, conservation NGOs, academia has allowed to identify 60 marine and coastal species. Ten of these species are globally threatened and five species are near threatened. Six sites are prioritized to be proposed as marine and coastal sites for protection of which sites are already Important Bird Areas.

2. Introduction

2.1 Overview

Biological resources of the coastal zone are very important for the livelihoods of people living there. They provide ecosystem services for people thanks to the existence of habitats like coral reefs, sea- grass beds, sand dunes, estuaries, mangrove forests and other wetlands that constitute the life-support for many marine animals. As the fourth biggest island in the world, the biodiversity of the coastal and marine of Madagascar is impressive.

Madagascar is marked by high coral species diversity with over 60 genera of coral. The barrier reefs in the south west of Madagascar are among the most extensive in the Indian Ocean and among the largest in the world. On the east coast, Nosy Boraha and the Antongil bay reefs are remarkably extensive. Nine species of mangrove trees have been inventoried from Madagascar. Mangroves cover an estimated 340,000 ha in Madagascar. There are 72 species of seagrass in the world and Madagascar alone has 12 species. Seagrasses are the primary food for dugongs (*Dugong dugon*) that visit the north eastern coast of Madagascar, specially the Masoala Marine Park.

Madagascar is characterized by a small number of bird species but a high endemism due to its isolation. This high endemism is more evident for inland birds, particularly for forest restricted birds. In the marine and coastal area there are fewer endemic birds but there are many important areas where birds congregate.

The southwest coast of Madagascar possesses an exceptional population of birds. Nosy Manitra, has a population of about 4,000 *Sterna dougalli*. On the east coast, Nosy Manampaho, in the south east of Antsiranana, is the largest Sooty Tern *Sterna fuscata* colony in Madagascar (21,800 pairs). Another important coastal species is the Madagascar fish eagle *Haliaeetus vociferoides*, which is a threatened endemic species. It occurs in mangroves and on off shore islets of the northwest coast. Other important coastal and marine birds are *Anas bernieri*, *Ardea humbloti*, *Charadrius thoracicus*, *Threskiornis bernieri*, *Thalassarche carteri*, *Glareola ocularis*, *Ardeola idea* and *Diomedea exulans*.

2.2 Threats to birds and their habitats

Over a quarter of the world's population lives within 100 km of the coast. It is projected that the urban coastal population will almost double during the next 20 or 30 years. If action is not taken the human pressure on the coastal resources will increase and affect the environment and habitat in the coastal areas. This situation will diminish biodiversity, decrease livelihood opportunities and aggravate existing poverty. Poverty and the pressures of economic development are the main causes of the threats.

In Madagascar, the main direct threats to seabirds (especially terns) are egg collection and hunting. For coastal species (such as gulls and herons) hunting and habitat destruction are

the major pressures. Mining exploration is increasing and will become a major threat in Madagascar. An example of this is Barren Island, although it is an Important Bird Area and a future protected area (Durban Vision), destructive phosphate exploration has started there. Future threats to birds in the marine and coastal environment include oil and gas exploration as many large areas in the west coast of Madagascar are potential zone for oil exploration.

2.3 The WIO marine project

In 1985, the Governments of the Eastern African Region adopted the “Protocol Concerning Protected Areas and Wild Fauna and Flora in the Eastern African Region”. This protocol obliges the Contracting Parties to undertake appropriate measures to maintain essential ecological processes and life support systems, to preserve genetic diversity, and to ensure the sustainable utilization of harvestable natural resources under their jurisdiction. In particular, to protect and preserve rare and fragile ecosystems as well as rare, depleted, threatened or endangered species of wild fauna and flora and their habitats in the Eastern African Region.

Over the years, the Eastern African region has come under intense pressure resulting from increasing population pressures, overexploitation and conversion of coastal habitats for other uses such as agriculture, aquaculture, port/harbour expansion or urban development. Some of these developments have led to the degradation of vital coastal and marine habitats such as mangrove forests, among others.

In this regard, BirdLife International in partnership with Nairobi Convention Secretariat facilitated the establishment of National Task Force (NTF) to review the status of birds listed in the protocol and compile a national report for Madagascar.

2.4 Objectives of the national report

The main objective of the national report is to document the status of birds and their habitats in the marine and coastal environment as indicators of marine and coastal ecosystem health. Specifically, the national report will:

- a. Provide an up to date list of the important and threatened bird species with description of the major threats and recommend conservation strategies.
- b. Present the status of birds and their habitats in spatial, tabular and/or graphic format.
- c. List candidate marine Important Bird Areas (IBAs) that could be specially protected as Marine Protected Areas (MPAs) for birds and other forms of biodiversity as well as key ecosystem services.
- d. Create linkages with national environmental legislations and Multilateral Environmental Agreements (MEAs).

2.5 Project Implementation

This work is a collaboration between the BirdLife International and the Nairobi Convention Secretariat. The implementation of this project in Madagascar was coordinated by Asity Madagascar, BirdLife partner in Madagascar. BirdLife International and BirdLife South Africa provided technical support for the project implementation.

A National Task Force (NTF) was created to facilitate the project implementation and to promote national ownership of the report and its contents. Membership of the NTF comprised Asity Madagascar, Nairobi Convention Focal Point, experts from conservation NGOs, and research institution/academia in Madagascar and abroad. Names, affiliation as well as the tasks of NTF are described in the table below:

Names	Affiliation	Function	Task
RASOANAINA Jacques	Ministère de l'Environnement et des Forêts	Focal point	Representative of the Government
RAMINOARISOA Vony	Asity Madagascar	Representative of Asity Madagascar	Information provider
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The first meeting for the project implementation was at Asity Madagascar office in September 2011 where the National Task Force was defined and identified. The work plan was designed also during the meeting. The NTF was contacted afterwards and preliminary works were done through individual communications (email, telephone, individual contacts). The objective of this process was to prepare the national consultation.

The workshop for the national consultation was organised early in 2012. Birds listed in the Protocol, their status, their habitat type, their habitat condition, their breeding status and geographical distribution were reviewed after the workshop. There was also an identification of priority sites (marine IBAs) for designation as marine protected areas in the Convention area.

3. General information

3.1 Location and physical features

Madagascar is a large island in the western Indian Ocean, off the southeast coast of Africa. It is 1500 km long and 500 km wide. A central mountainous spine runs down the length of the island with steeper slopes on the eastern side, where there is a narrow coastal plain. The east coast is dominated by sandy beaches. The western mountain slopes are gradual and the coastal area contains more diverse habitats: mangroves, saltpans, coastal lagoons, estuaries, sand beaches and offshore islands.

The coast of Madagascar is subdivided into six regions:

- The North Coast region (Regions¹ and Diana Sava northern part)
- The coastal area of North West (Region Sofia, and BoenyMelaky)
- The coastal area of South (Regions Androy and Anosy)
- The coastal region of West (Regions Menabe and Melaky)
- The coastal area of South East (Region Anosy northern part, Vatovavy Fitovinany, Atsimo Atsinanana)
- The coastal region of the East (and South Regions Sava part Atsinanana)

The principal habitats and ecosystems of Madagascar coastal zone are:

- Mangrove forests (3,300 km²)
- Lagoons (60,000 km²)
- Coral Reefs (1,042 km²)
- Rocky outcrops (in the north-east and north-west of Madagascar)
- Sandy beaches.

The population of Madagascar is approximately 20 million people, with a growth rate of about 2.7% per annum. 70% of the population work in the agricultural sector and 14% in fisheries. However, the fishing industry generates important revenue through the export of high value products like prawns and shellfish. The tourism industry has a high potential but has not yet been well explored. The most popular destinations are Nosy Be, Antsiranana, Toliara, Fort-Dauphin and Sainte Marie Island. The fishing and tourism industries combined earned USD 230 million in 2001.

3.2 Climate and vegetation

The geomorphology of Madagascar is an important climatic factor. The east of the country is characterized by a tropical humid climate and the west is comparatively dry. There are two main seasons in Madagascar: the cool season (austral winter) and the warm season (austral summer). The warm season (November- March) is dominated by storms and occasionally

¹ Administrative region

cyclones. The cool season (April-October) is dominated by the drought in the west region and by showers in the east.

The coastal area of Madagascar is formed mainly by mangrove forests which were estimated to cover 2,797 km² in 2005. The majority of the mangroves are found on the western coast, located at Mahajamba Bay, Bombekota Bay, Cap St Vincent, and Mahavavy. Very few patches are found on the northeastern part. Mangroves are coastal forest formations, specific to muddy shores and to estuaries in tropical and sometimes subtropical. Tropical mangroves occupy only the coastal areas that are inundated during high tides and exposed during low tides.

There are also littoral forests that grow behind the mangroves, behind the beaches, or directly along the seashore. These forests are extremely rare and among the most highly threatened vegetation types in Madagascar, despite their role in protecting soil from erosion, and preventing dune encroachment and flooding. Littoral forests are more common on the eastern coast of Madagascar, as isolated fragments with an estimated extent of no more than 450 km². Eleven littoral forest patches are inventoried in the eastern coast of Madagascar but very few are known from the western part (e.g. inside Sahamalaza-îles Radama).

In addition to mangrove and littoral forests, there are also other wetlands like swamps and marshes that are associated with the vegetation along the coastal area of Madagascar.

4. Ornithological importance

4.1 Categories and Criteria

The category and criteria definitions stated here are standard guidelines for assigning the appropriate threat status to bird species that are vulnerable to global extinction or whose populations are otherwise irreplaceable. They are based on BirdLife International criteria for identifying Important Bird Areas (IBAs), that is, sites that are important for conservation of vulnerable or irreplaceable bird species. These categories and criteria are internationally agreed, standardised, quantitative and scientifically defensible.

4.1.1 BirdLife's Guidelines

BirdLife International's guidelines for assigning Important Bird Areas are based on quantitative information on the presence of IUCN-listed threatened and or irreplaceable bird species at a particular site.

A1. Globally threatened: has species listed as Critically Endangered, Endangered or Vulnerable in IUCN Red List.

A2. Restricted-range species: global population restricted to an area <50,000 km².

A3. Biome-restricted species: if its distribution is > 50,000 km², but occurs mostly or wholly within all or part of particular biome.

A4. Congregations: This category is limited to congregatory waterbirds and seabirds. A site is listed if 1% of the global or biogeographic population occurs there, it regularly holds >20,000 waterbirds or 10,000 pairs of seabirds, or is a migration 'bottleneck'.

4.1.2 Species of Regional or National Conservation Concern

No species of special regional or national concern were listed.

4.1.3 Criteria for habitat selection

To be marine IBAs, coastal and marine sites should shelter species that respond to the criteria above. For A1, A2 and A3 categories, only the presence of a group of species is necessary to qualify the site as IBA. Thresholds are needed to select IBAs falling into A4 category. Field inventories have to be done to determinate if the thresholds are reached or not for certain sites. Assessment of the availability of the appropriate habitats should be done for some sites and, for others, existing species data have to be confirmed. The absence of quantitative or confirmative data should not prevent a site from being selected. If there is a probability that a site meets the condition of certain categories and the data and justification are available, the site should be proposed.

5. Important Birds in Madagascar

5.1 Birds status

The first objective of this project was to identify species of conservation concern in the Nairobi Convention area. To do this, the experts at the NTF workshop considered species status (IUCN Red List status), reproduction, habitat dependence, congregation, national criteria, biome and home-range. The goal was to prioritize species that are dependent to coastal and marine area of Madagascar.

The definition of the coastal zone was adapted from the definition created by experts during a workshop (1996) organized by the Intergovernmental Oceanographic Commission on the coastal zone integrated management. The coastal zone is defined as the intertidal zone between the high and low water marks, including adjacent parts of the terrestrial ecosystems plus a buffer zone of 2 km, to the Exclusive Economic Zones of territorial waters.

The following habitats are affected by the marine and coastal areas:

A-Coastal area

- a) Mangroves
- b) Lagoons
- c) Estuaries
- d) Sandy beaches

B-Marine area

- a) Coral Reefs
- b) Rocky reefs
- c) Marine prairie
- d) Coastal islands and islets

5.1.1 Tabular presentation of birds status

Table 1: Species requiring protection under the Nairobi Convention. IUCN = International Union for the Conservation of Nature; CR = Critically Endangered, EN = Endangered; VU = Vulnerable; NT = Near Threatened; LC = Least Concern. In instances where the population trend within the country is unknown, the global trend was taken from the BirdLife International Data Zone.

Scientific name	Common name	IUCN status	Habitat type	Habitat Use	Major threats (* regional)	Population Trend
<i>Haliaeetus vociferoides</i>	Madagascar Fish-eagle	CR	Sea-cliffs and rocky offshore islands, mangroves	Breeding	Habitat degradation/ conversion, Hunting	Decreasing
<i>Anas bernieri</i>	Madagascar Teal	EN	Estuarine water, mangroves	Breeding	Habitat degradation/ conversion, Hunting	Decreasing
<i>Ardea humbloti</i>	Madagascar Heron	EN	Coastal areas, mangroves, fresh water, lakes, rivers, marshes	Breeding, Foraging, Roosting	Habitat degradation/ conversion, Hunting	Decreasing
<i>Ardeola idae</i>	Madagascar Pond-heron	EN	Fresh water lakes, fresh water marshes/pools, rivers	Breeding	Hunting, Ecosystem degradation, competition with others herons	Decreasing
<i>Pterodroma baraui</i>	Barau's Petrel	EN	Coastal inshore water, pelagic deep water	Non-Breeding	*Hunting, Ecosystem degradation	Decreasing
<i>Thalassarche carteri</i>	Indian Yellow-nosed Albatross	EN	Coastal inshore water, pelagic deep water	Non-Breeding	Bycatch in longline fisheries	Decreasing
<i>Threskiornis bernieri</i>	Madagascar Sacred Ibis	EN	Estuarine water, mangroves, mudflats and salt flats	Breeding, Foraging	Hunting, Habitat degradation/ conversion	Decreasing
<i>Charadrius thoracicus</i>	Madagascar Plover	VU	Coastal marine	Breeding, Foraging	Aquaculture	Decreasing
<i>Diomedea exulans</i>	Wandering Albatross	VU	Pelagic deep water, pelagic continental shelf water	Non-Breeding	*Bycatch in longline fisheries	Decreasing
<i>Glareola ocularis</i>	Madagascar Pratincole	VU	Rivers, streams, creeks - permanent, rocky shoreline	Breeding	Ecosystem degradation, Ecosystem conversion	Decreasing

Scientific name	Common name	IUCN status	Habitat type	Habitat Use	Major threats (* regional)	Population Trend
<i>Numenius arquata</i>	Eurasian Curlew	NT	Mangrove, mudflats and salt flats, marshes, swamps	Foraging, Roosting	Ecosystem degradation, Ecosystem conversion	Decreasing
<i>Phoeniconaias minor</i>	Lesser Flamingo	NT	Saline, brackish/alkaline lakes - permanent, estuarine water	Non-Breeding	Ecosystem degradation, Ecosystem conversion	Decreasing
<i>Puffinus griseus</i>	Sooty Shearwater	NT	Coastal inshore water, pelagic continental shelf water, pelagic deep water	Foraging	*Harvesting, predation (rats)	Decreasing
<i>Thalassarche cauta</i>	Shy Albatross	NT	Marine intertidal, marine oceanic, marine neritic	Foraging	*Bycatch in longline fisheries	Unknown
<i>Thalassarche steadi</i>	White-capped Albatross	NT	Marine coastal, marine oceanic, marine neritic	Foraging	*Bycatch in longline fisheries	Decreasing
<i>Actophilornis albinucha</i>	Madagascar Jacana	LC	Freshwater marshes, lakes, rivers, streams	Foraging	Habitat degradation	Declining
<i>Anous tenuirostris</i>	Lesser Noddy	LC	Marine coastal, marine neritic	Foraging	Ecosystem degradation	Stable
<i>Arenaria interpres</i>	Ruddy Turnstone	LC	Costal beach, inland along dykes or on lake shores	Non-Breeding	Habitat degradation/ conversion	Declining
<i>Calidris alba</i>	Sanderling	LC	Sandy shoreline, sandbars, spits, permanent freshwater lakes	Foraging	Ecosystem degradation	Differing
<i>Calidris ferruginea</i>	CurlewSandpiper	LC	Mudflats and salt flats, estuarine, freshwater lake	Foraging	Ecosystem degradation, Ecosystem conversion	Increasing
<i>Calidris minuta</i>	Little Stint	LC	Mudflats and salt flats, freshwater lakes, marshes	Foraging	Ecosystem degradation	Declining
<i>Casmerodius albus</i>	Great Egret	LC	Mudflats and salt flats, bogs, marshes, swamps, fens, peatlands, freshwater lakes	Foraging, Roosting	Habitat degradation and loss	Differing
<i>Charadrius hiaticula</i>	Common Ringed Plover	LC	Marine coastal, marine intertidal, permanent freshwater	Foraging	Ecosystem degradation	Declining

Scientific name	Common name	IUCN status	Habitat type	Habitat Use	Major threats (* regional)	Population Trend
			lake, rivers			
<i>Charadrius leschenaultii</i>	Greater Sand Plover	LC	Mudflats and salt flats, sandy shoreline, sandbars, spits	Foraging	Ecosystem degradation, Ecosystem conversion	Unknown
<i>Charadrius marginatus</i>	White-fronted Plover	LC	Coastal beach	Foraging	Species disturbance, Ecosystem degradation, Ecosystem conversion	Declining
<i>Charadrius mongolus</i>	Lesser Sand Plover	LC	Mudflats and salt flats, sandy shoreline, sandbars, spits	Foraging	Habitat degradation	Declining
<i>Charadrius pecuarius</i>	Kittlitz's Plover	LC	Lakes, reservoirs and rivers, small permanent and temporary pools, flood plains, dry sandy riverbeds, marshes	Foraging	Habitat degradation/ conversion, Hunting	Unknown
<i>Charadrius tricollaris</i>	Three-banded Plover	LC	Sand, mud or gravel shores of inland freshwater lakes, temporary or muddy pools, and rivers, streams with shingle banks, rice-paddies	Breeding, Foraging, Roosting	Habitat degradation/ conversion	Unknown
<i>Dromas ardeola</i>	Crab Plover	LC	Sandy shoreline, sandbars, spits, mudflats and salt flats	Foraging	Ecosystem degradation	Stable
<i>Egretta garzetta</i>	Little Egret	LC	Mangrove, mudflats and salt flats, marshes, swamps, estuarine water, freshwater lakes	Foraging, Roosting	Ecosystem degradation, Ecosystem conversion	Increasing
<i>Fregata ariel</i>	Lesser Frigatebird	LC	Coastal inshore water, pelagic deep water, mangrove, shrubland	Foraging	Habitat destruction	Declining
<i>Fregata minor</i>	Greater	LC	Coastal inshore water, pelagic	Non-Breeding	Habitat destruction	Declining

Scientific name	Common name	IUCN status	Habitat type	Habitat Use	Major threats (* regional)	Population Trend
	Frigatebird		deep water			
<i>Larus dominicanus</i>	Kelp Gull	LC	Sea-cliffs and rocky offshore islands, coastal inshore water	Foraging	*Oil spills	Increasing
<i>Larus hemprichii</i>	Sooty Gull	LC	Sea-cliffs and rocky offshore islands, sandy shoreline, sandbars, spits, coral reefs, estuarine water	Foraging	*Ecosystem degradation, hunting	Declining
<i>Limosa lapponica</i>	Bar-tailed Godwit	LC	Estuarine water, freshwater lakes, rivers, streams	Foraging	Ecosystem degradation, Ecosystem conversion	Declining
<i>Mycteria ibis</i>	Yellow-billed Stork	LC	Mudflats and salt flats, bogs, marshes, swamps, fens, peatlands, freshwater lakes - permanent	Foraging	Ecosystem degradation, Ecosystem conversion	Declining
<i>Numenius phaeopus</i>	Whimbrel	LC	Marine coastal, marine intertidal, estuarine, fresh water lakes, rivers	Foraging	Ecosystem degradation, Ecosystem conversion	Declining
<i>Oceanites oceanicus</i>	Wilson's Storm-petrel	LC	Marine coastal, marine oceanic, marine neritic	Foraging	None in Madagascar	Stable
<i>Phaethon lepturus</i>	White-tailed Tropicbird	LC	Coastal inshore water, pelagic deep water	Foraging	Habitat destruction	Declining
<i>Phaethon rubricauda</i>	Red-tailed Tropicbird	LC	Coastal inshore water, pelagic deep water	Non-Breeding	None in Madagascar	Increasing
<i>Phoenicopterus roseus</i>	Greater Flamingo	LC	Estuarine water, saline, brackish/alkaline lakes - permanent	Foraging	Hunting, human disturbance, Ecosystem degradation, Ecosystem conversion	Increasing
<i>Platalea alba</i>	African Spoonbill	LC	Marine coastal, marine neritic, inland wetland	Foraging, Roosting	Ecosystem degradation	Stable

Scientific name	Common name	IUCN status	Habitat type	Habitat Use	Major threats (* regional)	Population Trend
<i>Pluvialis fulva</i>	Pacific Golden Plover	LC	Mangrove, mudflats and salt flats, marshes, swamps, freshwater lakes - permanent	Foraging	*Ecosystem degradation, Ecosystem conversion	Declining
<i>Pluvialis squatarola</i>	Grey Plover	LC	Mudflats and salt flats, marine coastal	Foraging	Ecosystem degradation	Declining
<i>Puffinus carneipes</i>	Flesh-footed Shearwater	LC	Pelagic deep water, pelagic deep water	Foraging	*Bycatch in longline fisheries	Stable
<i>Puffinus pacificus</i>	Wedge-tailed Shearwater	LC	Marin coastal, marine oceanic, marine neritic	Foraging	*Predation (rats), Ecosystem degradation	Declining
<i>Sterna anaethetus</i>	Bridled Tern	LC	Sea-cliffs and rocky offshore islands, sandy shoreline, sandbars, spits, coastal inshore water, pelagic deep water	Foraging	Harvested for subsistence	Differing
<i>Sterna bengalensis</i>	Lesser Crested Tern	LC	Coastal marine, sandy shoreline, sandbars, spits	Non-Breeding	Hunting, Recreational activities	Fluctuating
<i>Sterna bergii</i>	Great Crested Tern	LC	Coastal marine	Foraging	Hunting, Recreational activities	Stable
<i>Sterna caspia</i>	Caspian Tern	LC	Coastal marine	Foraging	Loss and deterioration of breeding habitat	Increasing
<i>Sterna dougallii</i>	Roseate Tern	LC	Coastal marine	Non-Breeding	Hunting, Recreational activities	Differing
<i>Sterna fuscata</i>	Sooty Tern	LC	Sea-cliffs and rocky offshore islands, sandy shoreline, sandbars, spits, coastal inshore water, pelagic deep water	Non-Breeding	*Predation (rats) , Harvested for subsistence	Differing
<i>Sterna hirundo</i>	Common Tern	LC	Pelagic continental shelf water, coastal inshore water	Foraging	*Human disturbance, Habitat loss	Declining

Scientific name	Common name	IUCN status	Habitat type	Habitat Use	Major threats (* regional)	Population Trend
<i>Sterna saundersi</i>	Saunders's Tern	LC	Marine coastal and marine neritic	Foraging	Species disturbance, Ecosystem degradation	Declining
<i>Sterna sumatrana</i>	Black-naped Tern	LC	Sandy shoreline, sandbars, spits, sea-cliffs and rocky offshore islands, coastal inshore water,	Non-Breeding	Ecosystem degradation	Unknown
<i>Sula dactylatra</i>	Masked Booby	LC	Marine intertidal, marine oceanic, marine neritic	Unknown		Declining
<i>Sula leucogaster</i>	Brown Booby	LC	Sea-cliffs and rocky offshore islands, coastal inshore water, pelagic deep water, pelagic continental shelf water	Foraging	*Disturbance and unsustainable levels of exploitation.	Declining
<i>Sula sula</i>	Red-footed Booby	LC	Marine and largely pelagic	Non-Breeding	*Habitat loss	Declining
<i>Tringa glareola</i>	Wood Sandpiper	LC	Bogs, marshes, swamps, fens, peatlands, permanent freshwater lakes, rivers streams	Foraging	Ecosystem degradation, Ecosystem conversion	Stable
<i>Xenus cinereus</i>	Terek Sandpiper	LC	Sandy shoreline, sandbars, spits, mudflats and salt flats, freshwater lakes	Foraging	Ecosystem degradation	Stable

5.1.2 Graphical presentation of birds status

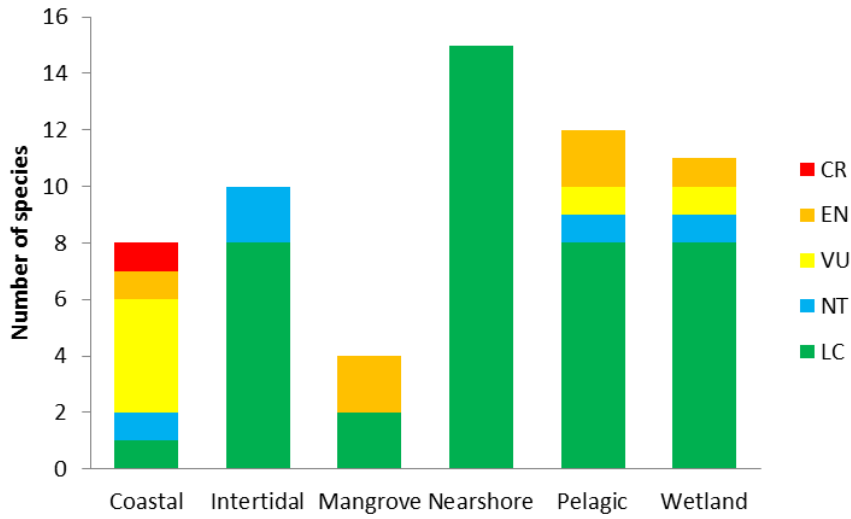


Figure 1: Numbers of species per IUCN category in each habitat type in Madagascar's coastal and marine environment. Note: that species which use more than one habitat type will be counted more than once. CR=Critically Endangered, EN=Endangered, VU=Vulnerable and NT= Near Threatened, LC= Least Concern

6. Conservation Issues

The major threats to birds in Madagascar are the development around the coastal and marine area and the burgeoning aquaculture industry. Hunting is also a problem but it is localised and sporadic.

The main threats to coastal and marine birds in Madagascar are pressures from human activities along the coast. The activity with the most impact is the agriculture. Wetlands, marshes and lakes are transformed into rice paddies. Due to a lack of water management techniques, the fields are often abandoned and people move to new areas.

Mangroves are also transformed into cultivated area for root and cereal crops mainly in the western part of Madagascar. This increases siltation of coastal waters and decreases the availability of bird habitat. In addition, the aquaculture industry has recently expanded in Madagascar due to higher market demands. This activity has transformed vast areas behind the mangroves (tan) into artificial basins.

Hunting is also a threat to marine species like terns and are more frequent in the islands in the north eastern of Madagascar. Herons in coastal and estuarine areas also are targeted but less frequently.

The newest pressures for birds are ecotourism, oil and mining industry development. However, Madagascar has a law called Mise En Compatibility des Investissements avec l'Environnement (MECIE), the objectives of which are to mitigate the impacts of these activities and ensure they are compatible with the environment. Environmental Impact Assessments are compulsory and "Terms of Reference" for the companies are specified on the exploration permits.

7. Priorities for Action

7.1 The approach

Identification of potential threats to biodiversity in the marine and coastal area of Madagascar was done through discussion between experts. The species were split into three main habitats, marine, coastal/intertidal and wetlands.

7.2 Assessing threats

Table 2: Threats and potential conservation actions to benefit bird and biodiversity conservation in Madagascar. Threats were categorised in “Prioritisation” on a scale of 1= slight to 4= critical.

Marine species				
Threat level 1	Threat level 2	Geographical area or habitat	Conservation Action	Prioritization
Energy production and mining	Oil exploration	On the western coast	Impact mitigation measures (MECIE)	2
	Mining (Phosphor) extraction	Small islands on the western coast	Impacts mitigation and control (MECIE)	3
Human intrusions and disturbance	Ecotourism, Fishery	Small islands in the western coast	Education, raising awareness	2
Over-exploitation, persecution and control of species	Over-exploitation (fishing)	Marine area	Enforcement of Control	3
Pollution	Garbage	Marine area	Education, raising awareness	2
Residential and commercial development	Tourism industry (Infrastructure)	Small island	Implementation of the Terms of reference from the exploration permit	3
Transportation and service corridors	Perturbation from engine by boat movement	Small island in northern and western coast	Enforcement of Control	2
	Transport of oil by tankers Fuel diversion	Small island in northern and western coast	Enforcement of Control	2

Coastal/intertidal species

Threat level 1	Threat level 2	Geographical area or habitat	Conservation Action	Prioritization
Agricultural expansion and intensification	Aquaculture	Coastal area and Mangroves	Impact mitigation measures	3
Human intrusions and disturbance	Ecotourism, Fishermen	Beach, intertidal area	Education, raising awareness	2
	Shrimp farm construction	In north-western coastal areas	Implementation of the Terms of reference from the exploration permit	3
Invasive and other problematic species and genes	Collect of seabirds, coastal birds and mangrove nesting birds (like Madagascar teal) eggs at nesting site	In the western coast	Education and control	3
Natural system modifications	Ecotourism management	Beaches	Impact mitigation measures	3
	Seaport construction	Coastal area	Implementation of the Terms of reference from the exploration permit	3
Pollution	Garbage	Beaches	Education, raising awareness	2
Residential and commercial development	Residential extension	Coastal area	Management plan delineation	2
	Tourism industry (Infrastructure)	All coastal areas in Madagascar	Implementation of the Terms of reference from the exploration permit	
Transportation and service corridors	Transportation (Boats)	Coastal area	Management plan delineation	2

Wetland (inland) species

Threat level 1	Threat level 2	Geographical area or habitat	Conservation Action	Prioritization
Agricultural expansion and intensification	Rice field expansion	Marshes, Lakes	Water management, implement modern methods of agriculture	3
Human intrusions and disturbance	Fishing	Marshes, Lakes	Education, raising awareness	2
	Tree cutting surrounding the wetlands zones	Lakes	Education, raising awareness	3
Invasive and other problematic species and genes	Invasive fish species, Fish (<i>Ophicephalus striatus</i>) and plant species (<i>Eicchornia crassipes</i>)	Lakes	Invasive species control measures	3
Over-exploitation, persecution and control of species	Over-exploitation (fishing)	Lakes	Enforcement of Control	3
	Collect of moulting birds, eggs at nestling	Lakes	Control, education	3
Pollution	Garbage and chemicals issued by intensive agriculture	Shores	Education, raising awareness	2
Transportation and service corridors	Transportation	Lakes	Management plan delineating	2
Geological events	Silting up by erosion	Lakes; marshes	Ecological restoration	3

7.3 Priority sites

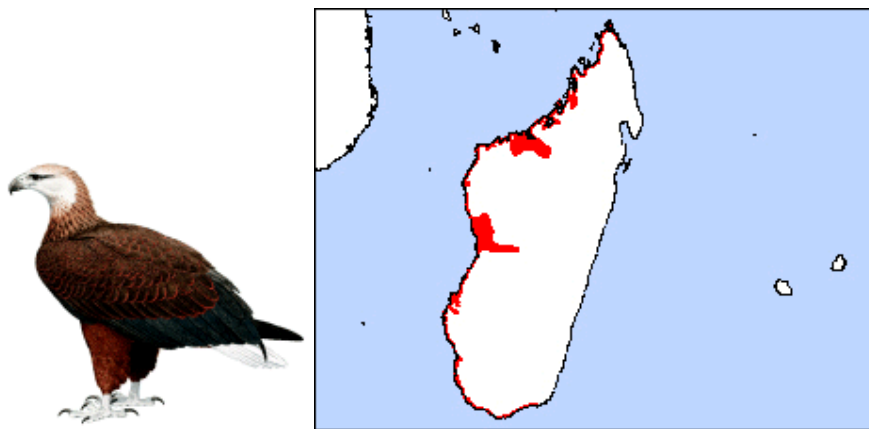
Table 3: Marine Important Bird Areas within Madagascar that should be considered for protection as Marine Protected Areas.

Site name	Area (km ²)	IBA criteria	Important species	Protected status?
Cape Saint André Forest and Wetlands	90110	A1, A2	<i>Tachybaptus pelzelinii</i> , <i>Lophotibis cristata</i> , <i>Haliaeetus vociferoides</i>	None
Loza Bay wetlands	60700	A1	<i>Haliaeetus vociferoides</i>	None
Mahajamba Bay wetlands	180000	A1, A4i	<i>Egretta dimorpha</i> , <i>Ardeahumbloti</i> , <i>Haliaeetusvociferoides</i>	None
North Pangalanes wetlands	5500	A1, A4i	<i>Anas melleri</i> , <i>Glareola ocularis</i> , <i>Coua reynaudii</i>	None
Southwestern Coastal Wetlands and Nosy Manitse	29580	A1, A2, A4i	<i>Ardea humbloti</i> , <i>Charadrius thoracicus</i> , <i>Sterna bengalensis</i> , <i>Sterna bergii</i> , <i>Sterna dougallii</i>	None
Mananara and Antongil bay	unknown	Proposed as an IBA	<i>Glareola ocularis</i> , <i>Sterna anaethetus</i> , <i>Sterna bengalensis</i> , <i>Sterna bergii</i> , <i>Ardea humbloti</i>	None

8. Description of important birds

Madagascar Fish-eagle *Haliaeetus vociferoides*

Key facts	
Current IUCN Red List category	Critically Endangered
Family	Accipitridae (Osprey, kites, hawks and eagles)
Species name author	Des Murs, 1845
Population size	240 mature individuals
Population trend	decreasing
Distribution size (breeding/resident)	40,900 km
Country endemic?	Yes



Justification: This species has an extremely small population which is probably declining rapidly, and it is therefore classified as Critically Endangered. However, recent data has suggested its population is stable, and may have been for some time.

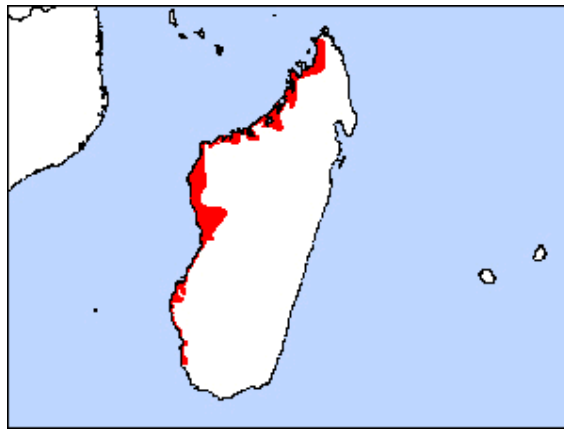
Distribution and population: This species survives in low numbers along the west coast of Madagascar. Surveys during 1991-1995 recorded at least 222 adults and 99 breeding pairs from 105 sites, apparently concentrated into three main regions: the Antsalova region west of Bemaraha Reserve, along the Tsiribihina River, and the coast from Mahajamba Bay to the island of Nosy Hara. Recent surveys suggest that the Antsalova district is the main stronghold, and the population is currently thought to comprise c.120 breeding pairs. Immature birds wander widely, making the non-breeding population difficult to assess.

BirdLife International (2012) Species factsheet: *Haliaeetus vociferoides*. Downloaded from <http://www.birdlife.org> on 15/02/2012.

Madagascar Teal *Anas bernieri*

Key facts

Current IUCN Red List category	Endangered
Family	Anatidae (Ducks, geese and swans)
Species name author	(Hartlaub, 1860)
Population size	1,500 - 2,500 mature individuals
Population trend	decreasing
Distribution size (breeding/resident)	50,200 km
Country endemic?	Yes



Justification: This species is listed as Endangered because it has a very small population, in one subpopulation that is undergoing a rapid and continuing decline owing to habitat loss and hunting.

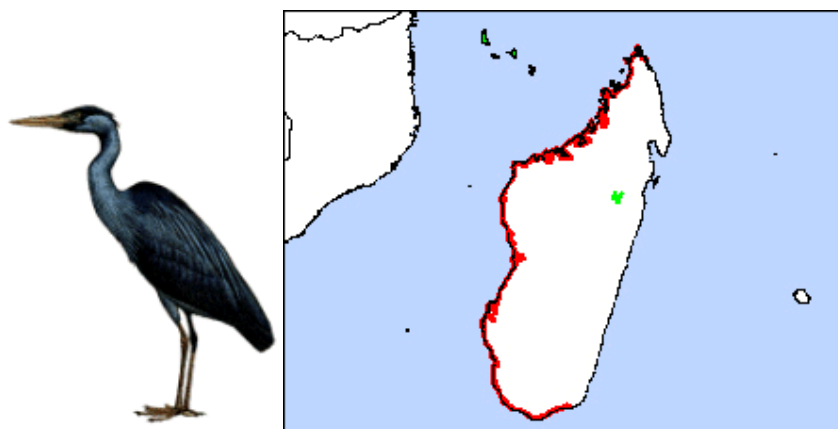
Distribution and population: *Anas bernieri* is endemic to western Madagascar. Its range encompasses a narrow coastal strip along the whole of the west coast and the extreme north-east. It is known to breed at many sites in Menabe and Melaky on the central west coast, and at Ankazomborona on the far north-west coast: 100-500 were estimated to be present between Antsalova and Morondava in July-August 1993 and a flock of 67 was seen near Tambohoranoin 1998; and a new breeding population of 200-300 individuals was recently discovered at Ankazomborona, north of Mahajanga and some 720 km north of the Masoarivo breeding site. The population in Baie de la Mahajamba was estimated to be 150-200 birds in November-December 2003. The total population is estimated at 1,500-2,500 individuals.

BirdLife International (2012) Species factsheet: *Anas bernieri*. Downloaded from <http://www.birdlife.org> on 15/02/2012.

Madagascar Heron *Ardea humbloti*

Key facts

Current IUCN Red List category	Endangered
Family	Ardeidae (Heron and egrets)
Species name author	Milne-Edwards & Grandidier, 1885
Population size	1,500 mature individuals
Population trend	decreasing
Distribution size (breeding/resident)	25,400 km
Country endemic?	Yes



Justification: This species is listed as Endangered because it has a very small population which is undergoing continuing declines owing to overexploitation and loss and degradation of its wetland habitats.

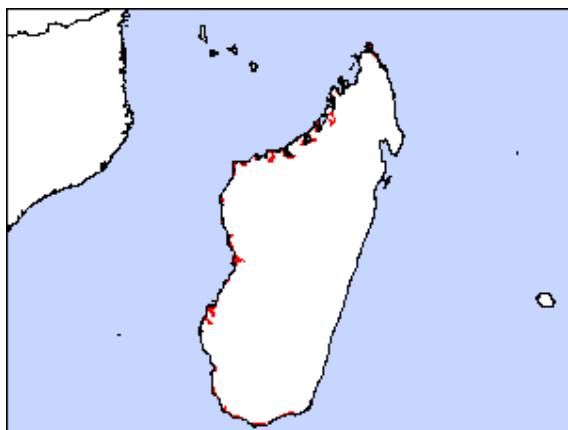
Distribution and population: *Ardeahumbloti* breeds only in Madagascar but is also recorded as a vagrant from the Comoro Islands and Mayotte (to France). In 1973, it was reported to have declined alarmingly and to be facing extinction unless completely protected. More recently it was found to be fairly common (though patchily distributed) in parts of north and west Madagascar, and uncommon in the south. It has also been seen regularly at Lake Alaotra. The total population was estimated to be no more than 1,500 individuals. It is now judged to be restricted to western Madagascar, where it is sparsely distributed, with its stronghold being the Antsalova region.

BirdLife International (2012) Species factsheet: *Ardea humbloti*. Downloaded from <http://www.birdlife.org> on 15/02/2012.

Madagascar Sacred Ibis *Threskiornis bernieri*

Key facts

Current IUCN Red List category	Endangered
Family	Threskiornithidae (Ibises and spoonbills)
Species name author	(Bonaparte, 1855)
Population size	2,300 - 3,250 mature individuals
Population trend	decreasing
Distribution size (breeding/resident)	25,500 km
Country endemic?	No



Justification: This species is listed as Endangered because it has a very small population which is declining owing largely to unsustainable harvesting of its eggs, disturbance of nesting sites and the degradation of wetland habitats in Madagascar. Declines are predicted to continue into the future.

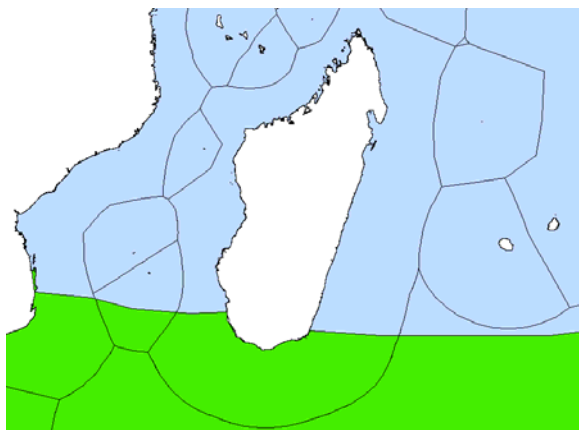
Distribution and population: The specific status of *Threskiornis bernieri* as distinct from *T. aethiopicus* has been discussed for some time and is now accepted. Two races are known: *T. b. bernieri*, found in the saline coastal zone and inland fresh water zone of western Madagascar (fewer than 2,500 and possibly no more than 2,000 mature individuals and declining), and *T. b. abbotti* on Aldabra, Seychelles (300-750 individuals). The species decline in Madagascar is shown by surveys in 2005 and 2006, in which 24 of the 26 sites revisited after surveys in the previous 10 years showed drastic reductions.

BirdLife International (2012) Species factsheet: *Threskiornis bernieri*. Downloaded from <http://www.birdlife.org> on 15/02/2012.

Indian Yellow-nosed Albatross *Thalassarche carteri*

Key facts

Current IUCN Red List category	Endangered
Family	Diomedidae (Albatrosses)
Species name author	(Rothschild, 1903)
Population size	85,000 mature individuals
Population trend	decreasing
Distribution size (breeding/resident)	35,300,000 km
Country endemic?	No



Justification: This species is listed as Endangered on the basis of an estimated very rapid ongoing decline over three generations (71 years), based on data from the population stronghold on Amsterdam Island. This decline is the result of adult mortality and poor recruitment owing to interactions with fisheries and disease.

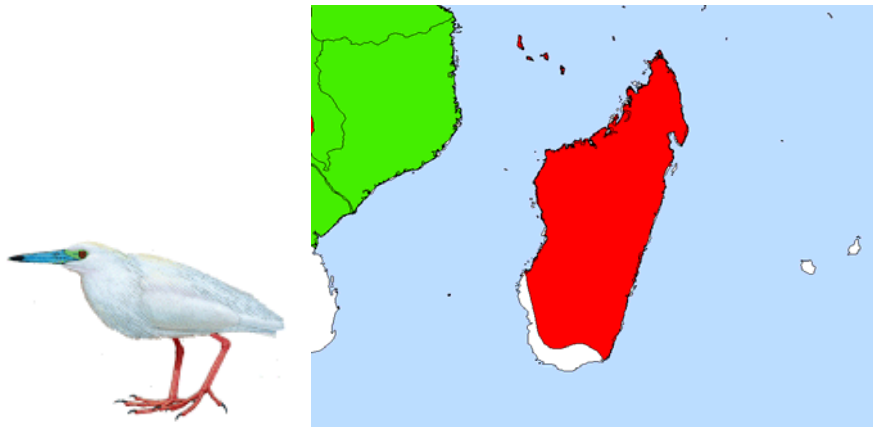
Distribution and population: *Thalassarche carteri* breeds on Amsterdam, Crozet Islands, Kerguelen Islands, and St Paul Islands (French Southern Territories) and on Prince Edward Island (South Africa). Outside the breeding season, the species disperses throughout the southern Indian Ocean between 30-50 degrees South, and birds are frequently observed off southern Africa and south-western Australia, extending east to the Tasman Sea and north-eastern New Zealand.

BirdLife International (2012) Species factsheet: *Thalassarche carteri*. Downloaded from <http://www.birdlife.org> on 15/02/2012.

Madagascar Pond-heron *Ardeola idae*

Key facts

Current IUCN Red List category	Endangered
Family	Ardeidae (Heron and egrets)
Species name author	(Hartlaub, 1860)
Population size	2,000 - 6,000 mature individuals
Population trend	decreasing
Distribution size (breeding/resident)	553,000 km
Country endemic?	No



Justification: This species is listed as Endangered because it has a very small population which is undergoing a continuing decline because many of its breeding colonies are heavily and increasingly exploited for eggs and young. This exploitation is exacerbated by pressures on its wetland habitats.

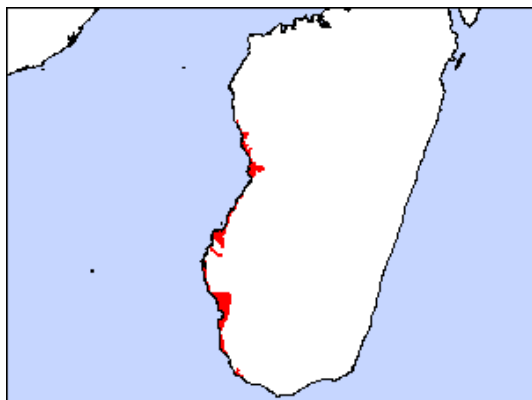
Distribution and population: *Ardeolidae* breeds on Madagascar (2,000-6,000 individuals), Aldabra (100 breeding pairs) in the Seychelles, and Europa (to Réunion, to France). It has a large non-breeding range throughout central, eastern, and southern Africa. It is present almost throughout Madagascar, but is always uncommon. A decline has been reported over the last 50 years, most notably on the high plateau. Whilst it remains fairly widespread, populations are low, and increasing exploitation at breeding sites is likely to increase the rate of population decline.

BirdLife International (2012) Species factsheet: *Ardeola idae*. Downloaded from <http://www.birdlife.org> on 15/02/2012.

Madagascar Plover *Charadrius thoracicus*

Key facts

Current IUCN Red List category	Vulnerable
Family	Charadriidae (Plovers)
Species name author	(Richmond, 1896)
Population size	2,700 - 3,500 mature individuals
Population trend	decreasing
Distribution size (breeding/resident)	11,100 km
Country endemic?	Yes



Justification: This species is listed as Vulnerable because it has a small population which is believed to be undergoing a continuing decline owing to pressures on its wetland habitats.

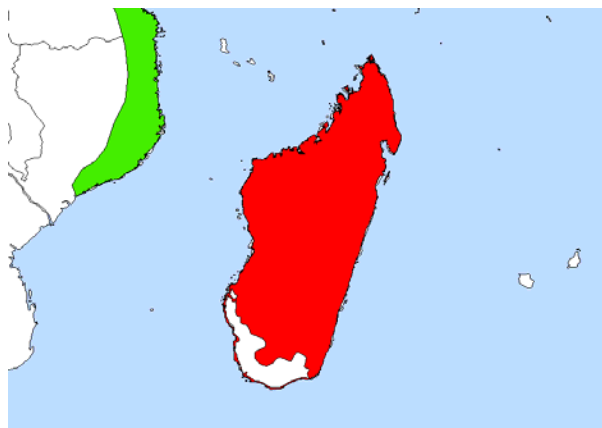
Distribution and population: *Charadriusthoracicus* occurs somewhat uncommonly between Boanamary of Mahajanga on the north-west coast and Tapera of Tolagnaro in south-eastern Madagascar, where recent surveys confirmed a total of 15 breeding sites, including Tsimanampesotse National Park. It favours saline lagoons and sandy coasts and estuaries, for example the Tambohorano wetlands, salt lagoons around Morombe and the Tsiribihina estuary (47 individuals seen in March 1998), and open alkaline grassland around Lake Tsimanampesotse. More than 60-100 pairs bred at Tsimanampesotse each year between 2005 and 2007. Sixty-one individuals have been seen on the mudflats at Bemoramba in Maintiramo. In January 1971, one was seen near Antananarivo and in 1985 it was infrequently reported from the east coast near Manakara. Its total population has been estimated to number 750-6,000 individuals, however this was not based on systematic surveys, and more recently it was estimated at c. 3,100 individuals through the modelling of observed densities at suitable sites across an estimate of the total area of habitat above a defined suitability threshold.

BirdLife International (2012) Species factsheet: *Charadrius thoracicus*. Downloaded from <http://www.birdlife.org> on 15/02/2012.

Madagascar Pratincole *Glareola ocularis*

Key facts

Current IUCN Red List category	Vulnerable
Family	Glareolidae (Coursers and pratincoles)
Species name author	Verreaux, 1833
Population size	5,000 - 10,000 mature individuals
Population trend	decreasing
Distribution size (breeding/resident)	545,000 km
Country endemic?	No



Justification: This species is listed as Vulnerable because its population is small and undergoing a continuing decline, probably owing to pressures on its wetland habitats.

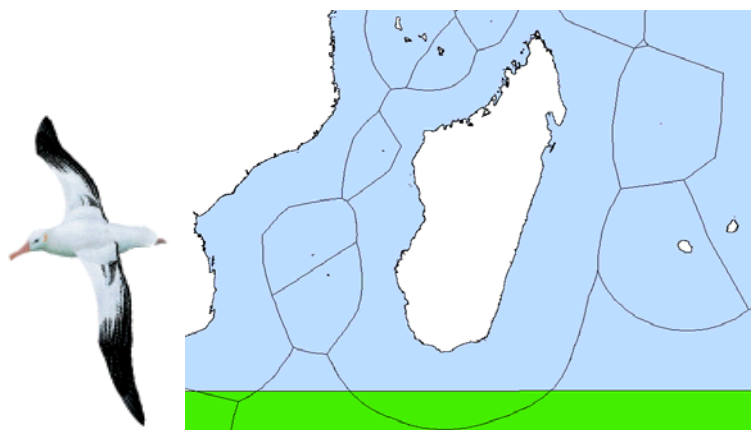
Distribution and population: Madagascar Pratincole is a migratory species breeding in Madagascar, where it is found in groups of 10-50 in a variety of habitats across most of the country except the extreme south-west. It appears to be more resident in eastern Madagascar which probably constitutes its main breeding range, whereas on the west coast it is most often observed as a migrant. It migrates to East Africa during the austral winter (May-August) where it is mainly found near the coast between Somalia and Mozambique. Its population is small, recently estimated to number 5,000-10,000 individuals, and thought to be declining, or stable following a major decline.

BirdLife International (2012) Species factsheet: *Glareola ocularis*. Downloaded from <http://www.birdlife.org> on 15/02/2012.

Wandering Albatross *Diomedea exulans*

Key facts

Current IUCN Red List category	Vulnerable
Family	Diomedidae (Albatrosses)
Species name author	Linnaeus, 1758
Population size	26,000 mature individuals
Population trend	decreasing
Distribution size (breeding/resident)	64,700,000 km
Country endemic?	No



Justification: Overall past and predicted future declines amount to a rapid population reduction over a period of three generations, qualifying the species as Vulnerable. Longline fishing is believed to be a main cause of decline in this species, causing reductions in adult survival and juvenile recruitment, and this threat is ongoing.

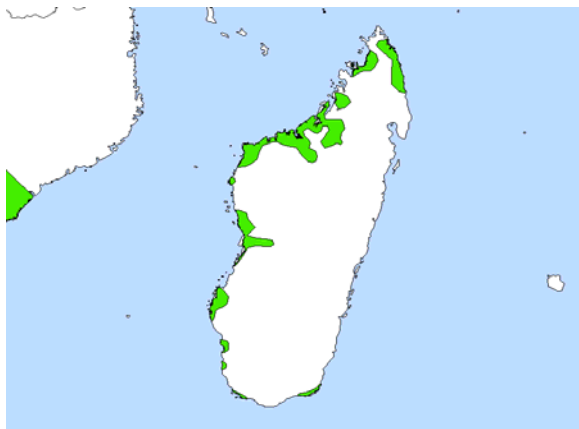
Distribution and population: *Diomedea exulans* breeds on South Georgia (Georgias del Sur) (c. 20% of the global breeding population), Prince Edward Islands (South Africa) (c. 40% of the global population), Crozet Islands and Kerguelen Islands (French Southern Territories) (approximately 40% of the global population) and Macquarie Island (Australia) (approximately 10 pairs breeding per year), with a total global population of c. 8,000 pairs breeding in any given year. Non-breeding and juvenile birds remain north of 50°S between subantarctic and subtropical waters with a significant proportion crossing the Indian Ocean to wintering grounds around the southern and eastern coast of Australia. A significant proportion of the Crozet and Kerguelen populations disperse into the Pacific and the western coast of South America.

BirdLife International (2012) Species factsheet: *Diomedea exulans*. Downloaded from <http://www.birdlife.org> on 15/02/2012.

Lesser Flamingo *Phoeniconaias minor*

Key facts

Current IUCN Red List category	Near Threatened
Family	Phoenicopteridae (Flamingos)
Species name author	(Geoffroy Saint-Hilaire, 1798)
Population size	2,200,000 - 3,240,000 mature individuals
Population trend	decreasing
Distribution size (breeding/resident)	331,000 km
Country endemic?	No



Justification: This species is classified as Near Threatened because populations appear to be undergoing a moderately rapid reduction. Proposed large-scale soda ash extraction at Lake Natron, the most important breeding colony, although currently on hold, would be disastrous for this species and, were this to happen, the species may qualify for uplisting to a higher threat category.

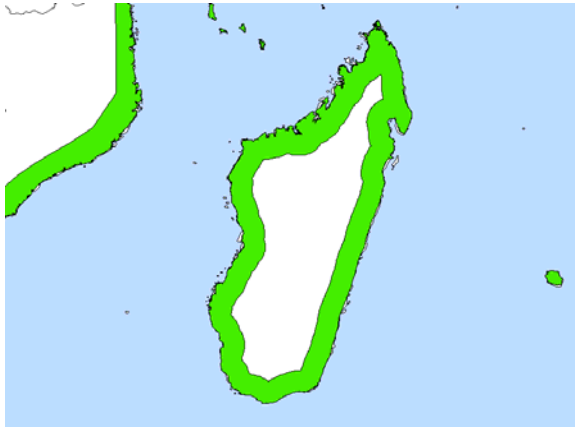
Distribution and population: *Phoeniconaias minor* breeds mainly in the Rift Valley lakes of East Africa in Ethiopia, Kenya and Tanzania. When not breeding, it occurs in virtually every sub-Saharan country and from the Arabian peninsula to Pakistan. The global population is c.2,220,000-3,240,000, including c.650,000 in Asia. Declines have been suggested for much of Africa, but are difficult to clarify due to widescale movement within the continent. It is adapted to respond to local environmental changes in sites by moving elsewhere, and thus depends on a network of suitable areas.

BirdLife International (2012) Species factsheet: *Phoeniconaias minor*. Downloaded from <http://www.birdlife.org> on 15/02/2012.

Eurasian Curlew *Numenius arquata*

Key facts

Current IUCN Red List category	Near Threatened
Family	Scolopacidae (Sandpipers and allies)
Species name author	(Linnaeus, 1758)
Population size	770,000 - 1,065,000 mature individuals
Population trend	decreasing
Distribution size (breeding/resident)	12,600,000 km
Country endemic?	No



Justification: This widespread species remains common in many parts of its range, and determining population trends is problematic. Nevertheless, declines have been recorded in several key populations and overall a moderately rapid global decline is estimated. As a result, the species has been uplisted to Near Threatened.

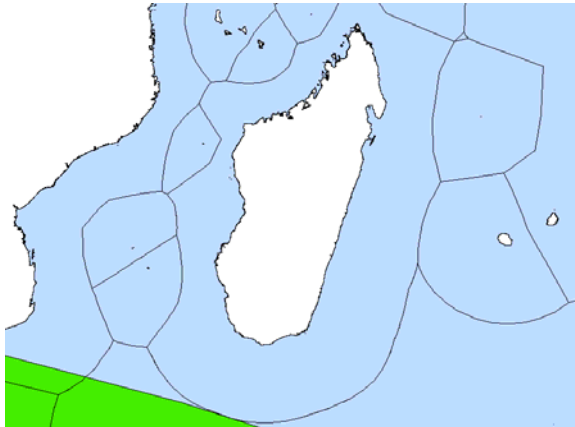
Distribution and population: *Numeniusarquata* is widely distributed, breeding across Europe. It winters around the coasts of north-west Europe, the Mediterranean, Africa, the Middle East, the Indian Subcontinent, South-East Asia, Japan and the Sundas. It has a large global population estimated to number 765,000-1,065,000 individuals. Add distribution in Madagascar.

BirdLife International (2012) Species factsheet: *Numenius arquata*. Downloaded from <http://www.birdlife.org> on 15/02/2012.

Sooty Shearwater *Puffinus griseus*

Key facts

Current IUCN Red List category	Near Threatened
Family	Procellariidae (Petrels and shearwaters)
Species name author	(Gmelin, 1789)
Population size	20,000,000 mature individuals
Population trend	decreasing
Distribution size (breeding/resident)	-
Country endemic?	No



Justification: This species is classified as Near Threatened because although it has a very large global population it is thought to have undergone a moderately rapid decline owing to the impact of fisheries, the harvesting of its young and possibly climate change.

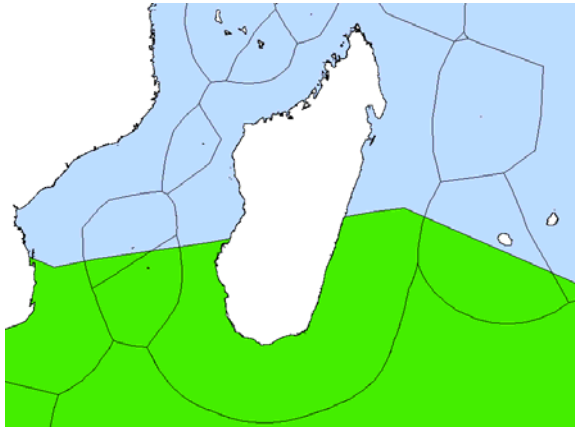
Distribution and population: *Puffinus griseus* is an abundant shearwater, breeding on islands off New Zealand, Australia and Chile, and the Falkland Islands (Malvinas). The total world population is thought to be over 20 million birds.

BirdLife International (2012) Species factsheet: *Puffinus griseus*. Downloaded from <http://www.birdlife.org> on 15/02/2012.

Shy Albatross *Thalassarche cauta*

Key facts

Current IUCN Red List category	Near Threatened
Family	Diomedidae (Albatrosses)
Species name author	(Gould, 1841)
Population size	26,000 mature individuals
Population trend	unknown
Distribution size (breeding/resident)	23,900,000 km
Country endemic?	No



Justification: This species breeds on just three islands. It may be susceptible to stochastic events and human activities, although one nesting site is moderately widely separated from the other two. For this reason it is treated as Near Threatened.

Distribution and population: *Thalassarche cauta* is an endemic breeder in Australia, with colonies on three islands off Tasmania. Data submitted to ACAP in 2005 estimated the total breeding population to be approximately 12,750 breeding pairs.

BirdLife International (2012) Species factsheet: *Thalassarche cauta*. Downloaded from <http://www.birdlife.org> on 15/02/2012

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