National Plan of Actions
for the Amsterdam albatross
Diomedea amsterdamensis
2011 – 2015

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Abstract

The Amsterdam albatross Diomedea amsterdamensis is a seabird species breeding only on a restricted site of Amsterdam Island (French Southern Territories, southern Indian Ocean). Described as a species in 1983, its conservation status is defavourable with the species listed as critically endangered by IUCN, owing to extremely low numbers (< 200 individuals) in this unique population despite an increasing trend.
Given the precarious situation of this iconic species, the National Nature Reserve of the French Southern Territories, assisted by many partners, launched in 2010 a five-year National Plan of Actions to improve the conservation status of the Amsterdam albatross. Four potentially heavy threats on the population have been identified : these are (1) tuna longline fisheries in the Indian Ocean that may kill individuals by bycatch, (2) pathogens causing mass mortality of chicks on a nearby colony of another albatross species nesting on the island, (3) introduced mammals that could deteriorate the unique nesting habitat of the species and consume their eggs and chicks, and (4) the loss of suitable habitat due to global changes, both on land by altered rainfall patterns and at sea with food web disequilibrium that may affect abundance of prey targeted.
20 concrete actions promoting the conservation of this species have thus been established in order to quantify, reduce and/or remove these threats. These actions have been prioritized and organized into seven sections of the plan : (1) maintaining the long-term monitoring as a sentinel of the population dynamics, (2) studying the mechanisms of pathogens transmission in seabirds of the island and antibodies detection in the Amsterdam albatross, (3) improving knowledge on marine habitats used by the species, (4) measuring the risk of interaction with longline fisheries and promoting the use of measures to reduce bird mortality in fisheries, (5) developing knowledge on the nesting habitat of the species, (6) measuring risk of deterioration of habitat and predation by introduced mammals on the nesting site, and (7) wide dissemination and accessibility of the plan to state agencies, international scientific community, regional fisheries management organizations and international organizations involved in conservation.

Base Martin-de-Viviès

Context

Albatrosses have always fascinated men, sailors, poets and nature lovers. They embody the collective imagination and freedom of the wilderness vast oceans. Yet many aspects of the biology of these iconic birds remain unknown, as are the great threats to their future. Of the 22 albatross species present in the world, 18 are globally threatened, including the Amsterdam albatross is classified according to the criteria of the International Union for Conservation of Nature (IUCN) as «critically endangered».

The population of Amsterdam albatross, a species endemic to the island of the same name is now estimated at less than 200 individuals, or some thirty couples that come to breed each year.

Amsterdam Island, located in the southern Indian Ocean, is part of French Southern and Antarctic. Covering an area of 55 square miles, this volcanic island is located on the ancient sea route connecting Europe to India. With its neighbor St. Paul Island, she is busy in the nineteenth century by whalers and seal. Amsterdam is home to three albatross species. The yellow-nosed albatross and the sooty albatross with dark backs are among the smaller albatross species with 2 m wingspan. The Amsterdam albatross, with 3 m wingspan and 6 to 7.5 kg belongs to the large albatrosses group.

Amsterdam is classified as a national nature reserve since 2006 and under the International Convention RAMSAR (wetland protection) since November 2008. It is part of the National Nature Reserve French Southern Territories brings together more than 2.2 million hectares of which 1.57 million in marine reserve. The French Southern Territories (TAAF), as an agency manager, have elaborated the management plan of the nature reserve, a real «how to» specify that the reserve management guidelines for the next five years. Thanks to this plan, thet TAAF carry out daily concrete actions, that aim at controling introduced species, restauring habitats, managing rubbish, and to a better conciliation between human activities and environment preservation. Finally, in the framework of this management plan, 90 actions for conservation are or will ba launched in the TAAF over the period 2011 to 2015.

Nature Reserve French Southern Territories, unlike other French reserves, has the distinction of «shelter» a human population grouped on scientific and logistics. The basis of Martin Viviès Amsterdam, is the smallest, it welcomes every year between 18 and 30 people depending on the season. This presence allows for decades to ensure the sovereignty of the French state on the part subantarctic and develop scientific programs over the long term. While the TAAF administration handles the logistics of these bases Southern, research activities are implemented by the French Polar Institute Paul Emile Victor (IPEV). Much research focuses on knowledge of the functioning and ecosystem conservation.

The population of Amsterdam albatross is followed as part of a research program conducted by CNRS Chizé since the 80s. The objective of such monitoring is particular to define the trend of the breeding population (adult survival, etc ...) and define the distribution of this species at sea. Knowledge of the species described in this document are derived from these studies.

As part of this plan and the «Grenelle» law, the TAAF, on demand by the Ministry in charge of Ecology decided to implement a national action plan for the conservation of the Amsterdam albatross. In this approach, the TAAF associated to the League for the Protection of Birds (LPO) for drafting the plan. A monitoring committee consisting of scientists from CNRS Chizé working on this species for many years, the IPEV, the National Museum of Natural History, fisheries organisations and the various authorities concerned, is established since January 2010 and aims at monitoring the work and validating the conservation measures proposed.

This approach is also in the context of commitments made by France to the international community, including the Agreement for the Conservation of Albatrosses and Petrels (ACAP).

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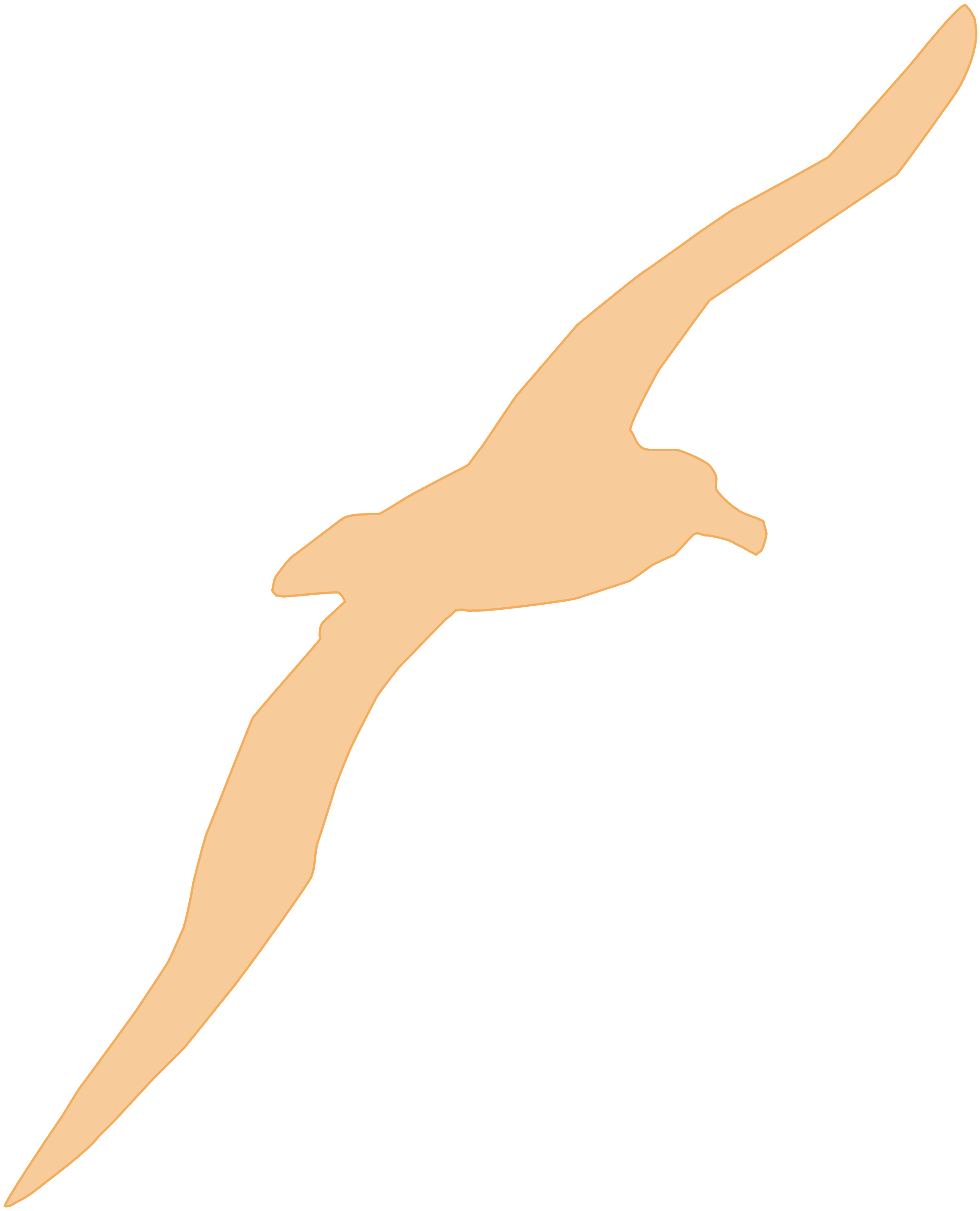
1. GENERAL INFORMATION ON THE NATIONAL NATURE RESERVE OF THE FRENCH SOUTHERN LANDS (RNN)



1. General information on the national nature reserve of the french southern lan

1.1. Structuring of the TAAF administration

Erected to the status of overseas territories (TOM) by the Act of 6 August 1955 which gave them their present name of «French Southern and Antarctic Lands» (TAAF), the islands of St. Paul and Amsterdam, the Crozet and Kerguelen archipelagos and Adélie Land have thereafter seen their status diverge from the common law. The constitutional law of 28 March 2003 granted them such a separate regime under the administrative organization of the State, distinct from that of other territorial overseas territories.

This law has inserted into the Constitution a provision specific to the TAAF. The TAAF is a community sui generis because they do not fit into existing legal categories of communities.

Indeed, in the absence of permanent population, the TAAF do not have an elected council and can not be subject to the same rules as departments and territories overseas. They are placed under direct administration of the State, their regime established by the simple law. The law of 21 February 2007 completed the process initiated by the constitutional revision of 28 March 2003, stating explicitly their legal moral personality. The TAAF are therefore a separate entity from the state.

The state representative in the Southern Lands is the prefect, which owns the title of senior administrator, and is described as «head of the territory.» The senior administrator has therefore missions of representing the state, management and administration of the territory, such as an executive would. The Senior Administrator is assisted by an advisory council of thirteen members appointed for five years on a proposal of Ministers in charge of the Overseas Territories, of ecology, of research and education; of national defense; of agriculture and fisheries; and of Foreign and European Affairs.

Since October 3, 2006, the TAAF are the agency manager of the National Nature Reserve French Southern Territories.

Headquarters are installed since 2000 in Saint-Pierre in the overseas department of Reunion, where it employs nearly 60 people.

On each district of the southern territories, the importance of staff varies from 20 to 100 people according to season and sites. Amsterdam is the station with the smallest capacity and Kerguelen holds the largest.

The logistics and transportation of personnel to the southern islands, accessible only by sea, is carried out by the Marion Dufresne 2. Owned by TAAF and equiped by CMA-CGM, the ship has two main functions, distributed over two separate operators: refueling districts by the TAAF and scientific oceanographic research by IPEV.

1.2. Creation of the RNN

France has indicated its commitment to preserve biodiversity by signing the Rio Convention in 1992. From this signature arose the ambition of taking at national level all the necessary measures to contribute to safeguarding the biological heritage. The Southern Lands are one of the last preserved areas of the country. The lack of economic activities and permanent human population of this territory make it a very favorable space for the creation of a National Nature Reserve which, in that it is representative sub-Antarctic ecosystems, can contribute to the diversity of spaces protected in France.

In December 1996, the Interministerial Committee of the polar environment, then chaired by Paul Tréhen recommended the creation of a nature reserve of French Southern Territories (RNN). The willingness to grant protection status at the national level to that territory was strongly supported by the scientific community.

It is eventually by Decree No. 2006-1211 of 3 October 2006, that was instituted the National Nature Reserve of the French Southern Territories. This is a national nature reserve which includes parts of land and sea. It concerns the French subantarctic islands: the Kerguelen and Crozet archipelagos and the Amsterdam and St. Paul islands.

1.3. Patrimonial values justifying the creation of the Nature Reserve

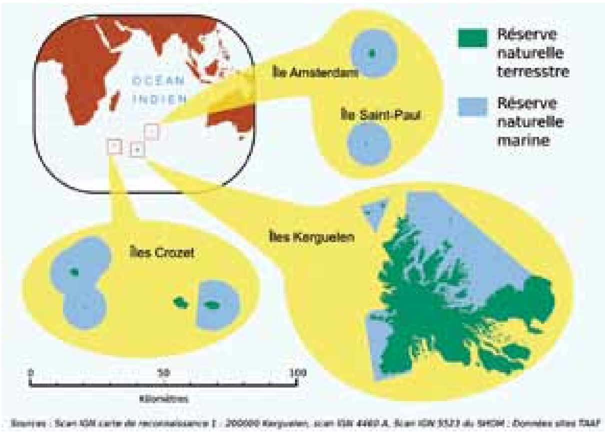
Due to a late (eighteenth) discovery and their remoteness from centers of human activity, the French subantarctic islands are unique sanctuaries, having suffered a low human impact. Marine environments are virtually intact, and terrestrial environments remain pristine on some islands of Kerguelen and Crozet.
They are home to the richest communities of invertebrates and plants of the sub-Antarctic islands. Plants and animals exhibit original adaptations developed over millions of years of evolution in total isolation, in the Southern Ocean, thousands of miles from any continent. The virtually intact biological heritage of these oceanic islands is therefore of considerable richness and importance.
High endemism rates, the strong influence of the ocean (with the almost exclusively marine origin of the inputs of elements in terrestrial systems via aerosols or marine vertebrates), the extreme isolation and remoteness of contamination sources (propagules and pollution), make these subantarctic islands original environments that have no equivalent in the Northern Hemisphere. They are therefore of exceptional interest for the conservation of biodiversity.
The subantarctic islands are indeed «sanctuaries» in the heart of the Southern Ocean. They concentrate the birds and marine mammals that require land to breed and moult on. At sea they offer the rare shallow areas of the ocean where marine life can develop intensively. This richness is increased by their key position in the vicinity of hydrological fronts that are areas of high productivity unlike the rest of the ocean. This explains the abundance of terrestrial and marine communities of Kerguelen and Crozet Islands.
Diversity of terrestrial species is relatively low compared to lower latitudes, due to extreme isolation and climatic constraints. It seems however much more important in the marine environment but remains much less documented.
French Southern islands are home to large numbers of marine mammals, including elephant seals (Mirounga leonina), Antarctic fur seals (Arctocephalus gazella) and subantarctic fur seal (Arctocephalus tropicalis). The elephant seal population exceeds 130,000 individuals in Kerguelen, which represents the second largest population in the world. The subantarctic fur seal population is estimated between 25 000 and 30 000 individuals in Saint Paul and Amsterdam.
Among the bird species nesting on the territory of the TAAF, twelve are threatened with extinction worldwide. The main threats to these species and their habitats are firstly introduced invasive species that disrupt the balance of ecosystems, the effects of global change and the activities of legal and illegal longline fishing.
The islands of St. Paul and Amsterdam show a large number of bogs, unique in several respects: the presence of Sphagnum (absent from the Crozet and Kerguelen Islands), high endemism and original physiological adaptations of the species. The marine and coastal wetlands of the islands and shores are sources of food for many populations of sea birds and fur seals, who also come to breed. The main seafloors (stands of Macrocystis and kelp beds, black coral Antipathidae, Gorgonacea floors, stony corals and sponges, etc..) are a chief biological heritage which has hardly been disrupted despite a century of fishing thanks to the use of selective methods. Amsterdam and St. Paul islands are, with the Juan Fernandez Islands and the South Pacific islands of Tristan da Cunha in the South Atlantic, the only islands of the tropical belt of the southern hemisphere to host populations of lobsters. Jasus paulensis is endemic of these two French islands.
The avifauna is particularly remarkable, the RNN being home to 48 species of birds, including eight endemic species from which the Amsterdam albatross (Diomedea amsterdamensis) and the MacGillivray prion (Pachyptila Macgillivrayi).
The Entrecasteaux cliffs, remarkable site of Amsterdam Island, hosts over three quarters of the world population of yellow-nosed albatross (Thalassarche chlororhynchos). Likewise, there are fifteen species of birds for which at least half of the world population breeds on the French Southern Territories.
Among these species, some suffer from an unfavorable conservation status. This is the case of the Amsterdam albatross. This endemic bird is classified as «critically endangered" according to IUCN criteria.

1.4. Outline of the RNN regulation

The RN was created by Decree No. 2006-1211 of 3 October 2006. As a regulatory mechanism, this promotion is accompanied by a solid legal framework. The area concerned includes terrestrial parts and marine areas, allowing enhanced and global protection of the biological richness it hosts.
Regarding the protection of nature, the framework proposed by the decree complements a legal edifice whose construction started more than fifty years ago (notably France is party to the International Whaling Convention since 1948). Its complexity comes partly from the long period during which it has continued to grow, and also from the diversity of its sources. On the territory of the nature reserve, regulation of nature conservation indeed includes norms of international law, national law, but also territorial regulations.
The management of the reserve is in turn distinguished from that of the majority of national nature reserves, firstly because of the distance between the territory and its headquarters, the other due to the administrative action specific to TAAF. However, as is true for all nature reserves, an advisory committee and a scientific council, responsible for assisting the manager, have been established.

1.5. Location of the RNN

The terrestrial part of the RNN is made up of Amsterdam Island, St. Paul Island, the archipelago of Crozet and Kerguelen Islands. They are located in the southern Indian Ocean to more than 12,000 km from France mainland, ranging from the subantarctic zone with the Crozet Islands (46 ° 25'S, 51 ° 45'E) and the Kerguelen Islands (49 ° S , 70 ° E), to the subtropical zone with the islands of St. Paul (38 ° 43'S, 77 ° 32'E) and Amsterdam (37 ° 50'S, 77 ° 30'E). Located more than 2000 km from any continent, the French Southern Islands are among the most isolated islands in the world. The island of Réunion, east of Madagascar, is the closest French territory. Crozet is 2860 km south of it, Kerguelen 3490 km, Amsterdam and St Paul 2880 km.
La falaise d'Entrecasteaux, site remarquable de l'île Amsterdam, abrite plus des trois quarts de la population mondiale d'albatros à bec jaune (*Thalassarche chlororhynchos*). Ce sont ainsi quinze espèces d'oiseaux dont la moitié au moins de la population mondiale vit sur les Terres australes françaises.
Parmi ces espèces, certaines pâtissent d'un statut de conservation défavorable.
C'est le cas de l'albatros d'Amsterdam. Cet oiseau endémique est classé « en danger critique d'extinction » selon les critères de l'UICN.



Map 1 Location of the National Nature Reserve of French Southern Territories (RNN)

This isolation explains why Kerguelen and Crozet were not discovered until 1772. For Amsterdam and St. Paul, their geographical location assured them a much earlier visit of Man. These islands were discovered in 1522 by Del Cano, the first known landing being made by Vlaming in 1696. They are indeed on the orthodromic ('great circle') line which links South Africa to Australia, a route favored due to seasonal winds. St. Paul especially, was promoted by its extraordinary natural harbor - a partially collapsed volcanic crater and open to the ocean from a violent storm in the seventeenth century.

1.6. Administrative boundaries and total area of the RNN

The reserve boundaries are set by the decree of October 3, 2006. The whole area represents a State private domain, with the exception of the island's stations, which are comprised in the public domain. No administrative boundaries delineate the reserve.
The RNN consists of all terrestrial parts of the islands of Crozet, Kerguelen, St. Paul, and Amsterdam, and part or all of their territorial waters. Territorial waters of Amsterdam are classified as marine reserve.
The total land area presented in the decree is 700 000 hectares. The marine reserve covers 1,500,000 hectares bringing the total area of the reserve to more than 2.2 million hectares. This is by far the largest nature reserve in France.

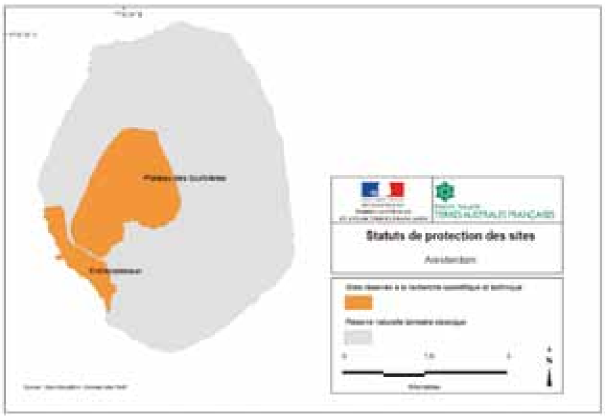
1.7. Amsterdam Island

Amsterdam and St. Paul islands are the only subtropical islands in the Indian Ocean. The national nature reserve includes both very narrow peri-insular shelves, extending to less than 2 nautical miles off the coast of Amsterdam and 2 to 8 nautical miles from the coast of St. Paul. Beyond lies the Exclusive Economic Zone (EEZ) around the two islands over 200 nautical miles and on integrated into the TAAF maritime area.

Amsterdam Island is the northernmost of the two, it covers approximately 9km by 7km or 55 square miles, and the island is dominated by La Dives Mount which rises 881 meters above sea level. Thus the island is subtropical with subantarctic affinities. The permanent station of Martin Viviès is located north of the island.

Map 2 Topology of Amsterdam Island

In addition to the decree establishing the RNN, a degree of improved protection is present in the TAAF. It concerns the sites listed under the territorial law No. 14 of 30 July 1985 above. It provides for the creation of «sites reserved for scientific and technical research,» where access is restricted to operators of research programs that take place there. The ranking of these sites was initially sought by scientists due to research programs they carry out on the different sites, and whose results could be adversely affected by an uncontrolled human use.



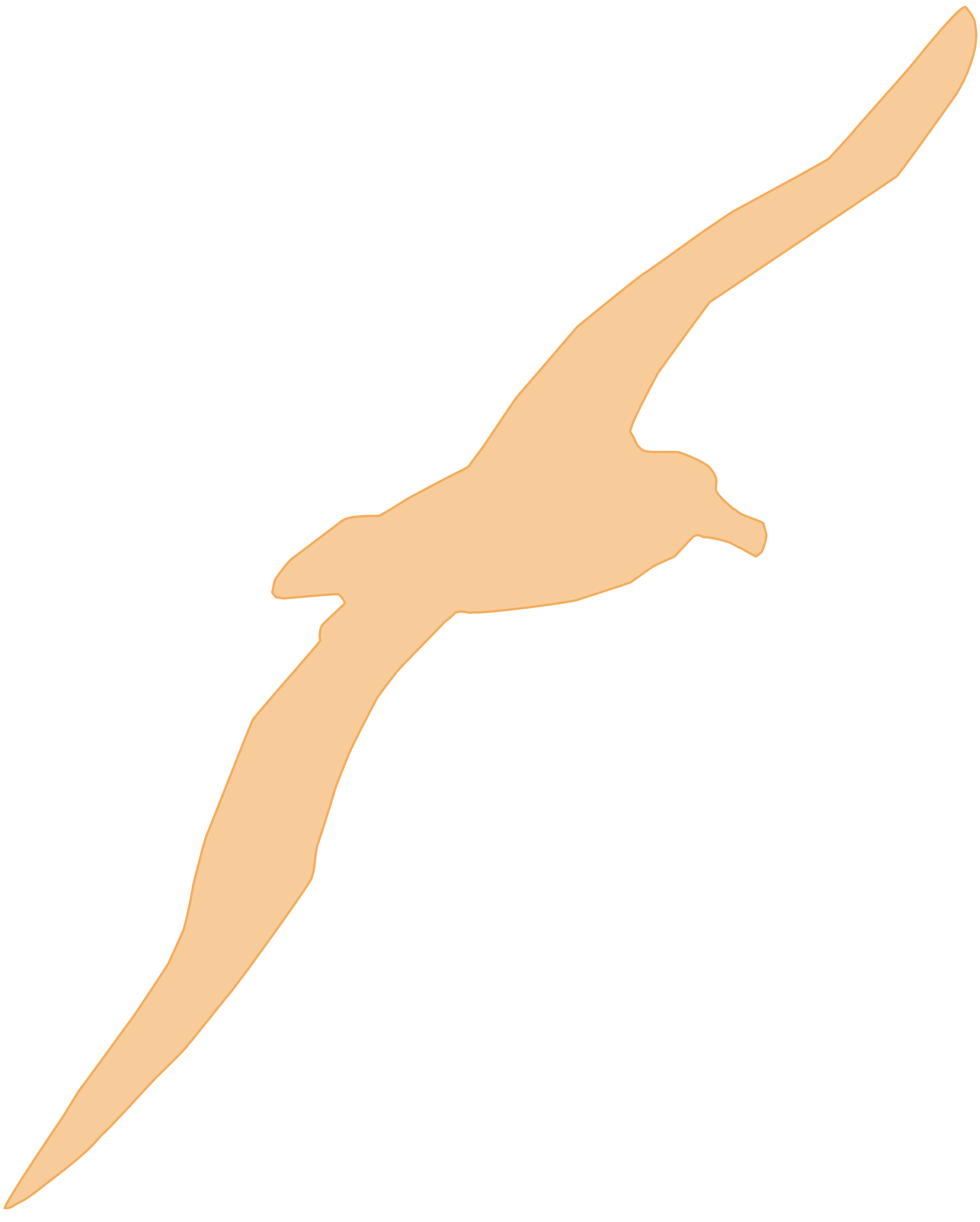
Map 3 The different protection status on the RNN of Amsterdam Island

Basically, the principle of this classification is to enable the ongoing of scientific monitoring. It is intended to apply only on the duration of the program or the times of the year during which surveys are performed. The Plateau des Tourbières, unique breeding site of the Amsterdam albatross, is classified as such.

1.8. The maritime area

The legislation gives to the administrator TAAF the competence to manage the fisheries in its EEZ. This text specifies the powers and provides valuable management tools (quotas, licensing, control, technical requirements, fee). The environmental care is considered at all levels of management of the fishery. In the EEZ of Amsterdam - St. Paul fishery targets the southern rock lobster with a trap fishing technique, conducted by a single French vessel.

2. STATUS OF KNOWLEDGE ON THE AMSTERDAM ALBATROSS



2. Status of knowledge on the Amsterda

2.1. General description

The Amsterdam albatross is a seabird of large body size (average wingspan: 2.80 m; average bodymass 6.3 kg) of the family Diomedeidae. Adult males and females have a very similar brown appearance (Roux et al. 1983): a flesh-colored beak, a body largely dark brown, with darker parts almost black (hood, tail feathers), a white face, a light belly (whitish) more or less uniformly brown vermiculated (Photo 2). As in other species of large albatrosses (genus Diomedea), the plumage gradually brightens with age, from chocolate brown in juveniles to a white plumage speckled with brown in older individuals in particular on the belly. Juveniles are very similar to those of other species of large albatrosses but all other large albatross species when older reach lighter plumage than the Amsterdam albatross.

Photo 2. Courtship between two adults of Amsterdam albatross on Amsterdam Island, Indian Ocean

2.2. Systematics

The Amsterdam albatross had never been observed onland before the observation by Paulian (in 1955) which describes it as a wandering albatross. It is Roux et al. (1983) that described the birds of Amsterdam as a distinct species. They based their description of new species on a number of criteria that separate it from the wandering albatross. Indeed, from the wandering albatross, albatrosses from Amsterdam Island breed in a dark brown plumage (rather than the more usual white plumage in the wandering albatross), at a different time of year (laying in April versus January). They are somewhat smaller and have a dark brown line along the cutting edge of the bill, a characteristic of the royal albatross. This taxonomic novelty has first not been universally accepted. For example Bourne (1989), Marchant & Higgins (1990) and Warham (1990) preferred to retain the Amsterdam albatross as a subspecies of the wandering albatross (Diomedea exulans).

The new species has been widely accepted as such (Sibley and Monroe 1990, CJR Robertson & GB Nunn 1998, Tickell 2000, M Brooke 2004) although other authors suggest that subspecies status would be more appropriate in the classification, given the low level of genetic divergence (Penhallurick J & M Wink 2004). However, a thorough comparison of the exulans complex using more recent data shows that the Amsterdam Albatross is quite different from other groups, exulans, dabbenena, and antipodes (Burg, Rains, Milot and Weimerskirch, unpublished).

A recent genetic study shows that this population, which rose by an extreme populational bottleneck (only 5 couples mentioned in 1982), exhibits the lowest genetic diversity known for a bird (Milot et al. 2007), which does not seem to be a handicap in terms of its current demographics. The study of genetic diversity of large albatrosses shows that this low genetic diversity may be an inherent character to albatrosses (Milot et al. 2007).

2.3. Retrospective

Amsterdam Island is one of the most isolated islands in the world, located in the middle of the Indian Ocean between Australia, Africa and Antarctica, more than 3000 km from the nearest continent. It is in the area of sub-tropical waters of the Indian Ocean, about 100 km north of St. Paul Island. This isolation explains the high level of endemism and low diversity of bird species present on these islands.

Although this island was discovered in 1522 by Sebastian del Cano, a part of its avifauna has remained unknown until the second half of the twentieth century. This island has never been inhabited, except for the occasional presence of sealers in the 18th century and shipwrecked, and staff (35 people) of the base permanently established since 1949 by the French Southern and Antarctic Lands (TAAF).

The «large albatrosses» had well been reported at sea in the vicinity of the two islands (Peron 1824, Von Pelzen 1869, Velain in 1877 Paulian 1960) but no reference to «wandering albatrosses» breeding on one of two islands had been made. Amsterdam Island is since then regarded as being located in the huge dispersal area of Diomedea exulans (Weimerskirch et al. 2006; Pinaud & Weimerskirch 2007).

During the first missions organized as part of the TAAF, P Paulian provided evidence of nesting of a «large albatross» on Amsterdam Island by publishing a photograph of an adult incubating its egg taken in April 1951 (R Delon) on the Plateau des Tourbières (Paulian 1953). Several pairs were nesting on the plateau during 1951, with all birds heavily marked with brown. Paulian could then not observe one in spite of his research during the summer of 1952. He therefore concluded, based solely on photography: «In the absence of material from Amsterdam Island, we can not know whether D. exulans from this island are similar to those of Tristan da Cunha or differ. We can only affirm the presence on Amsterdam Island of a dark subspecies, distinctly different from the birds of Kerguelen. «

During the summer of 1955/1956, P Paulian discovered deposits of sub-fossil bones. These remains belong to the current or recently extinct birds. They contain the remains of a «wandering albatross of relatively small size» that Jouanin & Paulian (1960) identify as being identical to the species present on Tristan da Cunha. Some pairs have then been reported as breeding in the year 1968, but research by Segonzac M during the summer of 1969/1970 were unsuccessful (Segonzac 1972). Thereafter some birds will be regularly observed («wandering albatrosses» heavily pigmented or brown adults) displaying courtship or chicks in down feathers (Roux et al. 1983). In the early 1980s very little was then known about the «wandering albatrosses» of Amsterdam Island. No ornithologist who stayed on the spot had been able to observe closely and at length, and no specimen had been collected (Roux et al. 1983). These observations proved the regular nesting, though in small numbers, of this albatross on the Plateau des Tourbières. In addition all individuals described or photographed had a common plumage heavily marked with brown.

It was not until early March 1981 that seven breeding pairs were discovered and followed to fledging (Roux et al. In 1983).

2.4. Legal status of protection

2.4.1. International level

As the species is listed in Annex I to the Convention on Migratory Species CMS, the concerned States thereto shall prohibit the collecting of individuals.

The Agreement for the Conservation of Albatrosses and Petrels (ACAP) is a multilateral agreement under the Convention on Migratory Species, which aims the knowledge and conservation of migratory species in coordinating international efforts to mitigate threats facing their populations: degradation of nesting sites, threats posed by the introduction of nonnative predators, limiting threats at sea catch by fishing gear. ACAP came into force in February 2004 and currently has 13 member countries including France. It covers 29 species of albatrosses and petrels which a majority is present in the French Southern and Antarctic Lands. Though the agreement does not have jurisdiction to take measures to regulate fishing in the sea, it produced a catalog of practical measures to minimize accidental catches by different fishing gears, which promotes the use of regional organizations in fishing that regulate fishing in the distribution areas of albatrosses and petrels. The Agreement also includes a database on the distribution and conservation status of populations covered by the agreement, with inputs from the Parties and observers. It has produced guidelines to limit the populations of invasive species and guidelines on biosafety. The Amsterdam albatross is considered a priority species for which an action plan is necessary and it is also one of the reasons that led to the emergence of the national plan of action.

2.4.2. National level

2.4.2.1. France

The Amsterdam albatross is protected under the Ministerial Decree of 14 August 1998 laying down across the country safeguards for birds in the French Southern and Antarctic Lands. Prohibited actions include the destruction or removal of eggs or nests, destruction, mutilation, capture or naturalization of individuals.

2.4.2.2. Other Countries : Australia

Relative to the known range of the species (see Map 4), only Australia has considered this species in its national legislation.

Under Australian national legislation the species is protected and listed:

- Environmental Protection and Biodiversity Conservation Act 1999 (Australian Government Environment Protection and Biodiversity Conservation Act 1999 - EPBC Act http://www.deh.gov.au/epbc/)
- List of threatened species (endangered) marine species, migratory species
- Recovery plan for albatrosses and giant petrels, 2001-2005 (Department of Environment and Heritage 2001)
- Plan for Reduction of catches threat of seabirds during oceanic longline fishing operations in 2006 (Department of Environment and Heritage 2006)

2.4.3. Legal status and conservation plans for the breeding sites

2.4.3.1. International level

The Convention on Wetlands signed in Ramsar in 1971, ratified by France in 1986, is an intergovernmental treaty that aims primarily to promote the conservation and wise use of wetlands. The base of the Convention is the Ramsar List of Wetlands of International Importance. The RNN of the French Southern Lands, which is listed in it since 2008, is the largest Ramsar site labeled under a European country (site No. 3FR035). The mechanism proposed by the 1971 agreement does not constitute a regulatory instrument, but a label certifying the quality and international significance of wetlands under its aegis.

2.4.3.2. National level – France

- National Nature Reserve (decree n ° 2006-1211) - Special protection Area

2.4.3.3. Regional – French Southern and Antarctic Lands

The world's unique breeding site of the species is included in an area restricted to Scientific and Technical Research (Decree 14 of July 30, 1985 - TAAF) in the National Nature Reserve of the French Southern Territories, managed by the administration of the TAAF. A single territory in the world is thus concerned with the reproduction of the species, the subtropical island Amsterdam (French Territorial Community of overseas with a special status). On a spatial (land), the nesting site of the Amsterdam albatross: the Plateau des Tourbières is defined as 'Important Area for Conservation of Birds' (Important Bird Area, IBA) (Catard 2003).

2.5. Conservation Status

The Amsterdam albatross is endemic to Amsterdam Island (37 ° 50'S, 77 ° 35'E) and breeds only in the highlands of the island: the Plateau des Tourbières. This leads to make the species one of the rarest birds in the world, with a global population estimated to 160-170 individuals (Rivalan et al. 2010).

Although the number of individuals has increased steadily since the mid-1980s, the restricted total population for the species and its low reproduction rate represents a source of concern (Rivalan et al. 2010). Several threats have been identified for this case: incidental mortality related to fishing activities (mainly fishing for tropical tuna longline (Weimerskirch et al. 1997; Inchausti & Weimerskirch 2001)), habitat destruction (fire) or introduced species (cattle (Micol & Jouventin 2005), cats, rats, pathogens (Weimerskirch 2004)).

This species is listed on the IUCN Red List as «Critically endangered» on a global scale (Internaional Birdlife 2008).

It is listed as «Critically endangered» because of its very low population size (estimated at 160-170 individuals cf.1.12.5), restricted to a single breeding area on a single island. Although numbers have increased recently (Rivalan et al., 2010), this population continues to be potentially at severe risk (Inchausti & Weimerskirch 2001) Rivalan et al. 2010 (Weimerskirch 2004), especially through the potential impact of industrial fisheries activity on adults and introduced diseases on adults and chicks.

The Amsterdam albatross is one of the species listed in the Agreement for the Conservation of Albatrosses and Petrels (ACAP Annex 1 - species of albatross and petrel which the Agreement applies).

2.6. Biology of the species

General knowledge about the biology of the Amsterdam albatross are derived from scientific research conducted on Amsterdam Island since 1982 by the CNRS Chizé within a program (No. 109 - seabirds and marine mammals as sentinels of global changes in the Southern Ocean) funded by the French Polar Institute - Paul-Emile Victor (IPEV).

Albatrosses (family Diomedeidae), share a very high homogeneity of their life history traits. These are large seabirds that breed on oceanic islands of the Southern Ocean and northern Pacific. These birds have a very low fecundity (a single egg laid every year or every two years for some species), a late sexual maturity and are very long-lived (Tickell 2000).

In the Amsterdam albatross, the adults return to the breeding colony in January-February, the males arriving before females. The breeding cycle lasts 10-11 months. The Amsterdam albatross is a biennal species, adults who have raised a chick until fledging take a sabbatical year before starting a new breeding cycle. The nest is built on the ground and a single egg is laid. The two adults of a pair participate equally to the incubation of the egg and rearing the chick, with an alternate presence on the nest. When one of the adults incubates the egg, its partner forages at sea. Chick fledges after a very long rearing period of nearly nine months. It will not return onland on Amsterdam Island before 4-5 years fully spent at sea. It will take several other years before the young bird becomes sexually mature. The average age of first breeding is 9 years, with the first reproductions recorded at five year old.

2.6.1. Selection of the breeding habitat

This albatross species nests on the high plateau of Amsterdam Island, at an altitude comprised between 500 and 700 m. This sector, the "Plateau des Tourbières" (Peat Bog Plateau), is exposed to westerly winds (Figure 1) and is characterized by very wet habitats, like often water-saturated peat with Sphagnum mosses, liverworts, and mosses (Lycopodium trichiatum), ferns (Blechnum penna-marina, Elaphoglossum succisaefolium), grasses (Agrostis delislei, Poa fuegiana, Trisetum insulare) and sedges (Scirpus aucklandicus, Uncinia brevicaulis, U. compacta). This environment is home to many endemic species, vegetation (Sphagnum, liverworts, grasses ...) and animals (including invertebrates; Diptera and wingless or brachypterous Lepidoptera). This habitat thus has a strong patrimonial value.

This is a very water-saturated habitat where there are few permanent ponds. The depth of peat and soil is highly variable: low near the outcrops of lava, and may reach several meters. The albatross nest is built on the ground from damp soil and various plant materials (Figure 4), usually on open areas of the peatbog.

Photo 4. D. Amsterdamensis - Adult incubating its egg on the nest made out of from damp soil and various plant materials, on the peatbog, Amsterdam Island, Indian Ocean

The entire suitable nesting habitat for the species on the Plateau des Tourbières does not seem to be «saturated», taking as reference the nest densities observed in colonies of wandering albatrosses (close species).

The soil mapping study (Figure 1) performed by Frenot and Valleix (1990) has highlighted the existence of four major types of soil, for which spatial organization roughly follows the altitudinal gradient, divided more or less concentrically around the peak, the Mont de la Dives:

Photo 3. Low vegetation (lycopods, Sphagnum, ferns, sedges) typical of high peatland soils on Amsterdam Island, Indian Ocean

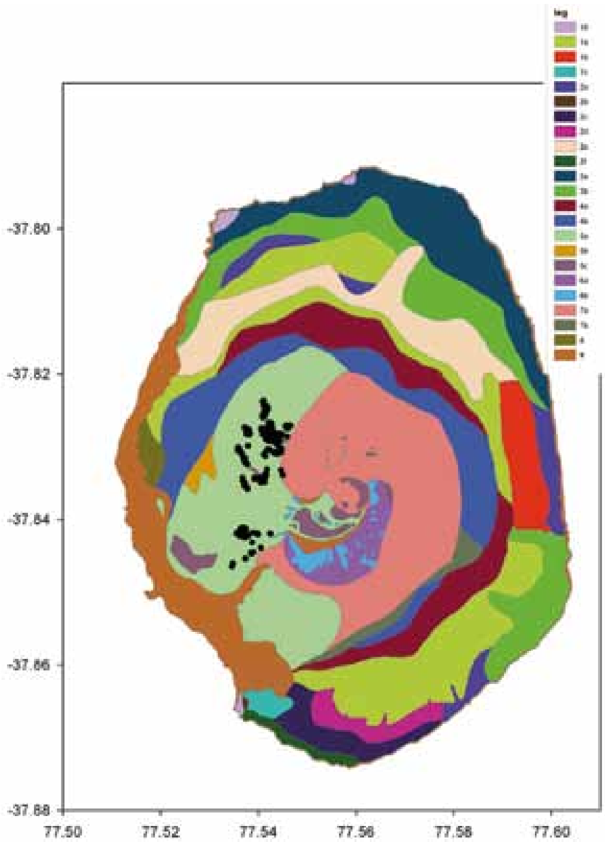
- Mineral soils low in organic matter on the highest sites,

- Peaty soils on the plateau and slopes of altitude,

- Very organic soils but well structured at medium and low altitude,

- Soils in different states of degradation due to very strong pressure from cattle trampling at low altitude, and mainly in the northern part of the island.

Examination of the distribution of nests of the Albatross Amsterdam shows that all of them are located on peat soils in altitude, and more specifically, without exception, the soil unit 5a. It is characterized by very wet peat soils, fibrist on surface (C / N close to 40), humification is more pronounced at depth (C / N dropping to 15). The thickness varies from 50 cm on the gentle slopes above 120 cm on the benches. Rock outcrops are rare on this soil unit, very spatially homogeneous.



1 - Mapping of soil units and nests (black dots) having hosted a breeding pair of D. amsterdamensis since 1999 on Amsterdam Island, based on data provided by programs IPEV No. 109 (long-term survey - Henri Weimerskirch of the CNRS Chizé) and No. 136 («Climate change, human actions and biodiversity of terrestrial subantarctic» - CNRS UMR 6553 Marc Lebouvier University of Rennes 1) (Frenot Valleix & 1990)

It is interesting to understand the reasons for this concentration of nests on this single unit and, consequently, their absence on neighboring units.

Unit 5b, located in the east of Mount Fernand, corresponds to an equivalent type of soil at the edge of the plateau of peatbogs, but has been heavily trampled by cattle in the late 1980s. The vegetation there was very fragmented in 1988, with a drying of surface areas.
Unit 5c characterizes the flat peaty areas at higher elevations. It is marked especially by the outcrop of groundwater to the surface and of a material of peaty consistency, very loose, unsuitable for nests building.
Units 6 and 7 in the higher areas are generally much less organic-rich with little fibrous surface areas. Again, this type of material does not favor the construction of albatross nests.
Unit 4, with its two subunits 4a and 4b constitute a transition to structured organic soils of medium altitude. Only the soils of unit 4b, between 450 and 500 m high, is similar to the soil surface of the unit 5a.
Thus, it seems that the Amsterdam albatross is very sensitive to soil characteristics that allow it to build its nests. Only the unit 5a brings together the necessary elements: a fibrist peat on the surface, constantly moist but not saturated, with the groundwater having to not outcrop. These fibrous materials are used by birds to build nests. Peat soils drained by trampling (5b) or water-saturated (5c) do not seem to suit this species. Unit 4b, bordering the central plateau, shares many surface affinities with unit 5a, but it appears on slopes going steeper. Other units of soil, with structured organic surfaces, are not likely to provide suitable materials for nest building.
It is thus clear that the extension of the breeding range of the Amsterdam albatross is strongly constrained by the soil type and it seems very unlikely that birds will establish outside of the unit 5a, as it was identified by Frenot and Valleix (1990).
Similarly, given the very long time necessary for the formation of this soil type, it is quite unlikely that Amsterdam albatrosses have nested lower in altitude in the past. This strenghtens the idea that the albatrosses bones found below (see 3.6.5) does not attest the presence of nests in the past on these areas of the island.
Moreover, there is no chance that the eradication of cattle in the northern part of the island allows an extension of the zone of albatross nests to the lowlands.
Finally, the wet peaty nature of "albatross soils" and their sensitivity to drying is well illustrated by the unit 5b: it strengthens the idea that the eradication of cattle is a guarantee that this fragile environment will no more be deeply changed even by rare incursions

of cattle. This also makes the threat of climate change particularly important. Indeed, if a significant change in temperature or precipitation on the Plateau des Tourbières occurs, this would have important consequences on the characteristics of the surface horizons of soils, building materials for nests of the albatrosses, and consequently reduce the surface of suitable habitats.

2.6.2. Breeding

Information regarding reproduction in this species are mainly from Jouventin et al. (1989).
Most eggs are laid in late February to March (average laying date: Feb. 28). They hatch in May after 79 days incubation, achieved through shifts (8-12) on the nest of each adult in a pair. After hatching, the adults shift again between foraging periods at sea and guard period of the chick on the nest, but for much shorter periods (2-3 days). The brooding period lasts 27 days on average, until the chick is thermically independent.

Photo 5. D. Amsterdamensis - Adult incubating the egg on the nest, and its mate, Amsterdam Island, Indian Ocean

Until the age of 132 days the chick is fed every 2.15 days and grows of 61 g per day. Between 132 and 230 days, growth is weaker, to eventually reach a mass of 8900 ± 600 g, that is, greater than that of adults. Then, bodymass decreases until fledging of the chick to 7200 ± 400 g on average, due to less frequent visits for adults. Chicks fledge in January-February after spending between 235 and 274 days on the nest (0). The entire breeding cycle is thus shifted by 2 months compared to the wandering albatross. Immature birds begin to return to the island between 4-7 years after fledging, but breeding does not occur until an average age of 9 years (record of first reproduction at age of 5 years (Weimerskirch et al. 1997)).

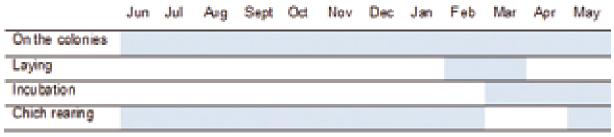


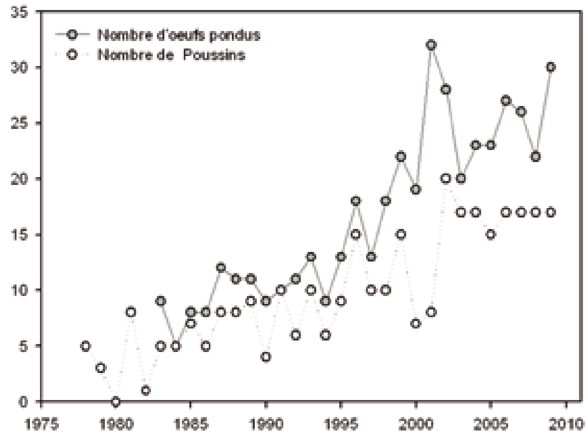
Table 1 Breeding cycle of *D. amsterdamensis*

2.6.3. Food

Since diet has not been studied until now, no data are currently available. However, the isotopic signature of nitrogen in the Amsterdam albatross indicates a trophic position higher than that of dark-mantled sooty as well as yellow-nosed albatrosses. The species, by analogy with other large albatrosses would forage mainly on large fish and squid (Cherel Y. et al. Unpublished).

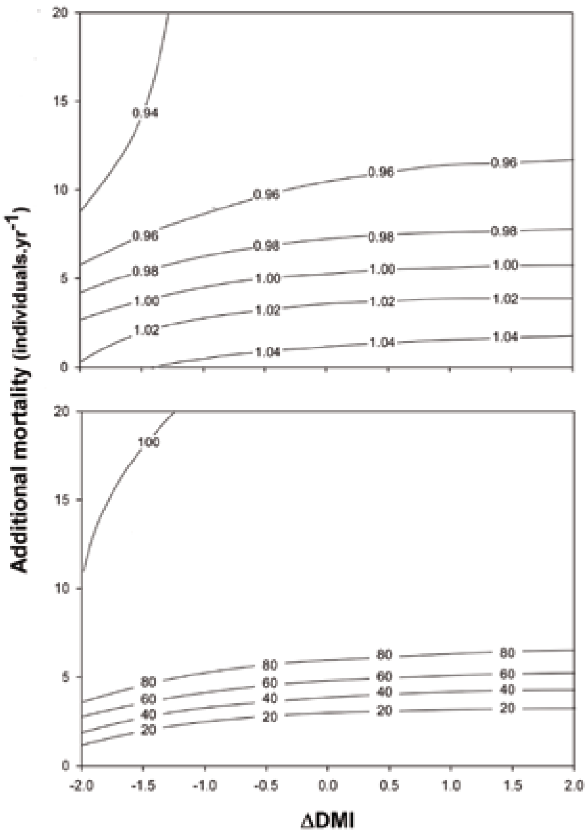
2.6.4. Demography and population dynamics

Information regarding demography and population dynamics are derived from publications (Weimerskirch et al., 1997, Inchausti & Weimerskirch 2001 and Rivalan et al. 2010.)
Data on breeding success and adult survival have benn collected continuously since 1983.
Pairs with successful breeding usually starts a new breeding cycle every second year; however, breeding during two successive years is possible when the couple fails early in its cycle, at the egg stage.
On average, each pair produces one egg every 1.8 years and one chick every 2.4 years.
Breeding success varied from 23.5% in 2001 to 100% in 1999. Between 1983 and 2007, average annual breeding success was 61%, a value close to those reported for other large species of the genus Diomedea. Breeding success was surprisingly low in 2000 (24.1%) and 2001. Without considering these two years, average breeding success was 64%.
Since 1983, a total of 301 Amsterdam albatrosses (57 adults and 244 chicks) were banded individually. The rate of annual adult survival is on average 97.1%, a very high value even for a long-lived bird. Juvenile survival is also high, 67% of the chicks fledged from Amsterdam returned (median survival between 1 and 7 years), representing a 94% annual survival between fledging and their seventh year. These survival rates are very high compared to other albatross species and birds in general. This partly explains a such fast increase in this population numbers in the 1980 and 1990. No trend in the rate of juvenile or adult survival was observed. The annual recruitment probability was estimated at 0.37 between 1990 and 2007.



2 - Number of eggs laid and chicks fledged in D. amsterdamensis (after unpublished data provided by H Weimerskirch, CNRS Chizé)

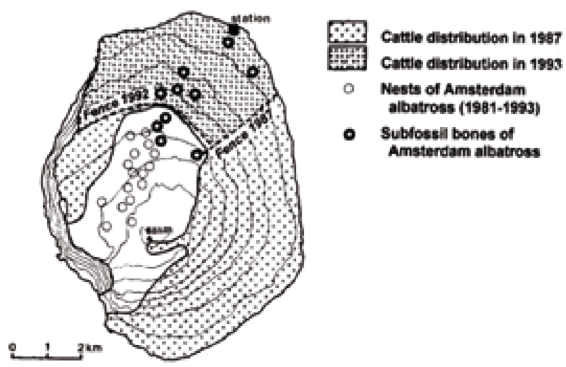
The demographic analyzes (sensitivity analyzes), showed that adult survival is the parameter that contributed the most to variance in the population growth rate from 1983 to 2007 (Rivalan et al. 2010).
Demographic projections show that when considering different scenarios (with / without additional bycatch in fisheries, and with predicted climate change) the population would continue to grow between 2.8-to 5.4-% annually without incidental mortality (see Figure 3). Conversely, when Rivalan et al. (2010) consider an incidental mortality of only 5 individual a year, the population would then show a decrease of 3.3% per year. In other words, the probability that the population would fall below the «historical threshold» of 1983 in the next 50 years could reach 96%.



3 - Projected growth rate of the population of D. amsterdamensis (top box) and the probability of decline (lower box) from different climate change scenarios (DMI index) and additional accidental death. Lines and isoclines of population constant growth rate (or probability of decline) for different values of parameters. The probability of decline represents the probability that the population of Amsterdam albatross falls below the historical level observed in 1983 (ie 9 breeding pairs) (Rivalan et al. 2010).

2.6.5. Distribution, abundance and trends since 1983

Figure 4 shows the distribution of the breeding population in 1993, the locations of subfossil bones (Jouventin et al. 1989) and areas of presence of introduced cattle on Amsterdam Island.



4 - Distribution of nests and subfossil bones of D. amsterdamensis, 1981-1993 (O), and distribution of wild cattle in 1987 and 1993 from (Micol & Jouventin 1995)

The distribution of subfossil bones suggests that the distribution of albatross nests could have been modified by the presence and development of the cattle herd on the island, thus restricting the nesting area where these latter are absent (Micol & Jouventin 1995). However the old accounts suggest that at the time of discovery of the island, a forest of phylicas encircled the island at low and medium altitudes, making nesting impossible for a large species of albatross. Regarding bones found at lower altitude on the island in the collapsed volcanic tubes (or pitfalls), Micol & Jouventin (1995) suggested they could be transported to their present location by water runoff. However this hypothesis is not consistent with the geomorphology of the sites. The distribution of bones in the bottom of the island could rather be explained by transport by man or by accidents experienced by the chicks during fledging. Chicks would have found themselves stranded or in areas with no wind or in shrubs.

Although other species have been introduced in the past, only four mammals remain -cattle Bos primigenius, cats Felix sylvetris, rats Rattus norvegicus, mice Mus musculus, and a species of bird-astrild Estrilda -, the Cattle being the only ones to have an impact in terms of significant degradation of habitat including trampling (see below see 1.11.1.1). The distribution of albatrosses subfossil bones may also be the result of the direct impact of man: during the 18th and 19th centuries albatrosses have been used as food by the survivors and sealers who stayed on the island, or as bait for fishing by various visitors to the island-whalers, traders or fishermen-see (Micol & Jouventin 1995).

The current distribution of the population (Figure 1; all 'active' nests, that is, occupied by a breeding pair) shows no growth in geographical extent compared to that of 1993, but rather an increase in nests density. Despite conservation actions carried out-fences limiting the herd north and east of the island and control of it.

The world's unique population of Amsterdam albatross is monitored continuously since 1983.

Information regarding the population abundance and trend are available in the publications from Rivalan et al. 2010, Weimerskirch et al. 1997; Inchausti & Weimerskirch 2001).

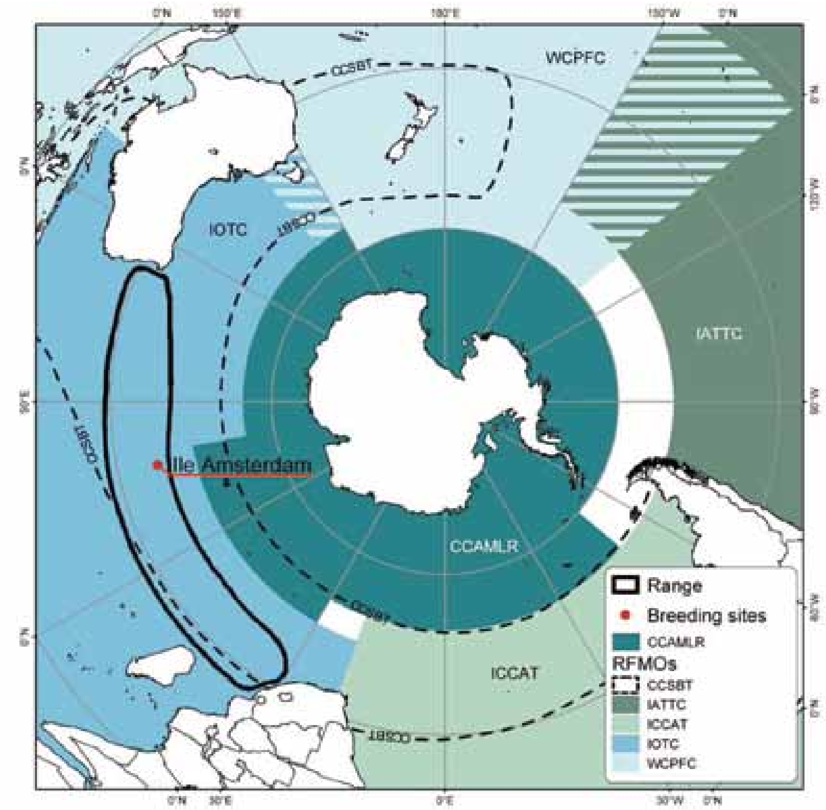
The number of eggs laid increased from a minimum of five in 1984 to a maximum of 31 in 2001 (Figure 2). This peak is due to poor breeding success in 2000 which resulted in the deferral of a portion of breeding pairs in the following year. Since 2004, the number of breeding pairs remained stable at 24-26 per year. Inchausti and Weimerskirch (2001) suggest that the population of Amsterdam albatross could have been affected by the activity of longline fishing that was active around Amsterdam Island between mid 1960 and mid- 1980s and probably caused the decline of other albatross species further south, in Crozet, Kerguelen and Marion. The recovery observed could correspond to a change in the fishing industry which has moved away from Amsterdam Island in the late 1980s.

The number of breeding birds on the single colony tended to increase steadily since the early 1980s, reaching a maximum of 31 breeding pairs in 2001. In 2007, 26 breeding pairs were present, 14 of which bred successfully. From the number of breeding pairs counted between 1983 and 2007, the growth rate observed (mean value) of the population was 1.049, an average annual increase of 4.9% (4.0% to 6.7% per year). This growth rate is however still very sensitive to a small increase in adult mortality. In this situation demographic models indicate that if only more than 5 Amsterdam albatrosses were killed annually (in a fishery, for example) in addition to the current mortality, population would decline rapidly.

The global population of Amsterdam albatross in 2007 is estimated from individual-based data with demographic models at 160-170 individuals with 80-90 mature individuals (Rivalan et al. 2010).

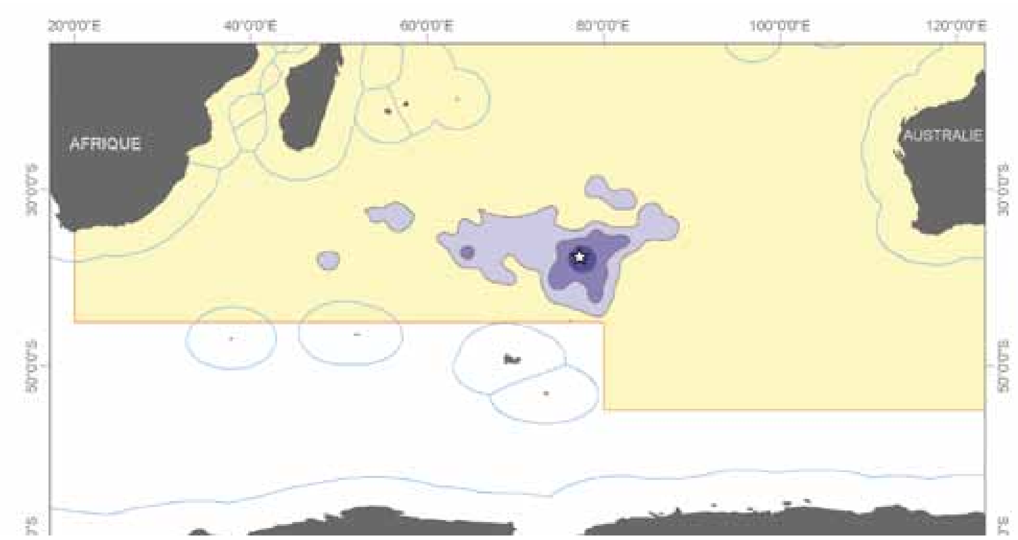
2.6.6. At-sea distribution range

The distribution at sea of Amsterdam albatross is vast, extending from the African coast to coast of Australia (Map 4).



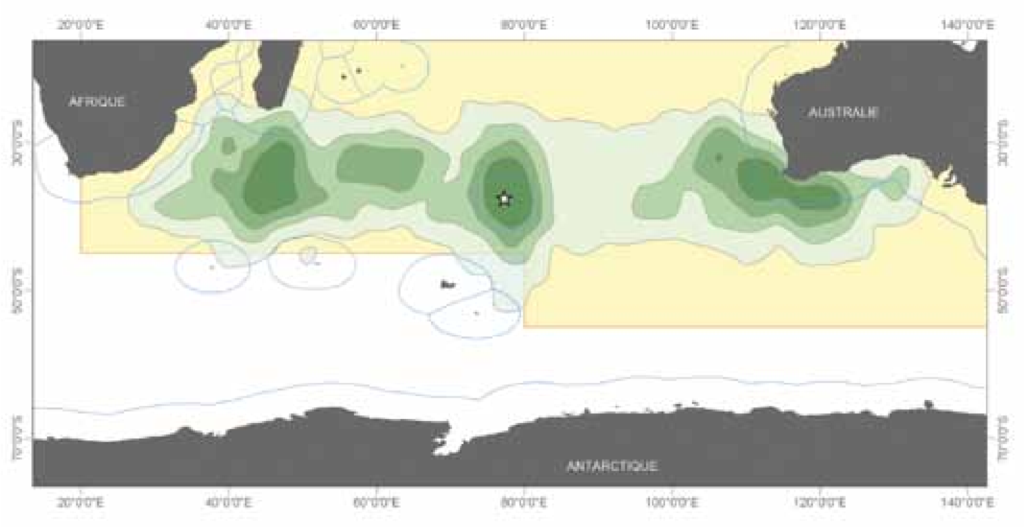
Map 4 Location of the only breeding site and approximate distribution of D. amsterdamensis based on satellite tracking data (Henri Weimerskirch, CNRS Chizé). Boundaries of Commission for the Conservation of Antarctic marine living resources (CCAMLR) and of regional fisheries management organizations (RFMOs) are indicated. IATTC - Inter-American Commission of Tropical Tuna. ICCAT - International Commission for the Conservation of Atlantic Tunas. IOTC - Indian Ocean Tuna Commission. WCPFC - Fisheries Commission WCPO. Is also referred to the traditional area where fishing is the Southern Bluefin Tuna (CCSBT - Convention for the Conservation of Southern Bluefin tuna).

The overlap between the distribution of the Amsterdam albatross and the sectors into which operate industrial fisheries targeting tuna (IOTC and CCSBT sectors) is clear (this will be developed later see 1.9.1).
This range covers different realities, however, as was demonstrated by CNRS Chizé when tracking adult individuals during incubation, adults on sabbatical or even immatures.

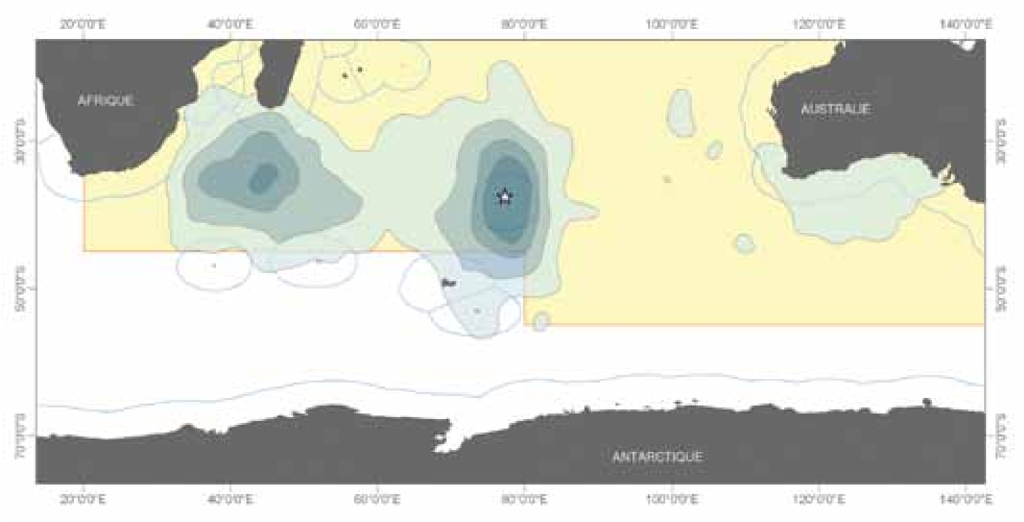


Map 5 Preliminary data from satellite tracking of incubating adult D. amsterdamensis (Number of tracks = 17) from February to April 1996 and March-April 2000. Densities represented are Kernel-distributions from most to least used, from the darkest to lightest: 25%, 50%, 75% and 95% - and the colony on Amsterdam Island (white star). The limits of the IOTC area (Indian Ocean Tuna Commission, in yellow) and EEZs (blue) are shown. Map based on the unpublished preliminary data provided by Henri Weimerskirch of the CNRS Chizé.

Breeding adults during incubation show a distribution centered on Amsterdam Island (Map 5), which is a common feature of all seabirds that are "central place foraging» animals, foraging at sea and breeding ground, forcing them to return to the colony to incubate the egg, protect and feed their chick. During incubation, the maximum radius of exploration is 2000 km, the area of distribution is centered on sub-Antarctic waters, but extends occasionnally into the tropical and subtropical waters. Indeed, during the breeding season, seabirds go back and forth between breeding and feeding areas.
No breeding adult has been monitored by satellite later in the reproductive cycle: during brooding small chick -guard period- or rearing chick until fledging of it. However there is some data for those periods of the reproductive cycle, with equipment of adults with miniaturized geolocators (GLS; Map 6).

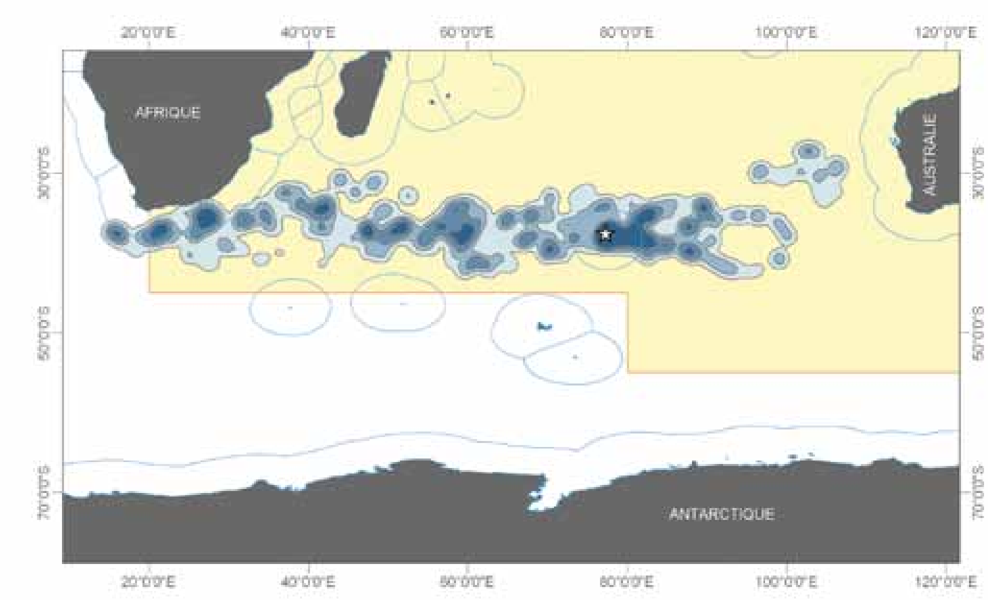


Map 6 Preliminary data on survey using GLS -geolocators- to track sabbatical adults from D. amsterdamensis after a breeding year (Number of tracks = 5) from January 2006 to February 2007. Are represented: Kernel-density distributions -most to least used, from the darkest to lightest: 25%, 50%, 75% and 95% - and the colony on Amsterdam Island (white star). The limits of the IOTC area (Indian Ocean Tuna Commission, in yellow) and EEZs (blue) are shown. Map based on preliminary data (being analyzed) unpublished provided by Henri Weimerskirch of the CNRS Chizé.



Map 7 Preliminary data on survey using GLS -geolocators- to track sabbatical adults from D. amsterdamensis after a breeding year (Number of tracks = 3) from January 2006 to April 2008. Are represented: Kernel-density distributions -most to least used, from the darkest to lightest: 25%, 50%, 75% and 95% - and the colony on Amsterdam Island (white star). The limits of the IOTC area (Indian Ocean Tuna Commission, in yellow) and EEZs (blue) are shown. Map based on preliminary data (being analyzed) unpublished provided by Henri Weimerskirch of the CNRS Chizé.

The non-breeding adults or in sabbatical year show an at-sea distribution much broader than breeders (Maps 6 and 7) due to the release of constraints related to reproduction. These individuals use subtropical waters from the system of the Agulhas Current, off the African coast, to the Australian coast (Great Australian Bight).



Map 8 Preliminary data from satellite tracking of juveniles of D. amsterdamensis (Number of tracks = 3) from January to May 2005. Are represented: Kernel-density distributions -most to least used, from the darkest to lightest: 25%, 50%, 75% and 95% - and the colony on Amsterdam Island (white star). The limits of the IOTC area (Indian Ocean Tuna Commission, in yellow) and EEZs (blue) are shown. Map based on preliminary data (being analyzed) unpublished provided by Henri Weimerskirch of the CNRS Chizé.

The juveniles, naive birds that go at sea for the first time, show a distribution in the first year at sea much larger (Map 8) than breeding adults (Map 5). These individuals use the system from subtropical waters of the Benguela Current and Agulhas Current, off the African coast, to the Australian coast. The distribution of juveniles shows similarities to that of non-breeding adults or on sabbatical (Maps 6, 7), although the sample size is reduced (n = 5 and 3).

Stage	Number of individuals equipped	Years of survey	Type of devices used
Juvenile	6	2005, 2009	Satellite tag
Breeding adult	17	1996, 2000, 2005	Satellite tag
Sabbatical adult *(off the breeding period)*	8	2006	Geolocator

Table 2 Summary of deployments of telemetric devices carried out on D. amsterdamensis to get data on at-sea distribution

2.7. Conservation status of the Amsterdam albatross

2.7.1. Methodology

Reminder : Under section 11-17 of the Directive «Habitats, Fauna, Flora» (European Commission), Member States must provide a periodic report making particular reference to the State Conservation, positive or negative, of habitat and species (Annexes I, II, IV, V DH) under their responsibility, or 458 species and habitats for France. The method developed by the National Museum of Natural History for assessing the conservation status (evaluation matrix and approach with traffic lights, cf. Methodological guide available at http://inpn.mnhn.fr / INPN / en / download / publi.htm) was validated by the Habitats Committee of the European Commission in April 2005. As part of national recovery plans, it was decided to apply this method to the species considered even if they do not depend on the directive «Habitats, Fauna, Flora.»
The proposed methodology is based on an assessment matrix for determining the conservation status of species in each of its biogeographic domains.
The matrix presents the criteria used to determine the conservation status, and the rules for combining these criteria based on four parameters: range, numbers, species' habitat, future prospects. Three states of preservation are possible, according to a system of «traffic light»: favorable (green), unfavorable inadequate (orange), unfa-

vorable bad (red). A fourth column is used to classify the state of the parameter «Indeterminate» if the information available does not allow to judge the state of conservation of the parameter. The last row of the matrix to determine the global conservation status of the species: the final assessment will depend on the color obtained for the worst one of the parameters.

Parameter	Conservation status			
	Favorable (green)	Unfavorable inadequate (orange)	Unfavorable bad (red)	Indeterminate (insuficient information)
Distribution range	Stable or increasing AND not inferior to the favorable reference range	Any other combination	Strong decline (> 1% per year) OR range more than 10% below favorable reference range	No information or available Information insufficient
Numbers	Numbers over or equal to the favorable reference population, AND breeding, mortality and age structure not deviating from normal	Any other combination	Strong decline (> 1% per year) AND numbers < favorable reference population OR numbers more than 25% below favorable reference population OR breeding, mortality and age structure strongly deviating from normal	No information or available Information insufficient
Species habitat	Habitat area sufficient (and stable or increasing) AND habitat quality suitable to long-term survival of the species	Any other combination	Habitat area insufficient to allow long-term survival of the species OR bad habitat quality not allowing long-term survival of the species	No information or available Information insufficient
Future prospects (relative to numbers, distribution range and habitat availability)	Pressure and threats not significant ; the species remains viable in the long-term	Any other combination	Strong impact of pressure and threats on the species; bad viability prospects in the long-term	No information or available Information insufficient
Global evaluation of conservation status	**All green, or 3 green and 1 indeterminate**	**1 orange or more but no red**	**1 red or more**	**2 indeterminate or more combined with green, or all indeterminate**

Table 3 Matrix used to evaluate the conservation status of species in the Directive Habitats and Birds in France

2.7.2. Evaluating the Amsterdam albatross conservation status

This evaluation will provide a reference status for the Amsterdam albatros conservation status for 2010.

2.7.2.1.The Amsterdam albatross case - study

The Amsterdam albatross is present in only one biogeographic realm:

- the Indian Ocean: hosts 100% of the global breeding population. The Amsterdam albatross is present throughout the year in subtropical waters of the Indian Ocean, more or less close to Amsterdam Island according to the phase of the breeding cycle for adults and over a wide area (up the coast of Africa to the Australian coast) for immature and non-breeders.

Distribution Range :
The concept of «favorable» reference range refers to the range that is considered sufficient for the species is viable. In the Amsterdam albatross, a seabird species, this range includes the breeding colony on land, as well as the distribution area at sea.

Numbers :
The favorable numbers reference is that in which the population is considered viable. This number is expressed in number of breeding pairs for the single global population of Amsterdam albatross (see Figure 2). However, in the case of this species which was «rediscovered» and described very recently, there is not strictly speaking an actual reference (we refer therefore to the number of couples mentioned in 1982, five couples does very likely not the actual historical numbers). Data are from the long-term monitoring program performed by the CNRS Chizé, consisting of a comprehensive annual count of nesting pairs on the breeding colony and individual monitoring, all birds being marked as part of the study population by Capture-Mark-Recapture (CMR) method.

Species' habitat :
The nesting habitat of the Amsterdam albatross is altitude peatlands (saturated with water and vegetation available for nest building). Since the establishment, in 1988 and 1992, of fences that prohibit access to cattle, these environments are free from all human activities except scientific activity, namely monitoring this population by CNRS Chizé, however their evolution can be influenced by climate change. The habitat used for feeding corresponds to the oceanic marine domain of subtropical waters, which will have to evolve with climate changes predicted by climate models and changes in use (particularly related to changes in industrial fisheries).

Future prospects :
This is to determine (still from an expert) if past or current pressures and threats jeopardize the long-term survival of the species and / or maintenance of its habitat.

Paramètre	Etat de conservation			
Color code	Favorable	Unfavorable inadequate	Unfavorable bad	Indeterminate
Distribution range				
Numbers				
Species habitat				
Future prospects				
Global evaluation of conservation status				

Table 4 Assessing the conservation status of the Amsterdam albatross in its biogeographic domain

2.7.2.2. Detailed evaluation

The overall assessment of the conservation status shows that the global population of Amsterdam albatross has an unfavorable bad conservation status. This finding may appear as going against the fact that the population has shown an annual growth rate over the entire monitoring period (1983-present). However this assessment is strongly linked to the context of this species in very small size, and its life history traits (long-lived species, low fertility, reproduction and very biennial strong partner loyalty) and site single nesting on the island which makes this population highly susceptible to any catastrophic event. Moreover, the population appears to be stabilizing in recent years without reasons being clearly identified.

Distribution range :
The extant of the present breeding colony is probably less than the historical range of nesting. It is possible that there was a restriction of this area due to the uncontrolled presence of cattle introduced in 1871 and returned to the wild.
The distribution at sea is known only through telemetric monitoring individual (or satellite geolocation) and very recently. Therefore historical data are lacking to conclude an extension or a reduction in the marine distribution of this species, and no recovery of band has been reported. In addition, reliable data distribution at sea is insufficient or absent for certain age classes or stages of the breeding cycle.
The synthesis of available data on the nesting area on-land (including lack of a reference state of the nesting area) and range at sea (with the need to acquire additional data) thus motivates a classification Indeterminate (blue).

Numbers :
The size of the global population is growing throughout the monitoring period (1983-2007) showing an annual growth rate of 4.9%, with a stabilization in the number of incubating occurring during the last years. Nevertheless, this remains extremely low for the entire species (160-170 individuals of which only 80-90 mature individuals) making the population very susceptible to any particular event that may increase adult mortality or decrease in the long-term the breeding success.
The global population of Amsterdam albatross can be considered at risk of decline or extinction, what motivates a classification unfavorable bad (red).

Species' habitat :
The breeding habitat has benefited from conservation measures since the 1990s that helped stop the degra-

dation by trampling cattle by containing the herd in a portion of the island apparently not suitable to nesting of the Amsterdam albatross. The sustainability of the conservation of this nesting habitat will benefit from the recent creation of the National Nature Reserve of the French Southern Territories. This habitat consisting of bogs in altitude saturated with water makes it sensitive to climate change (possible decreased precipitations). On Amsterdam Island, the air temperatures have increased over the period of monitoring the population and precipitation, although showing no trend over 50 years, tend to decline during the 2000s (Météo France; IPCC , 2008).
The foraging habitat is a vast oceanic area corresponding to the subtropical waters from the Benguela Current along the west coast of Africa, to the Australian continent. As is the case for most albatross species, the Amsterdam albatross has been in the past and remains a species potentially at risk of accidental interactions with fisheries (particularly industrial longline fisheries targetting the southern bluefin tuna Thunnus maccoyii; ACAP 2007), and other subtropical species of tuna. Indeed the distribution area of the species is in full overlap with these fisheries.
The synthesis of available data on habitat motivates an unfavorable ranking inadequate (orange).

Future prospects :
The outlook is highly unfavorable in the context of a species with very small numbers and unique nesting site located on an island which makes it highly susceptible to any extreme event (catastrophic). These prospects are evaluated according to different threats identified (see 1.9): climate change, changes in use (industrial fisheries), epizootic or introduced mammals, that may have a direct or indirect effect on the survival of individuals and / or their reproduction. It is also possible that these factors interact (possible interactions between climate change, fishing effort, change in offshore distribution area of individuals).
The synthesis of available data on the species, the onland nesting area and at-sea distribution thus motivates a classification unfavorable bad (red).

2.8. Potential threats on the Amsterdam albatross

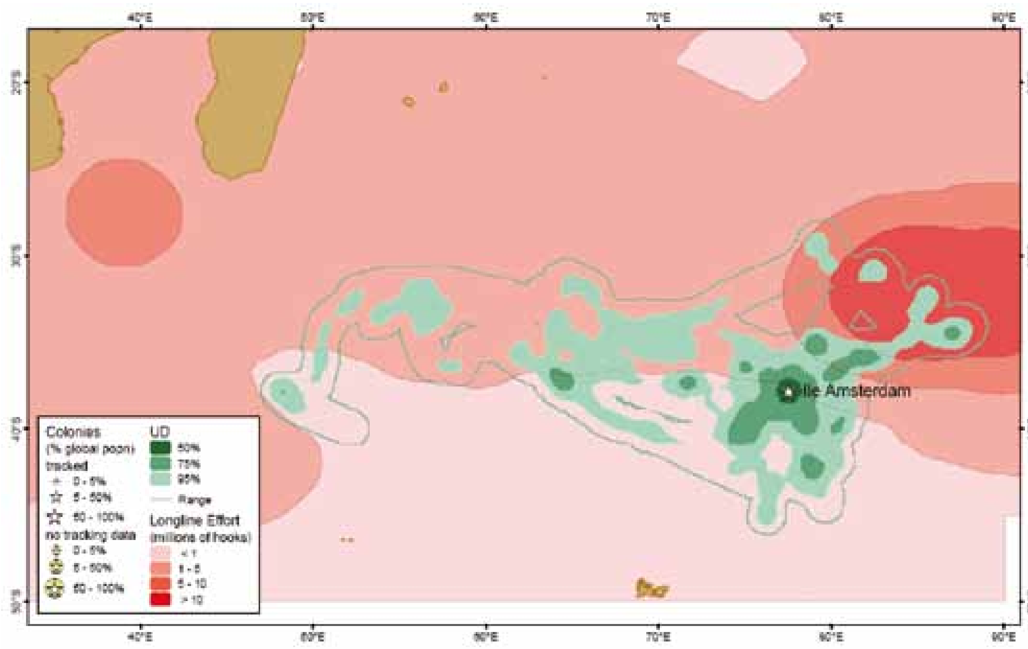
All threats listed below and summarized in Table 5 are described as potential threats because none has been directly observed, however, they are all strongly suspected (either according to demographic analysis or after similar cases on other islands and / or other albatross species) to have or have had a significant effect on the Amsterdam albatross.

Potential threats on the Amsterdam albatross	Description	Location
Incidental bycatch in longline fisheries	Bycatch of the species due to overlapping zones of species distribution and longline fishery targeting tuna species and trawl	Marine : Indian Ocean
Epizootic	Pathogens causing sudden death in chicks and in adults	Terrestrial : Amsterdam Island, Plateau des Tourbières, nesting colony
Introduced mammals	Introduced species (rat, mouse and cat) these may engage in predation on chicks and adults	Terrestrial : Amsterdam Island, Plateau des Tourbières, nesting colony
Global changes	Climate change or changes in use which can affect the survival or breeding success	Marine : Indian Ocean
	Risk of drying of peatlands in altitude that would substantially change the nesting habitat	Terrestrial : Amsterdam Îsland, Plateau des Tourbières, nesting colony
Human access to colony	Disturbance of the birds so that it may jeopardize breeding success	Terrestrial : Amsterdam Îsland, Plateau des Tourbières, nesting colony

Tableau 5 Synthesis of potential threats for the Amsterdam albatross

2.8.1. Incidental mortality in fisheries

At-sea surveys carried out by CNRS Chizé on the Amsterdam albatross show a complete overlap of the distribution range of adult Amsterdam albatrosses with longline fisheries in the IOTC and CCSBT areas over the last 20 years (map 9).



Map 9 At-sea distribution of adults of Amsterdam albatross (density of locations in green) and overlap with longline effort (in red) of the IOTC area (Indian Ocean Tuna Commission), showing that half of the distribution area is in direct contact with important fishing effort (average number of fishing hooks by 5 ° grid aside from 2002 to 2005). South of this zone, the Amsterdam albatrosses are also in contact with longliners in the area of the convention for conservation of the southern bluefin tuna. (Source: after ACAP document submitted, third session of the IOTC, in July 2007)

Weimerskirch et al. (1997) suggested that the by-catch related to the overlap of feeding areas of the Amsterdam albatross with longline fishery targeting southern bluefin tuna in the years 1960 and 1970 (Tuck et al. In 2003) could explain the very low numbers in adults present when the species was first described in 1983. Indeed, development of the fishery for bluefin tuna in the Indian Ocean occurred concomitantly with the worldwide decline of albatross populations, and it is very likely that the same causes have affected the Amsterdam albatross whose distribution area overlaps these fisheries more than for the wandering albatross. Although the fishing effort of the industrial fishery targeting southern bluefin tuna have declined in almost all of the distribution area of the Amsterdam albatross (Klaer & Polacheck 1997) and no incidental bycatch has been reported yet, the Amsterdam albatross species is still sensitive to any longline fishery operating in its range, especially in areas close to Amsterdam Island (Inchausti & Weimerskirch 2001). The fishing effort in subtropical waters showed an extremely dynamic in time and space. For example a very important new Taiwanese fishery was deployed near Amsterdam for the years 2006-2007, with the direct consequence of a strong increase in the level of threat to the species.
Nevertheless, it remains to be completed or to determine the extent to which other parts of the population (juvenile, immature or adult in sabbatical year) are also threatened by this fishery.

Moreover, although the recent demographic analyzes conducted from the long-term monitoring (CMR; Rivalan et al. 2010) did not show any relationship between fishing effort (longline fisheries targeting tuna in 1983 to 2007) and the survival rate in adults or juveniles, they clearly show that the additional mortality of only 6 individuals each year would lead to population decline and extinction in the medium term. This is consistent with high rates of adults and juveniles survival and the absence so far of bycatch report of the species, although it is known that fisheries are not required to report catch or ring recoveries outside the exclusive economic zones (EEZs). Returns of rings in the ocean fisheries are virtually non-existent anyway. It is also possible that some by-catch have been missed given the difficulty of identification (versus other albatross species of large size) of specimens pulled out

on the fishing lines after a prolonged stay in the water. Today, while all Amsterdam albatross are banded, bycatch could be postponed more reliably, but there is little chance that they are under current conditions. Thus, as a majority of fishing boats operating in these waters have no requirement to carry observers dedicated to incidental mortality, it is reported on a voluntary basis and where it is imposed, it is at a general level (ie national fleet catch by year, or all sectors).
Meanwhile, the overlap between the at-sea distribution of Amsterdam albatross with other fisheries operating in the EEZ (including the trawl in the South African EEZ; Map 9) leads to a high risk given the estimated incidental bycatch of birds in these areas (Watkins et al. 2008).

2.8.1.1. Indian Ocean Tuna Commission (IOTC)

The Agreement establishing the Indian Ocean Tuna Commission (IOTC) was adopted by the Hundred Fifth Session of the Council of the United Nations for Food and Agriculture Organization (FAO), on 25 November 1993. The Agreement became operative with the accession of the tenth Member March 27, 1996.
The goal of this Commission is to promote cooperation among its members to ensure, through appropriate management, conservation and optimum utilization of stocks covered by this Agreement, and promote sustainable development of their exploitation.

Map 10 Zones of the Indian Ocean Tuna Commission – IOTC (from European Commission: http://ec.europa.eu/fisheries/index_fr.htm)

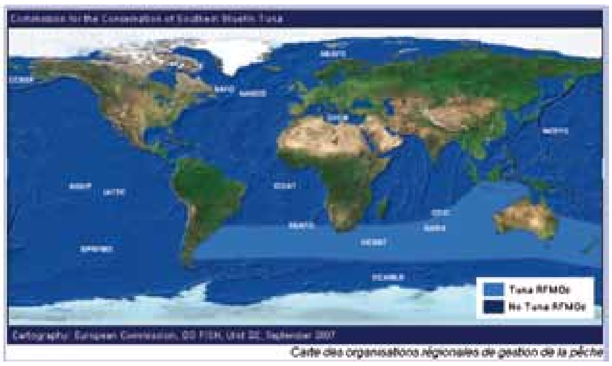
IOTC has particular responsibility to continuously monitor the status and trends of stocks and gather, analyze and disseminate scientific information, catch statistics and fishing effort, and other data relevant to the conservation and management of stocks covered by this Agreement and to fisheries based on such stocks.
This is important for the consideration of the breeding birds of Saint Paul and Amsterdam, which feed into the IOTC area (see p).

2.8.1.2. The Commission for conservation of southern bluefin tuna (CCSBT)

The agreement creating the Commission for the Conservation of Southern Bluefin Tuna was signed in May 1994, and became operative a year later. It currently has five Contracting Parties: Australia, New Zealand, Republic of Korea, Japan and Taiwan. Alongside them, the European Community, the Philippines and South Africa joined them as «cooperating non-members.» As such they do not have the right to vote but can participate in debates and scientific committees, and make proposals.
The objective of the CCSBT is to ensure, through appropriate management, conservation and rational exploitation of southern bluefin tuna.
To help achieve its objectives, the CCSBT has several types of missions:

- In its framework is set a total allowable catch allocated to the members;
- Considering and applying regulatory measures;
- Conducting and coordinating a scientific research program to provide data supporting its management policy;
- Providing a forum for discussion;
- Promoting activities affecting the conservation of ecologically related species (marine species that are associated with southern bluefin tuna fishery) and bycatch species.

France is not a party to the Agreement, in addition, the bluefin tuna fishery is not operated in the EEZs of French Southern Territories. However CCSBT does apply to feeding areas for Amsterdam albatross. The bycatch reduction is among the objectives of the Agreement.



Map 11 Zone of the Commission for the Conservation of Southern Bluefin Tuna -CCSBT (source European Commission: http://ec.europa.eu/fisheries/index_fr.htm)

2.8.1.3. The Southern Indian Ocean Fisheries Agreement (SIOFA)

Six countries (Comoros, France, Kenya, Mozambique, New Zealand and Seychelles) and the European Community signed this multilateral agreement on fisheries management in a large area of high seas of the Southern Indian Ocean on July 12, 2006 in Rome.

The southern Indian Ocean fisheries Agreement (SIOFA) aims to ensure long term conservation and sustainable use of fishery resources other than tuna in this area that falls outside the jurisdiction of national courts (see Map 12).

Map 12 Zone of the Southern Indian Ocean Fisheries Agreement-SIOFA (source European Commission: http://ec.europa.eu/fisheries/index_fr.htm)

A number of concrete actions will be taken pursuant to this Agreement, including:

- The establishment of effective mechanisms to monitor fishing in the SIOFA;
- Annual reports on fishing operations, including the amount of fish caught and released;
- Inspection of ships visiting the ports of the parties to the Agreement for compliance with SIOFA regulations, and denial of privileges in landing and unloading those who do not respect them.

Other joint actions include regular studies on the state of fish stocks and the impact of fishing on the environment, implementing joint management and conservation measures, and rules allowing member states to decide which operators are allowed to fish in the SIOFA area.

2.8.2. Epizootic

The long-term monitoring of the population of yellow-nosed albatrosses on Amsterdam Island carried out by CNRS Chizé has shown since the late 1980s that chick survival remain abnormally low for a species of albatross, especially in the lower colonies in the bottom of the cliffs (Weimerskirch 2004, Rolland et al. 2009). The causes of death have been elucidated only recently (Weimerskirch & Ghestem 2001). In 1995, observations into the colonies have shown that young chicks were not dying from attacks by the rats as was supposed, but were affected by a disease that caused sudden death. The analyzes performed in France on Ploufragan chicks who had just died allowed to detect two diseases: swine erysipelas and avian cholera ((Weimerskirch & Ghestem 2001); Weimerskirch 2004). The symptoms correspond perfectly to avian cholera. Swine erysipelas was also detected one year, without the presence of cholera.

Swine erysipelas is transmitted by bacteria (Erysipelothrix rhusiopathidae) that affects a wide variety of wild and domestic animals: terrestrial and marine mammals, birds, marine and freshwater fish, shellfish, and even humans. This is a deadly and contagious disease, also causing a decline in male fertility and reduced egg production, and death from sepsis and endocarditis. The mild form causes purple skin damage that are well demarcated (erysipelas). This bacterium is remarkably durable, it can withstand more than 8 years in the soil. It is also resistant in frozen meat, canned, smoked or salted. The marine environment is also favorable to its survival, for very long periods. The usual vectors can be healthy carriers of animals (in pigs, from 20 to 40% of healthy animals would be carriers), mice and other rodents, insects, fish in their aqueous humor, which can house a number of these bacteria without affecting the fish itself.

Contacts with French specialists in this disease (Dr Vaissere of Maison Alfort, specialist swine erysipelas) led the CNRS Chizé to find the strain typing of swine erysipelas, in order to on one hand determine the origin of of the disease, and on the other hand to potentially provide a vaccination. The interest of such typing was enabling to determine whether the disease was transmitted by animals introduced on Amsterdam Island, such as rats, or pigs. Serotyping was performed by Merial laboratories in Lyon (Dr. F. Milward). The strain affecting the yellow-nosed albatross is the strain 1b which is part of the serotypes more frequently isolated from pork (although the serotype 2 is much more dominant). However, it is impossible to assign a serotype to a particular animal species, since this serotype is also found in birds and telluric contamination. The presence of this serotype in the yellow-nosed albatross rather suggests contamination by introduced animals such as pigs, which were present on the island still in the 80s, but does not exclude natural contamination.

Avian cholera is a pasteurellosis (Pasteurella multocida bacterium), characterized by an acute mortality as with the swine erysipelas. This bacterium affects wild and domestic birds. This is a deadly infectious and conta-

gious disease, with acute or chronic forms, generalized or localized, characterized by a sudden and significant mortality. The disease exists in all countries where we raise poultry, animal husbandry, but also in nature where it causes very alarming enzootic in wild birds in North America (Friend 1999). This organism has a relatively limited survival time, up to four months in water and soil, not long enough to cause annual outbreaks.
Two bacteria are therefore detected separately according to year in the corpses. Avian cholera is probably the leading cause of mortality in the population of yellow-nosed albatross, with a secondary affection by swine erysipelas in some years. The presence of two highly pathogenic bacteria is surprising and might suggest a phenomenon of superinfection (Weimerskirch & Ghestem 2001).
On Amsterdam Island, it is therefore the adult yellow-nosed albatrosses, healthy carriers, which could reinfect their chicks. Moreover, there could be sensitization of chicks by swine erysipelas (recurring) to fowl cholera transmitted by adults. It is impossible to conclude a posteriori on the origin of these pathogens that occur naturally in wild populations. However, the domestic origin of these pathogens, especially by animals introduced accidentally or for breeding can not be excluded: the henhouse eliminated in 2007, following an outbreak that has unfortunately not been diagnosed, remained for several decades accessible to wild birds, including skuas that can be found thereafter throughout the island.

While the breeding success of the Amsterdam albatross has always been high throughout the long-term survey of the population (with the chicks having reached the age of 1 month have a high survival overall), in 2000 and 2001 breeding success dropped to a critically low level (respectively 34% and 26%, see Figure 2) (Weimerskirch 2004). More ominously, this bad breeding success was due to chick mortality during the first 2 months of life, the 2/3 of the chicks had disappeared at that age. The occurrence of this mortality during the first months of life the chicks and the proximity of nests affected obviously reminded chick mortality of yellow-nosed albatross and the existence of the same pathology in the Amsterdam albatross was suspected.
Analysis of the remains of the dead Amsterdam albatross chick and bacteriological examination of the surface of the nest, and coring of nests did not allow to detect the presence of Pasteurella or Erysipelothrix (Weimerskirch & Ghestem 2001) . These negative results do not, however, lead to conclude that mortality was not due to these pathogens.
The outbreak of a disease, notably with avian cholera present a few kilometers from the breeding colony of the Amsterdam albatross, would be catastrophic for the population because of its virulence in yellow-nosed albatrosses. All measures to avoid transmission by human are currently being taken (see 1.10) and extensive studies on avian cholera in Amsterdam should be conducted.

2.8.3. Introduced mammals

Introduced predators account for much of the extinctions of endemic species on islands and thus constitute a major component in the loss of biodiversity among vertebrates. The eradication of introduced species on ecosystems is often considered as the best solution. A recent study (Brooke et al. 2007) identifies Amsterdam Island among the 10 islands in the world that can benefit, in terms of conservation for bird species with unfavorable conservation status, eradication of introduced vertebrates. However, it seems necessary to consider an ecosystem approach in the context of problematic invasive species (see 2.17). The eradication of introduced mammals can present several challenges affecting both the decision and planning, technical implementation and monitoring. In some ecosystems, this eradication may be the cause of an even greater threat to 'prey' endemic species (ie birds) through the phenomenon called «liberation of meso-predators.» This process predicts that once the super-predators have been eliminated, a population explosion of meso-predators may follow which may cause the rapid extinction of «prey» species. This phenomenon has been documented in many species. Noteworthy, the eradication of feral domestic cat population is not always the best solution to protect endemic «prey» when meso-predators such as rats or mice, are also present (Bester et al. 2000, Courchamp et al. 1999; Wanless et al. 2007).

Introduced predators are present on Amsterdam Island (in addition to a native predator, the subantarctic skua), such as the feral cat (observed for the first time in 1931) or brown rat (introduced in 1931) to which must be added the potentially house mouse (introduced before 1823) (Wanless et al. 2007). Adults of large species of albatross are theoretically capable of protecting the egg or the chick against these predators. In 1995-96, continuous direct observations of the colony of yellow-nosed albatross were performed. These observations have shown that the mortality of young chicks suspected to be due to predation was not due to natural -skuas- , or to introduced -cats or rats- predators, but to a disease (Weimerskirch & Ghestem 2001). These predators simply consume already dead chicks.

The study of the diet suggests that cats eat mostly mice and rats (Furet 1989) and that rats are primarily herbivores (CP Doncaster, pers. Comm.). However, recent work has shown that the diet of the gray mouse in the Kerguelen oceanic island could contain a significant proportion of invertebrates (Le Roux et al. 2002).

A recent study carried out on the subtropical island of Gough (South Atlantic), about the impact of an introduced population of gray mouse on the population of Tristan albatross (Diomedea dabbenena) showed that mortality caused by mice significantly explained the very low reproductive success of this albatross population (Wanless et al. 2007). Population models showed that these levels of predation are sufficient to cause the observed decline in the albatross population. Unlike many other islands, mice are the only mammals introduced on Gough Island (Angel & Cooper 2006). Restoration programs to eradicate rats and other introduced mammals on island environments had the effect of increasing the number of islands where the mouse is the only introduced species. When the ecological effects of predators or competitors on these mouse populations are removed, they can develop into predatory seabird chicks. This study (Wanless et al. 2007) is the first to demonstrate that the gray mouse may be a significant predator of seabirds chicks in good condition. This is also suspected on Marion Island wandering albatross population (P. Ryan, unpublished data), following the eradication of feral cat population (Bester et al. 2000). Wanless et al. 2007 argue that, on sites where the mouse is part of a complex of introduced mammals as is the case for Amsterdam Island, the effects of dominance, competition and predation by larger species result in the fact that threats to the mouse are lower (Courchamp et al. 1999).

It is therefore essential, if such action is contemplated, to first assess predation by introduced species on the Amsterdam albatross. Simultaneously, it shall be considered to estimate the risk of impact and impacts on the population of Amsterdam albatross (via a demographic projection) of a partial eradication and also to aim to perfectly master the process of eradication so as not to generate counter-profits.

Some recent studies have shown that following a rat eradication there is a need for active management and / or support for the establishment of new nesting areas, because the composition of the plant community on an island where the rats were introduced historically may take considerable time to converge, or in some cases may never occur, compared to islands that have never been introduced (Mulder et al 2009).

Finally, the ability to estimate the costs of the eradication of introduced species is essential for a rigorous assessment of priorities for the restoration of island (Martins et al. 2006) and must be made ahead of the decision. Moreover, it is essential to refer to existing procedures such as ACAP synthesizing general rules for the eradication of introduced mammals breeding seabirds listed in ACAP (see Appendix 1).

In conclusion, rat, mouse and cat are invasive species introduced on Amsterdam island that may potentially be induced to conduct predation on the Amsterdam albatross (except for individuals of adult size). Ideally if total eradication of the whole island should be considered: it should cover the three species simultaneously, to avoid possible negative effects (eg release of meso-predators) if only one or two species were eliminated. Alternatively control of predators around breeding site could be considered only if it turned out that a particular species had a negative effect on the Amsterdam albatross.

2.8.4. Global Changes: climate change and changes in use

Recent demographic analyzes (Rivalan et al. 2010) show that climatic factors (global climate index as the «Indian Ocean Dipole» associated with trends in surface temperature of the ocean, the mixed layer depth and speed of wind) can have an effect on adult survival or reproductive success. They also show that warming waters in the area of Amsterdam in relation to climate change could have a significant impact on the Amsterdam albatross. By using the future scenarios of the IPCC, warmer subtropical waters could lead to a slower growth of the current population.
Climate change may also occur in terrestrial habitats, this habitat being particularly vulnerable to changes in precipitation and / or warming temperatures that would result in the dehydration of such environments currently saturated with water (Copson & Whinam 2006). This could well have repercussions on the dynamics of colonization of invasive plant species but also could increase the risk of natural fire (which the island has suffered from several times in its short history (see Jouventin 1994, Jouventin & Micol 1995)).
Changes in use affect industrial and / or craft fisheries patterns which in the past have shown a highly dynamic evolution of their fishing efforts. In this context of both climate change (cf.1.8.1) and changes in the global economy (see the impact that has had the rise

in oil products late in the 2000s on restructuring the fleets, particularly Asian) one might well see re-appearing and / or increasing a fishery in the ocean areas included in the distribution area of the Amsterdam albatross. This was the case recently with the deployment of a major Taiwanese longline fishery north of Amsterdam since 2006!

2.8.5. Human presence on the breeding site and surroundings

Threats connected to human use (land or air) either by site disturbance on the breeding colony and its surroundings, or induced by the presence of the Martin-de-Viviès scientific station, are managed by the current regulations within the RNN of Amsterdam Island (map 3). The overland transportation of Plateau des Tourbières is subject to authorization by the TAAF.
The Plateau is classified as site dedicated to the Scientific and Technical Research. Currently these permits relate to the scientists conducting long-term scientific monitoring of the Amsterdam albatross. Airborne disturbance, essentially due to helicopter flight, is not regulated for reasons of national sovereignty, but should be given strict instructions to avoid flying low to the colony. Currently no windmill is established on the island. Any proposed settlement should be considered in relation to the growing number of references on proven impact of such facilities on bird populations on the France mainland (Carrete et al. 2009).

2.9. Mobilizable expertise

The mobilizable expertise in France and abroad subject to contribute to the achievement of the national action plan is listed below by area of expertise.

Area of expertise	Expert	Competence
Scientific Research	Marine Predators Team CNRS Chizé Director H Weimerskirch	Survey of the population (census, individual survey…) Demographic analyzes and projections At-sea distribution / interactions with fisheries Evaluation of predation
	CNRS Team in Rennes Paimpont Director M Lebouvier (coll Y Frenot)	Survey of terrestrial habitats
Epizootic specialist	O. Mastain (SAGIR ONCFS network)	Study of pathogens (presence, transmission…)
Fisheries specialist	A. Fonteneau -IRD Albatross Task Force (Birdlife International) ACAP (Seabird Bycatch Working Group)	Experimental Research on conservation measures to mitigate incidental bycatch Observation of incidental bycatch Study of seabirds interactions with fisheries
Introduced mammals specialist	New-Zealand Team (?) M. Pascal (Ecology of Biological Invasions Team INRA Rennes) E. Vidal « Biotic Interactions and conservation biology» Team, Institut Méditerranéen d'Ecologie et de Paléoécologie CNRS Aix-En-Provence D. Pontier « Evolutionnary Ecology of populations » Team, Laboratoire de Biométrie et Biologie Evolutive CNRS Lyon T. Micol, LPO	Study of interactions rats/mice/cats with albatrosses Eradication

Table 6 : Expertise mobilisable susceptible de contribuer à la réalisation du plan national d'actions pour l'albatros d'Amsterdam par champ de compétence

2.10. Identification of actions already undertaken for the protection of the species

2.10.1. Measures of legal protection and management of the breeding site

2.10.1.1.Protection of the breeding site

The only breeding colony of the Amsterdam albatross is located on the Plateau des Tourbières on the heights of Amsterdam Island and is classified as an area restricted to scientific and technical research. Access to the colony, as part of scientific programs IPEV, is as such subject to authorization by the administration of the TAAF, this fits the legal status of French Southern and Antarctic Territories (Law No. 55 - 1052 of 6 August 1955, Decree No. 2008-919 of 11 September 2008), the National Nature Reserve of the French Southern Territories (Decree No. 2006-1211 of 3 October 2006) and through the creation of areas for scientific research and technology (order No. 14 of July 30, 1985).

Meanwhile, precautionary measures are applied to reduce the risk of contamination of the area by identified pathogens on yellow-nosed albatross in the cliffs of Entrecasteaux adjacent area. Thus, scientists going to the Plateau use equipment and facilities specifically disinfected (clothing, boots ...) dedicated to their work in this area. Furthermore, the use of snowshoes for any movement in this area aims to reduce environmental destruction, extremely vulnerable (very wet peat medium: Sphagnum ...), on the paths.

On the other hand, introduction of species is prohibited in the territories of the TAAF and active management of waste generated by the field station (Martin de Viviès) helps to limit the proliferation of populations of introduced mammals (cats, rats and mice).

2.10.1.2.Management of the breeding site

The introduced herd of cattle, identified as a major cause of habitat destruction in the late 20th century was the subject of several management actions. This population has undergone a «crash» due to illness in 1953, with decreasing numbers from 2000 to 800 individuals (see (Micol & Jouventin 1995) for a review), and then rose again to the initial level in 1988, by colonizing new habitats mainly borders north and northwest of the Plateau des Tourbières, degrading in a lasting way this extremely fragile ecosystem and approaching the breeding area of the Amsterdam albatross. It became urgent to act and several restoration solutions were then proposed by the CNRS Chizé to TAAF administration. In 1987 a restoration program of Amsterdam Island was planned (Decante et al. 1987) with the aim to stop the degradation of wildlife and native flora, and to reverse this trend as much as possible by controlling the herd cattle. The strategy then adopted consisted of a partial removal and targeted livestock coupled with his restriction on only part of the island, leaving the area of the Plateau des Tourbières without cattle. A fence of 4 km long through the eastern part of the island from the coast to the Plateau at height of the crater of Mount Olympe to 690 m (see 4). A massive culling was conducted in March-April 1988 and January-March 1989, with elimination of all 1059 cattle present south of the fence in an area of 1664 ha (Micol & Jouventin 1995). All the carcasses were left in situ, the area having no access for vehicles. The total elimination of this area has subsequently been confirmed by an helicopter survey. To estimate the demographic parameters to use for the management plan, 965 individuals were analyzed (Berteaux & Micol 1992).

North of the fence, monthly samples were collected in the flock to maintain herd size (580 in July 1989) to prevent a possible extension of its range to the Plateau. Subsequently, a drought caused significant mortality, reducing the density (from 0.81 to 0.47 individuals / ha) resulting in improved body condition, the fertility rate increasing the birth rate (Berteaux 1993). In 1990 and 1991, the recruitment rate observed in the herd exceeded then the elimination and in January 1992 the herd numbered 872 individuals on 1,225 ha. The herd had recolonized the Plateau again threatening the albatross nesting site, leading to new measures of protection. In February-March 1992, 327 animals were destroyed and a second fence was erected 4.5 km (from the first fence high end to the cliffs west, at an altitude of 400 m) so as to divide the island into two completely separate areas (see 4). Animals spotted south fences were removed, leaving the area completely free of cattle and restricting the herd to a fully fenced north (532 individuals in 1993 remained on 1225 ha or 0.43 individuals / ha) (Micol & Jouventin 1995). Since then management of the herd is conducted to maintain numbers and to monitor and maintain fences.

Currently, global eradication of the herd has been programmed in the biodiversity action plan TAAF (included in the «National Biodiversity Strategy»). This eradication is underway as part of the RNN and be completed in 2010/2011. This will eliminate a significant potential threat to the breeding site.

2.10.2.Measures to protect the species

Handling of individuals of the Amsterdam albatross in the context of scientific programs is subject of licensing (capture of animals-sampling-banding, release) from the administration of the TAAF (articles R.712-1 to R.714-2 of the Environmental Code) after opinion of the polar environment, the National Council for nature Conservation and ethics Committee of IPEV. This in the same framework described above (see 1.11.1).
The objective is to limit to strict necessary the disturbance of the colony and the number of operations of each individual.

The frequency of visits to the breeding colony for the control of reproduction is as follows:
- June to January 1 visit every 2 months
- February 15 to March 15: one visit per week (nests prospection)
- April to May: 1 visit per month
Control of the birds identity (rings reading) is carried out remotely using binoculars / telescope. Adults are not handled unless the banding is necessary.
The banding of chicks is carried out during a single visit (between 1 and 15 December) and they are handled only once.

2.10.3. Population monitoring and scientific research

The research program «Birds and marine mammals sentinels of global change in the Southern Ocean» (IPEV - No. 109; director: H. Weimerskirch) led by CNRS Chizé allowed to acquire all available data on the only global population of this endemic species.
Thus, all data used for the preparation of this plan are derived from this program: data allowing description of the species, data on the biology and ecology, both on land and sea based. The "observatory" approach of this program, whose goal is the long-term monitoring of the population, allowed to know the long-term variations in numbers, as well as temporal variations in demographic parameters (adult and juvenile survival, reproductive success, recruitment, quality of the young, sex ratio, etc..). Counting of the breeding pairs is carried out annually on the colony as well as individual survey using the Capture-Mark-Recapture technique.
It is also in the frame of this program that were conducted analyzes and demographic projections of the long-term series based on environmental variability (see 1.9.1).

2.10.4.Precautionary measures to prevent disease transmission

As part of the scientific activities of the program IPEV 109 (see 2.16.3), strict precautionary measures are applied to prevent the transmission of avian cholera and swine erysipelas (cross-contamination between yellow-nosed albatross and albatross of Amsterdam):
- At Entrecasteaux, movement is restricted to low colonies of yellow-nosed albatross to avoid transport on top of colonies that are less affected;
- For the Amsterdam albatrosses: a specific lot of equipment (clothing, gloves and boots) is dedicated to the trips made on the colony (Plateau des Tourbières). The same rules are strictly enforced for helpers on the field. In the case of single pair of boots, they are washed thoroughly with chlorine water.

The Amsterdam albatross adults are not handled (except for banding) and readings of rings are made as remotely as possible;
- The fieldtrips to Entrecasteaux are clearly separated from those on other sites. This means that no trip is made on the same day on Entrecasteaux and the Plateau des Tourbières.

2.10.5.Actions promoting at-sea protection

Hosting an extremely rare species such as the Amsterdam albatross implies great responsibility for France and TAAF, particularly since the signing and ratification in 2005 of the International Agreement for the Conservation of Albatrosses and Petrels (ACAP, 2001). This agreement seeks to conserve albatrosses and petrels by coordinating international activity to mitigate the threats facing populations of albatrosses and petrels.
BirdLife International, which unites more than a hundred NGOs working for the conservation of birds, has launched a global campaign for the Conservation of Albatrosses 'Save the Albatross', in particular, through the initiative of the Albatross Task Force (ATF), an international team of experts who work with fishermen to reduce the incidental mortality by improving their fishing practices. BirdLife International is also involved in various international commissions of fisheries organization -RFMOs-(Commission for the Conservation of Antarctic Marine Living Resources-CCAMLR, Indian Ocean Tuna Commission- IOTC, and the Commission for the conservation of southern bluefin tuna -CCSBT for the southern Indian Ocean). In this context, the individuals at sea tracking data collected by the CNRS Chizé are made available to the international scientific community via the database created and managed by

Birdlife International: Procellariiform Tracking Database (Birdlife International 2004), or directly in international conventions for the most recent data.
Based on the opinion of the ACAP agreement, which evaluated the effectiveness of different methods of limiting the impact of longline fishing on albatrosses and petrels,
are retained for their effectiveness the three following methods:
- Line weighting,
- Night-setting of the lines (between dusk and nautical dawn)
- Deployment of streamer lines (tori lines), with very specific technical specifications,

Existing measures to ICCAT (International Commission for the Conservation of Atlantic Tunas) were revised at the plenary of the organization in November 2011 in Istanbul. A new recommendation was adopted. It will apply south of 25 ° S from January 2013 as far as possible and no later than July 2013.
This recommendation provides that contracting parties seek to limit the catch of seabirds in the entire area of jurisdiction of ICCAT, applying effective measures, in respect of crew safety. To do this, they must ensure that their longline fleets apply a combination of at least 2 of 3 of these methods. The recommendation also requires contracting parties to collect data on the incidental catch of seabirds as part of their program of onboard observers.

The adoption of similar arrangements is under discussion within the IOTC (Commission on Indian Ocean Tunas).

2.11.Summary of management: an umbrella species

Thus the manager must keep in mind that the first evaluation of management must be a naturalistic evaluation.
As such terrestrial habitat supports a wide community of fauna and flora of peat wetlands (see 3.6.1). Furthermore, the marine environment used to feed is also the natural environment used by many species of birds particularly threatened heritage interest such as the wandering albatross, the yellow-nosed albatross, the black-browed albatross, the dark-mantled sooty albatross, the light-mantled sooty albatross, the white-chinned petrel or the northern giant petrel.
For this reason, the Amsterdam albatross is a typical umbrella species. The management assessment must take account of the impact on all species of heritage interest on the sites concerned.

2.12. Summary of gaps in terms of knowledge

Scientific studies conducted by CNRS Chizé allowed the description of the species, the acquisition and improvement of data on the biology and ecology of the Amsterdam albatross, both onland and at-sea, and long-term monitoring of the population (through the annual count of breeding pairs and studies capture, mark-recapture (CMR) to estimate individual demographic parameters such as fecundity, survival ... etc.. Nevertheless, essential data on the diet are currently lacking, since diet was not studied so far for ethical reasons (need for flushing stomach, which can stress the bird).
At-sea distribution data already acquired for individuals mainly focus on breeding adults during incubation, and thus feeding areas of breeding individuals for the period of brooding and rearing of the chick, that is to say the heart of austral winter, are not known. Some data are also available for adults outside the breeding season for sabbatical years taken between two breeding cycles. In a context of threat-related mortality of seabirds in fisheries, more substantial data are needed on the at-sea distribution of breeding individuals throughout their reproductive cycle but also during their sabbatical year. This is also the case for other age groups such as the chicks after fledging and immatures during all the years spent at sea.
It is also essential to acquire observational data on accidental bird deaths, because currently no requirement is made to RFMOs to report the numbers of accidental death, despite a recent advance which asks observers dedicated to the observation of incidental mortality of 5% of the fleet in the IOTC area. However this measure is not mandatory. There is currently no data on the birds' behavior in relation to the fishing boats which allow to quantify the interactions with them.
Apart from the short study conducted on pathogens present in the yellow-nosed albatross, the big picture and monitor longer-term are lacking on the knowledge of whether these pathogens are implicated in outbreaks observed on Amsterdam Island. It is therefore vital to explore the modalities of transmission of these pathogens, virulence etc.. and in contrasting conditions and variables, and therefore via a study of several reproductive cycles. Ideally the presence of antibodies

should be sought in the Amsterdam albatross, and a detailed study of pathogens in other species of albatross is essential before considering possible measures to take in case of appearance of the pathogen in the Amsterdam albatross.
Although there is no evidence of predation on the Amsterdam albatross, it can not be excluded, especially because of introduced species of mammals, and it is essential to quantify this hypothesis. A possible first step would be to set up ongoing automatic monitoring (by day and night IR) of the nests to detect interactions between albatrosses on their nests and introduced mammals.

2.13. Cultural and economic aspects

2.13.1. Cultural aspects

The Amsterdam albatross can be assimilated into the collective imagination to the giant albatross or wandering albatross. While this species has long been observed only by travelers explorers, fishermen, whalers and other traders venturing into the southern seas, the species is present in the culture especially through Charles Baudelaire's poem «The Albatross» (from the Flowers of Evil) helping to make a mythical animal in the popular imagination. In Anglo-Saxon the poem 'The Rime of the Ancient Mariner' contributed to make the albatross even more popular.

« The Albatross
Often, to amuse themselves, the crew of the ship
Would fell an albatross, the largest of sea birds,
Indolent companions of their trip
As they slide across the deep sea's bitters.

Scarcely had they dropped to the plank
Than these blue kings, maladroit and ashamed
Let their great white wings sink
Like an oar dragging under the water's plane.

The winged visitor, so awkward and weak!
So recently beautiful, now comic and ugly!
One sailor grinds a pipe into his beak,
Another, limping, mimics the infirm bird that once could fly.

The poet is like the prince of the clouds
Who haunts the storm and laughs at lightning.
He's exiled to the ground and its hooting crowds;
His giant wings prevent him from walking. »

This species appears in the movie world («Albatross» by J.-P. Mocky, 1971) or popular music («Hello Georgina» M. Polnareff) also gave its name to a sociological concept, the complex of the Albatross («the intellectual inhibition in intellectually precocious childhood: self-defense or self-prohibition?»).

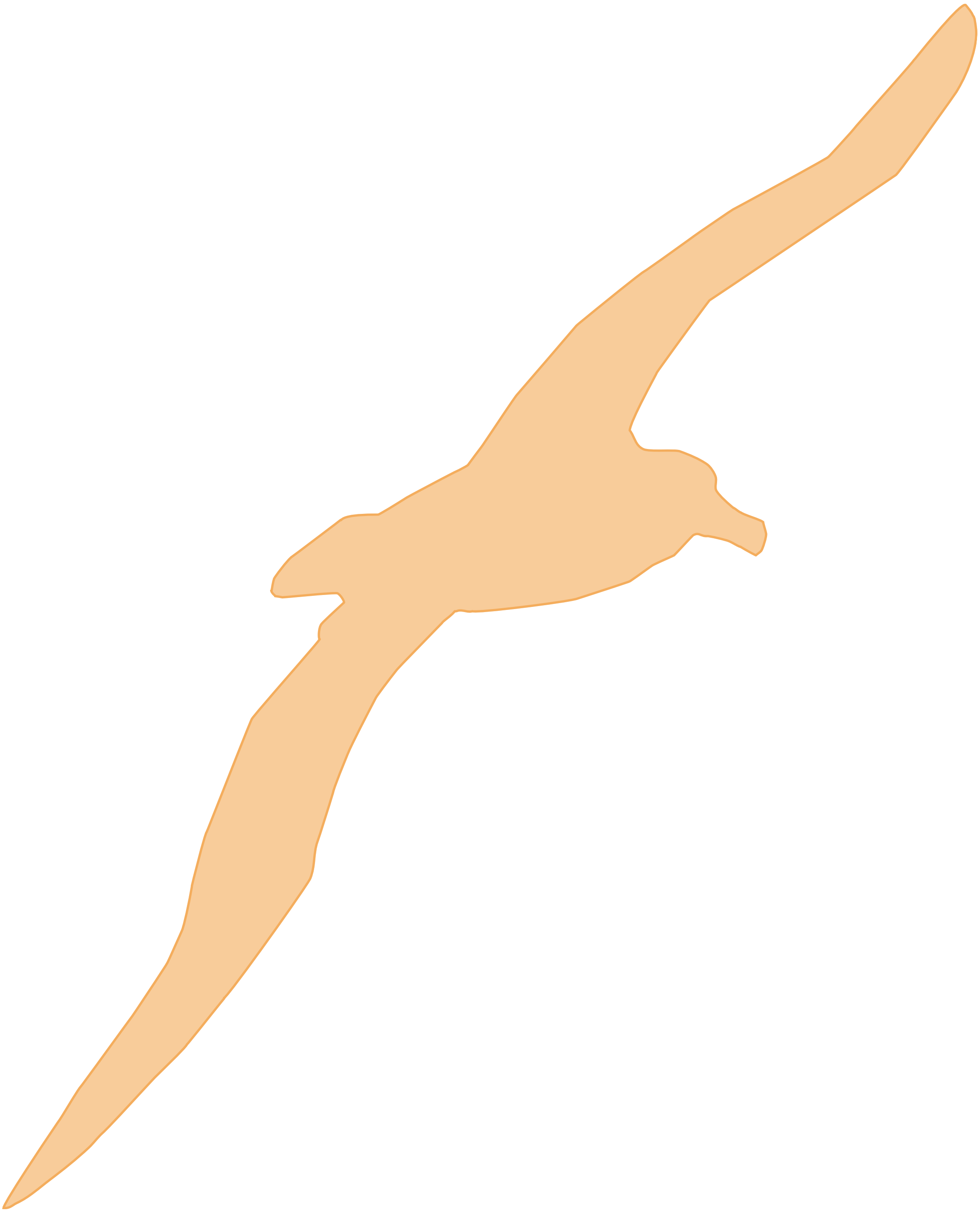
2.13.2. Economic aspects: economic exploitation for fishing and interactions with fisheries

It is important to consider the economic value of the oceanic areas encompassed within the distribution area of the Amsterdam albatross (see 1.9.1), via their commercial exploitation by the industrial and artisanal fisheries. The fisheries of the Indian Ocean are an extremely important economic value for both the national level (in the French EEZ, mainly by the EEZ around the island Amsterdam) and international (in areas managed by different RFMOs: here IOTC (which CCSBT) (2008 IOTC, CCSBT 2008). This operation involves many countries, including French longline fishery based in Reunion Island (Table 7). Incidental (bycatch) mortality associated with fisheries is one of main threats to different species of albatross including the Amsterdam albatross (see 1.9.1).

Fleet	Fishing effort (number of hooks)		Location	Source
	Total	South of 25°S		
China	14 539 264	1 080 080	Indian Ocean	CTOI
Korea	3 346 029	2 391 981	Indian Ocean	CTOI
France (Réunion)	2 745 327	410 983	Western Indian Ocean	Data SIH Ifremer Réunion/ IOTC
Spain	4 885 264	4 180 735	Indian Ocean	CTOI
Japan	45 078 268	18 995 598	Indian Ocean	CTOI
Seychelles	1 370 420	345 113	Indian Ocean	CTOI
Longline fishery IOTC (total)	**71 964 572**	**27 351 740**	**Indian Ocean**	**CTOI**

Table 7 Longline fishing effort in the IOTC (Indian Ocean Tuna Commission) area in 2008

3. NEEDS AND STAKES OF THE CONSERVATION OF THE AMSTERDAM ALBATROSS



3. Needs and stakes of the conservation of the Amsterdam albatross

As with many islands that are home to seabird populations, Amsterdam Island has experienced a series of human-induced perturbations since it was discovered (introduction of animal and plant species, fires). As elsewhere, island restoration is a challenge: the state of the original ecosystem is difficult to define and restoration aims may be vague and mobile, making it difficult to define exactly what to restore (Simberloff 1990). In the specific case of Amsterdam, knowledge on the original state of the island is virtually non-existent: this complicates the design of a plan aiming to a return to a 'natural' situation. Ancient descriptions of the island by mariners show the island had a 'forest belt' of Phylica trees, limited today to a small wood. We also know that sealers nearly extirpated the fur seals, which were formerly extremely abundant. Finally, subfossil bones on the island reveal the former presence of numerous species that seem extinct today (flightless duck, petrels), and also of the endemic Amsterdam albatross. However, there is no information to estimate the size of this latter population before first human landings and the species was described only in the middle of the 20th century. This population had been completely overlooked until then, probably due to the location of its nesting area on a very isolated part of the island.
Studies on the terrestrial habitats and soil of the island revealed that low-altitude areas have experienced considerable modification (grazing by cattle, fires), with dramatic loss of soil substrates, hence limiting restoration of the 'original' vegetation (and excludes, on the worst affected areas, full restoration). The current nesting area of Amsterdam albatrosses has only suffered a little damage, but the indigenous vegetation of mosses and ferns is highly vulnerable to trampling and to decreases in local rainfall.

3.1. Summary of the current situation

The conservation status of the Amsterdam albatross is unfavourable, and is classified as critically endangered on the IUCN red list, despite the total population showing an increasing trend until 2007. The number of birds is indeed still very low, mainly as a consequence of the extremely low starting point of the few individuals present in 1982 when the species was described. Efforts made to conserve the population at the nesting site are not sufficient to improve the current population growth rate, which may be considered as a maximum for a species with such a low fecundity rate.
The recent management plan of the National Nature Reserve of the French Southern lands has enhanced the on-land conservation of this population, but several potential threats remain (pathogens, predation).
The situation of Amsterdam albatross is still very precarious and uncertain, notably regarding climate change effects and change in demography functioning. Further uncertainties include potential additional at-sea mortality caused by interactions with fisheries in its very large oceanic habitat (southern Indian Ocean, from African to Australian coasts).

3.2. Optimal needs of the species

As a seabird, the conservation of Amsterdam albatross requires protection in two main habitats: terrestrial (breeding site) and marine (feeding sites).

3.2.1. Terrestrial

- nesting habitat: natural peat bogs
- good quality habitat: vegetation free from damage by climate change (drying out), trampling by cows and humans
- habitat free from predation risks or disease: controlling predation by introduced mammals and contamination by pathogens (introduced or not)
- limited disturbance by humans

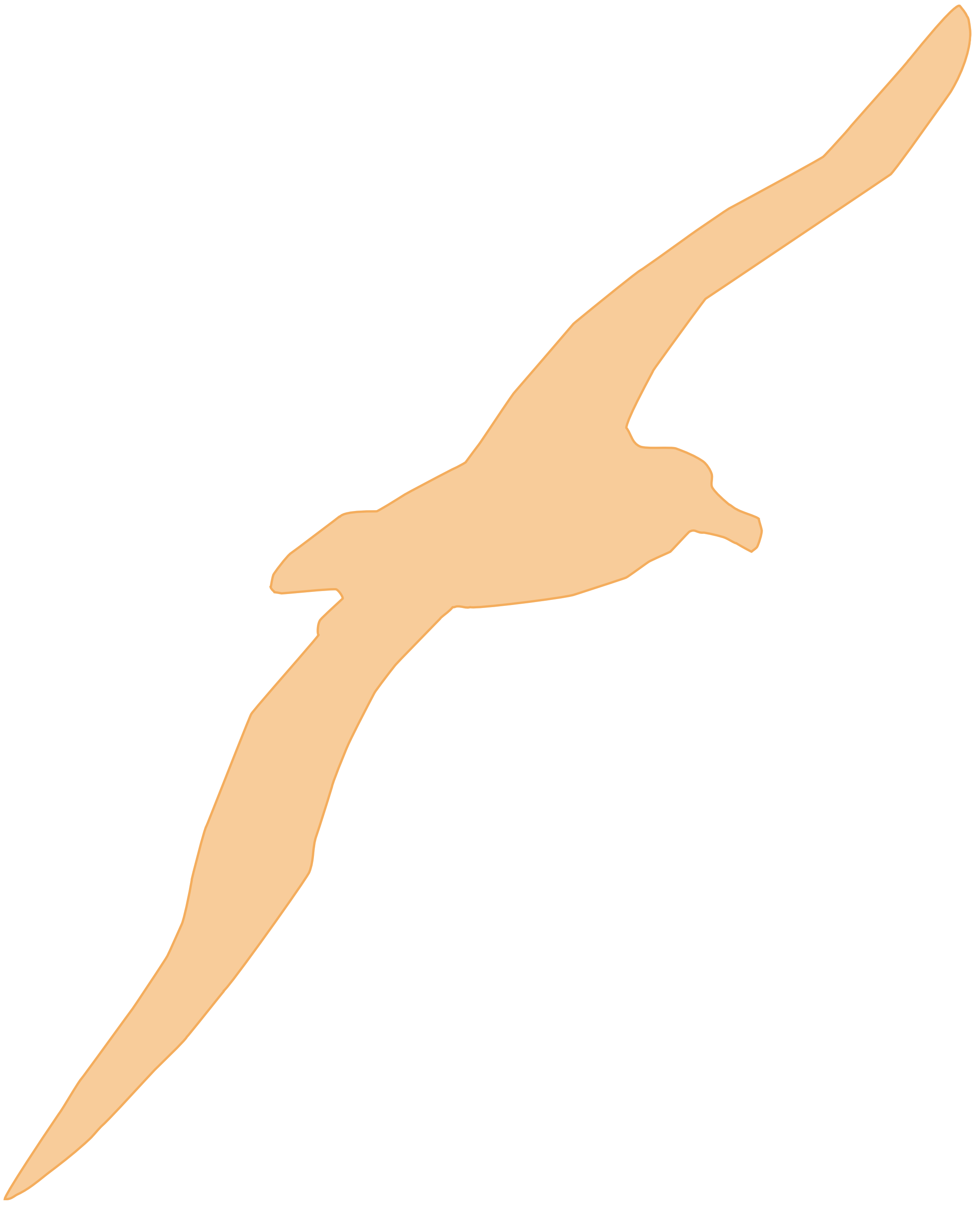
3.2.2. Marine

• secteur océanique utilisé pour l'alimentation diffère selon le statut des individus (reproducteurs, non reproducteurs, juvéniles, immatures, année sabbatique)
• zones utilisées par l'espèce exemptes des menaces liées à la capture accidentelle dans les pêcheries
• milieu océanique présentant une bonne disponibilité alimentaire pour les ressources ciblées par l'espèce (effets des changements globaux sur les ressources)

3.3. Long-term strategy

Between 1984 and 2007, the total Amsterdam albatross population increased at a mean rate of up to 5% per annum, with slight decrease during the last years. The total number of individuals is now estimated at between 160 and 170 individuals, including 80-90 mature individuals.
A long-term strategy for this long-lived species should aim at improving the conservation status of the Amsterdam albatross throughout its distribution area in the Indian Ocean.
In order to carry out this strategy, actions are planned within the framework of the following themes:
• maintain long-term monitoring of the species, notably through the survey of breeders on Amsterdam and individual surveys, in order to ensure a reliable indication of the population trend
• complete knowledge of the species' ecology, and more specifically on its diet, using methods that do not involve energy loss for the chicks
• complete knowledge the at-sea distribution survey of the species including (i) all demographic classes of the population and (ii) multi-year datasets of this distribution
• if possible, delineate in the total species' distribution area, sites of specific attractiveness for the birds, and hence evaluate the relevance of the 'Important Bird Area' approach (BirdLife International) for this critically endangered species.

4. IMPLEMENTATION OF THE PLAN AND STRATEGY ADOPTED FOR THE DURATION OF THE PLAN



4. Implementation of the plan and strategy adopted for the duration of the

4.1. Goals of the plan

The main goal of this plan is to increase the population size in the long-term.
This plan aims to maintain both the current rate of the total population increase (5%) and the adult survival rate above 0.95 (below these thresholds, the population would decrease). To achieve this, it is necessary to:

- Study transmission mechanisms of the pathogens in other albatross and seabird species on the island. Investigate the occurrence of antibodies in Amsterdam albatrosses. Maintain application of preventive measures to limit contamination risks. Establish measures to be taken (vaccination ?) in case of epidemic,

- Evaluate predation risks from mammals present on the breeding site, through direct observation and modelling. Predict demographic risks linked to the presence of these introduced mammals, according to three scenarios (no eradication, partial eradication and/or maintenance of populations, or total eradication of introduced mammals), plan and carry out to eradicate these introduced predators if it appears necessary,

- Evaluate interaction risks with longline fisheries and recommend and actively work towards ensuring the use of measures to reduce avian mortality in EEZs as well as in international waters,

- Be capable of reacting quickly if a threat significantly impacting the species appears,

- Maintain the long-term monitoring programme as a sentinel of the population (population dynamics, annual numbers...etc),

- Acquire and improve knowledge on the species: diet, trophic ecology, breeding biology, at-sea distribution,

- Broadcasting this plan at national and global scale. The very unfavourable conservation status of the Amsterdam albatross makes it crucial that this plan is accessible to State departments, as well as to international scientific community, to fishermen, to regional fisheries management authorities, to the different international commissions and to institutions involved in conservation.

4.2. Actions to implement

These actions aim to quantify, reduce and remove the threats potentially affecting the Amsterdam albatross. In total 20 actions have been identified.

When all possible action fields are considered (improving breeding habitat / preventing diseases / reducing risk of fisheries bycatch / eradicating introduced mammal species), the two fields showing the most immediate benefit for the population are preventing diseases and eradicating introduced mammal species. These two actions can be launched quickly and carried out entirely under the jurisdiction of French administration. However, limiting fisheries impacts should also remain a priority.


Poussin Albatros d'Amsterdam

Actions	Goals	Priority	Framework of the RNN	Budgeting from RNN	IPEV/ prog 109 or others	
1	**Long-term monitoring: scientific knowledge and research**					
1.1	Maintenance of the long-term survey of the Amsterdam albatross	1	no	no	In progress	p.63
1.2	Demographic analyses and survey of status and long-term trend of the Amsterdam albatross population	1	no	no	yes	p. 64
1.3	Demographic modelling & projection of the Amsterdam albatross population under different scenarios of conservation strategies	3	no	no	yes	p.65
2	**Epizooty**					
2.1	Improving knowledge on the potential pathogens of the Amsterdam albatross	1	yes		yes	
3	**Marine habitat use**					
3.1	Improving knowledge on the at-sea distribution of the Amsterdam albatross	1	no	no	In progress	
3.2	Modelling & predicting at-sea distribution of Amsterdam albatrosses under different scenarios of conservation strategies	1	no	no		
3.3	Identification of important marine areas for Amsterdam albatrosses	1				
3.4	Documenting Amsterdam albatrosses' diet in relation with fisheries - 1	1	no	no	yes	
3.5	Acquisition of knowledge on Amsterdam albatross diet - 2	2	no	no	yes	
4	**Interactions with the fisheries, reduction of bycatch and monitoring**					
4.1	Improving knowledge on at-sea interactions between fisheries and Amsterdam albatrosses	1	no	no	no	
4.2	Application of bycatch mitigation measures and survey in the southern Indian Ocean fisheries	1	no	no	no	
4.3	Observations of seabirds bycatch on longline fishing vessels near Amsterdam Island	1	no	no	no	
4.4	Supporting efforts to promote the application of conservation measures in fishing operations in the Indian Ocean	2	no	no	no	
4.5	Provide the RFMOs with estimates of the potential impact of fisheries on the Amsterdam albatross by combining on-land and at-sea surveys of individuals	2	no	no	no	
5	**Terrestrial habitat use**					
5.1	Characterisation and survey of the favourable nesting habitats	3	yes	no	In progress	
5.2	Environnemental benefits for other species	3	yes	yes	yes	
6	**Habitat restoration and invasive species**					
6.1	Evaluation of the interactions between introduced predator species and Amsterdam albatrosses	1	yes	yes	yes	
6.2	Eradication of introduced predator species on Amsterdam Island	1	yes	yes	yes	
7	**Communication**					
7.1	Communication of the national plan of actions for the Amsterdam albatross in France	2	yes	yes	no	
7.2	Coordination and implementation of the actions	1	yes	yes	yes	

able 8 Summary of the action sheets to implement for the national plan for the conservation of the Amsterdam albatross

4.2.1. Long-term monitoring: scientific knowledge and research

Action 1.1	Long-term monitoring: Maintenance of the long-term survey of the Amsterdam albatross	Priority **1** 2 3

Domain	Study /Protection/Communication
Timetable	Current/annual
Context	The breeding pairs have been counted every year since the species was described in 1984, and an individual-based survey is also carried out annually. It is essential to maintain this long-term monitoring activity to get reliable indicators of the population trend.
Description	• Collect data annually: count breeding pairs and locate nests on the breeding site every year, record the presence of individually ringed birds and breeding status of all individuals present (mate identity, breeding success, etc.) • Monitor the 'disappearance' of adult individuals from the breeding site • Centralise and manage data collected and contribute to the ACAP database annually The goal of this action is to census annually the number of breeding pairs on the world's single nesting site. This action also enables the the annual monitoring of all individuals present and their breeding status, and also to ring the chicks produced each year. This fieldwork is carried out each year by the over-wintering volunteer on Amsterdam Island within the framework of the French Polar Institute IPEV scientific programme no. 109 (directed by H Weimerskirch). Results of this action affect the onset of action 1.2
Localities targeted	Breeding site: Plateau des tourbières, Amsterdam Island
Financial evaluation	Funding of this action reports to IPEV (via programme no. 109) and to CNRS
Specific funding call for NPA	**No funding is asked for this action**
Potential executive partners	CNRS Chizé (Marine Predators Team, directed by H Weimerskirch), IPEV, National Nature Reserve of the French Southern lands
Potential funding	IPEV/National Nature Reserve of the French Southern lands
Indicators of progress and evaluation	Evolution of the population size estimates Survey on the anomalous disappearance of breeding individuals
References	Rivalan et al. 2010; IPEV Research Programme no. 109

Action 1.2	Long-term monitoring: **Demographic analyses and survey of status and long-term trend of the Amsterdam albatross population**	Priority **1** 2 3

Domain	Study /Protection/Communication
Timetable	Current/annual To be carried out during year 5 unless results of action 1.1 indicate the need for an intermediate analysis, comparative with Rivalan et al. 2010
Context	The breeding pairs have been counted every year since the species was described in 1984, and an individual-based survey is also carried out annually. It appears essential to maintain this long-term monitoring activity in order have a reliable indication of population trend, and to be able to detect rapidly any problem or change in this trend.
Description	• Analysis of the population trend every year using demographic data. Analysis of the numerical trend of the breeding population and estimation of survival rates by age class • contribute to the ACAP database annually • Scientific publications The goal of this action is to carry out the long-term trend survey of the global population of the Amsterdam albatross, in order to re-evaluate its status. This is done every year by the scientists from CNRS Chizé in charge of the long-term trends.
Localities targeted	Breeding site: Plateau des tourbières, Amsterdam Island
Financial evaluation	Funding needed for this action reports to CNRS (Chizé) which performs demography analyses. Funding of a database engineer in charge of monitoring this population, for 1 month (3,000€/year)
Specific funding call for NPA	**No funding is asked for this action**
Potential executive partners	CNRS Chizé (Marine Predators Team, directed by H Weimerskirch), IPEV, National Nature Reserve of the French Southern lands
Potential funding	CNRS
Indicators of progress and evaluation	Trend of the Amsterdam albatross population Trend of the demographic parameters (breeding success, recruitment rate, survival…)
References	Inchausti & Weimerskirch 2001; Rivalan et al. 2010; IPEV Research Programme no. 109

Action 1.3	Long-term monitoring: Demographic modelling & projection of the Amsterdam albatross population under different scenarios of conservation strategies	Priority 1 2 **3**

Domain	Study / Communication
Timetable	To be carried out during year 5 (results already available from a recent study prior to year 1), unless alert from action 1.1
Context	The breeding pairs have been counted every year since the species was described in 1984, and an individual-based survey is also carried out annually. Within this framework, this action will allow the prediction of the evolution of the Amsterdam albatross population under different scenarios (i.e., natural ones and/or with different management actions).
Description	Demographic modelling and projection of the Amsterdam albatross population will have to be carried out during the last year of the NPA using various scenarios (i.e., natural ones and/or with different management actions).: • **Model functional relationships** between the demographic responses observed on the colony and the oceanic conditions in the "hotspots" of habitat use (identified in action 4.2) • **Develop predictive models to predict the population trend**, by integrating the ecological and environmental variables affecting the distribution by age/sex/season • Integrate the long-term monitoring data on the Amsterdam albatross into other databases (i.e., multi-specific and environmental), in order to estimate the potential for this population as an indicator of changes in the marine environment (at a local- or large-scale). This action is dedicated to provide a helping tool for decisional instances and managers of the National Nature Reserve of the French Southern lands (notably prior to action 6.2).
Localities targeted	Breeding site: Plateau des tourbières, Amsterdam Island
Financial evaluation	This action will be performed thanks to an engineer contract at CNRS Chizé (4 months, 3,000€/month)
Specific funding call for NPA	**3,000€/month, hence 12,000€ on the whole NPA period**
Potential executive partners	CNRS Chizé (Marine Predators Team, directed by H Weimerskirch)
Potential funding	Researchers of the CNRS Chizé involved in the analyses/National Plan for Actions
Indicators of progress and evaluation	The projections of population size estimates according to different environmental scenarios allow to give priority criteria to managing actions considered
References	Inchausti & Weimerskirch 2001; Rivalan et al. 2010; IPEV Research Programme no. 109

4.2.2. Epizooty

Action 2.1	**Epizooty :** **Improving knowledge of the potential pathogens of the Amsterdam albatross**	**Priority** **1** 2 3

Domain	Study /Protection/Communication
Timetable	Annual
Context	Scientific studies allowed the detection of the presence of bacteria responsible for the diseases Erysipelas (*Erysipelothrix rhusiopathidae*) and avian cholera (*Pasteurella multicida*) that severely affected chicks of the yellow-nosed albatross, a taxonomically close species, that breeds on colonies neighbouring that of the Amsterdam albatross. The risks of contaminating the Amsterdam albatrosses are high (through indigenous birds such as skuas, but also through introduced mammals). Two previous years with high chick mortality in Amsterdam albatrosses may reflect disease with associated mortality. It is therefore very important to document whether these pathogens (or other ones) are found in Amsterdam albatrosses, and more widely on other seabird species, notably those species that may be found in close contact to Amsterdam albatrosses.
Description	Launching and maintenance of studies on the following themes: • **Searching for the presence of these two pathogens** or associated antibodies in adults and chicks of Amsterdam, yellow-nosed and dark-mantled sooty albatrosses, subantarctic skua and northern rockhopper penguin, and their effects (mortality, virulence…), • **Studying the life-cycle of these two pathogens** enabling to determine their *in situ* resistance, virulence, prevalence, vectors, cyclicity… • **Launching of a long-term survey** focusing on these pathogens • Re-evaluation of the preventive rules applied on the field against dissemination of pathogen agents, depending on the results obtained • Scientific publications This work will be made by a specialist team from ONCFS (SAGIR web, specialised in animal epizooty, directed by O Mastain), in collaboration with IPEV Research Programme no. 109 (directed by H Weimerskirch)
Localities targeted	Breeding site: Plateau des tourbières, Amsterdam Island
Financial evaluation	- Fieldwork by 1 specialist in avian epizooty from ONCFS during 1 month (November 2010 + 1 contract for 2 month (November-December 2010) 8,000€, and training of the IPEV programme 109 fieldworker for the NPA - Specific gear: tools for autopsy (250 €), small equipment for sampling (250€), 1 centrifuge (785€), camera for autopsy (850€) - Analyses : • Amsterdam albatross: complete scanning of all pathogens on samples (blood and samples/rectal swab): 300€/sample * 20 individuals (adults and chicks) = 6,000€ • Other species (yellow-nosed and dark-mantled sooty albatrosses, subantarctic skua and northern rockhopper penguin): search analysis for avian cholera prevalence: 80€/individual : 60 yellow-nosed albatrosses in different colonies, 15 sooty albatrosses, 10 skuas, 15 rockhopper penguins = 8,000€ - coordination, project management, report from experts: 3,000€ ONCFS + engineer NPA 1 month (3,000€/month) - Involvement of IPEV programme 109 fieldworker in the NPA - Boarding on R/V Marion Dufresne and accommodation (15,000€)
Specific funding call for NPA	- Only part of the total funding is asked for this action. The remaining part comes from the National Nature Reserve of the French Southern lands, TAAF, and IPEV - **Funding asked for this action is 20,000€**
Potential executive partners	Expert in epizootics O. Mastain (ONCFS SAGIR), CNRS Chizé (Marine Predators Team, directed by H Weimerskirch), IPEV, National Nature Reserve of the French Southern lands
Potential funding	National Nature Reserve of the French Southern lands / NPA / Action Plan for Biodiversity / IPEV
Indicators of progress and evaluation	Outcome and epidemiologic survey of the Amsterdam albatross population (sanitary vigilance) Ability of the managers of the National Nature Reserve of the French Southern lands to face an epidemiological threat on the population Scientific reports and articles, communication
References	Weimerskirch & Ghestem 2001; Weimerskirch 2004; IPEV Research Programme no. 109

4.2.3. Marine habitat use

Action 3.1	Marine habitat use: Improving knowledge on the at-sea distribution of the Amsterdam albatross	Priority: **1** 2 3

Domain	Study /Protection/Communication
Timetable	Current/annual
Context	Scientific studies have allowed both the acquisition and improvement of knowledge about the Amsterdam albatross ecology, on land as well as at sea. Nevertheless, some research fields remain to be studied and/or detailed. The at-sea distribution for certain life-cycle phases is still unknown (adults during chick brooding, immatures) and data already available on at-sea distribution comprise small individual numbers, or for only specific phases of the species life-cycle. Moreover, it seems important to acquire data on the at-sea distribution of individuals from different age-classes and stages on a sufficiently long term in order to evaluate both the influence of the environmental conditions on the at-sea distribution and the precise impacts of potential interactions with fisheries. The acquisition of new data on the individuals' at-sea distribution must be managed through a database to facilitate data quality control and exportations.
Description	Launching and maintenance of studies on the following themes: • **Study the individuals' at-sea distribution**: data already available mainly concern breeding adults (during incubation phase). Our goals are to: 1) acquire new data on adults brooding chicks (May-December) and on immatures, using ARGOS satellite tracking 2) increase sample sizes for studies of birds during sabbatical year and fledgling using geolocation technique, and incubating adults using ARGOS satellite tracking 3) acquire multi-year dataset to evaluate variability of the at-sea distribution and trying to link this variability to changes in environmental conditions • Combine at-sea tracking data at specific time scales to delineate distribution area, core range, and hotspots of habitat use for each one of the breeding stages and life-cycle phases • **Construct a spatial database** to gather Amsterdam albatross tracking data description and at-sea observations from ships • Control quality of new data and analyse them • Carry out an analytic survey to identify the spatio-temporal gaps in the datasets (age/sex, season....) • Scientific publications This is carried out within the framework of the French Polar Institute IPEV scientific programme no. 109 (directed by H Weimerskirch).
Localities targeted	Breeding site: Plateau des tourbières, Amsterdam Island / Indian Ocean
Financial evaluation	Funding needed for this action reports to IPEV via funding of its scientific programmes, and to CNRS regarding staff presence on the field; however this action needs a specific funding as a complement to buy telemetry devices and data analysis. Year 1: Survey of breeding adults (chick rearing): 10 ARGOS tags (25,000€), functioning during 6 months (location costs = 6,000€) Survey of adults during sabbatical year: 10 GLS loggers (5,000€) and analysis (5,000€) Year 2: Survey of juveniles and immatures : 15 ARGOS tags (45,000€) + location costs (15,000€) Year 2 and 4: Data analysis: 2*2 months (3,000€/month) engineer NPA Year 5: Synthesis of at-sea distribution, and database: to be carried out within the framework of an engineer NPA contract for 1 month (3,000€/month) at CNRS Chizé Multi-annual: Survey of juveniles: 20 GLS loggers/year (4,000€/year, analysis 5,000€/year) Funding for an engineer contract to carry out actions 1.2, 3.1 and 3.3 Boarding on R/V Marion Dufresne and accommodation (non quantified)
Specific funding call for NPA	- Only part of the total funding is asked for this action. The remaining part comes from the National Nature Reserve of the French Southern lands, TAAF, and IPEV - **Funding asked for this action is 73,000€**
Potential executive partners	CNRS Chizé (Marine Predators Team, directed by H Weimerskirch), IPEV, National Nature Reserve of the French Southern lands
Potential funding	Private foundations / National Nature Reserve of the French Southern lands / Action Plan for Biodiversity / NPA / IPEV
Indicators of progress and evaluation	Number of individuals tracked/equipped (satellite tags / GLS) Identification of the core-use areas and key habitats for birds at each one of the breeding and life-cycle stages Activation of a spatialised database Scientific reports and articles, communication
References	IPEV Research Programme no. 109

Action 3.2	Marine habitat use: Modelling & predicting at-sea distribution of Amsterdam albatrosses under different scenarios of conservation strategies	Priority **1** 2 3

Domain	Study/Protection/Communication
Timetable	Year 5
Context	Scientific studies allowed both the acquisition and improvement of knowledge about the Amsterdam albatross biology and ecology, on land as well as at sea. Nevertheless, some research fields remain to be more detailed, notably regarding at-sea distribution data of the individuals during different life-cycle phases. The objective of this work is understand how environmental conditions affect at-sea distribution using data that is available or about to be acquired (action 3.1).
Description	Build models that may predict at-sea distribution of the Amsterdam albatross population, under different scenarios (i.e., natural ones and/or with different management actions: • **Model functional relationships** between individuals' at-sea distribution and environmental variables (wind, sea-surface temperature, chlorophyll, bathymetry…) • **Develop predictive niche models to forecast at-sea distribution of the population** under different scenarios of environmental change, by integrating ecological and environmental variables affecting the distribution by age/sex/season • **Combine at-sea and at-land survey in a tool to aid decision makers** and managers of the National Nature Reserve of the French Southern lands, for instance in advising RFMOs. Use this tool to identify thresholds for conservation actions. **The ultimate goal of this action is to provide a decision-support tool for decision-making bodies and managers of the French Southern Lands National Nature Reserve** • Within the framework of the blueprint plan: **after 10 years of survey of individuals' at-sea distribution**, evaluate the trends of the Amsterdam albatross at-sea distribution.
Localities targeted	Indian Ocean
Financial evaluation	Funding needed for this action reports to IPEV (via programme no. 109) and to CNRS Chizé for data analysis in France mainland. Practically, this action will be performed thanks to an engineer NPA contract (6 months, 3,000€/month)
Specific funding call for NPA	**No funding is asked for this action**
Potential executive partners	CNRS Chizé (Marine Predators Team, directed by H Weimerskirch)
Potential funding	Researchers of the CNRS Chizé involved in the analyses / Private Foundations / National Nature Reserve of the French Southern lands
Indicators of progress and evaluation	Evaluation on a mid- and long-term of the at-sea distribution trend Get projections of the at-sea distribution of the population under different environmental scenarios allowing to sort priority amongst management measures planned Launch a decision-support tool Scientific reports and articles, communication

Action 3.3	**Marine habitat use:** **Identification of important marine areas for Amsterdam albatrosses**	**Priority** **1** **2** **3**

Domain	Study / Protection / Communication
Timetable	Years 1 & 5
Context	Preliminary results of recent studies on at-sea distribution of seabirds (mainly breeding adults) showed a strong overlap of adult Amsterdam albatrosses with longline fishing activities, and more specifically with those targeting southern bluefin tuna. It is still needed to complete available data (incomplete, scarce or even inexistent) and to determine to what extent certain population classes (juveniles, immatures or sabbatical adults) use risky areas. This is very important since recent demographic studies performed in CNRS Chizé from long-term survey of the population clearly show that additional mortality of only 6 individuals each year would drive Amsterdam albatrosses to extinction.
Description	Launching and maintenance of studies on the following themes: • **Identify important marine areas for this species according to priority criteria** based on the same procedure as to delineate Marine Important Bird Areas- Marine IBAs (Birdlife International). • **Separate marine important areas according to different breeding stages, age classes, etc, in order to characterise the different needs of the species along the different stages of its life-cycle** • **Develop a web to identify Marine IBAs of interest for at-sea protection of albatrosses, encompassing areas in international waters** (following the BirdLife International approach : highlighting areas identified as important for the conservation of the species, a fortiori if these appear important for several species/populations/breeding stages)
ant	Indian Ocean
Financial evaluation	This action is to be carried out within the framework of an engineer NPA contract in spatial analyses and fisheries statistics during 3 months in year 1 + 2 months in year 5 (3,000€/mois) CNRS Chizé, LPO
Specific funding call for NPA	**No funding is asked for this action**
Potential executive partners	CNRS Chizé (Marine Predators Team, directed by H Weimerskirch), IPEV, Birdlife International, LPO, ACAP, IUCN, National Nature Reserve of the French Southern lands RFMOs : IOTC/CCSBT, Koreas, Taiwan, Japan, South Africa, Australia, New Zealand, Madagascar
Potential funding	National Nature Reserve of the French Southern lands / Action Plan for Biodiversity / NPA
Indicators of progress and evaluation	Identification of Marine IBAs Establish priorities to action sites Scientific reports and articles, communication of results
References	Inchausti & Weimerskirch 2001; Rivalan et al. 2010

Action 3.4	Marine habitat use: Documenting Amsterdam albatrosses' diet in relation with fisheries	Priority **1** 2 3

Domain	Study / Communication
Timetable	Annual
Context	Scientific studies allowed both the acquisition and improvement of knowledge about the Amsterdam albatross biology and ecology, on land as well as at sea. Nevertheless, diet has never been studied. Yet, it would be necessary to evaluate occurrence of fisheries-related items (i.e., baits) in diet.
Description	Launching studies on the following themes: • **Collect and analyse systematically rejection pellets** around or on the nests to search for fisheries-related items (hooks, fishing gear, bait, fishery discards…), • **Analysis of C/N isotopic signature of feathers in relation with baits used in fisheries** • Prospect systematically around nests with metals detector (hooks), • Centralise and manage collected data, • Scientific publications. This is to be done within the framework of the French Polar Institute IPEV scientific programme no. 109 (directed by H Weimerskirch).
Localities targeted	Breeding site: Plateau des tourbières, Amsterdam Island
Financial evaluation	Funding needed for this action reports to IPEV via funding of its scientific programmes, and to CNRS regarding staff presence on the field. 1 fieldworker contract for 6 months: 6 * 2,122€ Boarding on R/V Marion Dufresne and accommodation (non quantified)
Specific funding call for NPA	**Contribution to fieldwork costs (scientific studies performed): 10,000€**
Potential executive partners	CNRS Chizé (Marine Predators Team, directed by H Weimerskirch), IPEV, National Nature Reserve of the French Southern lands
Potential funding	Action Plan for Biodiversity / NPA / IPEV
Indicators of progress and evaluation	Evaluation of occurrence of fisheries-related items in diet Scientific reports and articles, communication
References	IPEV Research Programme no. 109

Action 3.5	Marine habitat use: Acquisition of knowledge on Amsterdam albatross diet	Priority 1 **2** 3

Domain	Study / Communication
Timetable	Punctual/Periodical To be realised according to results of actions 3.3, 3.4 and 5.1
Context	Scientific studies allowed both the acquisition and improvement of knowledge about the Amsterdam albatross biology and ecology, on land as well as at sea. Nevertheless, diet has never been studied. Yet, diet study would allow revealing interactions between the species and fisheries (baits, fishery discards…)
Description	Following results of actions 3.3, 3.4 and 5.1 that would indicate the occurrence of items linked to fisheries in the birds' food, and/or large overlaps between important bird areas and fisheries, the following studies need to be started: • **Diet study** over a breeding cycle, from regurgitates collected from chicks on the colony. About 10 chicks during two successive years. The meal lost by the chick will be compensated by feeding chick a similar amount of food to that collected. • **Survey diet evolution** (rejection pellets) as a function of environmental conditions and relationships with certain breeding success or survival parameters. • Centralise and manage collected data • Scientific publications This is to be done within the framework of the French Polar Institute IPEV scientific programme no. 109 (directed by H Weimerskirch).
Localities targeted	Breeding site: Plateau des tourbières, Amsterdam Island
Financial evaluation	Funding needed for this action reports to IPEV via funding of its scientific programmes, and to CNRS regarding staff presence on the field. 1 fieldworker contract for 6 months: 6 * 2,122€ Cost of diet analyses: technician for 3 months (2122 × 3 = 6366 €) + researcher CNRS Chizé (DR2) for 1 month
Specific funding call for NPA	**See Action 3.4**
Potential executive partners	CNRS Chizé (Marine Predators Team, directed by H Weimerskirch), IPEV, National Nature Reserve of the French Southern lands
Potential funding	National Nature Reserve of the French Southern lands
Indicators of progress and evaluation	Description, quantification and survey of diet Scientific reports and articles, communication
References	IPEV Research Programme no. 109

4.2.4. Mitigation measures to reduce potential risk of bycatch, survey of potential interaction with fisheries

Based on available data on the closely-related wandering albatross Diomedea exulans, we can infer that Amsterdam albatrosses are at considerable risk of bycatch in long-line fisheries (pelagic or demersal). Although no such event has ever been recorded (noting that inexperienced observers might not recognise and identify an Amsterdam albatross specimen correctly) this would be an extremely rare phenomenon that could take years to occur. Demographic analyses demonstrate the considerable negative impact on the population trend of only a few individuals captured accidentally.

Bycatch mechanisms are well understood today and concern a number of species that feed in the same way. It is therefore urgent to act, by requiring the application of the best known methods to minimise bycatch, in all areas used by Amsterdam albatrosses.

Action 4.1	**Interactions with fisheries:** **Improving knowledge on at-sea interactions between fisheries and Amsterdam albatrosses**	**Priority** **1** 2 3

Domain	Study / Protection/Communication
Timetable	Years 1 & 5
Context	Preliminary results of recent studies on the at-sea distribution of seabirds (mainly breeding adults) showed a strong overlap of adult Amsterdam albatrosses with long-line fisheries, more specifically with those fisheries targeting southern blue-fin tuna. Although industrial fishing effort on this species has declined in almost the whole distribution area of the Amsterdam albatross (excluding the eastern sector), and that no bycatch event has been reported for this fishery, this species remains potentially at risk regarding any long-line fishery operating in its distribution area, notably in the vicinity of Amsterdam island. Fishing efforts can be extremely variable in time and space in the subtropical waters. Moreover, fisheries are not required to report bycatch or ring recoveries outside Exclusive Economic Zones (EEZs), and the number of fishing operations covered by dedicated observers is still extremely low. Nevertheless, available data on at-sea distribution needs to be enhanced and to be used to determine to what extent other parts of the population (juveniles, immatures or sabbatical adults) may be affected by this fishery. This is very important since recent demographic studies based on long-term survey by CNRS Chizé clearly show that additional mortality of just 6 individuals each year would drive the population to extinction.
Description	Starting and maintaining studies on the following topics : • **Characterise fisheries in the southern Indian Ocean within the distribution area of the Amsterdam albatross**, taking into account nationality, gear employed, targeted species, ship configuration, spatial and temporal distribution of fishing effort, rejection of fishery discards, type of bycatch monitoring, percentage of coverage by dedicated observers, mitigation measures needed/employed, and management authority. • **Analyse dynamically the overlap between albatrosses and fisheries** determined in actions 3.1 and 3.3 • **Evaluate utilisation and risks** incurred by birds in managed areas (EEZs, RFMOs etc) • **Identify jurisdictions for the EEZs and nationality of the concerned fleet into each RFMOs** by overlaying Marine IBAs and contours of EEZs and RFMOs. Report the results to nations, resource management authorities and to ACAP. • **Propose fishing action layouts** (closure of sectors, seasonal measures, etc)
Localities targeted	Indian Ocean
Financial evaluation	This action is to be carried out within the framework of an engineer NPA contract in spatial analyses and fisheries statistics during 3 months in year 1 + 2 months in year 5 (3,000€/month) CNRS Chizé (c.f. action 3.3)
Specific funding call for NPA	**Year 1: 9,000€** **Year 5: 6,000€** **= 15,000€** for the whole plan.
Potential executive partners	CNRS Chizé (Marine Predators Team, directed by H Weimerskirch), IRD (A Fonteneau), IPEV, Birdlife International, LPO, ACAP, IUCN, National Nature Reserve of the French Southern lands RFMOs : IOTC/CCSBT, Coreas, Taiwan, Japan, South Africa, Australia, New Zealand, Madagascar
Potential funding	National Nature Reserve of the French Southern lands/ Action Plan for Biodiversity / NPA
Indicators of progress and evaluation	Description of the southern Indian Ocean fisheries Identification of the overlaps between marine IBAs and operating fisheries Sort priorities in action sites Development of a partners web Scientific reports and articles, communication of results
References	Weimerskirch et al. 1997 ; Inchausti & Weimerskirch 2001 ; Rivalan et al. 2010

Action 4.2	Interactions with fisheries: Application of bycatch mitigation measures and survey in the southern Indian Ocean fisheries	Priority: **1** 2 3

Domain	Study / Protection/Communication
Timetable	Annual
Context	Preliminary results of recent studies on the at-sea distribution of seabirds (mainly breeding adults) showed a strong overlap of adult Amsterdam albatrosses with long-line fisheries, more specifically with those fisheries targeting southern blue-fin tuna. These fisheries are not required to report bycatch or ring recoveries outside Exclusive Economic Zones (EEZs), and the fishing area covered by dedicated observers is still extremely low. The measures that should be used by long-line fishing vessels to mitigate bycatch of albatrosses are well documented (night-setting of the lines, use of streamer lines (CCAMLR type) and weighing the lines or specification of a speed of immersion of the lines). This is made within the framework of recent demographic studies based on long-term survey by CNRS Chizé, that clearly show that additional mortality of only 6 individuals each year would drive the population to extinction.
Description	**a. National level** **Conitnue the application of 3 efficient mitigation measures (night-setting of the lines, streamer lines and weighting of the lines)** recommended and detailed by ACAP for long-line fisheries in the French EEZ (Amsterdam, Kerguelen, Crozet), sectors identified (action 4.1) as being used by Amsterdam albatrosses. **Maintain a coverage rate of 100% by dedicated observers** for the Amsterdam albatross in the French EEZs. **b. International level** **Continue and develop, notably through ACAP involvement, the application of the 3 efficient mitigation measures (night-setting of the lines, streamer lines and weighting of the lines)** by long-line fisheries in the sectors identified as used (action 4.1) by Amsterdam albatrosses (whatever the stage, age, or utilization level) in the IOTC and CCSBT zones. **Ask for the delineation of a special zone for the Amsterdam albatross** in the IOTC and CCSBT zones for which coverage rate by dedicated observers would be 50% minimum. If necessary, update this zone in the light of any new data on at-sea distribution of the species.
Localities targeted	Indian Ocean
Financial evaluation	**To be determined**
Specific funding call for NPA	**To be determined**
Potential executive partners	Ministry of Ecology / Ministry of foreign affairs / Ministry of Agriculture and Fishing, CNRS Chizé (Marine Predators Team, directed by H Weimerskirch), Birdlife International, IRD (A Fonteneau), RFMOs IOTC/CCSBT, CCAMLR, Coreas, Taiwan, Japan, South Africa, Australia, New Zealand, Madagascar, IPEV, ACAP
Potential funding	Ministry of Ecology / Ministry of foreign affairs
Indicators of progress and evaluation	Application of the three best measures known to reduce bycatch in the fisheries operating in the areas used by the Amsterdam albatrosses. Application of a coverage rate of fisheries by devoted observers of 50% minimum on a special zone delineated for the Amsterdam albatross into the IOTC and CCSBT (outside EEZ). Number of Amsterdam albatrosses captured in long-line fisheries
References	Inchausti & Weimerskirch 2001 ; Rivalan et al. 2010 ; BirdLife International Fact-sheets "Bycatch Mitigation"

Action 4.3	**Interactions with fisheries:** **Observations of seabirds bycatch on longline fishing vessels near Amsterdam Island**	**Priority** **1** **2** **3**

Domain	Study / Protection/Communication
Timetable	Annual
Context	The results of recent studies on the at-sea distribution of seabirds (mainly breeding adults) showed a strong overlap of adult Amsterdam albatrosses with long-line fisheries, more specifically with those fisheries targeting southern blue-fin tuna. No bycatch event of Amsterdam albatross has been reported in these fisheries. Nevertheless, this species remains potentially at risk regarding any long-line fishery operating into its distribution area, notably in the vicinity of Amsterdam island. Moreover, fisheries are not required to report bycatch or ring recoveries outside Exclusive Economic Zones (EEZs), and the fishing area covered by dedicated observers is still extremely low (<5%). It is crucial to determine if the Amsterdam albatross is associated with fishing vessels and to evaluate realistic bycatch risks
Description	**a. National level** • **Maintain a coverage rate of 100% by dedicated observers** for Amsterdam albatross into the Amsterdam EEZ (for which no bycatch event has been reported yet). **b. International level** • **Measure the occurrence of the species and its degree of association with fishing vessels in its distribution range and in its important areas.** • **Quantify seabirds bycatch on long-line fishing vessels** thanks to devoted observers. • **Design and apply an independent survey** (observers, video) of albatrosses bycatch (rate/importance) for all fisheries where Amsterdam albatross is at risk (identified in action 4.1), by using an evaluation of the best measures and protocols of data collection. • **Determine the intensity of survey needed to obtain reliable estimations** of albatrosses bycatch (rate/importance) for each fishery.
Localities targeted	Indian Ocean
Financial evaluation	Costs of ship-based observations carried out : to be estimated Estimation of ~30,000€ during the whole plan. To be specified according to the plan outcomes.
Specific funding call for NPA	**Estimation of ~30,000€ during the whole plan. To be specified according to the plan outcomes.**
Potential executive partners	CNRS Chizé (Marine Predators Team, directed by H Weimerskirch), Ministry of foreign affairs, IPEV, IOTC, CCSBT, CCAMLR, Birdlife International, ACAP, Albatross Task Force, High Seas Task Force
Potential funding	Ministry of foreign affairs, National Nature Reserve of the French Southern lands/Ministry of Ecology
Indicators of progress and evaluation	Data on the seabirds bycatch rate (and more specifically of Amsterdam albatrosses) by fishing vessels in international waters and/or national waters accessible to the international community Launching of a survey on bycatch rates Evaluation of a minimum survey level to obtain reliable estimates
References	Weimerskirch et al. 1997 ; Inchausti & Weimerskirch 2001 ; Rivalan et al. 2010

Action 4.4	Interactions with fisheries: Supporting efforts to promote the application of conservation measures in fishing operations in the Indian Ocean	Priority 1 **2** 3

Domain	Partnership/Protection/Communication
Timetable	Annual
Context	The results of recent studies on the at-sea distribution of seabirds (mainly breeding adults) showed a strong overlap of adult Amsterdam albatrosses with long-line fisheries, more specifically with those fisheries targeting southern blue-fin tuna. No bycatch event of Amsterdam albatross has been reported in these fisheries. Nevertheless, this species remains potentially at risk regarding any long-line fishery operating into its distribution area, notably in the vicinity of Amsterdam island. Several scientific studies have documented the importance to use different conservation measures (closure of the fishing areas, "scare-crow" methods) to reduce seabirds bycatch. At present, bycatch mitigation measures and bycatch data collection and reporting requirements are inadequate as fisheries are not required to use seabird bycatch mitigation measures (streamer lines, integrated weight longlines…). Moreover, fisheries are not required to report bycatch or ring recoveries outside Exclusive Economic Zones (EEZs), and the proportion of the fishery covered by dedicated observers is too low (<5%).
Description	This action does not aim at developing mitigation measures but rather at supporting actions already carried out in this way at the international level. **a. International level** **Support and promote the international field initiatives currently carried out** and aiming at heightening different partners (mainly fishermen) awareness and use of the different techniques allowing to reduce interactions between seabirds and fishing gear causing bycatch into the sector of the Indian Ocean south of 25°S. **Contribute to national/international efforts to develop seabirds bycatch mitigation techniques** in the involved fisheries. Facilitate this process through exchanges between scientists (workshops). Support international initiatives to reduce seabird bycatch, including in/at CCAMLR, IOTC, CCSBT & ACAP. For this last case, support action of ACAP towards RFMOs. Support the development and application by EU of a plan of action to reduce seabird bycatch in EU fleets. **At the national level, a minimum of 3 efficient bycatch mitigation measures (i.e. night-setting, streamer lines, integrated weight longlines) are already applied** by longline fisheries in the French EEZs (Amsterdam, Kerguelen, Crozet).
Localities targeted	Indian Ocean: IOTC sector, CCAMLR, EEZs of neighbouring countries
Financial evaluation	To be defined
Specific funding call for NPA	**To be defined**
Potential executive partners	CNRS Chizé (Marine Predators Team, directed by H Weimerskirch), IPEV, IOTC, CCSBT (via ACAP), Albatross Task Force, LPO, Birdlife International, National Nature Reserve of the French Southern lands. Supported by ACAP
Potential funding	National Nature Reserve of the French Southern lands / Ministry of Ecology
Indicators of progress and evaluation	Contribution to the different working groups, international and ACAP commissions Effective/best practice seabird bycatch mitigation measures formally adopted and applied in IOTC or any relevant RFMO in the distribution area of the Amsterdam albatross
References	Inchausti & Weimerskirch 2001; Delord et al. 2010

Action 4.5	**Interactions with fisheries:** **Provide the RFMOs with estimates of the potential impact of fisheries on the Amsterdam albatross by combining on-land and at-sea surveys of individuals**	**Priority** 1 **2** 3

Domain	Protection / Communication
Timetable	Annual
Context	The results of recent studies on the at-sea distribution of seabirds (mainly breeding adults) showed a strong overlap of adult Amsterdam albatrosses with long-line fisheries, more specifically with those fisheries targeting southern blue-fin tuna. No bycatch event of Amsterdam albatross has been reported in these fisheries. Nevertheless, this species remains potentially at risk regarding any long-line fishery operating into its distribution area, notably in the vicinity of Amsterdam island. Several scientific studies have documented the importance to use different conservation measures (closure of the fishing areas, "scare-crow" methods) to reduce seabirds bycatch. At present, bycatch mitigation measures and bycatch data collection and reporting requirements are inadequate as fisheries are not required to use seabird bycatch mitigation measures (streamer lines, integrated weight longlines…) in high seas in the IOTC zone. Moreover, fisheries are not required to report bycatch or ring recoveries outside Exclusive Economic Zones (EEZs), and the proportion of the fishery covered by dedicated observers is extremely low (<5%). Both ACAP and Birdlife International are engaged in seabird conservation, via involvement in RFMOs. It is therefore important to contribute to actions carried out by these inter-governemental organisations towards RFMOs.
Description	**Increase awareness of IOTC of the seabirds bycatch issue**, specifically for this species **Participate in international expert initiatives** beside RFMOs to reach an improvement of awareness in the priority to conserve certain species and to make obligatory the setting up of more sustainable fishing practices. For this we must **provide the RFMOs with estimates of the potential impact of fisheries on the Amsterdam albatross population** by combining on-land and at-sea surveys of individuals (with action 4.1). Provide to the international scientific community at-sea surveys of Amsterdam albatrosses (with action 3.1) via the *Procellariiform Tracking Database* managed by Birdlife International
Localities targeted	Indian Ocean
Financial evaluation	Funds needed for this action stand for the trips of scientists from CNRS Chizé involved in seabirds research & conservation to participate in working groups meetings of the RFMOs different commissions (IOTC, CCSBT) and ACAP (4000€/year)
Specific funding call for NPA	CNRS Chizé (Marine Predators Team, directed by H Weimerskirch), IRD (A Fonteneau), IPEV, Birdlife International, ACAP, plea to the French negotiator of the Ministry of foreign affairs, IOTC, CCSBT
Potential executive partners	Ministries / Ministry of Ecology
Potential funding	Contribution of 3,000€/year **Thus 12,000€ for the whole plan duration**
Indicators of progress and evaluation	Representation of France at IOTC Contribution to the different working groups of the international commissions and ACAP, notably by providing data on the areas where fisheries and Amsterdam albatrosses overlap Progress in implementing mitigation measures and increasing the minimum coverage rate of fisheries by devoted observers.
References	Inchausti & Weimerskirch 2001 ; Rivalan et al. 2010

4.2.5. Terrestrial habitat

Action 5.1	Terrestrial habitat: Characterisation and survey of the favourable nesting habitats	Priority 1 2 **3**

Domain	Study /Protection/Communication
Timetable	Years 3 and 5
Context	The Amsterdam albatross has been "re-discovered" and described very recently : hence, there are neither baseline numbers (the 5 pairs mentioned in 1982 cannot as a proper historical baseline) nor a proper understanding of the original nesting area. Historical data are available, first on the distribution of nests and sub-fossil bones, and second in the soil map of Amsterdam Island. However, no characterisation of the nesting habitat of the species has been made. Based on these data, it appears clearly that the favourable nesting habitat has never reached the limit of its carrying capacity (noting the maximal densities observed for wandering albatross colonies). This action takes place within the survey of environmental changes that may affect the terrestrial habitats.
Description	• **Characterise the nesting habitat** through a study using the soil map (surveyed in 1988), available data on vegetation, physical environment and albatross nest location (surveyed fully since 1999) with full geo-referencing. Within this framework, complete the vegetation coverage analysis of both nesting and potential habitats, and to detail at fine-scale the plant and invertebrate communities associated to the nests. • Survey the invasive species (plants, invertebrates) and their impact on the habitat • **Evaluate the carrying capacity of the site for albatrosses**: - measure the area of potential favourable nesting habitat for the species - estimate the maximum island capacity for nests, with reference to maximum densities observed for wandering albatross colonies • Scientific publications This is carried out within the framework of IPEV research programmes no. 109 (directed by H Weimerskirch) and no. 136 (directed by M Lebouvier).
Localities targeted	Breeding site: Plateau des tourbières, Amsterdam Island
Financial evaluation	Funding needed for this action reports to IPEV via funding of its scientific programmes, and to CNRS regarding staff presence on the field. Fieldwork season (2-3 persons during 1.5 to 2 months) Analyses in laboratory (data exploitation, synthesis and redaction) : to be defined
Specific funding call for NPA	**No funding is asked for this action**
Potential executive partners	CNRS Chizé (Marine Predators Team, directed by H Weimerskirch), CNRS Rennes Paimpont (directed by M Lebouvier), IPEV, National Nature Reserve of the French Southern lands
Potential funding	National Nature Reserve of the French Southern lands, IPEV
Indicators of progress and evaluation	Description of the nesting habitat, trend analyses Survey of invasive vegetation Quantification of the carrying capacity (number of breeding pairs) of the favourable area Scientific reports and articles, communication of results
References	Frenot & Valleix 1990 ; IPEV research programmes no. 136 and 109

Action 5.2	Terrestrial habitat: Environmental benefits for other species	Priority 1 2 **3**

Domain	Study /Protection/Communication
Timetable	Year 5
Context	From the viewpoint of nature conservation, the Amsterdam albatross is considered as an "umbrella" species, which means that management actions to protect it will also help preserving other species of both the fauna and flora. This action aims to measure and report during the whole plan, examples of benefits observed on other native species (of both the fauna and flora) from actions carried out for the Amsterdam albatross, by collecting data showing positive effects of the Plan on other species (considering the Amsterdam albatross as an "umbrella species"). If negative impacts are observed, they should also be reported.
Description	• **Evaluate the impact of the management/conservation actions on other native species** • **Measure environmental benefits** of setting up the action plan..
Localities targeted	Amsterdam Island and Indian Ocean
Financial evaluation	Funding needed for this action reports to IPEV via funding of its scientific programmes, and to CNRS
Specific funding call for NPA	**No funding is asked for this action**
Potential executive partners	CNRS Chizé (Marine Predators Team, directed by H Weimerskirch), CNRS Rennes Paimpont (directed by M Lebouvier), IPEV, Zone Atelier CNRS (INEE), National Nature Reserve of the French Southern lands, Ministry of Ecology, national operator of the plan
Potential funding	Animation of the plan / Ministry of Ecology, IPEV
Indicators of progress and evaluation	Site-specific list of native species which have been positively or negatively affected by management /conservation (and impact type) List of environmental benefits observed in the terrestrial/marine habitats
References	

4.2.6. Habitat restoration and invasive species

Action 6.1	**Habitat restoration:** **Evaluation of the interactions between introduced predator species and Amsterdam albatrosses**	Priority: **1** 2 3

Domain	Study /Protection/Communication
Timetable	Annual
Context	Elsewhere on the planet, introduced predators explain a large part of the extinction of endemic insular species and therefore are a major component in the loss of biodiversity among vertebrates. Numerous studies have shown the impact of introduced predator mammals on indigenous seabird species in insular environments similar to Amsterdam Island. Nevertheless, no predation event by an introduced species has ever been reported for the Amsterdam albatross.
Description	• **Evaluate and quantify interactions between Amsterdam albatrosses and introduced mammal species**: - directly, via automatic and continuous observations on the colony with infra-red cameras (years 1 & 2), - via the study of the introduced mammals' diet. • Scientific publications This is to be carried out within the framework of IPEV research programmes on Amsterdam Island (no. 109 directed by H Weimerskirch).
Localities targeted	Breeding site: plateau des tourbières, Amsterdam Island
Financial evaluation	Funding needed for this action reports to IPEV via funding of its scientific programmes, and to CNRS (notably via "Zone Atelier Antarctique") + specific funding Video-monitoring of the nests: 1000€ per nest (12 nests) Data analysis engineer PNA during years 2 & 3 : 2*1 month (3000€/month)
Specific funding call for NPA	**Funding asked: 16,000€ for the whole plan**
Potential executive partners	CNRS Chizé (Marine Predators Team, directed by H Weimerskirch), IPEV, National Nature Reserve of the French Southern lands
Potential funding	National Nature Reserve of the French Southern lands / Actions Plan for Biodiversity /Plan National Actions/ IPEV
Indicators of progress and evaluation	Quantification of the interactions between Amsterdam albatrosses and introduced predators
References	IPEV Research Programme no. 109, ACAP guidelines for eradication of introduced mammals from breeding sites of ACAP-listed seabirds

Action 6.2	**Habitat restoration:** **Eradication of introduced predator species on Amsterdam Island**	**Priority** 1 (highlighted) 2 3

Domain	Study /Protection/Communication
Timetable	Actions conditioned by actions 6.1 & 1.3
Context	Elsewhere on the planet, introduced predators explain a large part of the extinction of endemic insular species and therefore are a major component in the loss of biodiversity among vertebrates. Numerous studies have shown the impact of introduced predator mammals on indigenous seabird species in insular environments similar to Amsterdam Island. **This action is conditioned by results of actions 6.1 & 1.3.**
Description	Depending on results of actions 6.1 & 1.3 on introduced predators on Amsterdam Island: • **Maintain low levels of populations** of introduced species interacting with the Amsterdam albatross (on a part and/or on the whole island), by controlling them on the breeding site **<u>Or</u>** • **Eradicate all (or part of)** introduced species interacting with the Amsterdam albatross • Population survey of the introduced species after management actions This is to be carried out within the framework of IPEV research programmes on Amsterdam Island (no. 109 directed by H Weimerskirch).
Localities targeted	Breeding site: plateau des tourbières, Amsterdam Island
Financial evaluation	CNRS Costs of management and/or eradication of the populations of introduced species to evaluate
Specific funding call for NPA	**To be determined**
Potential executive partners	CNRS Chizé (Marine Predators Team, directed by H Weimerskirch), coll. D Pontier, T. Micol, IPEV, National Nature Reserve of the French Southern lands /TAAF Other partners to identify
Potential funding	To be defined / Actions Plan for Biodiversity /Plan National Actions
Indicators of progress and evaluation	Maintain low levels <u>or</u> eradicate all or part of the populations of introduced mammal species for which interactions have been previously evaluated Survey populations of introduced species
References	IPEV Research Programme no. 109, ACAP guidelines for eradication of introduced mammals from breeding sites of ACAP-listed seabirds

4.2.7. Communication

Action 7.1	Communication : Communication of the national plan of actions for the Amsterdam albatross in France	Priority 1 **2** 3

Domain	Communication
Timetable	Annual
Context	To be fully effective, the plan must not only be known but also understood and implemented by all staff sent inside the Nature Reserve, by the partners and by all relevant decision making institutions. The goal of this action is to broadcast, at national and mostly international levels, information about this plan and its stage of progress.
Description	Goals of this action are: • **Launch the plan** in a public event, with a public scientific conferences • **Broadcast information about the existence of this plan**, towards staff that may be sent to work in the Nature Reserve, particularly Amsterdam, towards decisional institutions and international community (e.g. Birdlife International, ACAP, RFMOs) and towards those involved in thefisheries (managers and fishermen), 1. Speech for staff/tourists that land on the island 2. Writing and pubblication of a shorter document directed at professional working in the fisheries 3. Preparation of a document to present the plan • **Make the plan and its current status widely accessible**. Though it is a national plan, it will be a priority to edit English and also Spanish if possible versions of the plan, accessible on the Internet. A shorter version may also be broadcasted. • **Conference for restitution/dissemination**
Localities targeted	French Southern Lands and every maritime stopover on Amsterdam Island All the regions: national territory and international community (scientists, RFMOs, governments of nations neighbouring the species' distribution area …etc)
Financial evaluation	Conference, public events…
Specific funding call for NPA	**25,000€ for the whole plan**
Potential executive partners	LPO, National Nature Reserve of the French Southern lands, national operator of the plan, Ministry of Ecology, CNRS Chizé
Potential funding	Animation of the plan / Ministry of Ecology / National Plan of Actions/
Indicators of progress and evaluation	Attendance at the public event for launching of the plan Editions of the plan available to the international community Number and quality of the addressees for these versions Number and quality of the addressees for the presentation documents, formations or animations
References	

Action 7.2	Communication : Coordination and implementation of the actions	Priority **1** (selected) 2 3

Domain	Protection/Communication
Timetable	Annual
Context	Success of the plan will depend on the actions carried out but also on the coherence and dynamism of the partnership network.
Description	• Survey the setting up of the plan of action and edit annual reports of outcomes from the information submitted from the different partners • Support partners of the plan with implementation of the actions • Review administrative procedures and proposals that modify or add unilateral actions towards the government services, ministries for Ecology, for potential validation by European Commission, if gaps are found. • Survey the indicators of progress, publication of the logbook (auto-evaluation of the plan)
Localities targeted	Amsterdam Island and Indian Ocean
Financial evaluation	**To be defined**
Specific funding call for NPA	**To be defined**
Potential executive partners	Operator of the plan, LPO, CNRS Chizé (Marine Predators Team, directed by H Weimerskirch), IPEV, National Nature Reserve of the French Southern lands, Ministry for Ecology
Potential funding	Publication of the plan / Ministry for Ecology / Actions Plan for Biodiversity / National Plan of Actions/
Indicators of progress and evaluation	Develop questionnaire mid-way though and at end of the plan, for the different partners and operators Annual Activity Report Peer review by international organisations (e.g. ACAP) and by the scientific community
References	

4.3. Partners of the national plan of actions

National Nature Reserve of the French Southern Territories, TAAF, IPEV, CNRS Chizé, LPO, IRD (A. Fonteneau), Museum National d'Histoire Naturelle, ONCFS SAGIR (Laboratory specialized in pathogens (animal/birds – control of epizooties).

4.4. Plan Monitoring, Evaluation and schedule

The monitoring committee's role is to assist the TAAF as Overseas Territories and management agency in coordinating and implementing the plan. Co-animation of Monitoring Committee will be provided in partnership with the LPO. The Committee shall be consulted in the initial stages of drafting, as expected.

The Monitoring Committee also includes the Ministries for Ecology, for Fisheries, for Overseas territories, the French Polar Institute – IPEV, the marine predators research team of the CNRS Chizé, the IUCN, and the MNHN. It will be enlarged if necessary.

The plan is set out for a period is five years (2010-2014). At the end of its effective period, an assessment will be established to evaluate the effectiveness of measures implemented particularly with regard to the conservation status of the Amsterdam albatross and its habitat, and to verify the adequacy of actions versus objectives undertaken.
To allow effective monitoring of actions implemented during the plan period, a report on these actions will be conducted annually. It will provide to the steering committee the necessary elements for a possible reorientation of priorities, depending in particular of the indicators of population trends of the Amsterdam albatross.
This annual report will contain at least:

- A review of achievements of each measure, indicating the progress and, where appropriate,
- The reasons for delays (see action sheets and table below);
- Reports of technical meetings;
- The proposed action planning for next year;
- An overview of communication media;
- A financial statement, specifying the cost of the actions undertaken, human resources and the sources of funds.

Domain	Action	Year				
		1	2	3	4	5
Long-term monitoring	1.1 Long-term survey					
	1.2 Demography & trends					
	1.3 Demography modelling					
Epizooty	2.1 Knowledge on pathogens					
Marine Habitat	3.1 At-sea distribution					
	3.2 Modelling at-sea distribution					
	3.3 Identification of Marine IBAs					
	3.4 Diet / part 1					
	3.5 Diet / part 2					
Interactions with fisheries	4.1 Knowledge on interactions					
	4.2 Bycatch mitigation measures					
	4.3 Bycatch observation					
	4.4 Supporting and promoting bycatch mitigation measures					
	4.5 Information to ORGPs					
Terrestrial Habitat	5.1 Nesting habitat					
	5.2 Environmental benefits					
Invasive Species	6.1 Interaction with introduced species					
	6.2 Eradication of introduced species					
Communication	7.1 NPA Communication					
	7.2 NPA Coordination & animation					

Table 9 Schedule for the actions plan to implement for the conservation of the Amsterdam albatross (D. amsterdamensis) in the frame of the national action plan (shades of gray- light to dark- indicate the actions of less priority to the most, in terms of interest, feasibility and timing)

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Susan Waugh-Filippi (Birdlife International Global Seabird Programme) has helped to improve this document by all the comments it has made.
Thanks to all the participants of the steering committee.

The indicators of progress are presented in each of the «action sheets» and are presented here as a summary table. The list is not exhaustive, the Steering Committee may establish additional indicators.

Domain	Action	Indicators of progress and evaluation
Long-term monitoring	1.1 Long-term survey	Evolution of the population size estimates
		Survey on the anomalous disappearance of breeding individuals
	1.2 Demography & trends	Trend of the Amsterdam albatross population
		Trend of the demographic parameters (breeding success, recruitment rate, survival…)
	1.3 Demography modelling	The projections of population size estimates according to different environmental scenarios allow to give priority criteria to managing actions considered
Epizooty	2.1 Knowledge on pathogens	Outcome and epidemiologic survey of the Amsterdam albatross population (sanitary vigilance)
		Ability of the managers of the National Nature Reserve of the French Southern lands to face an epidemiological threat on the population
		Scientific reports and articles, communication
Marine Habitat	3.1 At-sea distribution	Number of individuals tracked/equipped (satellite tags / GLS)
		Identification of the core-use areas and key habitats for birds at each one of the breeding and life-cycle stages
		Activation of a spatialised database
		Scientific reports and articles, communication
	3.2 Modelling at-sea distribution	Evaluation on a mid- and long-term of the at-sea distribution trend
		Get projections of the at-sea distribution of the population under different environmental scenarios allowing to sort priority amongst management measures planned
		Launch a decision-support tool
		Scientific reports and articles, communication
	3.3 Identification of Marine IBAs	Identification of Marine IBAs
		Establish priorities to action sites
		Scientific reports and articles, communication of results
	3.4 Diet / part 1	Evaluation of occurrence of fisheries-related items in diet
		Scientific reports and articles, communication
	3.5 Diet / part 2	Description, quantification and survey of diet
		Scientific reports and articles, communication
Interactions with fisheries	4.1 Knowledge on interactions	Description of the southern Indian Ocean fisheries
		Identification of the overlaps between marine IBAs and operating fisheries
		Sort priorities in action sites
		Development of a partners web
		Scientific reports and articles, communication of results
		Application of the three best measures known to reduce bycatch in the fisheries operating in the areas used by the Amsterdam albatrosses.

Table 10 Indicators of results and implementation of the national plan of actions for the conservation of the Amsterdam albatross (D. amsterdamensis)

	4.2 Bycatch mitigation measures	Application of a coverage rate of fisheries by devoted observers of 50% minimum on a special zone delineated for the Amsterdam albatross into the IOTC and CCSBT (outside EEZ). Number of Amsterdam albatrosses captured in long-line fisheries
	4.3 Bycatch observation	Data on the seabirds bycatch rate (and more specifically of Amsterdam albatrosses) by fishing vessels in international waters and/or national waters accessible to the international community Launching of a survey on bycatch rates Evaluation of a minimum survey level to obtain reliable estimates
	4.4 Supporting and promoting bycatch mitigation measures	Contribution to the different working groups, international and ACAP commissions Effective/best practice seabird bycatch mitigation measures formally adopted in IOTC
	4.5 Information to ORGPs	Representation of France at IOTC Contribution to the different working groups of the international commissions and ACAP, notably by providing data on the areas where fisheries and Amsterdam albatrosses overlap Progress in implementing mitigation measures and increasing the minimum coverage rate of fisheries by devoted observers.
Terrestrial Habitat	5.1 Nesting habitat	Description of the nesting habitat, trend analyses Survey of invasive vegetation Quantification of the carrying capacity (number of breeding pairs) of the favourable area Scientific reports and articles, communication of results
	5.2 Environmental benefits	Site-specific list of native species which have been positively or negatively affected by management /conservation (and impact type) List of environmental benefits observed in the terrestrial/marine habitats
Invasive Species	6.1 Interaction with introduced species	Quantification of the interactions between Amsterdam albatrosses and introduced predators
	6.2 Eradication of introduced species	Maintain low levels or eradicate all or part of the populations of introduced mammal species for which interactions have been previously evaluated Survey populations of introduced species
Communication	7.1 NPA Communication	Attendance at the public event for launching of the plan Editions of the plan available to the international community Number and quality of the addressees for these versions Number and quality of the addressees for the presentation documents, formations or animations
	7.2 NPA Coordination & animation	Develop questionnaire mid-way though and at end of the plan, for the different partners and operators Annual Activity Report Peer review by international organisations (e.g. ACAP) and by the scientific community

4.5. Financial estimate

The cost of a number of actions in the plan, including those to be undertaken directly by the operator can be offered with a reasonable level of accuracy. However, for others, the cost calculation is dependent on parameters specific to each plan's partner and site specific, making it difficult to accurately assess the cost of each action of the plan.
The following tables present the estimated cost per action and the partners involved as well as the annual cost per action throughout the plan.
This estimate does not include the cost of carrying out actions such as publishing brochures, travel outside the metropolitan area...

Thème	Action	Budgeting associé	RNN	IPEV	CNRS Chizé	Other partners	NPA
	1						
	1.1 Long-term survey	- Funding of this action reports to IPEV (via programme no. 109) and to CNRS	no	yes	yes	no	No
Long-term monitoring	1.2 Demography & trends	- Funding needed for this action reports to CNRS (Chizé) which performs demography analyses - Funding of a database engineer in charge of monitoring this population, for 1 month (3,000€/year)	no	no	yes	no	no
	1.3 Demography modelling	- This action will be performed thanks to an engineer contract at CNRS Chizé (cf actions 3.1) - 4 months, Year 5, 3,000€/month	no	no	yes	no	yes
	2						
Epizooty	2.1 Knowledge on pathogens	- Sampling gear : 2135 € - Sampling analyzes: complete scanning 6000€ + search analysis for avian cholera prevalence 8000€ - Contract funding for an epidemiologist 2 months (4000€/month) - Coordination, project management, report: 3000€	yes	yes	yes	ONCFS-SAGIR	Yes
	3						
Marine Habitat	3.1 At-sea distribution	- Funding needed for this action reports to IPEV via funding of its scientific programmes, and to CNRS regarding staff presence on the field - needs a specific funding as a complement to buy telemetry devices and data analysis: - Survey of breeding adults (chick rearing): 10 ARGOS tags (25,000€), functioning during 6 months (location costs = 6,000€) - Survey of adults during sabbatical year: 10 GLS loggers (5,000€) and analysis (5,000€) - Survey of juveniles and immatures : 15 ARGOS tags (45,000€) + location costs (15,000€) - Multi-annual survey of juveniles: 20 GLS loggers/year (4,000€/year, analysis 5,000€/year) - Funding for an engineer contract to carry out actions 1.2, 3.1 and 3.3: - Data analysis engineer NPA: 2*2 months per year (3,000€/month)	no	yes	yes	no	Yes
	3.2 Modelling at-sea distribution	- Funding needed for this action reports to IPEV (via programme no. 109) and to CNRS Chizé for data analysis in France mainland. - engineer NPA contract (12 months, 3,000€/month) in year 5	no	yes	yes	no	no
	3.3 Identification of Marine IBAs	- engineer NPA contract in spatial analyses and fisheries statistics during 3 months in year 1 + 2 months in year 5 (3,000€/mois) CNRS Chizé, LPO	no	no	yes	no	no
	3.4 Diet / part 1	- Funding needed for this action reports to IPEV via funding of its scientific programmes, and to CNRS regarding staff presence on the field. - 1 fieldworker contract - Frequency : 6 months year 1 (2122€/month)	?	yes	yes	no	no

Table 11 Costs per action (in euros) to implement for the Amsterdam albatross national plan of action and involvement of the different partners

	3.5 Diet / part 2	- Funding needed for this action reports to IPEV via funding of its scientific programmes, and to CNRS regarding staff presence on the field. - 1 fieldworker contract (cf action 3.4)	?	yes	yes	no	yes
Interactions with fisheries	4						
	4.1 Knowledge on interactions	- engineer NPA contract in spatial analyses and fisheries statistics during 3 months in year 1 + 2 months in year 5 (3,000€/month) CNRS Chizé (c.f. action 3.3)	no	yes	no	IRD	
	4.2 Bycatch mitigation measures	- To be determined	?	?	?	?	?
	4.3 Bycatch observation	- To be determined	?	?	?	?	?
	4.4 Supporting and promoting bycatch mitigation measures	- To be determined	?	?	?	?	?
	4.5 Information to ORGPs	Funds needed for this action stand for the trips of scientists from CNRS Chizé involved in seabirds research & conservation to participate in working groups meetings of the RFMOs different commissions (IOTC, CCSBT) and ACAP (4000€/year)	yes	no	yes	no	yes
Terrestrial Habitat	5						
	5.1 Nesting habitat	Funding needed for this action reports to IPEV via funding of its scientific programmes no. 109 and 136, and to CNRS regarding staff presence on the field. Fieldwork season (2-3 persons during 1.5 to 2 months) Analyses in laboratory (data exploitation, synthesis and redaction) : to be defined	yes	Yes	in progress	no	no
	5.2 Environmental benefits	Funding needed for this action reports to IPEV via funding of its scientific programmes no. 109 and 136, and to CNRS. To be determined	yes	yes	yes	no	No
Invasive Species	6						
	6.1 Interaction with introduced species	Funding needed for this action reports to IPEV via funding of its scientific programmes no. 109 and 136, and to CNRS + specific funding Video-monitoring of the nests: 1000€ per nest (~12 nests)	yes	yes	yes	no	Yes
	6.2 Eradication of introduced species	Funding needed for this action reports to IPEV via funding of its scientific program no. 109, and to CNRS + specific funding Costs of management and/or eradication of the populations of introduced species to be evaluated	yes	yes	yes	no	no
Communication	7						
	7.1 NPA Communication	To be determined	yes	yes	no	Yes	Yes
	7.2 NPA Coordination & animation	To be determined	yes	yes	yes	yes	No

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6. List of figures

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7. Annexes

Annex 1 - Mitigation of bycatch in fisheries - Practical information on mitigation of incidental catch of seabirds; BirdLife International has edited14 fact sheets summarizing all the latest results on measures of mitigation of bycatch grouped by type of fisheries and measures, including examples for the three most effective measures are presented below.
(cards available at the following address, downloaded on 25/02/2010:
http://www.rspb.org.uk/ourwork/policy/marine/international/publications.asp)

Bycatch Mitigation FACT-SHEET 5 (Version 1)

Practical information on seabird bycatch mitigation measures

Demersal and Pelagic Longline: Night-setting

Night-setting is one of the few mitigation measures that is equally applicable to both demersal and pelagic longline fisheries.

What is night-setting?

Night-setting requires no modification of the fishing gear. It simply requires setting to be started and finished during the hours of darkness, between nautical dusk and dawn.

Setting at night avoids periods when most seabirds are actively foraging. Available information suggests that albatrosses and petrels detect food items at close range by sight and so darkness effectively conceals baited hooks from most foraging seabirds. Additionally, many seabirds, particularly albatrosses, are most active during daylight hours, including dusk and dawn. Data from stomach temperature gauges (Weimerskirch and Wilson, 1992) suggest that wandering albatross, at least, feed primarily during daylight hours and rest at night. This is reflected in bycatch studies, which frequently show that time of day is an important factor affecting the number of birds caught during longline setting (e.g. Baker and Wise, 2005). In particular, dawn and dusk are times when birds are most active and consequently most vulnerable to longline bycatch (e.g. Belda and Sanchez, 2001).

Effectiveness at reducing seabird bycatch

On moonless cloudy nights, night-setting can be highly effective at limiting seabird bycatch. However, for up to two weeks every month the moon may provide enough light to significantly reduce the effectiveness of night-setting (Klaer and Polacheck, 1998; Petersen, 2008).

Seabird species

The effectiveness of night-setting is also dependent on the species assemblage. In some instances, where albatrosses compose the majority of bycatch, night-setting can effectively reduce seabird bycatch. Around the Prince Edward Islands, Southern Ocean, experimental trials indicate albatross bycatch rates are ten times higher during the day than at night whereas white-chinned petrel bycatch was halved when setting at night (Ryan and Watkins, 2002). Off the east coast of Australia, where shearwaters predominate, night-setting alone is less effective, although bycatch rates are still lower than day sets (Baker and Wise, 2005).

Best practice recommendation

To be effective, vessels should not commence line setting until at least one hour after nautical dusk and should complete setting at least one hour before nautical dawn. Combined with night-setting, deck lights should be kept at the minimum level appropriate for crew safety and directed inboard so the line is not illuminated as it leaves the vessel.

Potential problems and solutions

- Night-setting is only truly effective on dark nights (i.e. the new moon half of the lunar cycle). On clear nights with a full moon, night-setting becomes far less effective (Klaer and Polacheck, 1998; Petersen, 2008).
- In the highest latitudes during the summer months, the time between nautical dusk and dawn is limited. In these circumstances, fishing opportunities are greatly reduced.

Figure 1. At night, seabirds are generally less active and have difficulty locating baits.

Figure 2. Seabirds, and albatrosses in particular, are more active during the day.

BirdLife INTERNATIONAL

Bycatch Mitigation FACT-SHEET 3 (Version 1)

Practical information on seabird bycatch mitigation measures

Demersal Longline: Integrated weight longlines

Line weighting is an essential component of seabird bycatch mitigation strategies, being one of the most effective known mitigation measures (a primary measure). Best practice weighting regimes should result in rapid initial line sink rates that will reduce the likelihood of seabird bycatch. Integrated weight lines with lead beads in the core were developed to address this problem.

What are integrated weight longlines?

Seabirds are vulnerable to mortality during the short period between hooks leaving the vessel and sinking beyond the bird's diving range. In demersal longline fisheries, lines are weighted in order to deliver hooks to the target fishing depth as efficiently as possible and maintain the line on the seabed.

Autoline gear consists of a single line with baited hooks attached at regular intervals (Figure 1). On autoliners, the addition of external weights at regular intervals is problematic. Prior to the development of integrated weight lines, fishermen using the Autoline System generally applied less external weight than was necessary to achieve the high initial sink rate needed to minimise bycatch. Integrated weight lines were developed to improve sink rates in autoline gear. The weight is distributed evenly throughout the line, which results in a uniform linear sink rate from the sea surface.

Effectiveness at reducing seabird mortality

To avoid catching seabirds and allow robust statistical analysis, experimental trials have used the sink rate of lines under different weighting regimes to evaluate the potential for reducing seabird bycatch.

Early sink rate experiments

- Smith (2001) examined the sink rate of autolines under varying weighting regimes and found that adding external weight at large intervals (every 400 m) made no difference to the overall sink rate of the line.
- Robertson (2000) experimented with various external line weighting regimes on autoline gear. The results highlight the importance of weight spacing to achieving a steady sink rate. After examining several alternative regimes, Robertson concluded that a sink rate >0.3 m/s was desirable to minimise the exposure of the line to seabird strikes across a variety of setting speeds and weighting regimes.

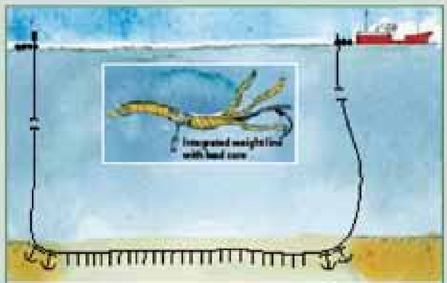

Figure 1. Autoline gear configuration.

Integrated weight experiments

- Trials in New Zealand found that the sink rates of lines with integrated lead beads (50 g/m) were similar to unweighted lines with 6 kg external weights every 42 m. Of particular importance to seabird bycatch is the initial sink rate – unweighted lines may float on or near the surface, held up by propeller turbulence, for up to 80 m astern. Integrated weight lines commenced sinking almost instantly and maintained a steady linear sink profile. These properties are reflected in the recorded sink rates of each line type: integrated lines averaged 0.2 m/s to 2 m depth and 0.24 m/s to 20 m, compared to unweighted lines, which lofted in propeller turbulence for >20 seconds before sinking and averaged only 0.11 m/s to 20 m depth (Figure 2).
- Improvements in the initial sink rate and sink rates to 20 m depth translated into a 95% and 60% reduction in white-chinned petrel mortality and sooty shearwater mortality, respectively (Robertson *et al.*, 2006) in the New Zealand ling fishery when using integrated weight lines.
- Integrated weight lines have also proven effective in reducing seabird bycatch in northern hemisphere fisheries (see Dietrich *et al.*, 2008), thus demonstrating the extensive applicability of the method. This study also demonstrated that integrated weight lines, when used in combination with paired streamer lines, very nearly eliminated seabird bycatch in the fishery in which it was undertaken.

In addition to the amount of weight applied to longlines, several other factors influence the sink rate of autoline gear:

Weight spacing

The mass of weight added to lines is clearly an important consideration but spacing between weights is equally important. To achieve a uniform sink rate, weight should be evenly distributed along the entire line. Integrated weights minimise line lofting in propeller turbulence resulting in a linear sink profile.

Environmental

In rough seas, heavy swell can maintain the line close to the surface and expose it in the troughs between waves. The pitching of a vessel in rough seas reduces the sink rate and can bring hooks back to the surface.

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Bycatch Mitigation FACT-SHEET 1 (Version 1)

Practical information on seabird bycatch mitigation measures

Demersal Longline: Streamer lines

Streamer lines are the most commonly prescribed mitigation measures for longline fisheries and are regarded as one of the most effective known mitigation measures (a primary measure). Streamer lines are cheap, simple to use and do not require modification of the fishing gear.

What are streamer lines?

Streamer lines (also called tori or bird scaring lines) consist of lengths of rope with brightly coloured streamers towed behind longline vessels during line setting to deter seabirds from attacking baited hooks. Currently, the design most commonly recommended for demersal longline fisheries is that prescribed by the Commission for the Conservation of Antarctic Marine Living Resources (SC-CAMLR, 2006). The CCAMLR recommended streamer line configuration is described in detail later in this Fact-sheet, under Technical Specifications.

Effectiveness at reducing seabird bycatch

When deployed properly under suitable conditions, streamer lines can be very effective at reducing seabird mortality. For example, in the North Atlantic experimental trials showed a 98% reduction in seabird bycatch (Løkkeborg, 2003) when a streamer line was used. In Alaska, paired streamer lines have the potential to reduce seabird bycatch of surface feeding species, primarily northern fulmars and Laysan albatrosses, by 88–100% (Melvin *et al.*, 2001). However, in this fishery shearwater bycatch rates remained unchanged, as their superior diving abilities allow them to target baits beyond the effective protection of the streamer lines.

Figure 1. Streamer lines deter seabirds from feeding on baited hooks.

Key to the effective use of a single streamer line, are the aerial extent achieved, the ability to adjust the line's position, the attachment height above sea level (>7 m), and the overall length (150 m). The spacing and length of streamers and type of materials used in the line's construction are also important considerations.

Streamer lines are more effective as a seabird deterrent when multiple lines are deployed. Reid *et al.* (2004) showed a significant decrease in seabird mortality when demersal longline vessels used multiple streamer lines. Two lines resulted in 75% reduction and three lines a 97% reduction in seabird mortality when compared with a single streamer line. Melvin *et al.* (2001) found strong statistical evidence for reduced seabird attacks on baits, resulting in lower bycatch rates, when paired streamer lines were used.

In several demersal longline fisheries, where the risk of seabird bycatch is high (Alaska, Heard Island and the French territories within CCAMLR), paired streamer lines are compulsory. Many biological and environmental factors influence the performance of a streamer line.

Seabird species

The number and species of seabirds associating with a fishing vessel are important considerations, as increased competition results in increasingly frenzied feeding activity. Under these conditions, birds are less likely to be distracted by streamer lines. Certain species of seabirds, particularly shearwaters, some petrels and albatrosses dive to considerable depths and can access hooks beyond the protection of a streamer line. Where diving species are numerous, experimental trials of streamer lines have been less convincing (Melvin *et al.*, 2004). Although effective in isolation, streamer lines alone are not sufficient to eliminate bycatch; a combination of mitigation measures is required.

Environmental variables

Wind strength and direction in relation to vessel course, can deflect the streamer line away from its desired position over the hook line. If the hook line is exposed, a single streamer line becomes ineffective.

Best practice recommendation

The key factors affecting the performance of a streamer line are the degree of aerial extent and the position of streamers in relation to the hook line.

- The aerial section is the active part of the line, and acts as a 'scare-crow' keeping birds from reaching baited hooks. Aerial extent is achieved through a combination of attachment height above sea level, overall length of the line and the drag caused by a towed object. Greater aerial extent will contribute to improved protection of the hookline. In order to give hooks sufficient time to sink, the aerial section of a streamer line should extend at least 100 m past the stern of a vessel.

Guidelines for eradication of introduced mammals from breeding sites of ACAP-listed seabirds

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BACKGROUND

Most birds (111 of 127) known to have become extinct since 1500 were island endemics, with mammalian introductions implicated in many cases (Courchamp *et al.*, 2003; Blackburn *et al.*, 2004; Towns *et al.*, 2006). The occurrence of introduced mammals on islands is therefore an issue of global conservation concern. It is also considered by many parties to the Agreement on the Conservation of Albatrosses and Petrels (ACAP) to represent a serious threat to the listed albatross Diomedeidae and petrel *Procellaria* and *Macronectes* species.

Of the various introduced vertebrates, by far the most widespread are Norway (brown) rat *Rattus norvegicus*, black (ship or roof) rat *R. rattus* and Polynesian rat or kiore *R. exulans*. In a recent review, Jones *et al.* (2008) concluded that the impact of rats was least on large, surface-nesting seabirds such as albatrosses, frigatebirds and larids, and greatest on small burrow-nesters such as storm petrels; several studies indicated an impact of rats on breeding success of *Procellaria* petrels; and, kiore were known to have killed adult Laysan albatrosses *Phoebastria immutabilis*. Moreover, recent work at Gough Island (Tristan da Cunha) indicates that predation by introduced house mice *Mus musculus*, which were formerly not considered to pose a threat to large seabirds, reduces the breeding success of Tristan albatross *Diomedea dabbenena* to the extent that the population is unlikely to recover even if fisheries impacts on adult and juvenile survival were eliminated (Cuthbert *et al.*, 2004; Wanless *et al.*, 2007). Other introduced mammals considered to pose threats to ACAP species either directly through predation or indirectly through habitat degradation and destruction include pigs *Sus scrofa*, goats *Capra hircus*, cats *Felis catus*, rabbits *Oryctolagus cuniculus* and mustelids (Croxall *et al.*, 1984; Croxall, 1991).

Given the threats posed by introduced mammals, some means of eliminating or ameliorating their impact is clearly desirable. As it happens, the islands on which ACAP species breed are usually sufficiently isolated that eradication is a practical option, given the very high chance that future re-introductions can be minimised. However, that isolation also increases the logistical challenges and therefore the cost, making it a greater challenge to secure sufficient funding compared with a similar island closer to a mainland. Accepting continuing decline of species of conservation concern, or the (usually costly) control of the introduced mammals in perpetuity, are clearly much less satisfactory options. Moreover, pest eradication from islands will usually benefit other components of the ecosystem, including burrowing petrels not listed under ACAP, terrestrial birds, invertebrate and plant communities. On inhabited islands, agricultural productivity may be enhanced significantly.

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