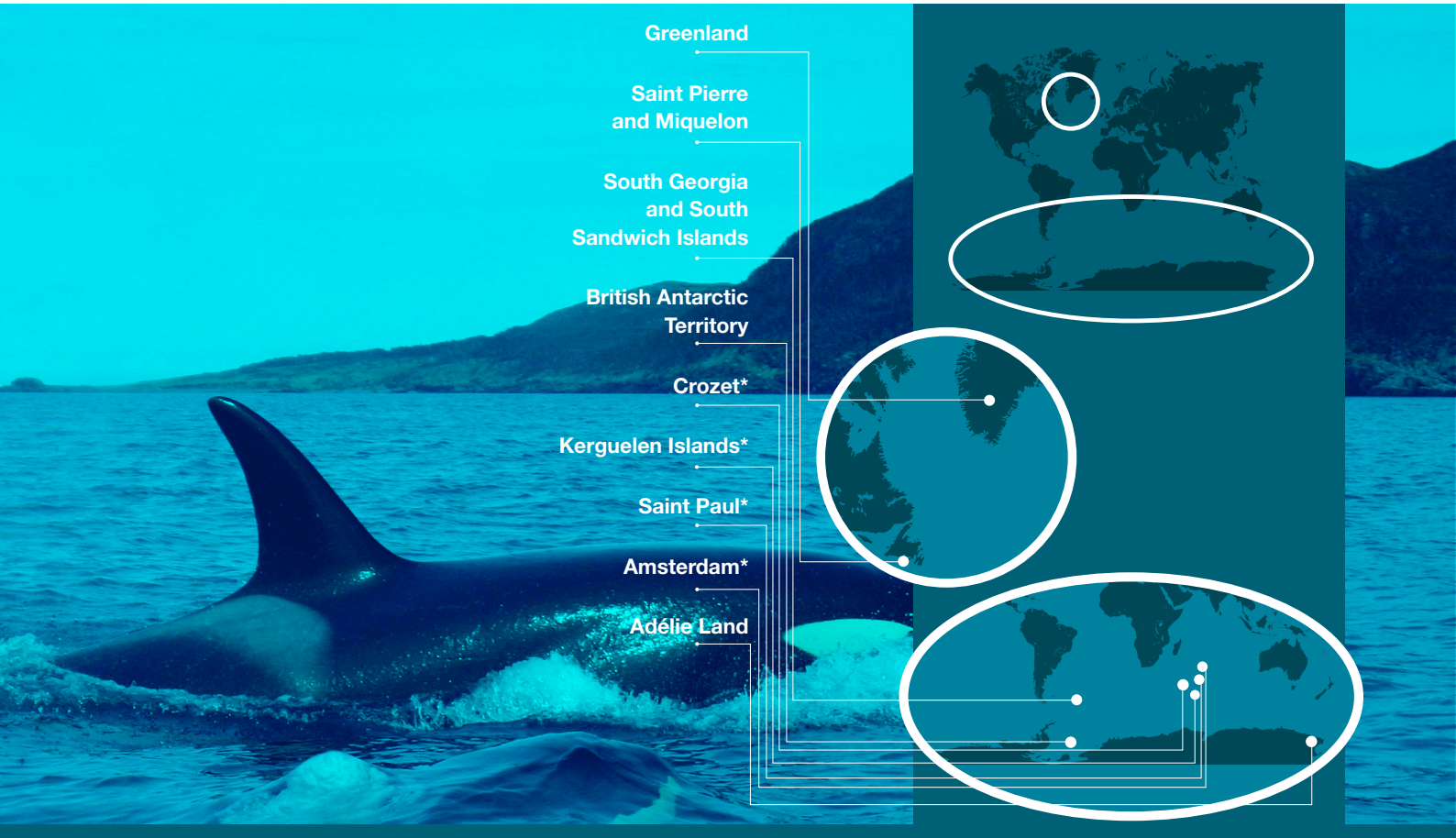
BEST
VOLUNTARY SCHEME FOR BIODIVERSITY AND ECOSYSTEM SERVICES IN TERRITORIES OF EUROPEAN OVERSEAS

EUROPEAN OVERSEAS

REGIONAL ECOSYSTEM PROFILE

Polar&Sub-Polar



* Part of Territory of the French Southern and Antarctic Lands (TAAF)

European Commission

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Disclaimer: *The **Regional Ecosystem Profile** is a technical document with input from regional and local experts and other stakeholders, obtained in a participatory consultation process. The results of this background document were used to elaborate a **Regional Investment Strategy** in the same participatory manner, which may serve as a guiding document for future national and regional strategies. Neither document is politically binding or replaces a national or regional strategy authorized by the respective decision makers. It does not represent an official position of the coordinator of the polar and subpolar hub.*

Contents

EXECUTIVE SUMMARY

The Polar and Subpolar region includes five European Overseas territories, covering a total surface almost as big as continental Europe: the Danish autonomous country Greenland and the French Overseas collectivity of Saint Pierre and Miquelon in the Arctic and Atlantic Ocean as well as the French Southern and Antarctic Lands (TAAF – French: *Terres australes et antarctiques françaises*) in the Southern Ocean, the British Antarctic Territory (BAT) on Antarctica and the British South Georgia and the Sandwich Islands in the Southern Atlantic Ocean. While mostly inhabited or sparsely populated, these territories host a large diversity of unique species and ecosystems.

The Polar and Subpolar region comprises one of the seven regions in the world, in which European Union (EU) Overseas entities are located: from the Arctic to the Antarctic, in the Atlantic, the Pacific, and Indian Ocean, and even in parts of the Amazon. Combined their marine areas (Exclusive Economic Zones (EEZs), Exclusive Fishing Zone (EZF) or maritime zones) cover 15% of the ocean. They host 20% of coral reefs and lagoons, provide the last refuge to 6% of globally threatened and endangered species and are acknowledged as biodiversity hotspots for their immense diversity of species, ecosystems and landscapes. Together, the 9 EU Outermost Regions (ORs) and 25 Overseas Countries and Territories (OCTs) host more than 70% of Europe's biodiversity.

The global importance of the rich, unique and valuable biodiversity in these regions as well as the ecosystems it depends on has been recognized internationally. Moreover, there is increasing awareness of the value of healthy ecosystems providing critical services that not only support local, regional economies and livelihoods but also offer cost-efficient climate change solutions. However, these ecosystems as well as the biodiversity are vulnerable and already affected by the impacts of climate change and other threats, as demonstrated in this ecosystem profile elaborated in a participatory approach with local and regional stakeholders under the **European BEST Initiative**[1].

The European BEST Initiative aims to strengthen biodiversity conservation and climate change adaptation in the 7 European Overseas regions by raising awareness, profiling the Key Biodiversity Areas as priority areas for actions, supporting actions on the ground. To achieve these objectives knowledge hubs were established in the 7 EU Overseas regions and tasked to develop a regional ecosystem profile by assessing the current situation of the region's biodiversity, habitats and their threats based on the most recent scientific data and observation and present them in the socio-economic and political context. Each regional knowledge hub has mobilized during 3 years local and regional actors and authorities in order to compile and discuss in a very participatory manner the latest available data feeding into the analysis before agreeing on priority areas for action for the region based on the outcomes of the species and ecosystems and threats assessments. Each ecosystem profile also includes an analysis of current conservation activities and relevant investments in the region.

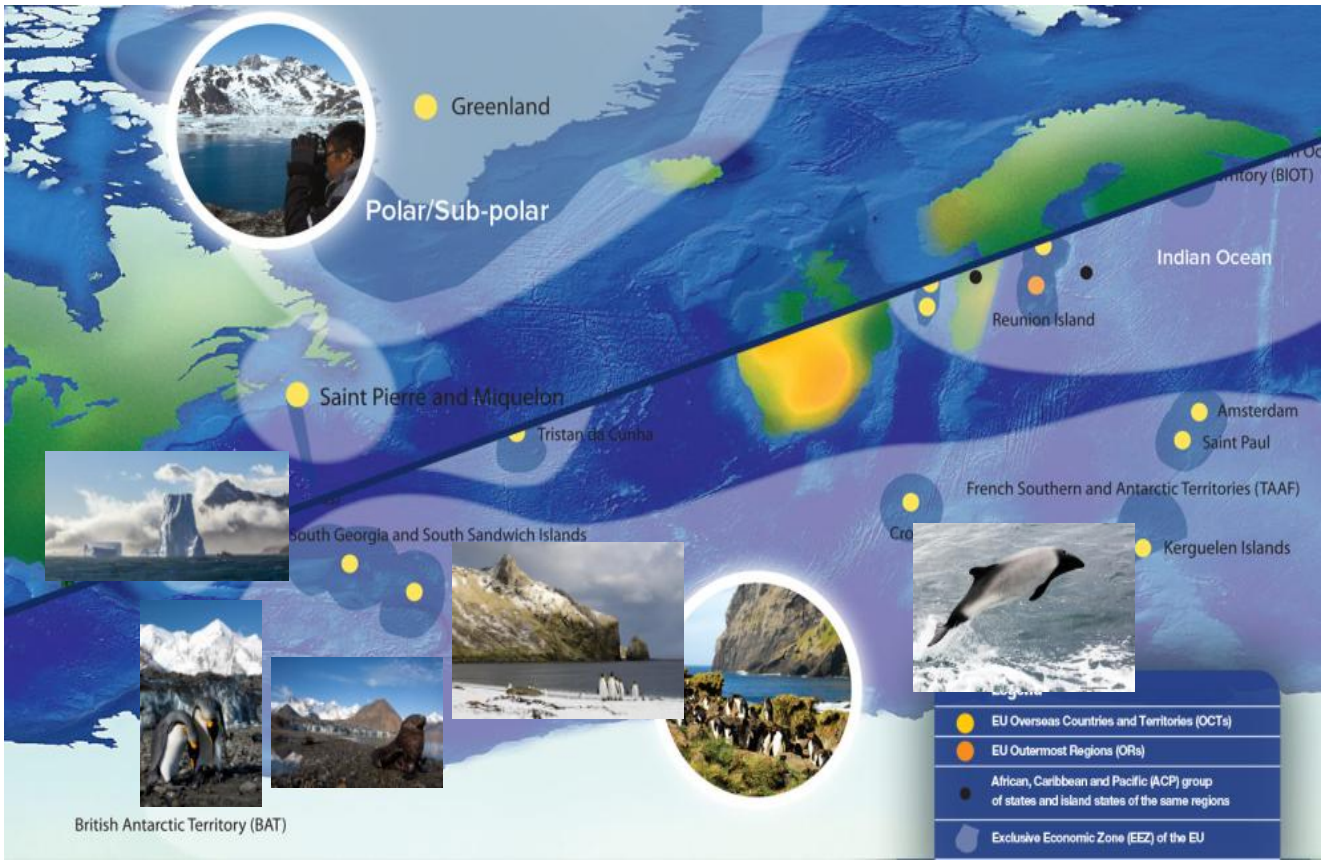
[1]BEST – Voluntary scheme for Biodiversity and Ecosystem Services in Territories of European Overseas. For more information visit: http://ec.europa.eu//best/

The Polar and Subpolar ecosystem profile

The Polar and Subpolar ecosystem profile was developed through a consultation process over the past 2 years, led by the French Southern and Antarctic Lands (TAAF) in partnership with local, regional and national organizations, and included an experts' roundtable meeting, consultations and workshops engaging more than 150 stakeholders from local communities, government institutions, research organizations and donor agencies of the Antarctic and Arctic regions (chapter 2).

The ecosystem profile presents an overview of biodiversity importance (chapter 3), socioeconomic (chapter 5), policy (chapter 6) and civil society (chapter 7) contexts of the EU Overseas territories located in the polar and sub-polar regions. Based on a scientific process, it determines Key Biodiversity areas (Chapter 4) and conservation priorities (chapter 10) considering habitat and species vulnerability (chapter 8) as well as existing conservation investments and programmes (chapter 9).

Figure 1. Map of the polar – sub-polar hub territories



The biodiversity importance of Polar and Subpolar ecosystems

The polar environments are characterized by a wealth of natural resources, remarkable marine and terrestrial biodiversity and extreme climate conditions. All territories of the region are located within very productive parts of the Atlantic, Indian and Southern Oceans, which support a large part of the world's marine biodiversity. The geographical remoteness of those places led to extreme endemism and adaptation of species.

The vegetation is often dominated by low-to-the-ground plants including mosses, lichens and a few vascular plants. Where present, tree coverage consists of dwarf or creeping species. Marine biodiversity in the polar and subpolar regions is one of the richest on earth, hosting important populations of crustaceans, pelagic and benthic species that provide resources for the many seabirds and marine mammals that congregate there.

The polar and subpolar EU regions are home to one Natural World Heritage Site, the Ilulissat Icefjord on the West Coast of Greenland. The Terres Australes et Antarctiques Françaises (French southern lands), located within the TAAF, will apply for Natural World Heritage in 2018.

However, while the uninhabited or sparsely populated territories of the polar and subpolar region host extreme species richness, in particular marine fauna and seabirds, their ecosystems and species are facing increasing threats. In fact, 60 species of polar and subpolar EU territories are listed as threatened by the global Red List.

The main causes of extinction are linked to

- Invasive alien species, which have a strong impact on native species and their habitats, especially for subantarctic islands
- Habitat destruction or degradation, caused mainly by human activities such as extractive industry (for Greenland) or fisheries (importance source of income for all territories)
- Overharvesting of marine resources, leading to a diminution of fish stocks and imbalance of the marine trophic system inside the boundaries of those territories but also at global scale
- Direct or indirect contamination due to human activities
- Global changes: The high climatic dynamics in those areas have already generated strong modifications of the environment, with irreversible losses in biodiversity and diminished ecosystem services that are essential for the whole planet. Existing threats and pressure on ecosystems are exacerbated by climate change as some areas are no longer permanently covered by ice and snow which allows access of the extractive and fishing industry to those new territories.

Conservation outcomes and niches for investment

A systematic process was undertaken to identify the highest priorities for conservation through delineation of Key Biodiversity Areas (KBAs). This ecosystem profile identifies 296 KBAs for the polar and subpolar regions, 39 in the Arctic and 57 in Antarctic, 174 terrestrial and 122 coastal or marine Amongst those KBAs, 53 were considered high and very high priority by the regional stakeholders and experts with actions needed to conserve these sites.

The following thematic priorities were defined:

1. Improving knowledge about climate change impacts on biodiversity
2. Research on and management of invasive alien species and restoration of habitats and species
3. Research and conservation of threatened and restricted range species
4. Research on marine and terrestrial ecosystems
5. Strengthening the network of marine and terrestrial protected areas
6. Ecosystem Based Management of coastal and marine areas, and marine resource harvesting
7. Assessment of impacts from human activities on biodiversity and ecosystems
8. Strengthening the political and legal framework for sustainable development
9. Improving sustainable development in the territories
10. Capacity building for conservation management
11. Raising awareness on environmental conservation

Photo 1. The Amsterdam albatross,

le Plateau des Tourbières (Copyright Cédric Marteau)

The Amsterdam albatros is one of the rarest birds on earth. Endemic from Amsterdam, it counts only 30 couples and is assessed as Critically Endangered by the IUCN Red List. Its main threats are the predation of chicks by cats, the interaction with fishing boats and the reduction of feeding resources due to climate change. Its reproduction area and its major feeding area have been delineated as priority KBAs. A multi-thematic approach is necessary to implement effective conservation action.

Conclusion

The polar and subpolar hub regroups very distant and different territories but those territories all have in common a very specific biodiversity, with a simplified terrestrial trophic network, a very rich marine life and great concentration of seabirds. The Arctic and Antarctic regions are facing similar threat linked to climate change, invasive alien species, marine exploitation and the destruction of habitat.

To face these threats, increased investments need to be allocated to biodiversity conservation and sustainable use of natural resources in those territories. This ecosystem profile highlights priority areas of conservation concern and thematic priorities for action.

The results of this inclusive and comprehensive ecosystem profile will be used as the basis for a regional investment strategy (RIS). The accompanying strategy presents priority areas for investment over the next 5 years with project ideas, also taking into account the current and past investments as well as the capacity for the implementation of conservation projects in the region.

Building on this analysis, through the consultation and discussion with more than 150 stakeholders and experts from local governments, local and regional institutions and organizations, the regional ecosystem profile and investment strategy aim to inform local, national, regional, European and international decision makers, politicians and investors when planning future developments and prioritizing sustainable investments.

Home to a rich marine life and a high terrestrial endemism, the polar and polar ecosystems are highly vulnerable to global changes and human activities. In the Ecosystem Profile, we delineate Key Biodiversity Areas and priorities for action. Elaborated in a participative way, this document could support investments in biodiversity conservation in those remote and fragile areas.

Photo 2. Iceberg in Nuuk Fjord, Greenland (copyright Claire-Sophie AZAM)

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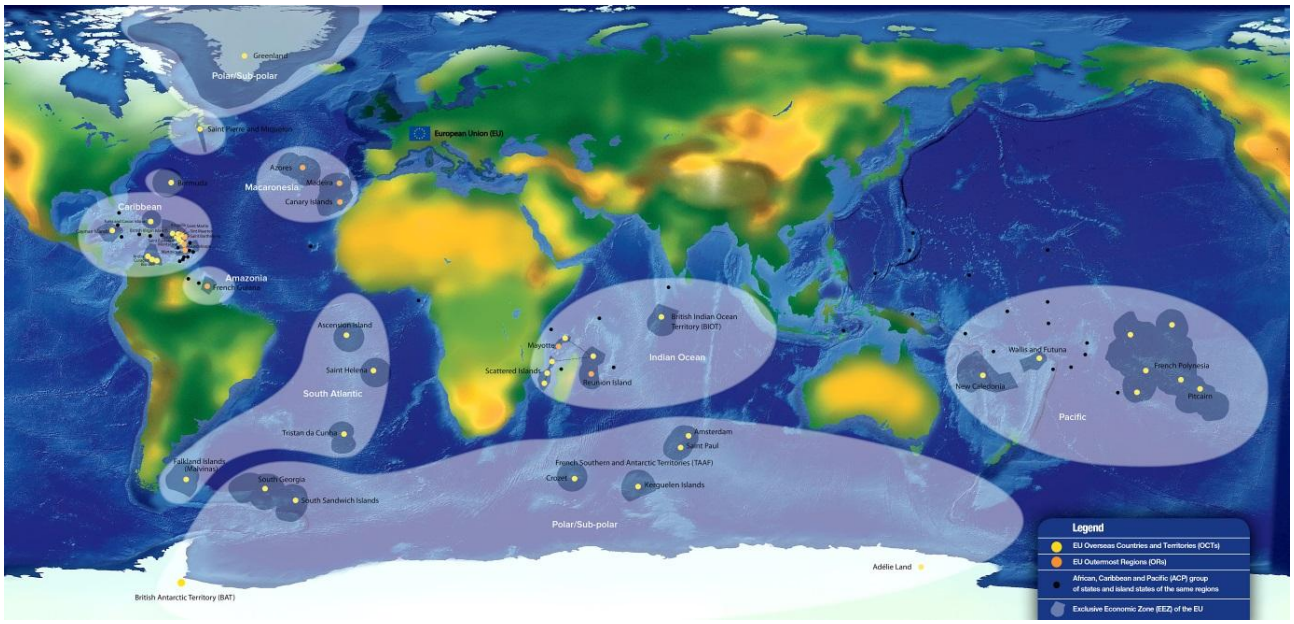
1. INTRODUCTION

The Polar and Subpolar region comprises one of the seven European Union (EU) Overseas regions, including a total of 34 overseas entities: 9 Outermost Regions (ORs) and 25 Overseas Countries and Territories (OCTs), linked to the 6 Member States Denmark, France, the Netherlands, Portugal, Spain and the United Kingdom. These ORs and OCTs are home to biodiversity hotspots with an immensely rich diversity of species, ecosystems and landscapes, which are highly vulnerable to human impacts and increasingly the impacts of climate change. Hosting more than 70% of European species, the biodiversity in the European OCTs has been recognized as being of international importance and crucial for achieving global and regional biodiversity targets. The ecosystems, on which they depend and the services they provide, have an estimated economic value of up to €1.5 trillion per year[2]. They support local economies and livelihoods in inhabited areas, as well as benefiting populations elsewhere, for example through the provision of fisheries products to global markets. They also offer cost-efficient solutions to the looming threats of climate change, which are already intensely felt in many ORs and OCTs as they are amongst the most countries most vulnerable to climate change. With increasing pressure on these ecosystems, effective management, conservation and restoration measures are critical to maintain the rich biodiversity and allow sustainable development.

Map 2: Map showing the 34 Overseas entities of the European Union, located in 7 regions of the world (Credit: Imre Sebestyén/UNITgraphics © IUCN)



[2] [2] Meyers, D., Quétier, F. (2014). Final Report: Options for the Future BEST Facility for Europe Overseas Biodiversity and Ecosystem Services.

The BEST Initiative

During the first conference on biodiversity and climate change in the EU overseas entities that took place in Reunion Island in July 2008, the need for a specific initiative to promote conservation of EU Overseas' biodiversity and ecosystems as well as to develop a political strategy has been expressed. The European Union's BEST Initiative (Voluntary scheme for Biodiversity and Ecosystem Services in Territories of European Overseas) is a tangible follow-up to concluding Message from Reunion Island (2008), stressing the urgency for the European Union and its Overseas Entities to counter climate change and biodiversity loss. Above all, the BEST initiative aims to strengthen biodiversity conservation and climate change adaption in Europe overseas by raising the Europe overseas' profile, generating support for action on the ground, and proposing mechanisms to enhance biodiversity and climate change policies as well as programmes targeted at Europe overseas.

Following-up to the recommendations of the Message from Reunion Island, the European Parliament adopted the BEST Preparatory Action in 2010 to address these challenges by promoting conservation and sustainable use of biodiversity and ecosystem services in EU ORs and OCTs and supporting local actors committing to relevant conservation measures on the ground.

Implementing the BEST Preparatory Action (2011-2013), the European Commission had launched two open calls for proposals in 2011 and 2012, respectively, and selected 16 of the 84 submitted projects in the EU Overseas regions for funding. A first partnership with the French Agency for Development (AFD) allowed financing of two additional projects. The overwhelming demand for financial support – exceeding six times the available budget – and the high quality of project proposals demonstrated the need for funding directed to projects aimed at protecting EU Overseas biodiversity.

In 2013, the European Commission decided to invest the funds available for the third and last year of the BEST Preparatory Action in a project aiming to ensure the sustainability of the BEST voluntary scheme. IUCN (International Union for Conservation of Nature) and partners won the open call for tender for "Measures towards sustaining the BEST preparatory action to promote the conservation and sustainable use of biodiversity and ecosystem services in EU outermost regions and overseas countries and territories".

The ultimate objective of the project is to build milestones and to enable measures to allow sustaining BEST activities beyond the lifetime of the Preparatory Action by setting up a platform for the conservation needs of the EU Overseas entities that allows information sharing and addressing challenges collaboratively and through the development of the regional ecosystem profiles to inform biodiversity strategies and to trigger investment through dedicated regional investment strategies.

Seven knowledge hubs coordinated by project partners (UICN France, TAAF, SAERI, WWF France, SPAW-RAC and FRCT) that are anchored and well established in the respective regions developed regional ecosystem profiles and investment strategies in cooperation with local actors. These regional ecosystem profiles and strategies provide a comprehensive overview of the threats to biodiversity and ecosystem services as well as current conservation activities and investment but also outline the challenges and needs in the ORs and OCTs.

The Polar and Subpolar Hub

The polar and subpolar regions include five European Overseas Countries and Territories (OCT), politically attached to three European Member States: Greenland (GL), a Danish autonomous country, and the French collectivity of Saint Pierre and Miquelon (SPM - France) in the north; the British territories of South Georgia and South Sandwich Islands (SGSSI), the British Antarctic Territory (BAT) and the French Southern and Antarctic Lands (French acronym TAAF - Territoire des Terres australes et antarctiques françaises), which include Amsterdam and St Paul Islands, Crozet and Kerguelen archipelagos as well as Adélie Land (French: Terre Adélie) in the south.

The Ecosystem Profile

The ecosystem profiling process follows a methodology, established by the Critical Ecosystem Partnership Fund (CEPF), adapted to the particular situation and needs of the EU Overseas. At the basis of this profiling process is a field-based, participatory and scientific approach: using a combination of desktop review of existing information and a series of consultations with local actors and authorities, each ecosystem profile was developed to efficiently guide actions on the ground and identify thematic conservation priorities and future projects to be considered for funding. The regional participation process assures that the final outcome is owned and used by stakeholders in the region to allow focussing research and management efforts and directing future funds to where their application can have the highest positive impact.

Photo 3. Workshop on TAF KBA delineation, Paris

The Ecosystem profile has been elaborated in a participative approach, involving more than 150 stakeholders and experts from local and national institutions. Worshops were organized in France and in Greenland, while teleconference and email exchanges supported the consultation in South Georgia, BAT and Saint-Pierre et Miquelon.

This ecosystem profile, coordinated by the TAAF (Terres australes et antarctiques françaises), presents an overview of the polar and subpolar region in terms of its biodiversity conservation importance, major threats to and root causes of biodiversity loss, and the socioeconomic, policy and civil society context in which conservation takes place. The profile also presents assessments of patterns of conservation investment in the polar and subpolar region over the last decade. It defines a comprehensive suite of measurable conservation outcomes at species and site scales and identifies conservation priorities.

The Regional Investment Strategy

Based on the ecosystem profile a regional investment strategy is elaborated in collaboration with the regional and local stakeholders for donors interested in supporting civil-society-led conservation efforts in the region. Each investment strategy provides a clear picture of what the conservation priorities are and identifies niches, in which investment can provide the greatest incremental value for conservation, enabling donors and programmes to effectively target their efforts. It comprises strategic directions over the next 5 years and proposes projects in line with the conservation priorities, taking into account current and past investments as well as the capacity of the region to implement proposed project ideas.

The accompanying investment strategy for the polar and subpolar region presents potential projects to be funded, which were proposed by and discussed with civil society organizations (CSOs), local authorities, individuals and other entities in order to help implement the strategy by addressing the identified investment priorities. The investment strategy will not define concrete project concepts or specific project activities, which will have to be developed in accordance with future funding opportunities.

Photo 4. King penguin in South Georgia (Copyright Dr. Judith Brown)

2. BACKGROUND

The French Southern and Antarctic Lands (TAAF) is a French OCT which administers the islands of Amsterdam and Saint-Paul, the archipelagos of Kerguelen and Crozet in the Southern Indian ocean, Terre Adélie (Adélie Land) on the Antarctic and the îles Eparses (Scattered Islands) in the Indian Ocean. The whole EEZ of the Southern lands have been designated as a National Nature Reserve, administered by the TAAF. The TAAF, as the manager of the southern islands, is leading field conservation actions in this area, in close partnership with several research institutions.

The TAAF joined the BEST initiative and was appointed to coordinate the Polar and Subpolar Hub. From 2015, the TAAF led a 2 year consultation process that led to the creation of this ecosystem profile. More than 150 stakeholders from civil society, government institutions and research organizations of the Antarctic and Arctic regions were consulted. The South Atlantic Environmental Research Institute (SAERI) supported the elaboration of the Ecosystem Profile for South Georgia and South Sandwich Islands as well as British Antarctic Territory.

Data on species and ecosystems were gathered and trigger species (species of important conservation value) were identified. Following a methodology designed for the BEST III programme, Key Biodiversity Areas were delineated to outline areas of special conservation concern and the consultation of stakeholders allowed prioritizing them. A first designation of priority areas for actions is presented in this document, along with thematic priorities. They will be detailed and deepen in a second stage, the Regional Investment Strategy.

Table 1. Timeline of the BEST Ecosystem Profiling Process in the Polar and Subpolar Hub

	2015		2016		2017
	1st semester	**2nd semester**	**1st semester**	**2nd semester**	**1st semester**
Preparatory work	TAAF & SPM	Greenland	South Georgia South Sandwich Islands & BAT*		
Consultation		TAAF & SPM	Greenland, SPM and TAAF	Greenland, South Georgia South Sandwich Islands & BAT*	Greenland, South Georgia South Sandwich Islands & BAT*
Workshops			Greenland and TAAF (June- July)		
Validation and completion				Greenland, SPM and TAAF	South Georgia South Sandwich Islands & BAT*

*South Georgia South Sandwich Islands & BAT parts of the Ecosystem Profile were created with the technical support of SAERI

3. BIOLOGICAL IMPORTANCE OF THE POLAR AND SUBPOLAR REGION

The polar and subpolar territories are remote areas experiencing extreme climate conditions. The temperatures are particularly low, in some areas the winds blow semi-permanently reaching speeds of 200 km/h and precipitation is either very abundant or very limited depending on the territory. In the north, the Arctic is characterized by an Arctic climate for ice-covered Greenland and borderline humid continental/subarctic climate for Saint Pierre and Miquelon, which is influenced by several ocean currents. In the south, the frozen continent of Antarctica is surrounded by a cold ocean and a belt of sub-Antarctic islands. These natural climatic extremes and the remoteness of those territories have acted as barriers to human colonization which led to a limited population in the Arctic territories and no permanent population in the southern and Antarctic territories. Direct human impact is therefore limited, and has enabled the conservation of relatively pristine ecosystems, particularly on land, although the marine resources of the Southern Ocean were heavily impacted by historical harvesting. The territories of the polar and subpolar region are characterized by high species richness and marine biomass. The remoteness and extreme conditions have led to high rates of species endemism and adaptations. Those places are excellent observatories of land-sea interactions and climate change impact on biodiversity.

3.1. Geography, Geology and Climate

Table 2. Territory facts and figures at a glance

Region	Land area (Km^2)	Land Protected area (%)	Marine area (Km^2)	Marine Protected area (%)	Total area (Km^2)
GL	2,166,086	36.3	2,353,856	2.1	4,519,942
SPM	242	22.7	12,348	2.1	12,590
TAF	7668	100	1,659,098	100	1,666,766
SG - SSI	3,903	100	1,449,532	74	1,453,370
BAT	1,709,400	100	NA	NA	1,709,400
AL	432,000	100	NA	NA	432,000
TOTAL	4,319,194		5,430,736		9,749,930

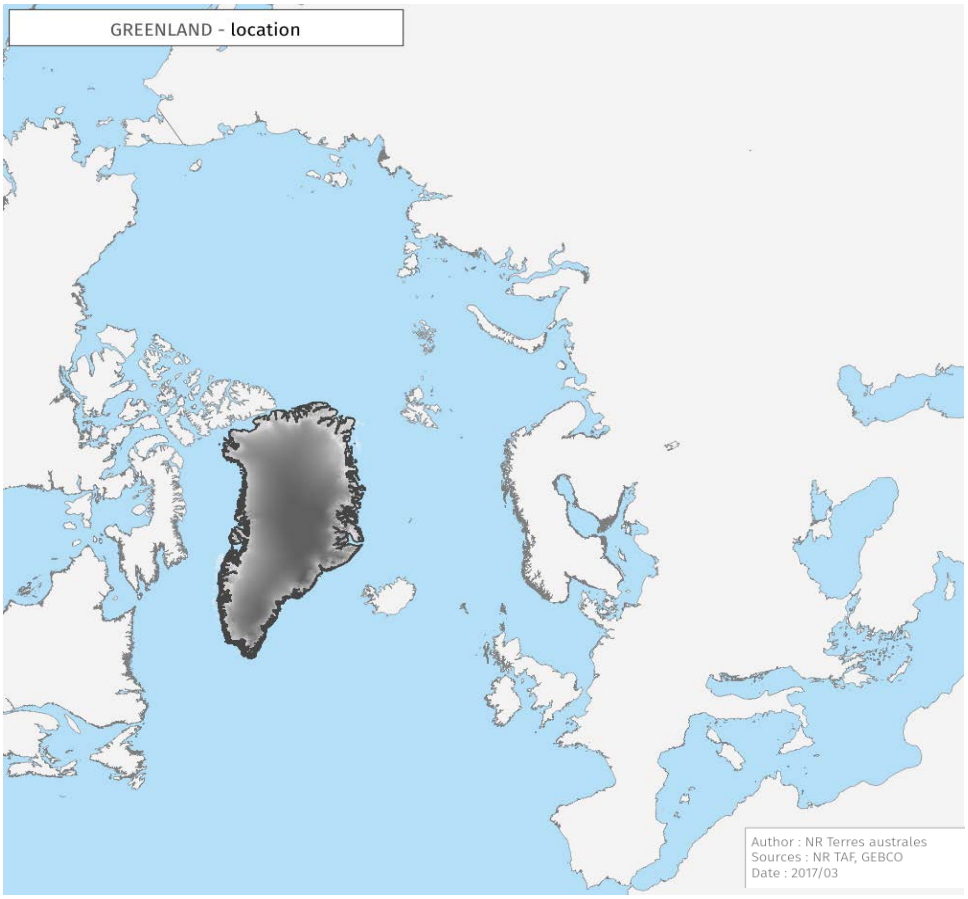
3.1.1. Greenland

Greenland (59º00'N to 83º00'N; 11º00'W to 74º00'W) is the largest island in the world with a total area of 2,166,000 km². Over 80% of its surface (1,755,637 km²) is covered with ice of almost 3 million cubic meters volume and 410,000km² are exposed bedrock. Greenland's highest elevation is Gunnbjørn Fjeld at 3,700m, which is part of the Watkins Range, the most notable mountain range in the East. However, most of Greenland is lower than 1,500 m with a central land area forming a low-lying basin on average 300 m below sea level as a result of ice sheet pressure.

The Atlantic Ocean surrounds Greenland's southeast; the Greenland Sea to the east; the Arctic Ocean to the north; and Baffin Bay to the west. Canada, to the west across Baffin Bay, and Iceland, east of Greenland in the Atlantic Ocean are the nearest countries. The Arctic Ocean basin is surrounded by the ancient continental shields of North America, Europe, and Asia, with the geologically more recent lowland plains, low plateaus, and mountain chains between them. Surface features vary from low coastal plains to high ice plateaus and glaciated mountains.

Greenland has an arctic climate with average temperatures that do not exceed 10°C in the warmest summer months. In the southern part of the country and the innermost parts of the long fjords, the temperature can, however, rise to more than 20°C in June, July or August.

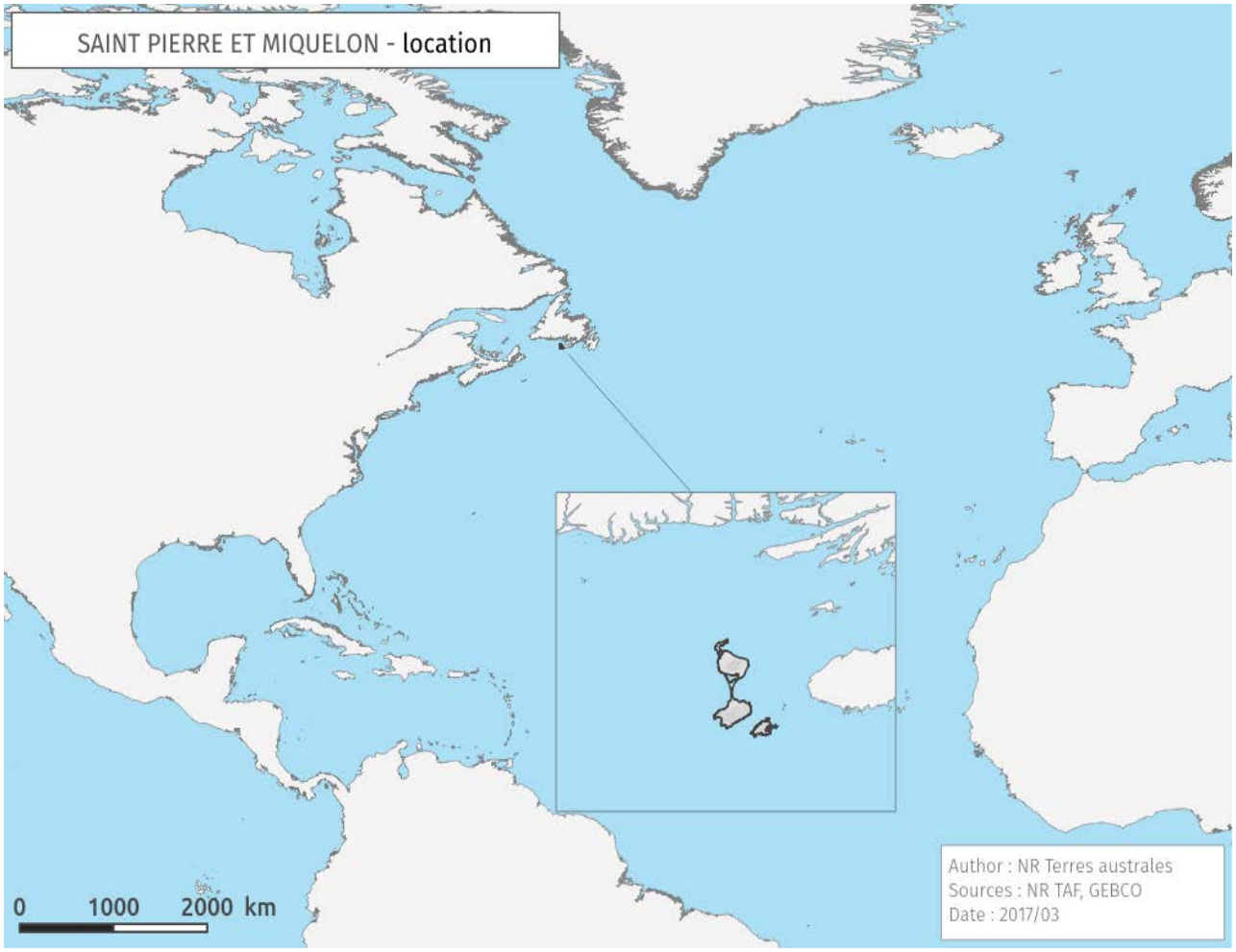
Figure 2. Greenland Location



3.1.2 Saint Pierre and Miquelon

Saint Pierre and Miquelon (46°47′N; 56°11′W) is an archipelago of 8 islands in the North Atlantic Ocean, located 25 km south of Newfoundland (Canada) with a total land surface of 242 km², of which only the two largest islands, Saint-Pierre (27 km²) and Miquelon-Langlade (216 km²), are inhabited only during the summer by the people from Saint-Pierre island. Saint-Pierre is surrounded to the south-east by smaller dependencies: Île aux Marins, Île aux Pigeons, Île aux Vainqueurs, Grand Colombier and Petit Colombier. Saint Pierre is separated from Miquelon-Langlade by a 6 km strait. In the Northern part of Miquelon Island, le Cap-Miquelon is connected to Miquelon by an isthmus where Langlade is established. Despite the fact that the archipelago is not located at high latitude, it experiences sub-Arctic oceanic conditions. Average annual temperatures are 5.5°C mark, with 120 days of frost per year, and close to 80% humidity.

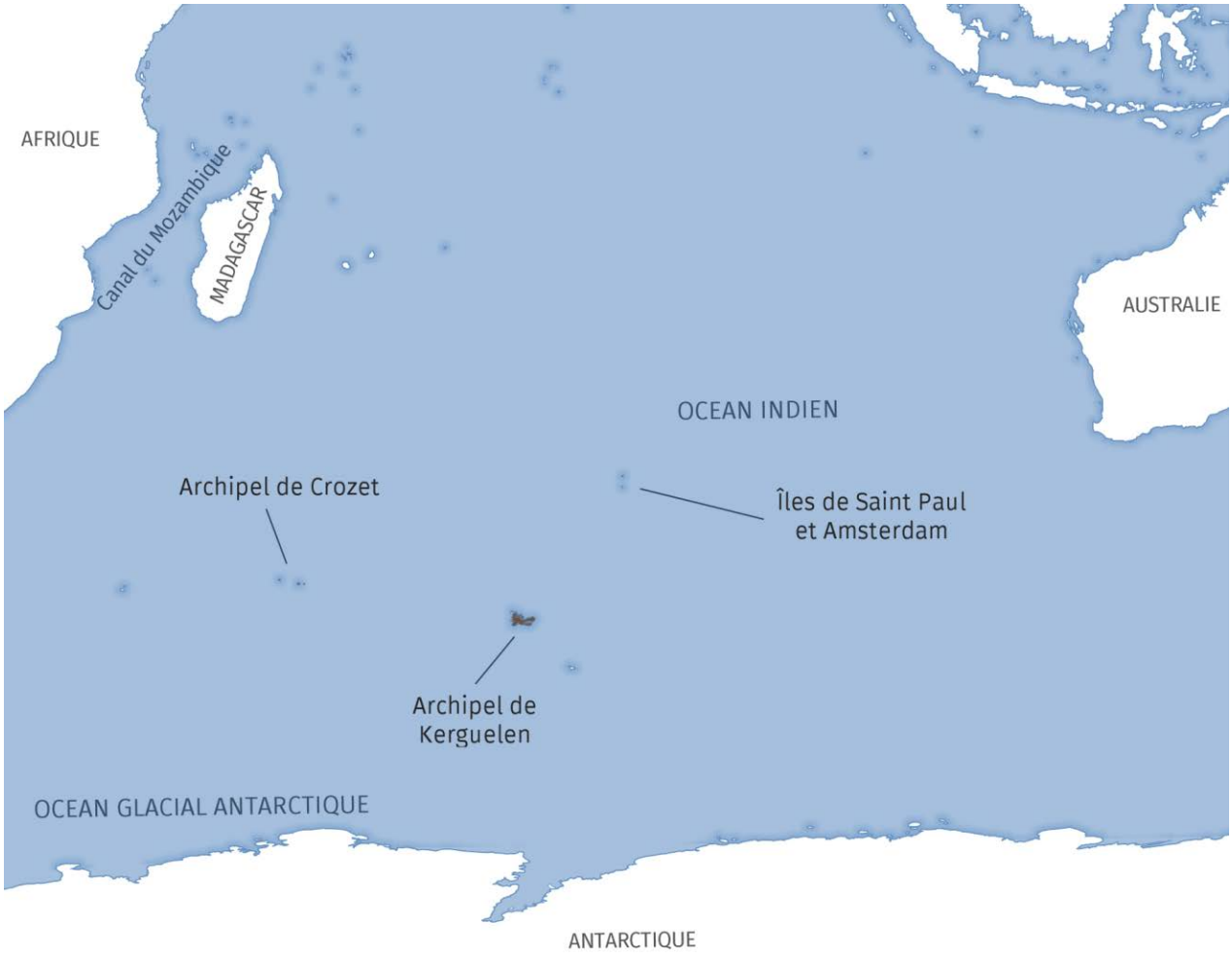
Figure 3. Saint-Pierre-et-Miquelon location



3.1.3 The French Southern Lands

The Territory of the French Southern and Antarctic Lands (French: *Territoire des Terres australes et antarctiques françaises*) consists of five districts located in the Southern Ocean, three of which are commonly known as the French Southern Lands (In French*: les Terres australes Françaises*): the Saint Paul and Amsterdam islands, and the archipelagos of Kerguelen and Crozet. Adélie Land (In French: *Terre Adélie*) resides in Antarctica, while the fifth district – the Scattered Islands (*Îles Eparses*) is located in the Indian Ocean, around Madagascar. This section will address only the French southern lands (TAF).

Figure 4. The French Southern Lands location



Saint-Paul and Amsterdam

Among the most remote islands in the world, Amsterdam and Saint-Paul are located more than 3,000 km away from any continent south of the Indian Ocean. Both islands were formed relatively recently between 400,000 and 40,000 years ago through volcanic activity. Numerous craters and vents are present, though there has been no recent volcanic activity. Amsterdam Island (55 km^2), located approximately 80 km north (37°50'S, 77°32'E) of St. Paul Island, has an extinct volcano reaching 867 m of altitude. The western part of the volcano collapsed, forming vertical cliffs of 400-700 m. St. Paul Island (38°43′S 77°31'E) is 4.8 km wide. It is the top of an active volcano, which last erupted in 1793 (from its SW Flank), and presents steep cliffs on the east side. The thin stretch of rock that closed off the crater collapsed in 1780, letting the sea in through a 100m channel. The interior basin, 1 km wide and 50 m deep, is surrounded by steep walls up to 270 m high and has active thermal springs.

Approximately 500 km north of the Antarctic convergence, Amsterdam and Saint-Paul have a moderate oceanic climate. Surface seawater temperature varies from 12.7°C in August to 17.4°C in February, air temperatures from 11.2°C in August to 17.4°C in February, with an annual average of 14°C (Météo France data, 1951-2015). Relative humidity is generally high due to the frequency of low cloud ceilings, on average 80% year-round. Precipitation is high with an annual average of 1,114 millimeters (mm) distributed over 239 days and falling primarily as rain. Hail or snow is observed in winter but seldom at low altitudes. December through March is drier (78 mm per month) than April to November (100 mm per month).

Figure 5. Amsterdam Island

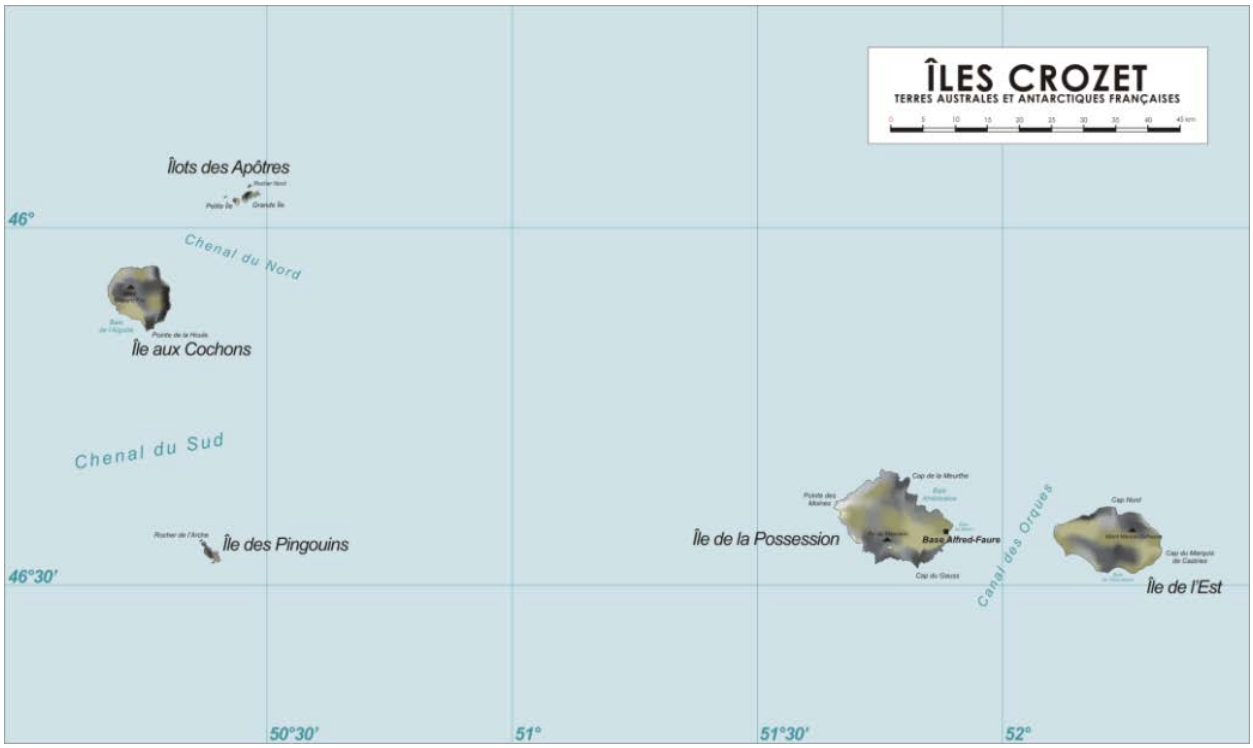
Figure 6. Saint-Paul Island

Crozet Archipelago

The Crozet archipelago (46º00'S to 46º30'S; 50º00'E to 52º30E) has a cumulative land area of 352 km^2. It is divided into two groups of islands that are bisected by the 2 km deep Indivat basin, east of which there is an abrupt thinning of the crust. There are five main volcanic islands, the western group comprises Île aux Cochons, Îles des Pingouins and Îlots des Apôtres, and the eastern group comprises Île de la Possession and Île de l'Est.

Formed approximately 8 million years ago by volcanic activity, the two eastern islands are the oldest among the Crozet islands. Of the western islands, Îles des Apôtres is 5.5 million years old, while Île aux Cochons and Îles des Pingouins are of more recent origin, dating back to 0.4 and 1.1 million years, respectively (Giret et al. 2003). Île de la Possession is the largest island in this archipelago (150 km^2), reaching a height of 934 m. Île de l'Est (120 km^2), with sheer cliffs reach 1100 m high. Île aux Cochons is the third largest island, with 70 km^2. This island is a 600 m high volcanic cone, and its open crater consists of alternations of pyroclastic rocks and lava flows. Îles des Pingouins and Îlots des Apôtres are 3 km^2 and 2km^2 in area, and reach heights of 420 m and 289 m, respectively. The average annual air temperature is 5.5°C (Météo France 1970-2015) (3.4°C in august, 8.4°C in February) and the average annual precipitations are superior to 2300 mm.

Figure 7. Crozet archipelago



Kerguelen Archipelago

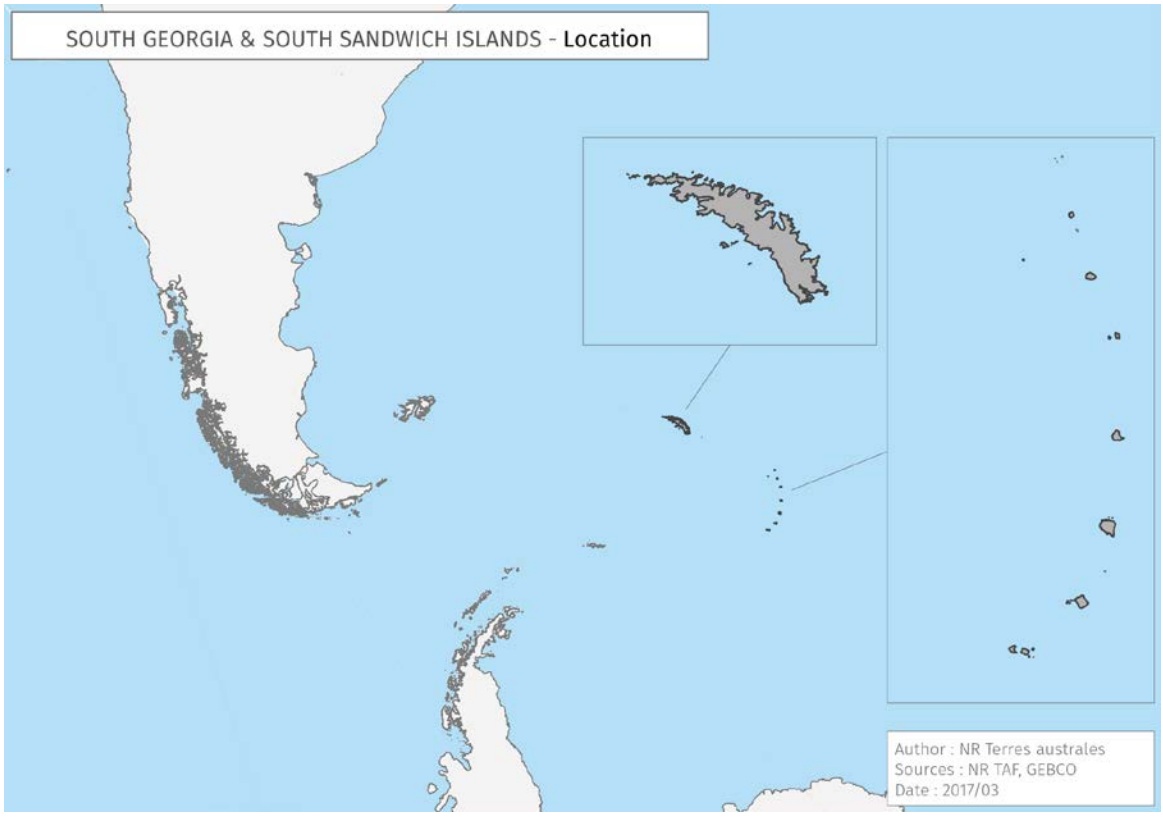
The Kerguelen archipelago (48º27'S to 50º00'S; 60º27'E to 70º35'E) is located 1500 km east of the Crozet Islands and reach a maximum altitude of 1850 m. The entire exposed land area is 7,215 km^2. The group is composed of one large island, Grande Terre, of about 6,600 km^2, and around 300 other islets. The climate is oceanic, with a low mean average temperature of 4.85ºC (Météo France 1951-2015), 70% to 80% humidity, heavy cloud cover, and strong westerly winds. The mean annual rainfall at Port-aux-Français station is 753 mm (Météo France 1951-2015). There is a permanent ice cap covering an area of 50 km by 20km in the west. The archipelago is approximately 39 million years old, with 85% of its surface area covered by flood basalts.

Figure 8. Kerguelen archipelago

3.1.4 South Georgia and South Sandwich Islands

South Georgia and the South Sandwich Islands are part of the Scotia Arc, a largely submarine ridge that links the tip of South America with the Antarctic Peninsula. South Georgia (53°57' -54°55'S; 35°40' - 38°20'W), which is the largest island on the Scotia Arc, is located in the South Atlantic Ocean, 2000 km east of the tip of South America, and 1,400 km south-east of the Falkland Islands. Geologically, the island consists of tightly folded, Mesozoic sedimentary rocks, with little trace of fossils. Smaller islands and islets off the coast of South Georgia include Annenkov Island, Bird Island, Cooper Island, Grass Island, Pickersgill Islands, Welcome Islands, Willis Islands and Trinity Island. The following remote rocks are also considered part of the South Georgia Group: Shag Rocks, Black Rock, and Clerke Rocks. Altogether, South Georgia has a land area of 3,528 km², which is largely barren, mountainous and heavily glaciated. Thirteen peaks rise to over 2,000 m with Mount Paget in the Allardyce Range the highest at 2,943 m (Burton, 2012).

Figure 9. Location of South Georgia and South Sandwich Islands



The permanently cold sea maintains a cold maritime climate on the islands, and the weather is very variable and harsh. At King Edward Point on the sheltered north coast of the island the mean annual temperature is 1.8 C, with a mean summer temperature of +5 C and a mean winter temperature of -1 C. Annual precipitation is around 1600 mm (63 in) (varies across island), much of which falls as sleet or snow, which is possible in any month. Inland, the snow line in summer is at an altitude of about 300m. The wind is a dominant feature of the South Georgia weather.

The South Sandwich Islands (56°18' to 59°27'S, 26°23' to 28°08'W) are a group of 11 actively volcanic islands in the South Atlantic Ocean, north of the Weddell Sea and 550-750 km southeast of South Georgia. They extend for 305 km and occupy 310km², with in average 80% of each island covered by glaciers. The Island's' highest point is Mount Belinda (1,370 m) on Montagu Island.

The South Sandwich Islands are much colder than South Georgia, being farther south and more exposed to cold outbreaks from the Antarctic continent. They are also surrounded by sea ice from the middle of May to late November (even longer at their southern end). Recorded temperature extremes at South Thule Island have ranged from −29.8 °C to 17.7 °C.

South Georgia can be divided in biozones and regions, following the non-native plant management plan (GSGSSI, 2016) (Annexe 1).

The South Georgia and South Sandwich Islands 200 nautical miles Maritime Zone (MZ) was declared in 1993 with a total area of 1.3 million km2. The South Georgia and South Sandwich Islands Sustainable Use Marine Protected Area (MPA), which includes the 1.07 million km2 of the MZ that are north of 60 S, was declared in 2012 and was updated in 2013 (GSGSSI, 2013) (Annexe 2).

3.1.5 British Antarctic Territory and Adélie Land

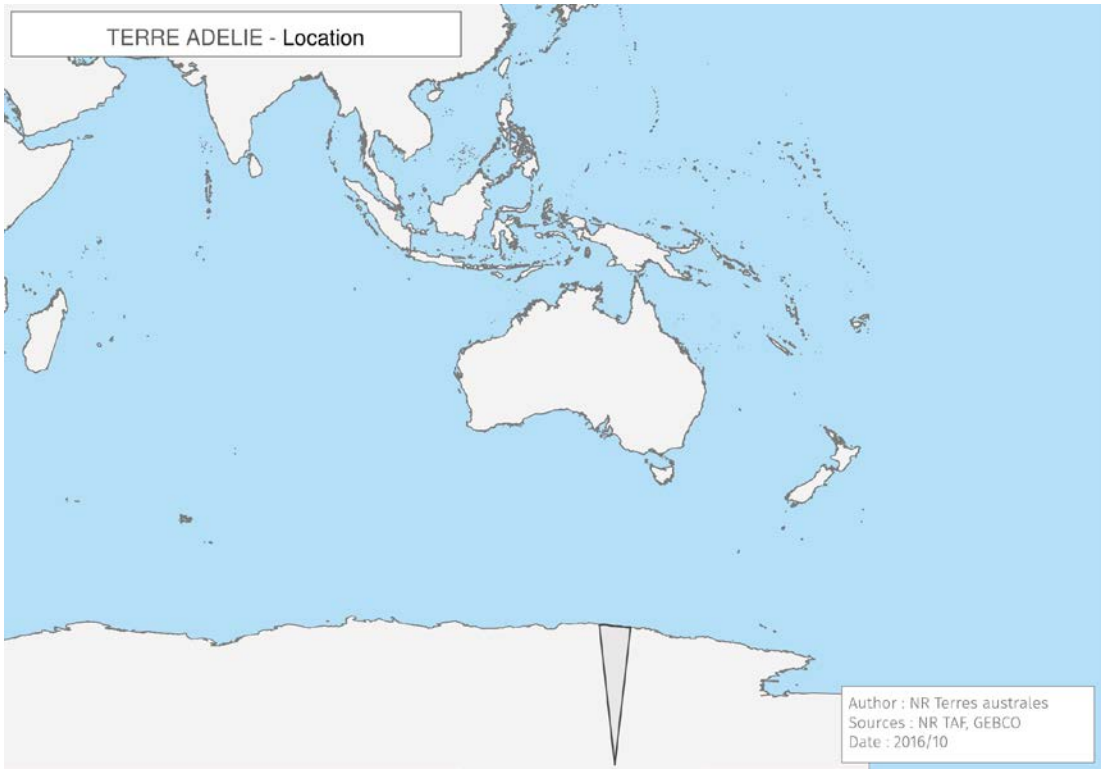
The British Antarctic Territory (BAT) is in West Antarctica, and comprises all of the land and islands in the sector south of latitude 60°S, between longitudes 20°W and 80°W (figure 10). It has a land area of 1.7 million km^2 and includes the Antarctic Peninsula, the South Shetland Islands, South Orkney Islands and numerous other offshore islands, the Ronne Ice Shelf (Weddell Sea) and parts of Coats Land. In contrast to the other territories discussed in this document, BAT does not include any marine area. The territory forms a wedge shape that extends to the South Pole, overlapping the Antarctic claims of Argentina (Argentine Antarctica) and Chile (Chilean Antarctic Territory). Over 99% of the territory's land surface is covered by a permanent ice sheet, with numerous large ice shelves extending to the coast. The mountainous Antarctic Peninsula extends 1,300 km northward from the continent, and contains the territory's highest peak, Mount Jackson (3,184 m).

The northern Antarctic Peninsula and adjacent islands have a maritime climate, with mean summer temperatures of 1-2°C, mean winter temperatures of -15 to -20°C, and precipitation averaging 35-50 mm per year. The continental region is drier and colder, with mean annual temperatures from -30 to -50°C.

Adélie Land is in East Antarctica, to the west of the Ross Sea (figure 11). The territory extends between longitudes 136°E and 142°E, from a coastline along the Southern Ocean inland to the South Pole, and covers a land surface of 432,000 km^2. Adélie Land borders the Australian Antarctic Territory both on the east and on the west.

Figure 10. British Antarctic Territory overview. Map shows the three British Antarctic Survey research stations (Rothera, Halley and Signy).

Figure 11. Adélie Land overview



3.2. Habitats and ecosystems

The polar and subpolar terrestrial biodiversity greatly differs between the Northern and Southern hemisphere. The Antarctic continent has been isolated from the rest of the world's land masses for about 30-35 million years (Trewby 2002), and has been almost totally covered in ice for 15 million years, which led to a very sparse terrestrial fauna and flora. In contrast, the Arctic is located in one of the world's smallest oceans surrounded by a relatively narrow zone of islands at the edge of the two large northern continents. Therefore, the Arctic has a richer terrestrial fauna and flora derived from the Eurasian and North American continents.

The specific characteristics of the terrestrial ecosystems of the polar environment are defined by the harshness of climate. Low temperatures, strong winds, poor soils, and prolonged periods of light and darkness have strongly conditioned the species of these environments. As a result, species have become highly specialized and adapted to these surroundings. In general, Arctic biodiversity is characterized by small numbers of endemic species. In contrast, the Antarctic includes very high proportions of endemic species and a diverse and abundant marine biomass (Clarke et al. 2003). The terrestrial food chains in the Arctic are relatively simple consisting of a few plant species, herbivores and predators (mammal or bird) per region. These are simplified yet further in the Antarctic, where indigenous terrestrial and freshwater vertebrates are nearly absent, with the exception of a single passerine on South Georgia, and three species of duck in South Georgia and Kerguelen (Convey, 2013). The vegetation is often dominated by low-to-the-ground plants including mosses, lichens, a few vascular plants, and tree coverage consisting of dwarf or creeping species. Although sub-Antarctic ecosystems are more diverse and complex than those of the Antarctic latitudes (Convey 2007), they remain simple with low diversity in specific taxonomic or biological functional groups but high endemism.

Photo 5. The bogs of Amsterdam plateau, TAF (Copyright TAAF)

3.2.1. Greenland

Terrestrial Ecosystems

Greenland has the northernmost and the longest north-south stretch of landmass in the Arctic, ranging up to 2,600 km. Combined with rugged coastline, mountainous terrain, arctic deserts, inland areas, these results in a wide range of variation in physical conditions and therefore, a diversity of living conditions for terrestrial organisms.

The physical conditions shape species composition and distribution of plant communities and habitats. The diversity of terrestrial habitats can be illustrated by describing the plant communities (modified from Jensen & Christensen, 2003).

- Heath: Vegetation dominated by dwarf shrubs, i.e. woody plants less than half a meter tall. Heath is the most common vegetation type, especially in Low arctic Greenland.
- Scrub: Meter-high scrub of northern willow is found in the Low arctic along streams and protected slopes with heavy snow cover during the winter.
- Forest: Together with scrub, forest belongs to the most productive terrestrial habitats. Birch forest is only found in the summer-warm inland areas in South Greenland. These areas contain several boreal species not found elsewhere in Greenland.
- Snowbed: The snow-bed plant community is located on sites that covered by snow large parts of the year due to wind, shadow or other physical parameters. The species here are adapted to the short growing season and favor the stable winter temperatures and humidity

  Herb-slope: This habitat has a thick and stable snow cover during the winter; Characteristic to this community type are several species of fern and two of Greenland´s orchid species.
- Grassland and steppe: Dry grass and sedge dominated habitats occur in central West and East Greenland. They are associated with south facing slopes and flat valley bottoms with a thin snow cover.
- Mires: Mires predominantly occur in the southern and northern part of Greenland. They are dominated by sedge or grass plant communities.

Photo 6. Low to the ground vegetation, Nuuk, Greenland

(Copyright Claire-Sophie Azam)

Freshwater ecosystems

Greenland hosts various freshwater habitats: Streams, brooks, outflow from lakes, homoeothermic springs, nutrient-poorand nutrient rich lakes and ponds, saline lakes. Most of Greenland´s fresh water is bound in the 1,700,000 km² inland ice, which amounts to about 9% of all fresh water on Earth. A large amount of fresh water is released every spring as melt water from the Ice Cap and from snow. Surface drainage is poor due to the permafrost layer and rocky underground. Hence most of the rain that falls in terrestrial habitats (not as snow on the inland ice) feed water runoffs and plays a role in building and eroding the landscape. Most Greenlandic freshwater areas are nutrient poor since they only receive a minimum of nutrients from the clean melt water.

Coastal Ecosystems

Greenland's coast has a countless number of large and small islands and fjords resulting in a coastline of about 40,000 km. It is rocky coastline with numerous islands, deep fjords and large fjord networks. The coast and some of the fjords are characterized by relatively high primary production. In addition to the spring bloom of phytoplankton, a late summer bloom also occurs. The recycling or transport of nutrients to the top water layers, by ocean currents and tidal water movement, causes this late summer bloom. Because of the high primary production, life along and near the coast is rich in comparison to the rest of the marine environments.

Photo 7. Nuuk's Fjord (Copyright Claire-Sophie Azam)

Marine Ecosystems

Greenland is surrounded by several bodies of water and these are affected by the different currents that adjoin Greenland. The transportation of water with different salinities and temperatures by ocean currents, and the dispersion of ice and marine organisms are of fundamental importance to the distribution and composition of marine ecosystems. The relationship between the cold East Greenland Current and the warmer, more saline Irmiger current varies from year to year and affects the distribution of marine species. It also affects which species of fish and marine mammals are able to enter Greenlandic waters. The currents result in upwellings of nutrient-rich water, which provide the basis for a high level of primary production. Marine ecosystems in Greenland are characterized by seasonal ice cover and marked fluctuations in temperature and light. When the ice melts, there is typically a sudden increase in light and a burst of plant growth in the form of an ice edge bloom in spring and summer. These support large populations of fish, marine mammals and birds.

Photo 8. Benthic species of Greenland (Copyright Chris Yesson)

3.2.2 Saint Pierre and Miquelon

The archipelago has a variety of habitats: sandy beaches; dunes and coastal grasses; steep cliffs; sphagnum peatlands with ponds and marshes; and bare summits dominated by Ericaceae or heath plants. Deep valleys carved out by water erosion, are covered by a natural boreal forest consisting conifers and other dwarf or creeping plant species, depending on their exposure to the wind.

Focus on the boreal forest

The forest of Saint-Pierre-et-Miquelon is the only boreal forest of France. The forest of the archipelago can be considered as representative of the sub-category balsam fir-white birch of the East, observed in the ecologic region of Gulf of St. Lawrence.

The high balsam fir-white birch is the one with the more similarities with other fir stands of the boreal forest. Tree species, as *Betula papyrifera* and *Sorbus Americana* and *decora* are present. High balsam fir-white birch and other high tree stands represent close to 40% of the archipelago forest. The boreal balsam fir-white birch is a dynamic ecosystem with a development regularly interrupted by insect plague as *Neodiprion abietis*, *Lambdina fiscellaria*, *Choristoneura fumiferana*, or by total or partial windfalls.

The Boreal Forest is the largest ecosystem on earth. It represents 1/3 of the world's forest. It is a poor ecosystem that took over 10,000 years to form. The Boréal Forest is the only one in France and therefore, it represents a high patrimonial value.

A decline of the forest have been observed on the archipelago of Saint-Pierre et Miquelon. The causes include the harsh climate conditions, wood cutting and pressure from herbivores.

Photo 9. Forêt boréale (Copyright Jean-Philippe Siblet)

When the forest is very exposed to the wind and salt spray, the fir-white birch reach a maximum height of 7 meters. The low fir-white birch represents 40% of the forest of the archipelago. They have a high density, reaching up to 10 000 trees per hectare. In the most extreme climatic condition, the forest takes the form of a dwarf fir-white birch reaching 2 meters of height at the maximum. Around 20% of the forest in the archipelago has a maximum height of 4 meters.

The white spruce mainly composed of *Picea glauca*, appear in specific conditions. Agriculture and the destruction of forests favorite the apparition of this habitat. Grazing in white-fir birch forest can also favorite the development of white spruce.

At least, the Fern Glades are wide open area invades by fern and grasses. The most representative plant is the *Osmunda cinnamomea* and fern of the type Dryopteris. This kind of ecosystem, find frequently in the archipelago, is relatively rare in the boreal forest.

3.2.3 French Southern Lands

Terrestrial ecosystems

Several ecosystems can be found on the islands with a marked difference between Crozet and Kerguelen Archipelagos (subantarctic ecosystems) and Saint-Paul and Amsterdam Islands (subtropical ecosystems). Crozet and Kerguelen have been discovered lately (1772) which allowed a limited anthropogenic disturbance, on the contrary to Amsterdam and Saint-Paul discovered in the 16th century (1522).

On Crozet and Kerguelen, the frequency and strength winds played a determining role in the repartition of vegetation communities. The islands do not have trees and the vegetation is mostly located on protected watersheds. Plants communities are mostly composed of three species of phanerogams: the Kerguelen cabbage (*Pringlea antiscorbutica*), the *Azorella selago* and the *Acaena magellanica*. Humid areas are dominated by bryophytes, grasses (*Agrostis, Deschampsia Poa*) and buttercups. Those communities are facing the invasion of alien species. Some of them (*Poa annua, Cerastium fontanum, C. glomeratum, Sagina procumbens*) have already colonized the totality of the islands, while others are still in expansion (*Taraxacum* sp.).

Nevertheless, some islands are still close to their original state such as a few islands in the Golfe du Morbihan, the western part of the golfe des Baleiniers, the golfe Choiseul, the western part of the Péninsule Rallier du Baty and the north of the archipelago, as well as the islands of Pingouins and Apôtres, in Crozet.

Amsterdam and Saint-Paul have a milder climate. Amsterdam was originally covered with a *Phylica arborea* forest, the only native tree of the French southern islands, between 100m and 250m altitudes. The numerous fires and the introduction of bovines in 1871 completely modified the landscape. Since the eradication of bovines and the restoration of the *Phylica* forest, native communities are reappearing on the least degraded sites. In Amsterdam, peat bogs can be found on the “plateau des tourbières”, one of the only peat bogs found on this latitude, which hosts very unique flora assemblages including Sphagnum species (absent from Crozet and Kerguelen).

Photo 10. Primitive terrestrial ecosystems in Kerguelen Island, TAAF (Copyright TAAF)

Coastal and marine ecosystems

Kerguelen and Crozet plateau are part of the richest area in the sub-Antarctic region. The oceanographic conditions have created a very rich environment, with a high primary productivity and a high diversity of mesopelagic and demersal fishes. It creates major breeding and feeding areas for marine mammals and birds in the southern Indian Ocean. The benthic realm presents a great diversity of Vulnerable Marine Ecosystems taxa, which suggests unique and fragile benthic ecosystems. On the coasts of Kerguelen and Crozet, the *Macrocystis pyrifera* species (algae) form an ecosystem of fundamental biological importance. It is estimated that it would gather about a third of benthic marine species of the area, about 200 invertebrate species and represents a nursery zone for 2/3 of the fishes. It also hosts the endemic subspecies of Commerson dolphin (*Cephalorhynchus commersonii kerguelensis*).

An ecoregionalization process was conducted for Kerguelen and Crozet from 2012. It allowed defining 18 ecoregions for Kerguelen and 6 for Crozet. The details for each ecoregions can be found in the following reports:

Ecoregionalisation of the Kerguelen and Crozet islands oceanic zone. Part I: Introduction and Kerguelen oceanic zone. CCAMLR Report WG-EMM- 16/43. 18 June 2016.

Ecoregionalisation of the Kerguelen and Crozet islands oceanic zone. Part II: The Crozet oceanic zone. CCAMLR Report WG-EMM-16/54. 18 June 2016.

Photo 11. King pinguins on *Durvillaea antarctica* ecosystems, TAAF (Copyright TAAF)

a. Pelagic realm

i. Primary production

The Southern Ocean, South of the SAF is the largest HNLC area (high-nutrient, low-chlorophyll). This paradox is mainly due to the limitation of primary production by the low availability of micro-nutrients in Antarctic Surface Waters (notably dissolved iron) because of the distance from ice-free continents (Martin et al., 1990; Tagliabue et al., 2012). The Kerguelen region is one of the major exceptions, due to the input of iron and other trace metals from the island and from the shelf (Quéroué et al., 2015; Van der Merwe, 2015). This induces a natural fertilization of Antarctic Surface Waters that promotes an important development of phytoplankton above the shelf and downstream (to the east).

The phytoplanktonic bloom associated with the Kerguelen Plateau is observed every year in November and December (growing phase), and persists to a lower extent in January and February (declining phase) (Mongin et al., 2008).

ii. Plankton and pelagic fish

The biogeographic atlas of the Southern Ocean (de Broyer et al., 2014) gave synthesis on the presence of marine species including plankton, fish or cephalopods. The large scale biogeographic patterns of these groups are linked to the latitudinal zonation due to the position of the major frontal zones (Koubbi et al., 2014). In this context, the geographic position of the Kerguelen Islands in relation to these fronts induces high changes in pelagic assemblages over short distances. These assemblages are subtropical, linked to the Transition Frontal Zone, the Polar Frontal Zone or the Antarctic zone, respectively. The transition is not only latitudinal; it differs longitudinally because of the meandering of the Polar Front around the Kerguelen island shelf. The Subantarctic Front is the main biogeographic barrier of Southern Ocean species whereas the Polar Front is the main barrier to the subtropical fauna (Duhamel et al., 2014; Koubbi et al., 2014).

Photo 12. The Myctophidae family represent the most important biomass of the pelagic fishes of TAF (Copyright Messina Straits)

b. Benthic realm

i. Littoral and nearshore areas

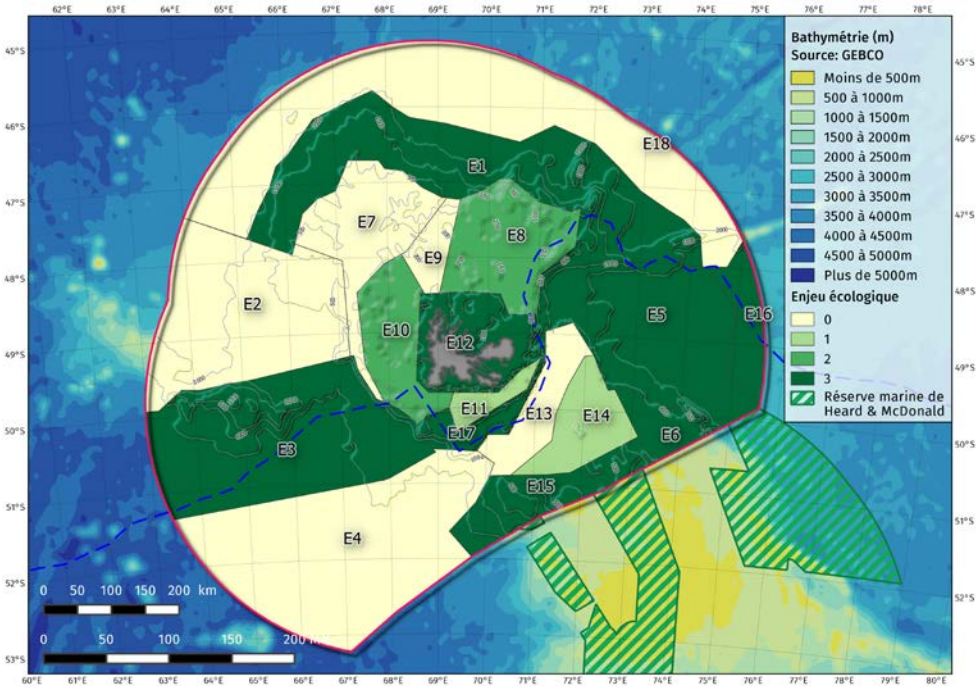
The coastal benthic zone is here considered between the supratidal domain and 100 m depth. It includes various patchy habitats and ecosystems, which are unique to the Kerguelen Islands in this part of the ocean (e.g. deep and blocking mussel-beds) but also globally (numerous fjords with entrance sills). Since 2011, the IPEV program n° 1044 PROTEKER in partnership with TAF national natural reserve, aims at setting up a nearshore long-term sub-marine observatory for the inventory of the Kerguelen Islands coastal marine species and ecosystems and the monitoring of coastal biodiversity facing the impacts of environmental changes related to global warming. For this purpose, nine different stations were defined in contrasting areas, which are representative of the diversity of coastal habitats: kelp forest zones, habitats with sponges and fjords. These sites were also instrumented with temperature recorders and colonisation plates to study benthic assemblage dynamics.

ii. Neritic zone and shelf break – VME indicators

The benthic Kerguelen populations can be characterized spatially following the distribution of indicator taxa of vulnerable marine ecosystems (VME). These taxa were defined according to the CCAMLR VME's protocol with consideration of the patrimonial aspect, the role in structuring the habitat, if the taxon is a bioindicator of the existence of a remarkable benthic ecosystem or if the taxon is sensitive to human pressure. Over the Kerguelen shelf, the geographic distribution of sampled VME indicator taxa by the POKER surveys were used for modelling potential habitats of these taxa by using ecological niche modelling based on catch data POKER campaigns. These distributions highlight contrasting and complementary patterns.

Photo 13. Benthic assemblage in Kerguelen (sponges, ascidiacea) (Copyright PROTEKER)

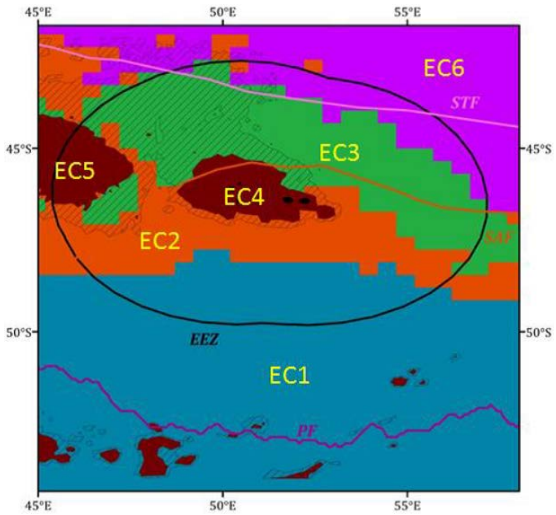
Figure 12. Marine ecoregions in Kerguelen (Koubbi et al. 2016)



Name of the ecoregion :	E10. Plateau Ouest
E1. Talus Nord	E11. Plateau Sud
E2. Zone océanique ouest	E12. Zone côtière
E3. Banc Skiff	E13. Passage Kerguelen Heard
E4. Zone océanique sud-ouest	E14. Zone sud productive
E5. Méandre du Front Polaire / Polar Front meander	E15. Les seamounts de Kerguelen- Heard
E6. Incursion d'eau froide	E16. Zone océanique Est
E7. Plateau nord-ouest et ouest	E17. Zone de plateau Sud
E8. Nord-est du plateau de Kerguelen	E18. Zone océanique Nord
E9. Zone néritique nord	

The full description of Kerguelen's ecoregions can be found in: Ecoregionalisation of the Kerguelen and Crozet islands oceanic zone. Part I: Introduction and Kerguelen oceanic zone. CCAMLR Report WG-EMM- 16/43. 18 June 2016.

Figure 13. Marine ecoregions in Crozet (Koubbi et al, 2016)



EC 1 : Low productivity area / transit area for King Pinguins
EC 2 : Seabirds transit and feeding birds
EC 3 : High productivity area
EC 4 : Crozet Shelf
EC5: Del Cano rift
EC 6: Subtropical Front zone

The full description of Crozet Ecoregions can be found in: Ecoregionalisation of the Kerguelen and Crozet islands oceanic zone. Part II: The Crozet oceanic zone. CCAMLR Report WG-EMM-16/54. 18 June 2016.

3.2.4 South Georgia and South Sandwich Islands

3.2.4.1 Terrestrial ecosystems

Approximately half of South Georgia's area of 3,755 sq km (1,450 sq miles) is covered with ice and permanent snow. The permanent snow-line lies about 450 to 600 m above sea level on the northern side of the island but down to about 300 m on the colder southern side. The mountains are surrounded by ice-fields and huge glaciers that run into the valleys and end in impressive white cliffs in the fjords. The southern side of the island is more glaciated due to the higher precipitation adding to the layers of ice. Many of the glacier fronts have retreated in recent years, particularly on the north-east coast. Most notable is the Nordenskjold Glacier, which has been retreated by around 1 m per day (Cook et al., 2010) (figure 14 &15).

Figure 14. South Georgia showing the extent of permanent ice cover.

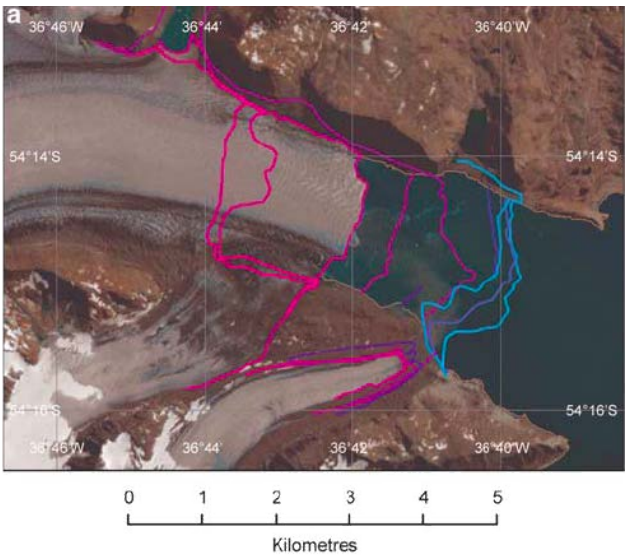


Figure 15. Retreat of the Nordenskjold Glacier (from Cook et al., 2010).

With its mountainous and glaciated landscape, only the coastal fringes, which are snow free in the summer months, can support vegetation. Consequently only 8% of the land mass provides a suitable habitat for plants. Of that, only 3% is fully vegetated, with the remaining 5% either partially or sparsely vegetated. That vegetation shows a strong altitudinal zonation. At lower levels, particularly on the warmer NE side of the island, the vegetation can be lush and, in the natural state, is dominated by tussac (*Poa flabellata*) grassland. In ungrazed areas tussac dominates much of the coastal fringe and provides nesting habitat for white-chinned petrels and other ground nesting seabirds. *Festuca* grassland (*F. contracta)* is also widespread at lower altitudes particularly on the central north coast.

Mire and bog communities occur in wetter areas, often associated with streams and springs are are dominated by the greater rush (*Juncus scheuchzeroides)* and the brown rush (*Rostkovia magellanica).* Fellfield communities, which consist of scattered mosses, lichens and various vascular plants, occur on dry stony ground in exposed windswept sites on the coast and on inland plateau and mountain ridges (Clarke et al., 2013).

The vegetation has been modified by the introductions of non-native plants and of reindeer. Reindeer (*Rangifer tarandus*) were introduced to the island by Norwegian whalers for food and sport. The first introduction was in 1911 to the Barff Peninsula (Figure 16), with reindeer introduced to the Busen area a few years later. Whilst the whaling stations were in operation, the reindeer were controlled, but since the end of whaling in the 1960s the reindeer population increased largely unchecked. Fortunately the reindeer were constrained by the large glaciers, which were a barrier to them reaching new parts of the island (except the Royal Bay area, which they reached). Reindeer had a major impact on the terrestrial ecosystems, particularly on tussac and the greater burnet (*Acaena magellanica*).

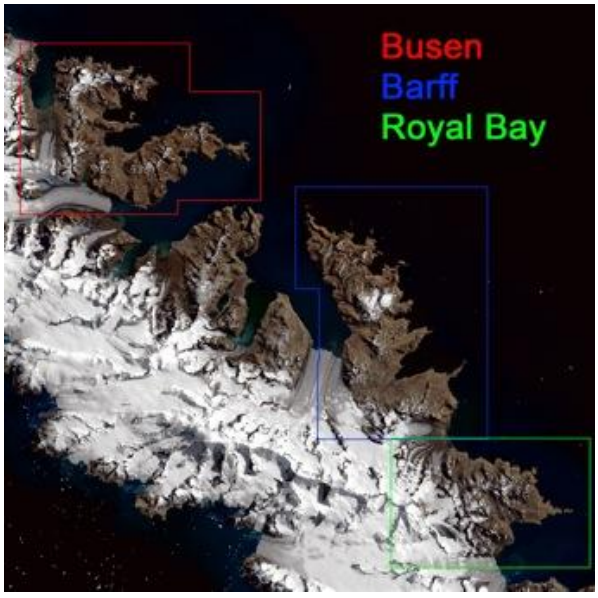


Figure 16. The three areas inhabited by introduced reindeer

In 2011 the Government of South Georgia and South Sandwich Islands took a decision to eradicate the reindeer and following a successful eradication project the island is now reindeer-free and the vegetation is recovering.

South Georgia is home to huge numbers of seabirds that nest in coastal areas. Many of the smaller petrels and prions nest in burrows in scree or associated with the coastal vegetation. Details of the locations of key seabird colonies is available from the South Georgia GIS (http://www.sggis.gov.gs).

3.2.4.2 Marine ecosystems

Pelagic ecosystems

South Georgia is strongly influenced by the Antarctic Circumpolar Current (ACC), and its associated fronts (Meredith et al., 2003). The island lies to the south of the Antarctic Polar Front (APF) and north of the Southern Antarctic Circumpolar Current Front (Figure 17), with sea surface temperatures varying between zero in the winter and 4 C in the summer. There is evidence of recent warming (Whitehouse et al., 2008). The South Sandwich Islands lie to the south of the Southern Boundary of the ACC and sea-surface temperatures rarely exceed 1.5 C.

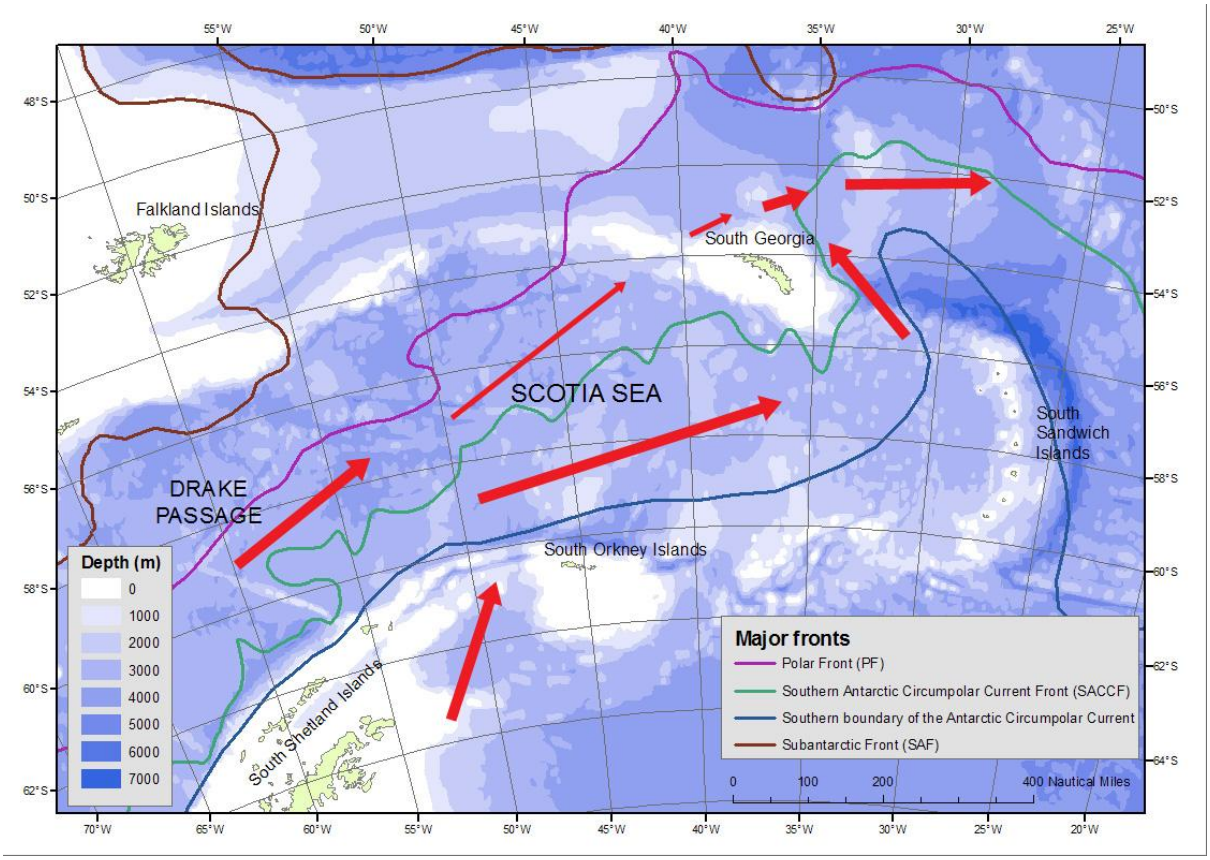


Figure 17. The Scotia Sea, showing the main currents and fronts that influence the marine ecosystems of South Georgia and the South Sandwich Islands (from GSGSSI, 2013).

The waters around South Georgia are amongst the most productive in the Southern Ocean (Atkinson et al., 2001), with large phytoplankton blooms present throughout the summer, particularly in the area to the NW of the island. These blooms are stimulated by nutrients released from the island and surrounding continental shelf and are typically dominated by large colonial diatoms, such as *Eucampia antarctica*, *Odontella weissfloggii* and *Chaetoceros socialis* (Atkinson et al., 2001; Murphy et al., 2007).

The high phytoplankton production leads to levels of zooplankton biomass that are 4-5 times higher than typical Southern Ocean values. Antarctic krill (*Euphausia superba*) make up almost half the zooplankton biomass in the seas around South Georgia. Krill, which reach 60 mm in length, form dense swarms in the upper 200 m and are the key species in the

pelagic food-web, directly linking primary production with abundant vertebrate predators in short, and efficient food chains. The life-cycle of krill is linked to the sea ice zone and are carried to South Georgia on the ACC, with the krill around South Georgia dominated by adult stages. Aside from krill, copepods are the dominant zooplankton, with over 25 species recorded from the seas around South Georgia, including the abundant *Calanoides acutus*, *Rhincalanus gigas* and *Calanus propinquus*. Salps (*Salpa thompsoni*) and pelagic amphipods such as *Themisto gaudichaudii* are also important components of the zooplankton.

The rich zooplankton supports large populations of pelagic (particularly myctophids) and demersal fish, squid, seabirds and marine mammals.

Benthic ecosystems

The benthic ecosystems of the South Georgia and South Sandwich Islands are extremely varied, ranging from the shallow coastal areas to the extreme depths of the South Sandwich Trench (max depth 8,265 m), but the benthic invertebrate fauna is probably the least known of all the marine fauna of the maritime zone (figure 18).

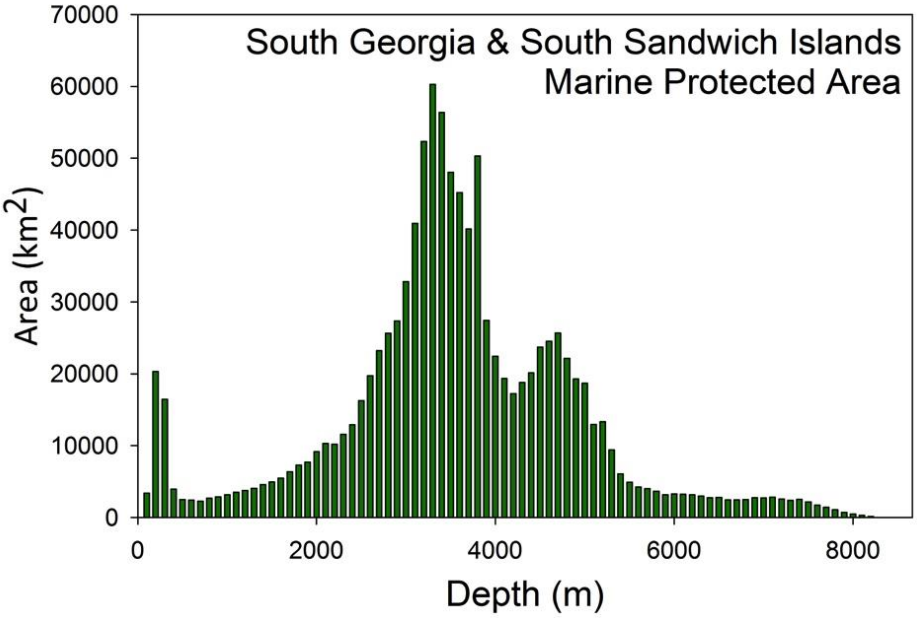


Figure 18. Seafloor areas in each 100 m depth zone in the South Georgia and South Sandwich Islands MPA (from GSGSSI, 2013).

The coastline of South Georgia, which totals over 600 miles (1,000 km) in length, is deeply indented and embayed. Steep-sided fjords up to 9 miles (15 km) long and often over 300 m in depth intersect impressive sea cliffs. The headlands are surrounded by extensive wave-cut platforms, and beaches of sand or shingle form at the head of sheltered bays. The south-west coast of the island is exposed to heavy wave action from the prevailing westerly winds. The north-east facing coast is more sheltered, but is subject to swells generated by northerly and occasionally easterly gales. The coastal algal flora of South Georgia is dominated by stands of the giant kelp, *Macrocystis pyrifera*, with sub-canopies of the large brown algae

Himantothallus grandifolius and complex assemblages of foliose red algal species (Rhodophyta). The tidal range on South Georgia is around 1 m and intertidal seaweeds show distinct zonation. The nearshore algal flora of South Georgia is similar to that of other sub-Antarctic islands and the southern tip of South America (Sanders 2006).

South Georgia is surrounded by a broad continental shelf, but with a relatively small area at depths of less than 50 m. Distinct glacially eroded troughs extend from the major fjords marking the path of former glaciers. Shag Rocks and Black Rock occupy a separate area of continental shelf, separated from the South Georgia shelf by a deep channel (> 1,000 m), and have a distinctly different demersal ichtyofauna.

Hogg et al. (2011) reviewed and collated over 17,000 faunal records from historical surveys and collections on the South Georgia shelf and found 1,445 species from 436 families in 22 phyla. The study highlighted that many of the species are endemic or at the edge of the range and suggested that the South Georgia shelf is one of the most speciose regions in the Southern Ocean.

In the South Sandwich Islands, most of the 200 km total of coastline is sheer vertical rock or ice, with very few beaches or low-lying, level ice-free terrain and very small areas of shallow shelf. Offshore, the local bathymetry is occasionally modified by submarine eruptions, with uplifting and subsidence of the ocean floor and shorelines. There are very few sheltered coastal areas and all shorelines are exposed to heavy wave action under the influence of the prevailing westerly wind and ocean swell. Neither *Macrocystis pyrifera* nor *Durvillea antarctica* have been recorded, and most littoral zones are steep and lack any shelving reefs below the reach of tides and ice scour, with the result that shallow-water fauna and marine algae are thought to be relatively impoverished, and similar to that of the South Orkney Islands (Sanders 2006).

The deeper regions of the SGSSI MZ have been poorly studied, and hydrothermal vents have recently been discovered on the East Scotia Ridge, to the west of the South Sandwich Islands (Rogers et al., 2012).

3.2.5 British Antarctic Territory and Adélie Land

3.2.5.1. Terrestrial and freshwater ecosystems

Only 0.2-0.4% of the land area of the Antarctica is free of ice, and its terrestrial habitats are therefore limited to rocky outcrops (nunataks) protruding from ice sheets, and coastal areas that are snow-free during the summer months. Low temperatures, poor soils and lack of water make most Antarctic terrestrial ecosystems very simple, with low species abundance and diversity. Mosses and lichens occur on exposed rocks, and two species of flowering plants also grow in the milder, maritime climate of the Antarctic Peninsula during the summer months, extending south to Alexander Island (70° S). Some of the richest terrestrial vegetation known in Antarctica occurs at locations within British Antarctic Territory (e.g. Signy Island, South Orkney Islands). There are no permanently land-based vertebrates, however small invertebrates such as springtails and mites can be locally abundant, and display virtually complete species-level endemism. These species are scientifically important as signals of long-term isolation and evolutionary history. Small lakes and streams are present in some ice-free areas of the northern Peninsula during summer, with associated communities of freshwater crustaceans, diatoms, cyanobacteria and algae.

3.2.5.2. Coastal and marine ecosystems

The Antarctic coastline consists mainly of glacier fronts and ice shelf margins, with few ice-free areas although these are expanding (Lee et al. 2017). Large concentrations of breeding land-based marine predators, including penguins, flying seabirds and seals, are present in many of these ice free coastal areas. Sea ice conditions are a major influence on coastal habitats, with some areas experiencing dramatic seasonal change. Permanent sea ice (fast ice) is present in more southerly areas of the Antarctic Peninsula and particularly in the western Weddell Sea, while marine areas surrounding the northern Peninsula and adjacent islands are free of sea ice for most of the summer.

Photo 14. British Antarctic Territory - Antarctic landscape (by Simon Vacher)(c) Stewart McPherson

Pelagic ecosystems

The Atlantic sector of the Southern Ocean is bounded by the eastward-flowing Antarctic Circumpolar Current (ACC), which narrows as it passes through the Drake Passage between South America and the Antarctic Peninsula (see Figure 11). Strong advective flow and eddies occur throughout the Scotia Sea, associated with the Weddell-Scotia Confluence. Mixing of micronutrients with surface waters support extensive summer phytoplankton blooms around the Scotia Arc, which are consumed by a range of zooplankton species including Antarctic krill (*Euphausia superba*), and in turn support a high diversity and abundance of seabirds and marine mammals foraging at sea (Murphy et al., 2007). Sea ice forms an important habitat for juvenile krill, and for several species of penguins, seabirds and seals during both the winter and the summer. Marked interannual variability in winter sea ice distribution and sea surface temperatures is linked to southern hemisphere-scale climate processes such as the El Niño Southern Oscillation (Murphy et al., 2007), but also to local processes like the calving of the Mertz glacier tongue that can have drastic consequences on the local populations of top predators (Ropert-Coudert et al. 2015). While ice melting on land has opened ice-free areas for reproduction (and will continue to do so, Lee et al. 2017), sea ice has, paradoxically, increased in extent in the recent years, reaching new maxima (NASA 2015) and disrupting the ecosystems locally.

Benthic ecosystems

The Antarctic continental shelf is narrow, with an average depth of 500m (deeper than the global mean of 100m). Seafloor temperatures are generally very cold (<1°C), although western Antarctic Peninsula shelf is significantly warmer than shelves around continental Antarctica, as a result of flooding of the shelf by Circumpolar Deep Water from the Antarctic Circumpolar Current (Clarke et al, 2009). Antarctic benthic communities show a high degree of patchiness in both abundance and diversity, and there is a general decrease in abundance from shallow to deeper areas (Griffiths, 2010). Iceberg scouring is a major influence on the structure of benthic habitats to at least 500m depth (Gutt et al, 1996).

Photo 15. British Antarctic Territory - Antarctic landscape (Copyright Simon Vacher Stewart McPherson)

3.3. Species diversity

The polar and subpolar EU Overseas regions host a very specific biodiversity, adapted to the unique climatic and oceanic characteristics of polar and subpolar regions. Species diversity is unequal between taxonomic groups, amphibians and reptiles being nearly absent, while bird diversity and endemism is very important. Due to the isolation of most of the territories, endemism is high and species have developed unique biological characteristics. However little is yet described for these areas and continued research regularly discovers new species.

Photo 16. *Anatalanta aptera*, an interesting fly that has lost its wings, Southern Lands (TAAF)(Copyright TAAF)

Photo 17. South Georgia - King Penguins (Copyright Stewart McPherson)

The polar and subpolar regions are characterised by a very specific biodiversity and biological processes. While the marine area is extremely productive, the terrestrial area is relatively poor but highly adapted to the environmental conditions (photo 18). The richness of marine resources allow the great concentrations of marine apex predators, such as birds and marine mammals (photo 19).

3.3.1 Greenland

Plants

Presently, 515 indigenous vascular plant species are known in Greenland (Bay, 1993). They include 21 aquatic plant species and a single marine species, the sea-grass *Zostera maritima*. The vascular plants of Greenland also include a number of species that are thought to have been introduced by Norsemen or other travelers (Pedersen, 1972), but they have only spread to the natural vegetation to a small degree and are not included in the total number of species.

Table 3. Most represented plants families and genus in Greenland

Taxons	**Number of species**
Poaceae (family)	71
Asteraceae (family)	68
Cyperaceae (family)	59
Carex (genus)	47
Draba	19
Hieracium	18
Saxifraga	16
Ranunculus	12
Brassicaceae	38
Caryophyllaceae	33
Rosaceae	25
Saxifragaceae	18
Juncaceae	18
Ranunculaceae	16
Ericaceae	10

The families Ericaceae, with only 10 species in Greenland, and Salicaceae are the most dominant families in Greenland in terms of vegetation biomass. Many plant families are only represented by one or a few species, for example, Boraginaceae, Lamiaceae and Apiaceae Conifers, which dominate in the temperate plant regions just south of the Arctic and make up the timberline in both North America and Russia along the transition between the northern boreal zone and the Arctic, are only represented by one species in Greenland, prostrate juniper (*Juniperus communis ssp. alpina*). This species is never a dominant element of Low Arctic vegetation.

Current estimates of the number of lichens in Greenland are somewhere around 950 species. Lichens are found in all ice-free regions of the country and on nunataks. They grow on soil, cliffs and other bare surfaces. Greenland's lichen species are categorized based on distribution patterns: circumpolar (distribution in the northern region of the globe); amphi-Beringian (distribution in the area around the Bering Strait); amphi-Atlantic (distribution on both sides of the Atlantic Ocean) and disjunct (distribution in Greenland and, for example, western North America).

Approximately 600 species of mosses are found in Greenland. The mosses in Greenland are dominated by foliose mosses, which account for over 440 species (Mogensen, 1987). Granite mosses, sphagnum mosses and liverworts comprise 10, 27 and 135 species, respectively (Mogensen, 1987). Within the seven families that have been worked on, the following rare species can be mentioned: *Oligotrichum falcatum, Andreaea alpina, A. heinemannii, Sphagnum pylaesii, S. lenense, S. obtusum* and *Lyellia aspera*.

Birds

235 bird species occur in Greenland (Boertmann, 1994). Of the 58 well-established breeding bird species, 37 are widely distributed on both sides of the Atlantic, 8 have their primary distribution in North America and 13 species are mostly distributed in Europe. Some species are associated with High Arctic Greenland, quite a few are associated with the Low Arctic region, others have small distributions within these climactic zones and only four species, red-throated divers (*Gavia stellata*), rock ptarmigans (*Lagopus mutus*), gyrfalcons (*Falco rusticolus*) and snow buntings (*Plectrophenax nivalis*), are found throughout Greenland (Boertmann,1988).

Photo 18. Calidris alpina arctica, an endemic subspecies (Copyright Taenos)

The waterfowl family (Anatidae) is the most species-rich, while the alcid family (Alcidae) has the largest number of individuals. Since the last count (Salomonsen, 1967), the Barrow's goldeneye (Bucephala islandica) has disappeared. Ten new species of breeding birds have been recorded and some roving marine birds have become more common. There are no endemic species, but a few subspecies: the dunlin (*Calidris alpina arctica*), an Iceland gull subspecies (*Larus glaucoides glaucoides*) and Greenland white-fronted goose (*Anser albifrons flaviostris*), although they winter partly or completely outside of Greenland, breed only in Greenland. One mallard subspecies, *Anas platyrhynchos conboschas*, and two rock ptarmigan subspecies, *Lagopus mutus captus* and *L. m. saturatus*, are truly endemic since they are not found outside of Greenland. In addition to the red-throated diver (*Gavia stellata*), the great northern diver (*Gavia immer*) also breeds in Greenland. Great northern divers are typical in large lakes on the west coast northward to Qaanaaq and on the east coast up to Hochstetter Forland.

Although the order Procellariiformes (petrels, fulmars, albatrosses) is represented in small numbers, the northern fulmar (*Fulmarus glacialis*) is the species most commonly seen in the waters surrounding Greenland. It breeds only a few places (Qeqertarsuup Kangerlua, Uummannaq and Qaanaaq), but in high abundance. They nest on steep cliff walls in colonies that can contain thousands of pairs. Great shearwaters (*Puffinus gravis*) are the only breeding birds from the southern hemisphere that in smaller or larger numbers are summer/autumn guests in Greenland every year.

Photo 19. Fulmar Fulmarus glacialis (Copyright Robert Thompson)

Of the species in the order Pelicaniformes (pelicans, cormorants, frigates), only great cormorants (*Phalacrocorax carbo*) breed in Greenland (Boertmann & Mosbech, 1997). Northern gannets (*Sula bassana*) are regular guests in Greenland in June-September, most often in the region from Qaqortoq to Nuuk. Waterfowl (Anatidae) include swans, geese and ducks. Six goose species breed on the west coast or in the High Arctic region. All of the species are increasingly successful, with the exception of the white-bellied brant (*Branta bernicla hrota*) (Boertmann, 1994; pers. comm.). The number of snow geese (*Anser caerulescens*) has increased since the middle of the 1970s and the species has expanded its distribution in Greenland. The breeding distribution of Greenland white-fronted geese (*Anser albifrons flaviostris*) is limited to West Greenland from the region around Nuup Kangerlua to the Upernavik district (Salomonsen, 1990). After a period of decrease in size, the population has increased once again. Since the Greenland white-fronted goose only breeds in Greenland, the country is particularly responsible for its survival. An international conservation plan has been initiated. Canada geese (*Branta canadensis*) occur as two races, a small one and a large one (Fox et al., 1996; Bennike, 1990).

There are 9 duck species in Greenland, some of which are visiting and others breeding in the country. The mallard subspecies *Anas platyrhynchos conboschas* is endemic to Greenland and nests along the coast in the open water area in West Greenland and by Tassilaq/Ammassalik. Common eiders (*Somateria mollissima*) have a circumpolar distribution and are common breeding birds along Greenland's coasts, more frequently on the west than the east coast (Salomonsen, 1990). King eiders (*Somateria spectabilis*) breed in the High Arctic and Harlequin ducks (*Histrionicus histrionicus*) nest along gushing streams. Long-tailed ducks (*Clangula hyemalis*) breed throughout Greenland and are common birds in many areas. Red-breasted mergansers (*Mergus serrator*) are rather common breeding birds by lakes and shallow-water coasts in West Greenland.

The white-tailed eagle (*Haliaeetus albicilla*) is Greenland's largest bird of prey. It breeds in West Greenland from Qaqortoq to southern Aasiaat (Hansen, 1979; Bennike & Feilberg, 1982). The population has been in decline, but after its complete protection in 1973 and a number of studies on its living habits, it is no longer threatened (Salomonsen, 1990; Kampp & Wille, 1990). The peregrine falcon (*Falco peregrinus tunderus*) is a common breeding bird in West Greenland up to Qeqertarsuup Tunua and from there, less common northward to southern Qaanaaq. The gyrfalcon (*Falco rusticolus*) has a circumpolar distribution, breeding in West, North and possibly Southeast Greenland. The gray morphs breed primarily in the

Low Arctic while the white morphs are widely distributed (Boertmann, 1994). All three species mentioned above are completely protected in Greenland, meaning there is a ban on trade in eggs and live or dead individuals. The species are listed in CITES Appendix I.

Rock ptarmigans (*Lagopus mutus*) are the only gallinaceous birds (Galliformes) represented in Greenland. They are very common breeding and resident birds and are found in more or less all terrestrial habitats.

Waders (Charadrii) comprise a large portion of the terrestrial birds and encompass many of the species that breed in Greenland. They dominate the bird fauna in the High Arctic and of the 11 species of waders that regularly breed in Greenland, 9 breed only in the High Arctic region of the country or have their primary distribution there (Meltofte, 1985). Common ringed plovers (*Charadrius hiaticula*), ruddy turnstones (*Arenaria interpres*), red knots (*Calidris canutus*), dunlins (*C. alpina*), sanderlings (*C. alba*) and red phalaropes (*Phalaropus fulicarus*) are the most numerous High Arctic waders (Meltofte, 1985). In West Greenland purple sandpipers (*Calidris maritime*) are breeding birds. The red-necked phalarope (*Phalaropus lobatus*) breeds primarily in the Low Arctic region of the country by shallow lakes with shore vegetation. The long-tailed skua (*Stercorarius longicaudus*) is a High Arctic species that breeds in small numbers in Qeqertarsuup Tunua and is common in Northeast Greenland and most of North Greenland. The parasitic jaeger (*Stercorarius parasiticus*) has a more Low Arctic distribution and commonly breeds along more or less the entire west coast up to southern Upernavik and on the east coast from the Blosseville Coast to Hochstetter Forland.Both the pomarine skua (*Stercorarius pomarinus*) and the great skua (*Stercorarius skua*) are common migrant guests throughout large parts of the country in May/June-October (Boertmann, 1994).

Photo 20. Common ringed plover (*Charadrius hiaticula)* (Copyright Christophe Perelle)

Gulls (Laridae) are represented by eleven species in Greenland. A subspecies of the Iceland gull (*Larus glaucoides glaucoides*) breeds only in Greenland and is thought to number between 20,000 and 100,000 pairs in West Greenland. Black-legged kittiwakes (*Rissa tridactyla*) are the most common gulls in Greenland (Boertmann et al., 1996).

The Arctic tern (*Sterna paradisaea*), Greenland's only tern, occurs throughout the country by both fresh and salt water, but is mainly concentrated in West Greenland, with just a few colonies in South Greenland. It is estimated that there are 30,000 to 60,000 individuals in West Greenland and that the entire breeding population probably does not contain more than 80,000 individuals (Boertmann, 1994; 1996). Since they winter in Antarctica, Arctic terns complete one of the longest migrations known to birds.

The alcids (Alcidae) include six species in Greenland, all of which nest in colonies. The black guillemot (*Cepphus grylle*) is the most widely distributed, while Atlantic puffins (*Fratercula arctica*) and razorbills (*Alca torda*) are less common and have a scattered distribution. Thickbilled murres (*Uria lomvia*) nest in 21 colonies in West Greenland, with more than half

of the individuals occurring in five colonies in Avanersuaq. The total population estimated at 535,000 individuals and contains about 5% of the North Atlantic population (Kampp et al., 1994; Boertmann et al., 1996). Common murres (*Uria aalge*) are found in colonies with thick-billed murres in South Greenland, Paamiut, Nuuk and Maniitsoq. Little auks (*Alle alle*) breed primarily in the High Arctic and are the most numerous birds in Greenland. It is estimated that there are 20 million pairs of little auks in Avanersuaq (Boertmann et al., 1996), which accounts for about 80% of the global population (Nettleship & Evans, 1985).

Photo 21. The majestic Snowy owl *(Nyctea scandica)*

Snowy owls (Nyctea scandica), the only breeding owls found in Greenland, breed in the High Arctic. The Arctic lemming is the most important prey item for snowy owls and breeding success depends on the number of lemmings. The snowy owl is listed in CITES Appendix II.

Among the passerines (Passeriformis), the raven (*Corvus corax*) is the country's only corvid. It breeds throughout Greenland, except in the northernmost regions, and winters close to nesting sites. The common redpoll (*Carduelis flammea*) is most common in continental areas in willow and birch scrub. Towards the north, it is replaced by the Arctic redpoll (*Carduelis hornemanni*), which is a primarily High Arctic species. In contrast to common redpolls, Arctic redpolls winter in Greenland. The snow bunting (*Plectrophenax nivialis*) is a common breeding bird throughout the country. Snow buntings winter in the southernmost parts of the country and further north during mild winters. Northern wheatears (*Oenanthe oenanthe*) breed primarily in the country's Low Arctic regions in dry, rocky areas. The Lapland bunting (*Calcarius lapponicus*) breeds primarily in Low Arctic regions of the country and is most often found in lush, continental areas with birch and willow. During mild winters, a small portion of the population winters in southern West Greenland (Boertmann, 1994).

Fishes

Greenland's fish fauna includes 216 species, of which approximately 150 species are observed regularly, the rest are known only from a few specimens or occur as visitors.

The species can be divided into two main groups, boreal species that are associated with temperate water bodies, such as the one the Gulf Stream and Irminger Current send up along the coast of Southwest Greenland, and Arctic species that are most abundant north of the submerged ridge in the Davis Strait and in the waters of North and East Greenland. Boreal species comprise about 40% of the species, as do Arctic species. The rest of the species have a boreal-Arctic distribution. However, many of the species' distributions are not fully known. Species composition and distribution change with climate and Arctic species disperse southward in cold periods, while boreal species become more abundant in milder periods.

The bony fishes dominate the fish fauna with approximately 140 species. The families that contain the most species are the cod (Gadidae), sculpin (Cottidae) and eelpout (Zoarcidae) families. Capelins (*Mallotus villosus*) and sand lances (*Ammodytes sp*.) are abundant and prey items for a number of other fish species, birds and mammals. Of all the fish, the Greenland halibut (*Reinhardtius hippoglossoides*) has the greatest commercial interest. The Atlantic cod (*Gadus morhua*) used to be the species with the greatest commercial interest. Cyclostomes (Cyclostomata) are represented by hagfish (*Myxine glutinosa*), which are carrion feeders along Southwest Greenland.

The cartilaginous fishes (Chondrichthyes) are generally benthic and are comprised of three shark (Galeoidea) species and four skate (Batoidea) species. The Greenland shark (*Somnious microcephalus*) is the most widely distributed shark. It is found along all the coasts, except for the northernmost ones. Skates are found at water temperatures above 0°C. Arctic skates (*Raja hyperborea*) and thorny skates (*R. radiata*) are the only species that occur as far north as Baffin Bay.

Photo 22. Greenland shark, *Somniosus microcephalus*

The Greenland shark has the longest known lifespan of all vertebrate species (392 ± 120 years), and is among the largest extant species of shark. They grow to 6.4 m (21 ft) and 1,000 kg (2,200 lb). The sharks' livers were once used for machine oil, and they were killed in great numbers before a synthetic alternative was found. Nowadays, they are bycatch species of Greenland's fisheries.

Marine Mammals

Twenty-two marine mammal species occur in the waters surrounding Greenland, either as breeders or as visitors. The seals found here do not occur in the southern seas, while some of the whales are found in both the southern and northern seas.

The Atlantic walrus (*Odobenus rosmarus rosmarus*) winters in Greenland (Born et al., 1995). Walruses gather close to foraging areas on ice floes or sometimes on land on so-called haul-outs. Their narrow food niche and limited distribution make walruses vulnerable to environmental changes and easy targets for hunters (Born et al., 1995). As a consequence, the number of walruses in central West Greenland has decreased sharply since the turn of the century (Born et al., 1994; 1995). Walruses are listed in CITES Appendix III.

The five true seal (Phocidae) species found in the waters surrounding Greenland are distributed among three genera. Harbor seals (*Phoca vitulina*) occur along the entire west coast, particularly along the southern part, and in Southeast Greenland up to Ittoqqortoormiit. Ringed seals (*Phoca hispida*) and bearded seals (*Erignathus barbatus*), both of which are associated with sea ice, occur along all of Greenland's coasts. Harp seals and hooded seals (*Cystophora cristata*) are among the migrant seals. They breed on pack ice both west and east of Greenland and after the breeding season, migrate north along Greenland's west and east coasts.

Whales (Cetacea) are represented by fifteen species in Greenland; nine toothed whales and six baleen whales (Born et al., 1998). Male sperm whales (*Physeter macrocephalus*) occur in small numbers by West Greenland and a bit more abundantly by East Greenland. Females and their young occur further south in the North Atlantic. In West Greenland, humpback whales (*Megaptera novaeangliae*) are principally found between Paamiut and Sisimiut. Bowhead whales (*Balaena mysticetus*) were protected internationally in 1934 after experiencing severe hunting pressure for several hundred years. In some years, sei whales (*Balaenoptera borealis*) occur off of Southwest Greenland and between Southeast Greenland and Iceland. Blue whales (*Balaenoptera musculus*) only occur sporadically in West Greenland, northward to Uummannaq, but are principally found between Paamiut and Sisimiut (Born et al., 1998). The five species mentioned above are completely protected and are listed in CITES. The Sei whale (*Balaenoptera borealis*), the blue whale (Balaenoptera musculus) and the fin whale (Balaenoptera physalus) are listed as Endangered by the IUCN.

Minke whales (*Balaenoptera acutorostrata*) are found along the entire west coast but also in East Greenland along large stretches of coast. Fin whales (*Balaenoptera physalus*) are found in West and East Greenland. The hunting of minke and fin whales in Greenland is by quota and is internationally considered to be aboriginal/subsistence catch. Minke and fin whales are listed in CITES Appendix II (west) and Appendix I (east) and fin whales Appendix I, respectively.

Beluga whales (*Delphinapterus leucas*) migrate along Greenland's west coast. In the spring they migrate across Baffin Bay to summer areas in northern Canada. Beluga whales are found from along the ice edge in Avanersuaq from early spring and the open water period until autumn. Beluga whales are rare in East Greenland. Several studies suggest that the beluga whale population has declined drastically and perhaps was halved from 1981 to 1994 (Heide-Jørgensen & Reeves 1996). Hunting may have caused the decline. Beluga whales

are listed in CITES Appendix II. Like beluga whales, narwhals (*Monodon monoceros*) conduct yearly migrations. They are most abundant by the west coast and less so by the east coast. The narwhal is listed in CITES Appendix II. Harbor porpoises (*Phocoena phocoena*) occur along Greenland's entire west coast, but are thought to occur primarily in the areas off Paamiut, Maniitsoq and Nuuk.

Several other species of toothed whales are also found in Greenland: orcas, (*Orcinus orca*), bootlenose whales (*Hyperoodon ampullatus*), long-finned pilot whales (*Globicephala melas*), white-sided dolphins (*Lagenorhynchus acutus*) and white-beaked dolphins (*L. albirostris*).

Pictures of Marine mammals of Greenland

Photo 25. The Atlantic walrus (*Odobenus rosmarus rosmarus*)

Photo 24. Sperm Whale (*Physeter Macrocephalus*) (Copyright Hiroya Minakuchi-Minden Pictures)

Photo 23. Beluga whales (*Delphinapterus leucas*

3.3.2 Saint Pierre and Miquelon

Plants

The archipelago counts the only boreal forest of France. The climate of the archipelago, cold and humid, is very favorable to the creation of peatland. 30 species of sphagnum on the 50 existing in all North America is present on the archipelago. The family of the Cyperaceae is the most important, with 70 species of Carex and 20 other species. In this habitat that can be observed many carnivorous plants like Sarracenia, Drosera, Utricularia, and an important part of the 21 species of orchidaceae of the archipelago.

Globally, the flora of the archipelago consists of about 600 species of vascular plants of which at least 50% are aquatic and 27% have been introduced. 177 species of mosses can be found, including the 30 sphagnum precedently quoted, and hundreds of lichens. Considering the proximity with Terre-Neuve, 20 kilometers, there is no endemism, but many species boreal are unique on the French territory.

Photo 26. Terrestrial landscape in Colombier, Saint-Pierre et Miquelon (Copyright Joël DETCHEVERRY)

Birds

The population of marine nesting birds is of interest, particularly on Grand Colombier Island. According to population survey conducted in 2008 (Lormée et al. 2008, 2012), more than 363,787 [95% CI 5 295,502–432,072] breeding pairs of Leach's Storm petrel (*Oceanodroma leucorhoa*) nest every year, as well as 9543 [95% CI 7160 – 11926] breeding pairs of Atlantic puffin (*Fratercula arctica*), 196 breeding pairs of Black-legged Kittiwake (*Rissa tridactyla*), 63 breeding pairs of great cormorant (*Phalacrocorax aristotelis*) and 48 breeding pairs of Black Guillemot (*Cepphus grylle*). Complementary surveys were conducted in 2015 (Lormée et al. 2015) and estimated that the island hosts 7 176 [95% CI 4 616 – 10 016] breeding pairs of Common Mure (*Uria aalge*), 1 443 [95% CI 1 147 – 1 737] breeding pairs of Razorbill (*Alca torda*). In 2016, the first two breeding pairs of northern fulmars (*Fulmarus*

glacialoides) were observed. Several couples of Piping Plover (*Charadrius melodus melodus*), a near threatened species in North America, nest on the Miquelon-Langlade isthmus. One species has been introduced (the Ruffed grouse, *Bonasa umbellus*) and one species has disappeared (the Willow grouse, *Lagopus lagopus*).

During the winter season, seaducks are observed on the islands, like the Eider duck (*Somateria mollisima*) whose population is estimed at more the nine thousands. On the south cost of Saint-Pierre Island, at least three hundreds of Harlequin ducks (*Histrionicus histrionicus*) can be observed, as well as the Red necked Grebe (*Podiceps grisegena*) whose population during the winter season is estimed at 150 individuals. Near the isthmus of Miquelon-Langlade on the Eastern side, the Kakawi duck (*Clangula hyemalis*) is observed (more than a hundred birds) along with three scoters species. The white wings scoters are the most common species followed by the Black scoter and the Surf scoter. The population of scoters (all species included) is estimed to be more than 1200.

The Grand barachois is a big pond of more than 10 km² where salt water comes when the tide starts to rise. This lagoon is localized on the northern part of the isthmus of Miquelon-Langlade. During late of summer and early fall many shorebirds are observed. Hunting is prohibited inside the pond. In this lagoon, every falls and winter seasons, black ducks (*Anas rubripes*) are present and their population is estimed to reach 600 hundreds birds. The Golden eye duck is also present in the Grand barachois during fall and winter and its population is estimated at 150 individuals.

Photo 27. Atlantic puffin in St Pierre et Miquelon (Copyright Joël Detcheverry)

Fishes

There are no freshwater fishes in the archipelago. Every species of fishes go to the sea at one moment of their life cycle. Some of them are anadromous, which means that their reproduction takes place in freshwater, as *Salvelinus fontinalis*, *Osmerus mordax*, Gasterosteidae as sticklebacks, and Salmonidae. Other species of fishes of the archipelago

are catadromous, meaning they live in freshwater but their reproduction in is saltwater, as the *Anguilla rostrate americana*.

Marine fish species include *Gadus morhua*, *Mallotus villosus*, *Melanogrammus aeglefinus, Xiphias gladus*, *Hippoglossus hippoglosus, Reinhardtius hippoglossoides, Pollachius virens, Limanda ferruginea, Cyclopterus lumpus, Anarichas lupus, Scomber scombrus, Merluccius billinearis, Urophysis tenuis, Glyptocephalus cynoglossus, Hyppoglossoides platessoides, Raja radiata, Salmo salar, Sebastes marinus, Thunnus alalunga, Thunnus thynnus, Lamna nasus* and Eelpout species.

Marine Mammals

At least 23 marine mammal species are known to occur around St Pierre and Miquelon, including 19 species of cetaceans (whales, dolphins, and porpoises) and four species of phocids (true seals) (Annexe 3). Additional marine mammal species, such as pygmy sperm whales and ringed or bearded seals, may occur very rarely. Two seal species are present in the Grand barachois. One of them, the Harbour seal, breeds on the lagoon and is observed all year aroung while the Grey seal just visit the area. The Grey seal is observed during spring, summer and fall seasons. The population of those two species is estimed to be at least one thousand individuals.

Photo 28. White-Beaked Dolphin, StPierre&Miquelon (Copyright Joël DETCHEVERRY)

Marine reptiles

Two marine reptiles are present in SPM waters during the summer season: the Leatherback turtle (*Dermochelys coriacea*) and the Green turtle (*Chelonia mydas*).

3.3.3. The French southern Lands

Plants

The flora of the French southern lands is relatively poor, including 36 native phanerogam species in total. Bryophytes and lichens, more numerous (>100 species), are still under inventory and new species are still being regularly described. At least 11 species of mosses and 4 species of lichens are endemic to the islands. The Crozet islands host 18 phanerogams species and 10 pteridophytes. Kerguelen Islands host 22 phanerogams, of which *Lyallia kerguelensis* (endemic of the archipelago) and 8 pteridophytes. Amsterdam and Saint-Paul host respectively 18 and 10 species of pteridophytes, 17 and 10 phanerogams (of which 7 are endemic) (inventory still ongoing). In total, the French Southern Lands host at least 24 endemic species (of which 9 phanerogams).

Most of the vascular flora of the islands of the Kerguelen archipelago is also present in the the temperate region of the Southern Ocean. Vascular plants endemic to the region include *Poa cookii* and *Pringlea ascorbutica* (both found on all the islands in the ecoregion), *Polystichum marionense* (found on the Crozet, Amsterdam, Marion and Prince Edward Islands, SAFR), *Ranunculus moseleyi* (only found in Marion island and Kerguelen Islands), *Lyallia kerguelensis* (only found on the Kerguelen Islands), *Poa kerguelensis* (only found on Heard and the Kerguelen Islands) and *Colobanthus kerguelensis* (Crozet, Kerguelen, Heard, Marion and Prince Edward Islands, Mc Donald Island). Other non-endemic, but notable, plant species include *Crassula moschata, Aceana magellanica*, the cushion-shaped *Azorella selago*, the feathery *Leptinella plumosa*, and the grass *Agrostis magellanica*. Among the non-flowering plants, the fern *Blechnum penna-marina* should be noted.

Amsterdam Island is the only French Subantartic Island that supports a native tree, *Phylica arborea*. In the Rhamnaceae family, this tree has small, narrow leaves and honey-scented yellow flowers, reaches 6-7 m, and is abundant on the Tristan da Cunha-Gough Island group in the Atlantic Ocean (Jouventin 1994). An early description of Amsterdam Island from 1726 described an almost impenetrable Phylica forest in a belt around the island at 100 to 250 m covering almost a third of its surface. Nowadays the "Grand Bois" (large forest) is the only thick remnant of Phylica on the eastern coast covering about 8 hectares, or about 0.2% of the whole island (Jouventin 1994). This dramatic reduction was likely the result of cutting, fires and destruction by the cattle that were introduced in the later 1800s (they have now been eradicated). The program conducted by the TAAF to replant Phylica arborea trees was successful: about 3000 trees were planted.

Photo 29. The Phylica arborea, the only tree of TAF(Copyright TAAF)

Birds

The French Southern Lands host the greatest bird population in the world, counting more than 50 millions of birds only for Crozet and Kerguelen archipelagos. In total, the French southern lands host 47 species of birds and for 15 of them, at least half of the world's population breed on the islands (annexe 4).

The islands of Crozet and Kerguelen host extremely rich communities with respectively 38 and 36 species of birds breeding on sites. Crozet is considered to have the highest bird's biomass on earth with about 60 tonnes of birds per km2 and it hosts all six species of albatrosses that breed in the ecoregion (Weimerskirch et al. 1986). 80% of the world's population of Salvin's prion (*Pachyptila salvini salvini*) can be found on the Île de l'Est of the Crozet group. More than half the world's population of king penguin (*Aptenodytes patagonicus*) is found on the Crozet archipelago (Guinet et al. 1995) with 500,000 breeding pairs on Île aux Cochons, the largest colony in the world (Jouventin and Micol 1995). 342000 breeding pairs of the king penguin are also found on the Kerguelen Islands (Chamaillé-James et al. 2000).

There are currently 11 breeding seabird species on Saint-Paul and Amsterdam, of which 4 are extremely rare. The endemic Amsterdam albatross (*Diomedea amsterdamensis*) is one of the world's rarest species of avifauna, found only on Amsterdam Island; its population estimated at only 167 individuals (Rivalan et al. 2010) is restricted to the upland Plateau des Tourbières and has only 30-40 pairs breeding in 2014 (CNRS Chizé Monitoring Database). Thus, this species is assessed critically endangered (CR) by the IUCN Red List. The Macgillivray's prion (*Pachyptila macgillivrayi*) is a species endemic to the ecoregion with less than 100 breeding pairs, has been assessed vulnerable (VU) by the local Red List (UICN France et al. 2015). The islands supports approximately 80% of the world's population of Indian yellow-nosed albatross (*Thalassarche carteri*), was assessed endangered (EN) with about 27,000 breeding pairs (Jouventin 1994).

Photo 30. The king pinguins and the yellow nosed albatross, two emblematic species of the TAF (Copyright TAAF)

Other residents of the islands are the northern rockhopper penguin (*Eudyptes moseley*i), the sooty albatross (*Phoebetria fusca*) (240 pairs), the grey petrel (*Procellaria cinerea*), the antarctic tern (*Sterna vittata*), the brown skua (*Catharacta lonnbergi*), and common waxbill (*Estrilda astrild*) (introduced 1977-1985) (Jouventin 1994).

The French southern islands host numerous threatened birds including the Indian yellow-nosed albatross (*Thalassarche carteri*) (EN), the sooty albatross (*Phoebetria fusca*) (EN), the grey-headed albatross (*Thalassarche chrysostoma*) (EN), the Eaton's pintail (*Anas eatoni*) (an endemic of Crozet and Kerguelen) (VU), the wandering albatross (*Diomedea exulans*) (VU), the rockhopper penguin (*Eudyptes chrysocome*) (VU), the macaroni penguin (*Eudyptes chrysolophus*) (VU) and the white-chinned petrel (*Procellaria aequinoctialis*) (VU) (annexe 4).

A synthesis of available knowledge on birds and their distribution is available in the Atlas of Top predators (Delord et al., 2013).

Fishes

A total of 28 species of fish have been reported off Saint Paul and Amsterdam (Duhamel, 1989). The species belong to a sub-tropical ichthyofauna, with a strong biogeographic link with the ichthyofauna of Tristan da Cunha. The most abundant coastal fishes are the St Paul's fingerfin (*Nemadactylus monodactylus)*, the hapuku wreckfish (*Polyprion oxygeneios)*, the stripped trumpeter (*Latris lineata)* and in the bluenose warehou (*Hyperoglyphe antarctica)*. These species have been fished almost continuously since 1948, linked with the St Paul's rock lobster *Jasus Paulensis* fishery. In the open seas, the southern bluefin tuna is also reported.

A total of 125 marine fish species occurring in Crozet and Kerguelen waters have been described, including 5 sharks, 4 skates and 117 bony fishes. 84 species occur off Crozet and 111 species off Kerguelen. Three families are dominant in terms of number of species: Myctophidae (25 species), Nototheniidae (10 species) and Liparidae (8 species). Each of these families inhabits three different habitats: offshore midwater; shelf and coastal domain; and deep sea.

Photo 31 : Patagonian toothfish (*Dissostichus eleginoides)*

Photo 32 : Unicorn icefish *(Channichthys rinnoceratus)*

The distribution of pelagic species in the region follows a latitudinal zonation. Lanternfishes (Myctophidae) comprise 94% (by number) of the catches from offshore midwater trawls. They mainly belong to the temperate and polar biogeographical groups. These lantern fishes, none of which exceed a few centimeters in length, are very important in the trophic ecology of the region, representing an abundant prey for top-predators.

The species of benthic fishes, dominated by the Notothenioidei, belong to the Kerguelenian bio-geographical province of the Southern Ocean. This province encompasses, from West to East, Prince-Edward, Crozet, Kerguelen, Heard/McDonald and Macquarie Islands. The Kerguelen Plateau, the largest shelf in the Southern Ocean, is also the only region in which two genera of Channichthyidae co-occur, one of which, Channichthys, is endemic. Some of these notothenioid species have been fished commercially since the last quarter of the 20th century, and 2 can be considered important to the fishery: the mackerel icefish, *Champsocephalus gunnari* and the Patagonian toothfish, *Dissostichus eleginoides*, the largest antarctic teleost fish.

Photo 33 : Mackerel icefish (*Champsocephalus gunnari*)

Deep sea species are known mainly from catches of single specimens. Some species such as Macrouridae, Rajidae and Moridae, are present in numbers up to below 1500m. Information on their diversity and biology remains relatively limited.

Marine Mammals

23 species of marine mammals have been reported off Kerguelen and Crozet Islands (annexe 5). Breeding species include 8 species of cetaceans and 3 species of seals. A sub-species of Commerson dolphin was recently described as endemic of the Kerguelen Islands, *Cephalorhynchus commersonii kerguelensis,* and is assessed endangered on the regional IUCN Red List (UICN France et al. 2015) and data deficient (DD) on the global Red List. Both Crozet and Kerguelen host local populations of killer whales (*Orcinus orca*) assessed on the local Red List as endangered (EN) and DD on the global Red List.

Among visiting species in the French southern lands, 3 cetaceans are assessed as EN: the blue whale (*Balaenoptera musculus*), the Sei whale (*Balaenoptera borealis*) and the fin whale (*Balaenoptera physalus*); and 1 species as vulnerable (VU): sperm whale (*Physeter macrocephalus*).

Species of pinnipeds breeding in the French southern islands include the Antarctic fur seal (*Arctocephalus gazella*), the Sub-Antarctic fur seal (*Arctocephalus tropicalis*), and the Southern elephant seal (*Mirounga leonina*). The crab-eater seal (*Lobodon carcinophaga*), the Weddell seal (*Leptonychotes weddellii*) and the leopard seal (*Hydrurga leptonyx*) are occasionally encountered in Crozet and Kerguelen. Kerguelen hosts the second largest population of Southern elephant seals of the world.

Photo 34 : The Commerson dolphin (*Cephalorhyncus commersonii ssp kerguelensis*) in the golfe du Morbihan, Kerguelen island

Photo 35 : Orca *(Orcinus orca)* in Crozet

3.3.4 South Georgia and South Sandwich Islands

Plants

There are 25 species of vascular plants native to South Georgia, comprising 5 grasses, 3 rushes, 1 sedge, 9 dichotyledon herbs, 6 ferns and 1 clubmoss. Over 50 naturalised introduced vascular species, which mostly occur around the old whaling stations, and about 125 species of mosses, 80 of liverworts and 150 of lichens. There are no known endemic vascular plant species, although there are a few endemic bryophytes and lichens. There are no trees or shrubs, and only mosses and lichens survive in the inland rock and ice environment. Of the vascular plants, only seven develop extensive stands and dominate distinct communities. They are tussac grass (*Poa flabellate)*, greater burnet (*Acaena magellanica)*, tufted fescue grass (*Festuca contracta)*, greater rush (*Juncus scheuchzerioides)*, brown rush (*Rostkovia magellanica)*, antarctic hairgrass (*Deschampsia antarctica)* and the introduced annual meadow-grass *Poa annua*, which dominates areas previously grazed by reindeer and trampled by seals and penguins. The vegetation changes with altitude and regional climatic differences.

Photo 36. South Georgia landscape, tussac grassland (Copyright Dr. Judith Brown)

Extensive areas of vascular vegetation are principally confined to low-altitude coastal areas and offshore islands, islets and stacks where the landscape is dominated by tussac grassland, with *Parodiochloa flabellata* dominant. This species extends from sea level to a maximum altitude of 200m on the south coast and 400 m on the north coast. Short grassland, dominated by *Festuca contracta*, is widespread up to 200 m altitude on coastal areas of the central north coast. Stands of *Acaena magellanica* herbfield occur most frequently in sheltered damp tussac grassland. These were heavily grazed by reindeer but, following the recent eradication of reindeer, are now recovering. Mire and bog communities dominated by *Juncus scheuchzerioides* and *Rostkovia magellanica* occur wherever there are seepage slopes, streams and springs. Moss banks are dominated by *Polytrichastrum alpinum* and *Chorisodontium aciphyllum*. In wetter areas of the island, *C. aciphyllum* is usually the dominant moss species. *Polytrichastrum alpinum* is dominant in areas that were

grazed by reindeer, where selective grazing has resulted in replacement of the original tussac grassland by mosses. Fellfield communities consisting of scattered mosses, lichens and various vascular plants occur on dry stony ground in exposed windswept sites on the coast and on inland plateaux, screes, rock faces and mountain ridges.

The flora of SSI is considered to belong to the maritime Antarctic zone, although it is relatively poor in species composition compared to the South Orkneys and South Shetland Islands. This is thought to be due to the islands' extreme geographical isolation and the volcanic activity that is continually modifying terrestrial habitats. There is only one species of vascular plant, Antarctic Hairgrass *Deschampsia antarctica*, recorded from Candlemas Island only. A variety of bryophytes, lichens and hepatica grow on rocky crests, boulder scree, coastal cliffs and areas permeated by summer meltwater. Algae, notably *Prasiola crispa*, occur extensively in areas adjacent to penguin colonies. Of significance are the unique vegetation complexes of hepatics and mosses that form around warm, damp fumaroles.

GSGSSI have developed a strategy to deal with non-native plants (GSGSSI, 2016b).

Birds

South Georgia holds one of the world's most abundant and diverse seabird communities, whose total breeding population probably exceeds 30 million pairs (Annexe 6). Thirty species of bird are recorded breeding on South Georgia (Clarke et al., 2012; Poncet & Crosbie, 2012) with sixteen species breeding in the South Sandwich Islands (Lynch et al., 2016). This includes five species of penguin, four species of albatross and 14 species of smaller petrel, including nine burrow-nesting petrels. There is one landbird, an endemic passerine, the South Georgia pipit, and there are five waterbird species including two species of waterfowl. Three endemic sub-species / taxa have been recognized: the South Georgia pintail and the blue-eyed or imperial cormorant, which are confined to the island group, and the Antarctic (South Georgia) tern.

Seven endangered or near threatened species breed on South Georgia (Annexe 6), including the endangered grey-headed albatross. Under BirdLife's Endemic Bird Area categorization system, the island qualifies as a Secondary Area (s037) because of the restricted-range South Georgia pipit, which is confined to South Georgia and its offshore tussac islands. Seven of the island's Procellariidae taxa (wandering albatross, black-browed albatross, grey-headed albatross, light-mantled albatross, southern giant-petrel, northern giant-petrel and the white-chinned petrel) are protected under the Agreement for the Conservation of Albatrosses and Petrels (ACAP).

Photo 37. The Grey headed albatros, assessed as endangered in the IUCN Red List

In global terms, South Georgia is the most important breeding site for grey-headed albatross and white-chinned petrels, the third most important site for wandering albatross (after the Prince Edward Islands and the Crozet Islands) and the second most important site for king penguins (after the Crozet Islands), and the third most important site for black-browed albatross (after the Falkland Islands and Islas Diego Ramirez, Chile). Well over half the world population of white-chinned petrels (Martin et al., 2008), grey-headed albatross, Antarctic prions and common diving petrels breed on South Georgia, as do nearly half of king penguins and gentoo penguins and possibly blue petrels, and around one-quarter of macaroni penguins (subject to revision as the population has declined significantly in recent years).

Wandering albatross, northern giant-petrels, brown skuas and snowy sheathbills account for 20% or more of the world's population, and black-browed albatross and Southern giant-petrels for approximately 15%.

The South Sandwich Islands are home to nearly half the world's chinstrap penguins (Lynch et al., 2012), and its populations of snow petrels, cape petrels and southern (Antarctic) fulmars are believed to be of global significance.

Seabird tracking data is available from (http://www.seabirdtracking.org), which includes tracking of albatross and penguins from South Georgia.

Photo 38. South Georgia - King Penguins (Copyright Stewart McPherson)

Marine Mammals

Nineteen species of marine mammal occur around South Georgia and South Sandwich Islands (Poncet & Crosbie, 2012; GSGSSI, 2013; Annexe 7), including 14 species of cetaceans and five seals. Three of the cetaceans are are considered Endangered by IUCN (blue whale, sei whale and fin whale) and 1 species as Vulnerable (sperm whale).

South Georgia is home to around 3 million Antarctic fur seals, which represents around 90% of the global population. They also occur in the South Sandwich Islands, but numbers are much smaller and largely restricted to the northern islands. Around 400,000 southern elephant seals also breed on South Georgia, with smaller numbers on the South Sandwich Islands. There is a small colony of Weddell seals breeding on South Georgia and leopard seals and crabeater seals (rarely) are non-breeding visitors.

Photo 39. Fur Seals in South Georgia (Copyright Stewart McPherson)

Marine fishes and invertebrates

The pelagic environment is rather uniform and consequently the pelagic marine fauna of the South Georgia and South Sandwich Islands Maritime Zone is not particularly diverse and is similar to that found in other parts of the Southern Ocean (Ward et al., 2012).

The benthic habitats are much more diverse extending from the shallow coastal fringe to the depths of the South Sandwich Trench and, consequently, the diversity of benthic fauna is extremely high, although rather poorly quantified. Hoog et al. (2011) collated existing species records from historical surveys of the South Georgia shelf (depth < 500 m and 31,800 km^2), which indicated very high biodiversity, with large numbers of endemic and range edge species (Annexe 8). The study verified 17,732 records yielding 1,445 species from 436 families, 51 classes and 22 phyla. The most speciose area was Cumberland East Bay on the north coast, which had 577 different species.

The Hogg et al. (2011) study only looked at the South Georgia shelf and did not consider biodiversity at greater depths or around the South Sandwich Islands. Some data has been collected in association with the longline fishery, including data on deep-water corals (Taylor et al., 2013a,b). Further data on marine biodiversity is available on the SCARMarBin database (http://www.scarmarbin.be), but that dataset is by no means complete. Recently, Rogers et al. (2012) reported the discovery of hydrothermal vents in the East Scotia Ridge, to the west of the South Sandwich Islands, with new species of vent associated fauna.

Other studies have looked at particular faunal groups. For example Collins et al. (2004) reported on the cephalopod fauna of the South Georgia slope, with six species of octopus and seven of squid.

The ichthyofauna of the SGSSI Maritime Zone includes over 100 species of pelagic and demersal fish in 32 families (Annexe 9; Collins et al., 2008; GSGSSI, 2013; Gregory et al., 2016).

The most common families are the Myctophidae and the Nototheniidae. There are seven endemic species. The porbeagle shark, which occurs in South Georgia waters is listed as Vulnerable by IUCN, but is found throughout the cool temperate zones of the Southern & Northern hemispheres.

3.3.5 British Antarctic Territory and Adélie Land

Plants and terrestrial invertebrates

The majority of the Antarctic continent is covered by permanent ice and snow leaving less than 1% available for colonization by plants, located along the Antarctic Peninsula, its associated islands and in coastal regions around the edge of the rest of the Antarctic continent. There are no trees or shrubs, and only two species of flowering plants are found: Antarctic hair grass (*Deschampsia antarctica*) and Antarctic pearlwort (*Colobanthus quitensis*). The vegetation is predominantly made up of lower plant groups (mosses, liverworts, lichens and fungi) that are specially adapted to surviving in extreme environments – in particular tolerating low temperatures and dehydration.

There are around 100 species of mosses, 25 species of liverworts, 300 to 400 species of lichens and around 20 species of macro-fungi. The greatest diversity of species is found along the western side of the Antarctic Peninsula, South Orkney and South Shetland islands where the climate is generally warmer and wetter than elsewhere in the Antarctic continent (Ochyra et al, 2008).

Terrestrial invertebrates are species poor, however substantial spatial complexity in the richness and identity of species is found across Antarctica. Chown and Convey (2007) defined a biogeographical boundary between the Antarctic Peninsula and the remainder of West and East Antarctica (the Gressitt Line), with a complete lack of overlap at species level in the faunas of the two regions, across the dominant terrestrial faunal groups. Only two higher insect species (both Diptera) occur in Antarctica, together with other invertebrate groups including mites, springtails, tardigrades and nematodes. Recent studies indicate that terrestrial microbiota may be considerably more diverse than previously thought (Convey, 2010).

Birds

19 bird species occur in Adélie Land, nine of which breed in the area (Annexe 10). Six breeding species are classified as LC (Least concern) and one as NT (Near threatened) on the global IUCN Red List (IUCN Red List 2016). The TAAF regional assessment (IUCN France, MNHN & TAAF, 2015) resulted in one species considered as regionally Critically Endangered (CR – Antarctic Giant Petrel) and 4 species as Vulnerable (VU – Emperor penguin, Antarctic fulmar, Cape petrel and South Polar Skua). There is one emperor penguin colony in Adélie Land, at Pointe Géologie (Prévost, 1961) that has been experiencing a decline in the recent years and is highly threatened based on the climatic scenario for the region (Jenouvrier et al. 2014). While the populations of Adélie penguins in the Peninsula are in decline, other populations are stable or slightly increasing. Satellite measurements of population, using traces of guano visible from space, have led to a new estimate that suggest an increase in the total number of Adélie penguins and colonies over Antarctica. This contributed to the downgrading of the species on the IUCN scale from Near Threatened to Least Concerned, despite an alarming situation locally in Pointe Geologie,

where two years with no chicks being fledged out of ca. 20 000 pairs, have been recorded (Ropert-Coudert et al. 2015, and pers. Comm.).

The British Antarctic Territory holds a greater number of breeding bird species with a total of 20 (Annexe 10). Five penguin species breed in the region, including very large colonies of gentoo and chinstrap penguins in coastal areas in the north western Peninsula and adjacent islands. Emperor penguins breed on sea ice mainly around the Weddell Sea coasts, and at one colony near the tip of the Antarctic Peninsula (Snow Hill Island) (Fretwell et al., 2012). Among these, the macaroni penguin is classified as Vulnerable, while 3 further species are classified as Near Threatened (emperor, Adélie and gentoo penguin). Flying seabirds breeding in the British Antarctic Territory include fulmars, petrels, shags, skuas, gulls and terns.

Photo 40.The Adélie penguin, Terre Adélie (Copyright Yan Ropert-Coudert)

Fishes

Antarctic fish are highly adapted to an extreme environment, with many species having unique characteristics such as the presence of antifreeze glycoproteins in blood and body fluids. The biodiversity of fishes in this region is lower than in other oceanic regions, and 96 of the 235 fish species are part of the same suborder (Notothenioidei) existing only in the Southern Ocean.

Marine Mammals

Sixteen species of marine mammals have been reported off the British Antarctic Territory, including 11 cetacean species and 6 pinnipeds (Annexe 11). Among these, 2 are listed as endangered (EN): blue whale (*Balaenoptera musculus*) and fin whale (*Balaenoptera physalus*); and 1 species as vulnerable (VU): sperm whale (*Physeter macrocephalus*).

Four species of pinnipeds breed on the Antarctic continent: the Ross seal (*Ommatophoca rossii*), the crabeater seal (*Lobodon carcinophaga*), the Weddell seal (*Leptonychotes weddellii*) and the leopard seal (*Hydrurga leptonyx*). Southern elephant seals (*Mirounga leonina*) and Antarctic fur seals (*Arctocephalus gazella*) are also present in British Antarctic Territory, and breed on the South Orkney and South Shetland Islands. Southern elephants seals breeding in subantarctic islands are also known to use the sea-ice edge in summer (Bornemann et al. 2000) and winter (Labrousse et al. 2015).

Barnes et al. (2009) provide an estimate of biodiversity across the marine, intertidal, terrestrial and freshwater realms of the South Orkney Islands, located in the north of the British Antarctic Territory. This constitutes one of the first complete estimates of the faunal biodiversity of a polar locality. Across all realms, 1224 species were recorded. Most are endemic to the Southern Ocean, but only a few occur only at the South Orkney Islands. The majority of the species recorded were marine species, of which 992 were marine invertebrates. Another circumpolar source of information for biodiversity can be found in the Biogeographic Atlas of the Southern Ocean (De Broyer et al. 2014), which documents the abundance of all marine taxa in all localities around the continent.

Photo 41. The Crabeater seal - British Antarctic Territory (Copyright Stewart McPherson)

4. CONSERVATION OUTCOMES

4.1. Introduction

The BEST ecosystem profile (EP) is based on the EP methodology developed by CEPF (Critical Ecosystem Partnership Fund), which gained wide recognition for the elaboration of Ecosystem profiles of biodiversity hotspots (CEPF, 2014). The BEST EP methodology was adapted to the needs and situation of the EU Overseas. The EP aims to define the quantifiable set of species and sites that must be conserved to maximize the long-term persistence of global biodiversity. Given the threats to biodiversity, quantifiable targets for conservation can be set in terms of “extinctions avoided” (species outcomes) and “areas protected” (site outcomes). By presenting quantitative and justifiable targets against which the success of investments can be measured, conservation outcomes allow the limited resources available for conservation to be targeted more effectively, and their impacts to be monitored at global scale.

4.2. Methodology

This ecosystem profile methodology allows the definition of conservation outcomes that encompass species and site. In theory, within any given region, or, ultimately, for the whole world, conservation outcomes should be defined for all taxonomic groups. However, it requires comprehensive data on the distribution and the global conservation status of all species breeding at sites and across corridors. Many of these data are incomplete or absent in the polar and subpolar regions and only cover a few taxonomic groups. To face the lack of data, the BEST methodology includes a strong participation of local scientific experts. It adopts an iterative approach according to which new available data may be included in the future.

4.2.1 Species outcomes

The methodology defines species outcomes as the number of extinctions avoided. To do so, it considers species globally threatened according to the International Union for Conservation of Nature (IUCN) Red List of Threatened Species. The standardized methodology of the IUCN Red List of Threatened Species allows the classification of species into 9 threat categories (IUCN 2012; 2014). The species classified in the vulnerable (VU), endangered (EN) and critically endangered (CR) categories are considered threatened and are included in the species list (data extracted from 2015.2 IUCN Red List in August 24, 2015). Species categorized as Data Deficient (DD) are not included because they are considered to be priorities for further research but not yet priorities for conservation actions.

For the OCTs located in the polar and subpolar hub, the global conservation status has been assessed comprehensively only for birds and mammals. Some groups of invertebrates and plants have been assessed but many gaps remain. Moreover, the distribution of many taxa remains poorly known. Thus, conservation outcomes have been defined mostly for birds and

mammals, while plants, invertebrates and fishes were incorporated only when information was available.

Two regional Red Lists are also available for the territories located in the polar-subpolar hub: the Red List of vertebrates of the TAAF (UICN France et al, 2015) and the Red List of Greenland (which includes birds, freshwater fishes, butterflies, mammals and orchids) (Boertmann 2007). Threatened species according to these regional Red Lists were not directly included in our species sample as they might be national or regional conservation priorities but are not global priorities. Nevertheless, these regional Red Lists provide additional information about the conservation status of species located in the TAAF and Greenland, which is particularly useful for species undocumented at global level. Therefore, we included in our set species those not evaluated or listed DD at global level and threatened (EN, CR, VU) at regional scale, as the lack of information at global scale might be hiding an important threat to those species.

The species list drawn here is used to trigger protection on site (through site outcomes) but also to recommend species oriented actions. Species outcomes are considered to be met when a species' global threat status improves, particularly when it enters the IUCN Red List category LC (Least Concern).

4.2.2 Site outcomes

Many species are best conserved by protecting their habitats and their biological communities, through conservation actions at a network of sites. The BEST methodology identifies Key Biodiversity Areas (KBAs), which are explicitly designed to conserve biodiversity at the greatest risk of extinction (Langhammer et al. 2007). The KBA methodology is data-driven rather than based on expert opinion, although, in data-poor regions, the role of experts becomes much more important. All KBAs meet one or more standard criteria (Table 4. Criteria to identify trigger species (Based on Langhammer et al, 2007)). This transparency allows results to be critiqued and revised at any point.

4.2.2.1. KBA delineation process

The delineation of Key Biodiversity Area of polar and subpolar European Overseas Countries and Territories has been elaborated following five steps:

- Listing of all the stakeholders involved in ecological survey, management or research in subpolar and polar OCTs. During the consultation process, more than 150 members of 60 organizations have been contacted.
- Identifying species of global conservation concern (trigger species (see a.) for the different territories of polar and subpolar OCTs.
- Building preliminary maps of Key Biodiversity Area in OCTs, with location of trigger species using available data (see b.).
- Consultation of stakeholders to validate the trigger species list, the KBA delineation, and to discuss KBAs' prioritization.
- Finalization of the KBAs' delineation and prioritization in regard of experts feedback

a. Identification of trigger species

The first step of the BEST methodology is to identify “Trigger species”, species of global conservation importance that trigger the delineation of a KBA. They act as “umbrella species” for widespread and common species. Species considered in the dataset include species and subspecies. Data come from the IUCN Red List (global and regional) as well as published and unpublished ecological data transmitted by the experts. Direct observations by reliable observers and specimen records from the last 50 years were taken to be “confirmed” records.

Table 4. Criteria to identify trigger species (Based on Langhammer et al, 2007)

KBA Criteria		
A	Globally Threatened Species	Site with confirmed presence of CR or EN species
		>10 pairs or 30 individuals of VU species
B1	Restricted-range Species	Global range <50 000 km² (or species with large but clumped distributions) - 5% global population at one site
B2	Globally significant congregations	Globally significant congregation (or source population) - 1% of global population seasonally at the site
M-C	(Marine) Bioregionally restricted assemblage	(Marine) Specific, restricted assemblage

- Species already documented as being threatened with extinction according to the IUCN Red List Species are most likely to become extinct **(criterion A).** For VU species, when information concerning the size of population was missing, experts were consulted to classify them as trigger species.

- Species restricted to a limited geographic range might not be currently threatened but a localized threat could have a major impact on their population **(criterion B1).** This criterion has not frequently been used because it requires precise information on species distribution area which is scarce, especially for birds and marine species.

- The **criterion (B2)** is based on the occurrence of significant congregations of individuals, such as seabird breeding colonies, feeding assemblages or concentrations of sessile species. The criterion is valid if 1% of the global population is seasonally present at the scale of the archipelago. The areas triggered by this criterion can be very large. Therefore, experts were consulted to refine the KBAs delineation to the areas where colonies are particularly dense.

- **Criteria M-C** is based on “marine bioregionally restricted assemblages”, under which unique biological communities can trigger sites not triggered by individual species.

For Greenland, species triggering the delineation of Important Bird Areas (IBA) were included in the dataset. It includes globally threatened species, restricted range species, significant congregations but also assemblages (more than 20 000 waterbirds or more than 10 000 seabirds, of one or more species). This will be noted as “IBA criteria”.

Limitations:

Information on species abundance and distribution is quite scarce in polar and subpolar territories and mainly concerns vertebrates and terrestrial species. In the same way, IUCN Red List Assessments are not available for all taxonomic groups.

Therefore, trigger species used to delineate KBAs in the region are mainly from well-known taxonomic groups (mostly vertebrates). Invertebrates and plants are significantly under represented.

Also, the quantity of data available is correlated with the presence of data surveys. This potential bias has to be taken into consideration while interpreting the results.

b. KBA delineation

Areas where trigger species are present are considered for KBA delineation. The delineation process has favored the definition of a KBA as a “management unit”, with no size limit.

Different methods were considered to delineate KBAs:

- **Geographical range of species or species assemblage** and preferential marine habitat of seabird prey. It requires comprehensive data on species distribution which is not always available for the polar and subpolar region.
- **Ecologically important areas such as ecoregions (TAF), Particularly Sensitive Areas (PSSA, Greenland) or specially protected areas in Antarctica (ASPA or ASMA)**
- **Important Bird Areas (IBAs)** which methodology is quite close from the BEST methodology.
- **Existing protected area networks**, including the zonation perimeter.
- **Administrative units.** When a species has been observed in an area but not data is available to delineate the exact distribution, administrative units have been taken into consideration as they represent the usual management area where conservation actions can be taken.
- **Bathymetry profile for marine areas.** This correlated to species repartition and potentially to fishing pressure.

All those areas were refined with the consultation of experts.

For marine KBA delineation, caution was taken not to publish sensitive data on economically valuable species distribution and abundance.

c. KBA Prioritization

In order to help discriminate among the large number of KBAs identified in the different regions, an initial biological prioritization was undertaken, using the methodology set out in Langhammer *et al.* (2007). This methodology is based upon the principles of irreplaceability and vulnerability (Table 10).

Table 5. Criteria for Initial, Biological Prioritization of KBA's (Based on Langhammer et al. (2007))

Irreplaceability	**Species-based Vulnerability**	**Site based Vulnerability**	
		High	**Low**
Extreme Species endemic to region and not known from any other site	Extreme (CR)	**1**	**1**
	High (EN)	**1**	**1**
	Medium (VU)	**2**	**4**
	Low (not CR, EN or VU)	**3**	**5**
High Species known only from 2-10 sites globally	Extreme (CR)	**2**	**3**
	High (EN)	**2**	**4**
	Medium (VU)	**3**	**5**
	Low (not CR, EN or VU)	**4**	**5**
Medium Species known only from 11-100 sites globally	Extreme (CR)	**3**	
	High (EN)	**4**	
	Medium (VU)	**5**	
	Low (not CR, EN or VU)	**5**	
Low Species known from more than 100 sites globally	Extreme (CR)	**4**	
	High (EN)	**5**	
	Medium (VU)	**5**	
	Low (not CR, EN or VU)	**5**	

- **Irreplaceable species** are species that only occur in few sites. The sites that support them are priorities for conservation. Irreplaceability was estimated with available data completed with experts' consultation.

- **Species-based vulnerability** considers globally threatened species (CR, EN, VU). The sites that support them are priorities for conservation as their degradation can lead to the extinction of one or several species. Species not assessed as threatened by the global or a regional Red List were classified in the “Low” category.

- A final consideration is **site-based vulnerability**. All things being equal, actually threatened sites (due to, for example, fishing activity or invasive species) are higher priorities for conservation actions than sites not under severe, immediate threat.

Site-based vulnerability is quite difficult to estimate due to the lack of data on pressures (actual and future) in those territories. With the support of experts, we defined high vulnerability for sites exposed to identified actual and future pressure and low vulnerability for sites not exposed to direct pressure. Future impacts of global changes were not integrated as a direct threat as they cannot yet be predicted or addressed on site.

These three criteria of irreplaceability, species-based vulnerability and site-based vulnerability were combined to assign each KBA to one of five priority levels, as shown in Table 5.

Following this initial biological prioritization process based on objective criteria, experts were consulted to refine this list. This approach allowed integrating local knowledge and highlighting local stakes but experts’ bias need to be taken into consideration.

Limitations: There is no prioritization between sites within one priority category. Also, it is not relevant to compare or prioritize sites between different territories, as the precision of data and experts consulted were different between territories.

Disclaimer: *This section, as well as the entire document, has been developed as part of the European project ‘Measures towards Sustaining the BEST Preparatory Action to promote the conservation and sustainable use of biodiversity and ecosystem services in EU Outermost EU Outermost Regions and Overseas Countries and Territories’. It does not represent an official, formal position of the Terres australes et antarctiques françaises (TAAF), coordinator of the hub polar and subpolar. TAAF releases from the responsability of the proposal that are made in the section below, that is the result of a coherent application of the methodology, as requested by the European Commission.*

4.3. Results

Table 6. Summary table of threatened and trigger species in the polar and subpolar hub

	Greenland		SPM		TAAF		SGSSI		BAT		AL	
	T1	**T2**	**T1**	**T2**	**T1**	**T2**	**T1**	**T2**	**T1**	**T2**	**T1**	**T2**
Mammalia	11	13	2	3	4	8	4	6	0	0	0	0
Birds	2	25	3	5	12	43	4	26	1	18	0	2
Fishes	8	9	2	2	3	18	1	8	0	0	0	0
Reptiles	0	0	2	2	0	0	0	0	0	0	0	0
Plantae	1	1	0	0	0	20	0	0	0	5	0	0
Others	0	0	0	0	0	8	0	0	0	0	0	0
Total	22	49	9	12	19	97	9	40	1	23	0	2

T1: Threatened species according to the IUCN Red List (IUCN 2014)

T2: Trigger species according to the BEST methodology

Photo 42. The king penguin, a trigger species in TAF (Copyright Claire-Sophie Azam)

4.3.1 Greenland

4.3.1.1. Species outcomes

Twenty-three species were selected: twenty species assessed threatened by the global Red List and 3 species non evaluated or DD at global level but assessed as threatened by the local Red List (Annexe 12). It includes a majority of marine species: 9 fishes, 2 marine birds and 10 marine mammals. Only one plant (the round leaves orchid, *Amerorchis rotundifolia*) is terrestrial.

Table 7. Threatened species present in Greenland according to the IUCN Red List

	VU	EN	CR	Total
BIRD	2	0	0	2
FISH	6	2	0	8
MAMMALIA	7	5	0	11
PLANTAE	1	0	0	1
Total	15	7	0	22

Photo 43. The polar bear, a trigger species of Greenland

4.3.1.2. Site outcomes

1. Identification of trigger species

In total, 47 species (Annexe 13) match the criteria of trigger species for key biodiversity areas (see 4.2. Methodology), in Greenland (Table 8).

Table 8. Summary of trigger species in Greenland

Taxonomic Group	Threat Status			Other trigger criteria	Total
	CR	EN	VU		
Mammalia	1	5	5	3	13
Birds	0	0	2	23	25
Fishes	0	2	7	0	9
Plantae	0	0	1	0	1
Total	**1**	**7**	**15**	**25**	**48**
Percentage	2%	14%	31%	51%	100%

Of the 48 trigger species in Greenland, 7 are assessed EN, all of them are marine species (5 marine mammals and 2 fishes) and 1 CR, the East Greenland Bowhead (*Balaena mysticetus* (Svalbard-Barents Sea (Spitsbergen) subpopulation)).

On the species matching "other criteria" (restricted range, congregations etc.), two are assessed CR on the local Redlist, the narwhal (*Monodon monoceros)* and the beluga whale (*Delphinapterus leucas)*, one species is assessed EN, the Greater white-fronted goose (*Anser albifrons flavirostris)* and the Ivory gull *(Pagophila eburnean)* is assessed VU.

Four species have been identified to determine Important Bird Areas through the criterion "more than 20 000 waterbirds or more than 10 000 seabirds, of one or more species" and therefore were added to our trigger species list. These are the snowly owl (*Bubo scandiacus*), the Gyrfalcon (*Falco rusticolus*), the red phalarope (*Phalaropus fulicarius*) and the long-tailed jaeger (*Stercorarius longicaudus*).

2. Delineation of Key Biodiversity Areas

Thirty-four KBAs were identified in Greenland covering a total surface of 174 066 600 km2 (Annexe 14). It includes the Northeast Greenland National Park (Kalaallit Nunaanni nuna eqqissisimatitaq (GRL22) (972000km2).

Within those KBAs, 21 are Important Bird Areas (IBA), 5 RAMSAR sites and 12 Particularly Sensitive Sea Areas (PSSA)(AMAP 2013).

Figure 19. Greenland Key Biodiversity Areas overview

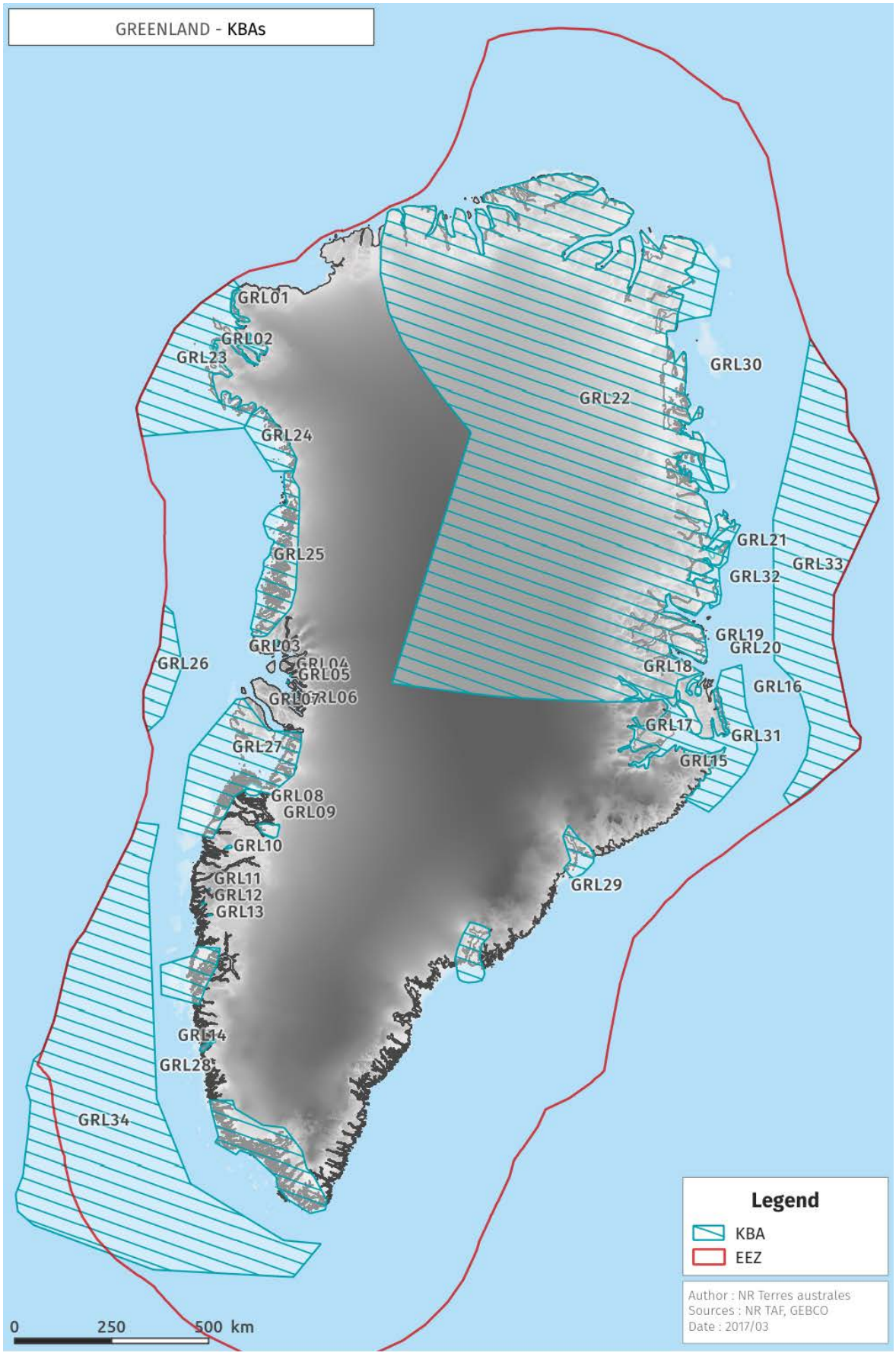


Figure 20. Greenland northwest coast Key Biodiversity Areas

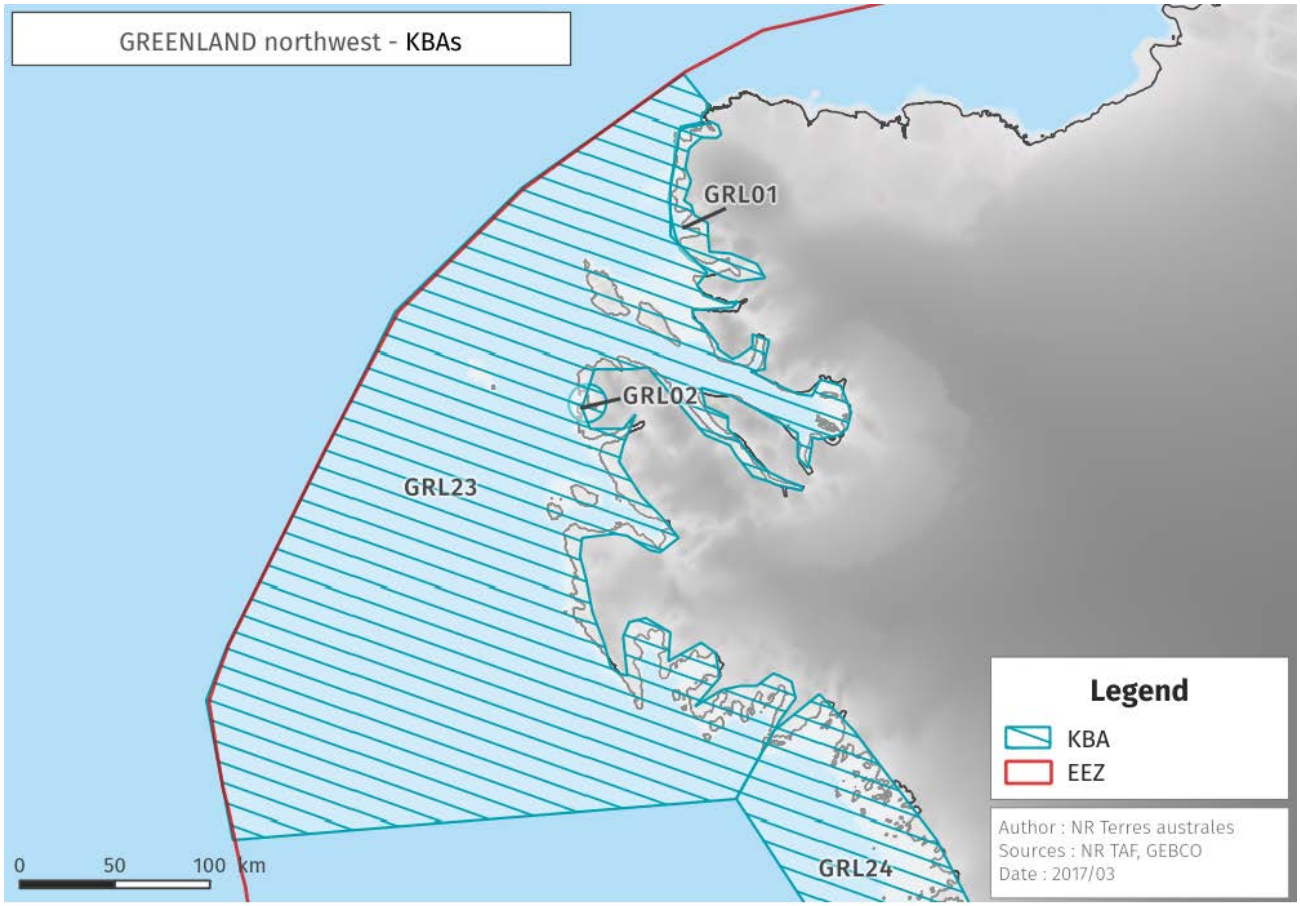


Figure 21. Greenland west coast Key Biodiversity Areas

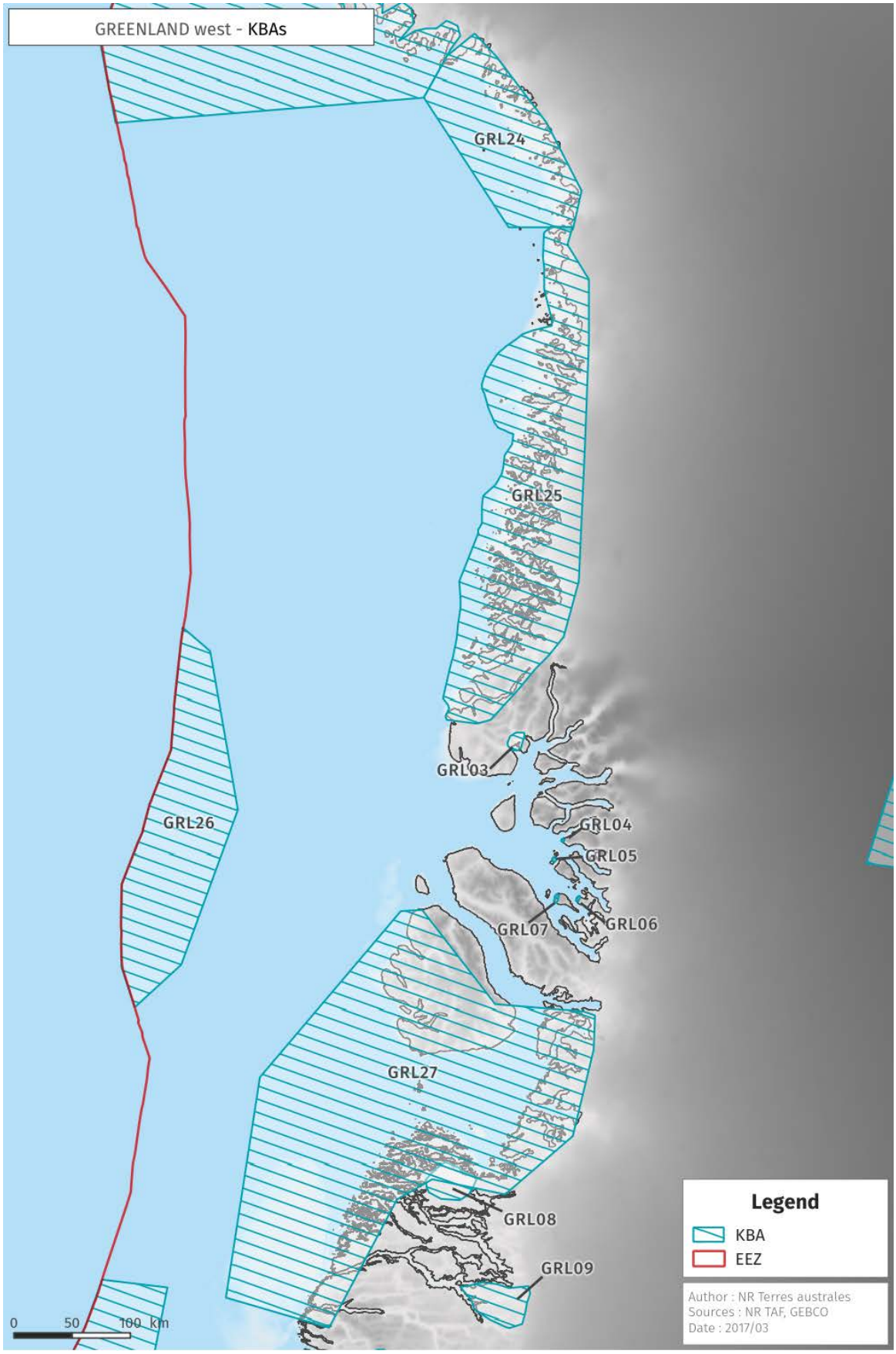


Figure 22. Greenland southwest coast Key Biodiversity Areas

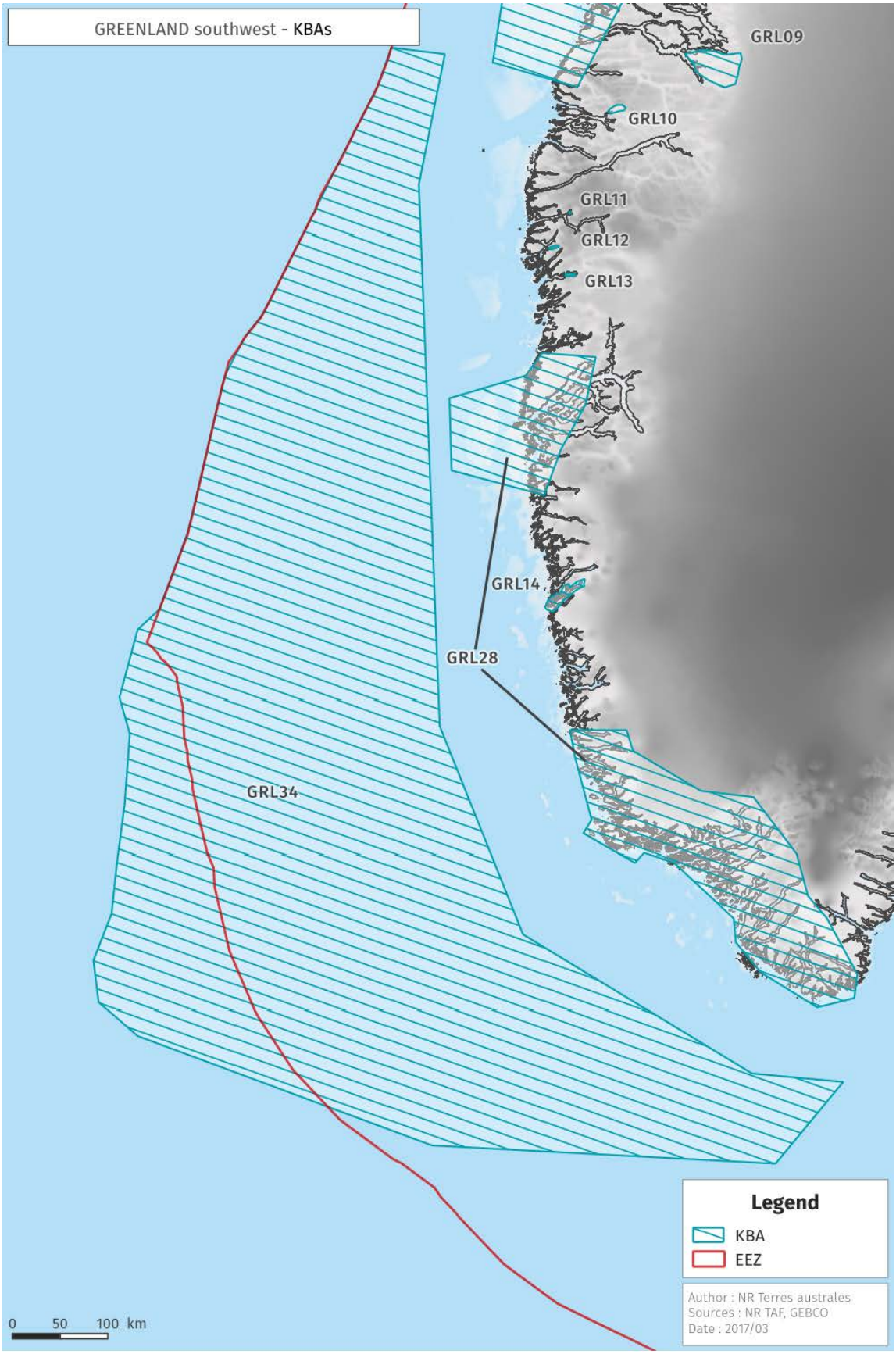


Figure 23. Greenland northeast coast Key Biodiversity Areas

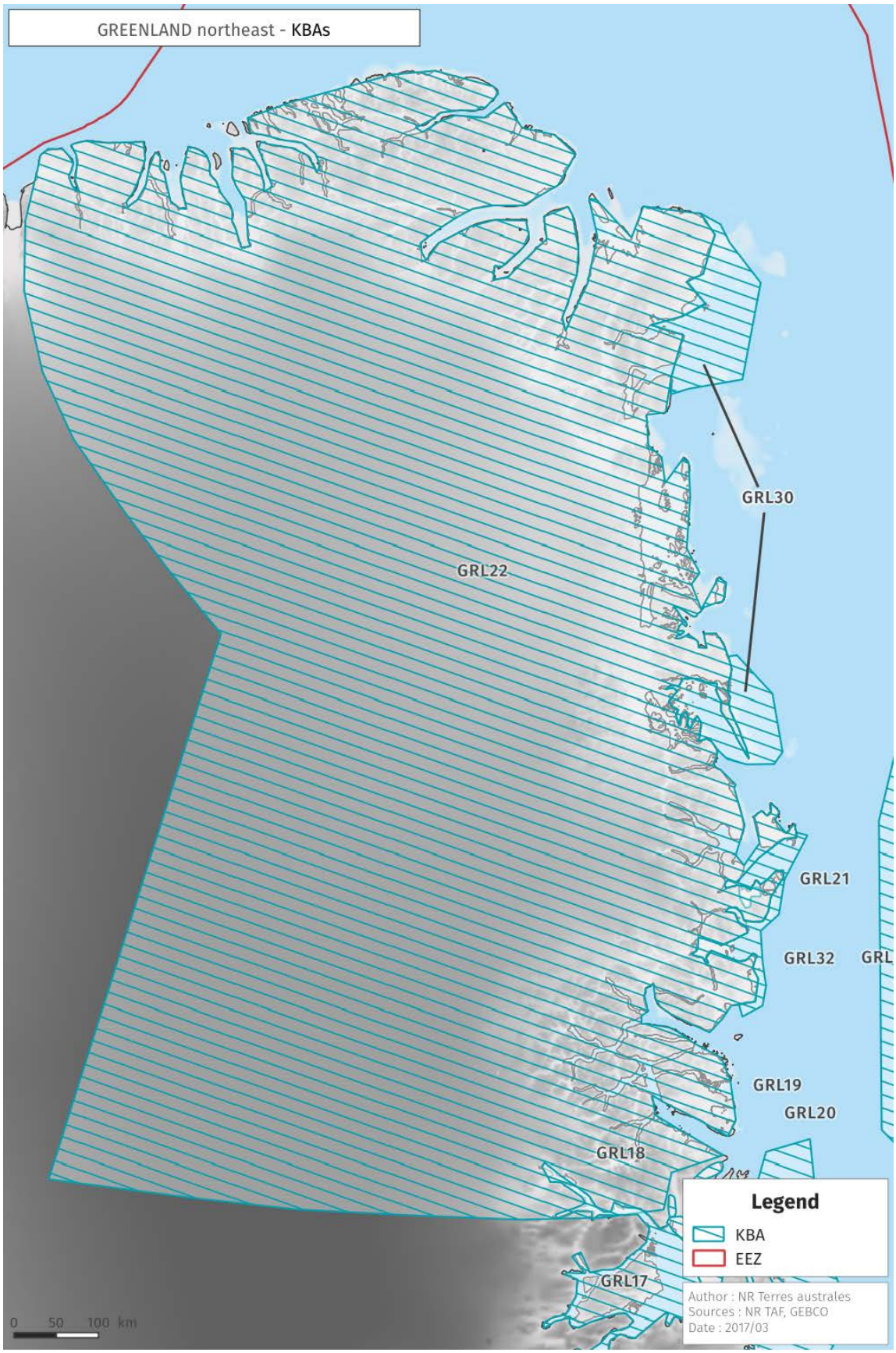


Figure 24. Greenland east coast Key Biodiversity Areas

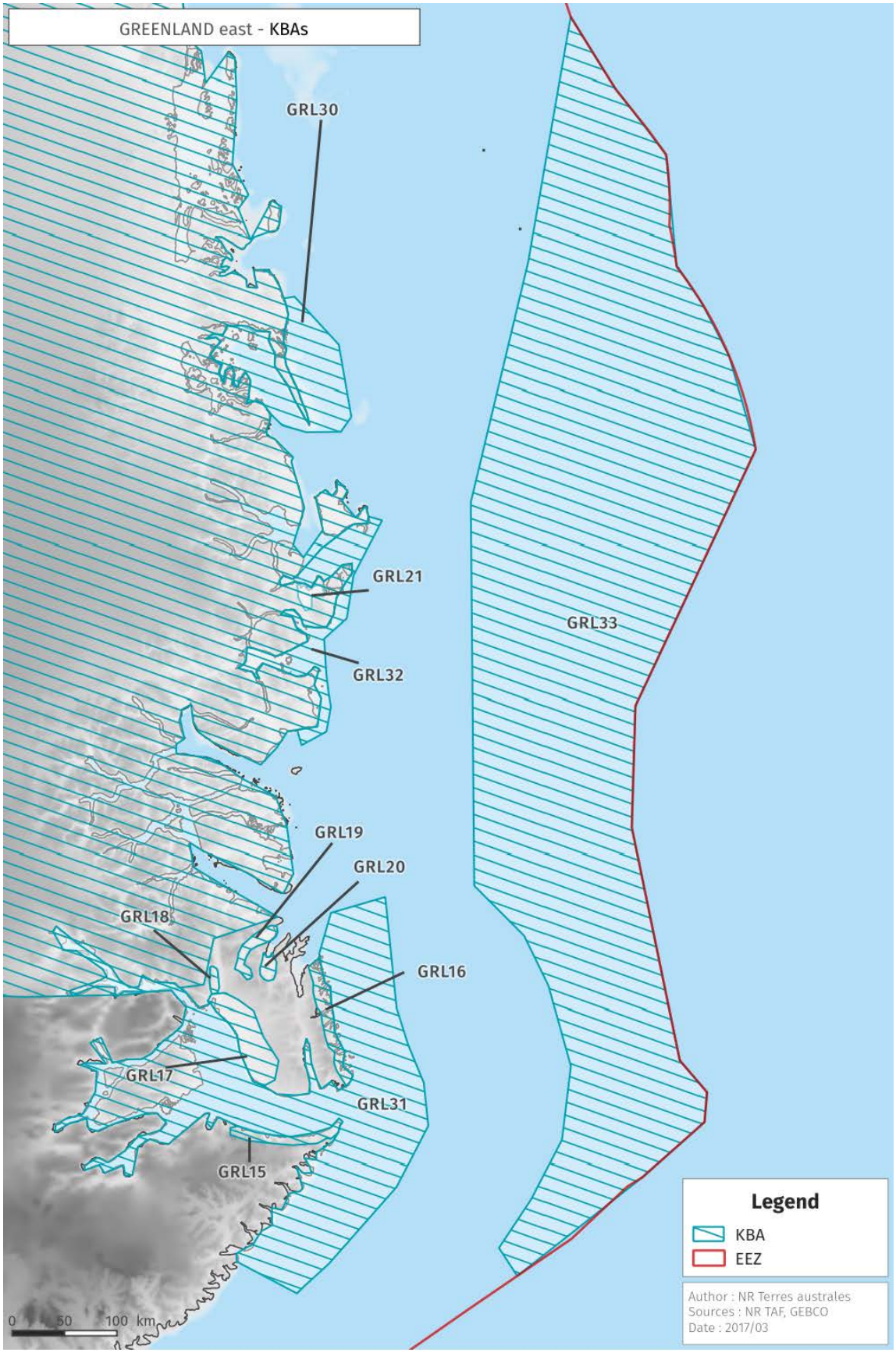
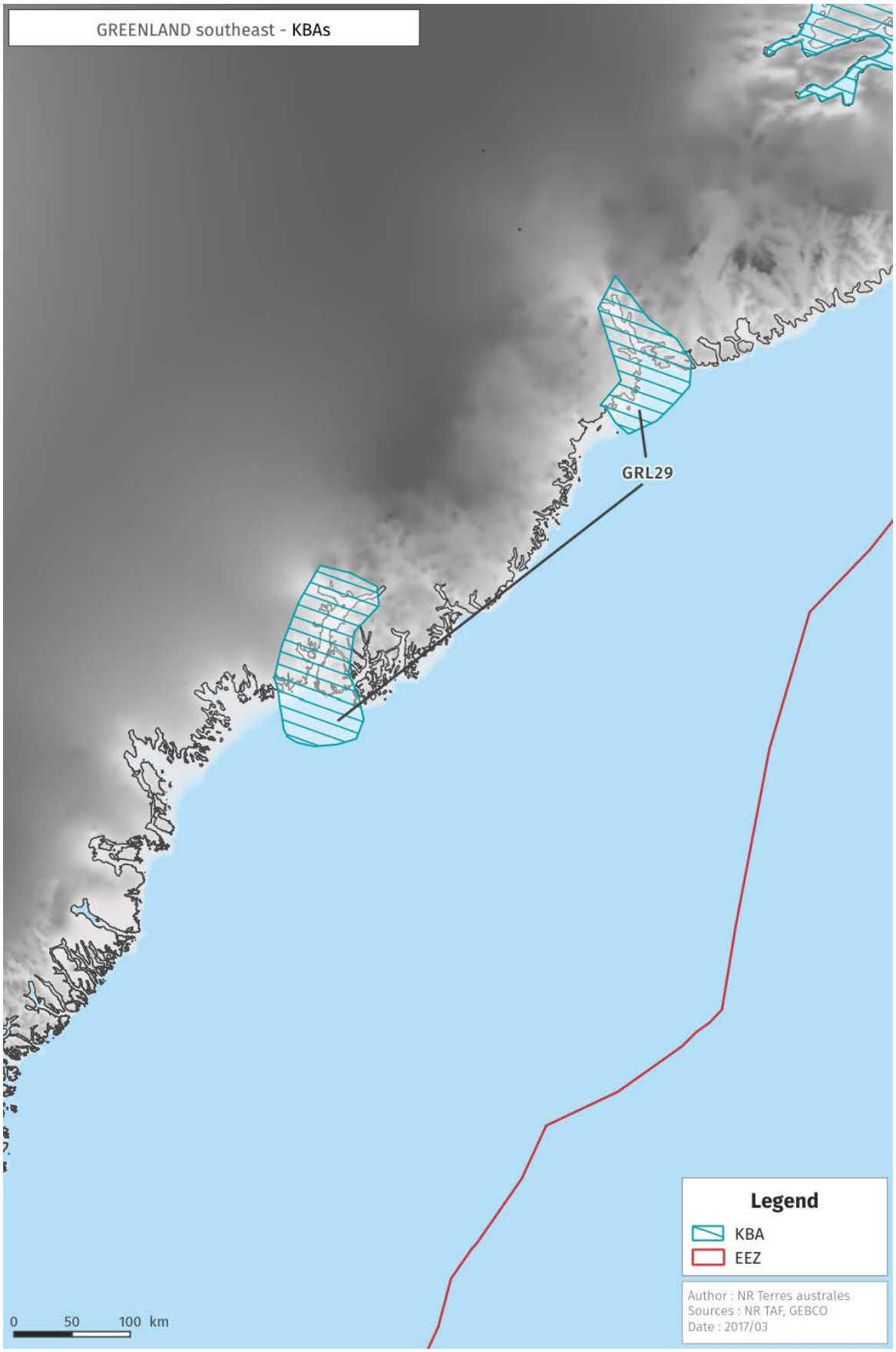


Figure 25. Greenland South East Key Biodiversity Areas



3. Prioritization

An initial biological prioritization was undertaken according to species irremplaceability, vulnerability and sites vulnerability (Table 9 & annexe 15).

All PSSA have been selected as priority KBAs excepted The Labrador Sea drift ice and the Southwestern Greenland Sea that are zones associated with the marginal ice zone therefore highly dynamic within and between years, especially with climate change impacts. All of those priority KBAs are areas of “heightened ecological significance” (AMAP 2013), hosting great concentration of seabirds, marine mammals, benthic and pelagic diversity.

Table 9. Results of the Prioritization of KBAs in Greenland

Priority Level	**Greenland**
1	6
2	5
3	2
4	10
5	11
All KBAs	**34**

4.3.2 Saint-Pierre-et-Miquelon

4.3.2.1 Species outcomes

Nine species are assessed threatened by the global Red List. It includes three birds, two mammals, two reptiles and two fishes.

Table 10. List of threatened species present in Saint-Pierre et Miquelon according to the global Red List

TAXONOMY	Latin Name	IUCN Red List category
AVES	Clangula hyemalis	VU
AVES	Euphagus carolinus	VU
AVES	Melanitta fusca	EN
MAMMALIA	Balaenoptera musculus	EN
MAMMALIA	Balaenoptera physalus	EN
PISCES	Gadus morhua	VU
PISCES	Amblyraja radiata	VU
REPTILIA	Dermochelys coriacea	VU
REPTILIA	Chelonia mydas	EN

Photo 44. *Melanitta fusca* (Copyright Markus Varesvuo)

4.5.3.2. Sites outcomes

1. Identification of trigger species

In total, 12 species (Annexe 16) match the criteria of trigger species for key biodiversity areas, (assessed on the IUCN Red List as globally threatened, restricted range species and globally significant congregation) occur in Saint-Pierre-et-Miquelon (Table 11). These include 5 terrestrial species and 7 marine species.

Of the 12 trigger species in Saint-Pierre-et-Miquelon, 4 are EN, 5 are VU, and 3match the globally significant congregation criterion.

Table 11. Summary of trigger species in Saint-Pierre-et-Miquelon

Taxonomic Group	CR	EN	VU	Other trigger criteria	Total
Mammalia	0	2	0	1	3
Birds	0	1	2	2	5
Fishes	0	0	2	0	2
Reptilia	0	1	1	0	2
Total	**0**	**4**	**5**	**3**	**12**

2. Key Biodiversity Area delineation

Six KBAs were identified in Saint-Pierre-et-Miquelon, both in coastal and marine area (Annexe 17). Two of them were identified with the criteria “1% or more of the global population of a congregatory seabird or terrestrial species”: the “Grand Colombier Island” due to the congregation of the Leach's storm petrel (*Oceanodroma leucorhoa)*, and the “Hunting reserve of South Saint-Pierre”, for the presence of both the Red-necked grebe (*Podiceps grisgena)* and the Harlequin duck (*Histrionicus histrionicus)*. The four others Key Biodiversity Area were delineated for globally threatened species, EN or VU in the IUCN Red List.

The whole EEZ of Saint-Pierre and Miquelon was delineated as a KBA as it hosts several trigger species. The information about the distribution of species is quite scarce which prevents us from delineating more precise areas. The Ecosystem profile follows an iterative approach and in this objective, this KBA could be redelineated in the future.

Figure 26. Saint-Pierre-et-Miquelon Key Biodiversity Areas

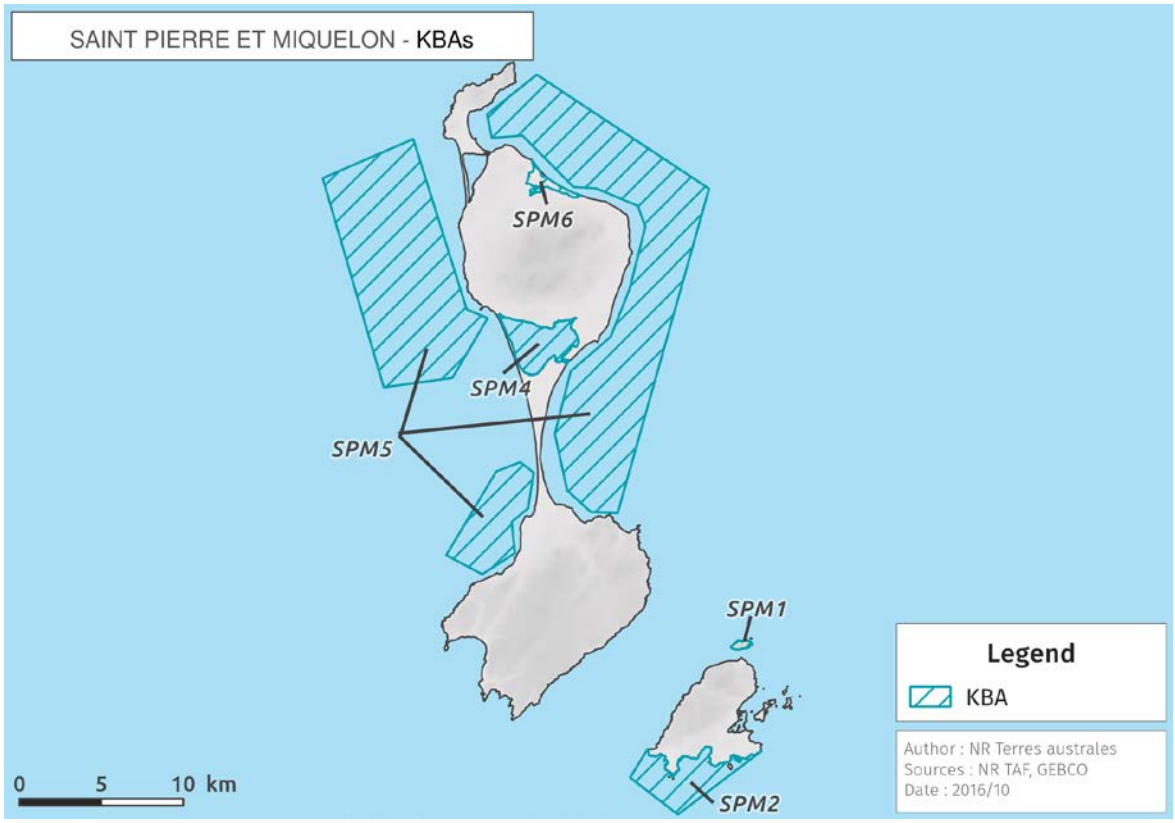
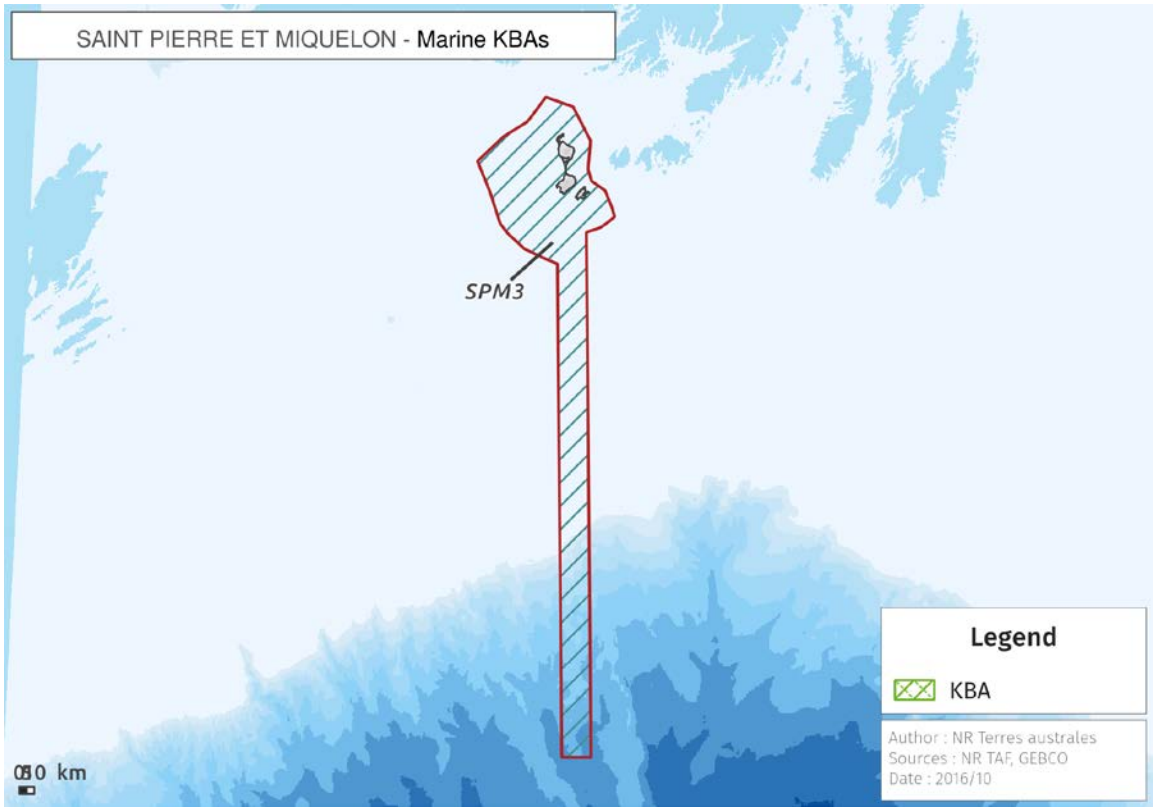


Figure 27. Saint-Pierre et Miquelon Key Biodiversity Areas



3. Key Biodiversity Areas prioritization

After the prioritization process, two KBAs were assigned to the priority level 1 and 2 because of the presence of threatened species and a high site vulnerability.

Table 12. KBAs of Saint-Pierre-et-Miquelon according to their priority level

Priority Level	SPM
1	1
2	1
3	1
4	1
5	2
All KBAs	**6**

Table 13. KBAs in Saint-Pierre-et-Miquelon by order of priority

Priority	Code KBA	Name
1	SPM3	Saint Pierre et Miquelon EEZ
2	SPM4	Grand Barachois
3	SPM1	Grand Colombier Island
4	SPM6	Etang de Mirande
5	SPM2	Reserve de chasse et de faune sauvage du Sud Saint Pierre
5	SPM5	Clangula hyemalis coastal aggregation

4.3.3 French Southern Lands

4.3.3.1 Species outcomes

Nineteen species are assessed as threatened according to the IUCN Red List (12 birds, 4 mammals and 3 fishes) (Annexe 18). Two of those species are endemic to the French Southern Lands: the Amsterdam Albatross (*Diomedea amsterdamensis*) (only present in Amsterdam) and the Eaton's pintail (*Anas eatoni*, only present in Kerguelen and Crozet). The two CR species in the region are the Amsterdam Albatross and the Southern Bluefin Tuna (*Thunnus maccoyii*). Fifteen globally threatened species are present on Kerguelen (the largest archipelago), 9 in Crozet and 7 in Saint-Paul and Amsterdam (Table 14).

Table 14. Threatened species present in the French Southern Lands according to the IUCN Red List

	CR	EN	VU	Amsterdam and Saint-Paul	Crozet	Kerguelen	Total
Birds	1	4	7	7	7	9	**12**
Mammals	0	3	1	0	0	4	**4**
Fishes	1	0	2	0	2	2	**3**
Total	**2**	**7**	**10**	**7**	**9**	**15**	**19**

Photo 45. The Amsterdam albatross, an endemic species of TAF

4.3.3.2 Site outcomes

1. Identification of trigger species

For the French Southern Lands, 97 species (Annexe 19) match the criteria of trigger species for Key Biodiversity Areas (see 4.2. Methodology).

Of the 97 trigger species in the French Southern Lands, 56 (65 percent) occur in Kerguelen archipelago, 47 (55 percent) in the Crozet archipelago, and 17 (19 percent) in Amsterdam archipelago.

Most of the species are restricted range species (39 species) and congregates significantly in the islands (more than 1% of the global population) (25 species).

Table 15. Overview of trigger species and subspecies in the French Southern Lands

Taxonomic Group	IUCN Red List			Other trigger criteria	Total	Distribution by archipelago		
	CR	EN	VU			Kerguelen	Crozet	Amsterdam and Saint Paul
Birds	1	4	7	31	**43**	34	21	11
Mammals	0	3	1	4	**8**	1	2	1
Fishes	1	0	2	15	**18**	10	9	0
Plants	0	0	0	20	**20**	9	3	11
Molluscs	0	0	0	4	**4**	4	4	2
Annelids	0	0	0	2	**2**	2	2	1
Arthropods	0	0	0	2	**2**	1	1	2
Total	**2**	**7**	**10**	**68**	**97**	**57**	**47**	**18**
Percentage	2%	9%	13%	76%	100%	65%	55%	19%

2. KBA Delineation

Fifty nine KBAs were identified in the French Southern Lands, 33 terrestrial KBA's and 28 Coastal and Marine KBAs (Annexe 20).

For the Kerguelen marine area, a workshop was held in Paris in June 2016 (Koubbi et al. 2016a) that gathered 29 experts from different disciplines and organizations. Together, they identified 18 ecoregions in Kerguelen EEZ that are described according to the benthic realm, the pelagic realm and the top predators. Given the lack of precise data that exist on Kerguelen marine areas, it was decided that those ecoregions will be taken as KBA candidates. In fact, they represent feeding and reproducing areas and corridors for many marine trigger species.

For Crozet marine area, a program has been conducted since 2013 to describe Crozet marine ecoregions: CROMEBA (Crozet Ecosystem Based Management). This programme is still ongoing but the first results (Koubbi et al. 2016b) define 6 ecoregions with its associated benthic, pelagic and top predators' characteristics. Due to the lack of precise information on marine species geographical range, the consensus was made to use those ecoregions as KBA candidates, as they host several marine trigger species.

For Amsterdam and Saint-Paul, the bathymetric profile, corresponding to biodiversity potential distribution area, was used.

Figure 28. Terrestrial and coastal Key Biodiversity Areas in Kerguelen archipelago

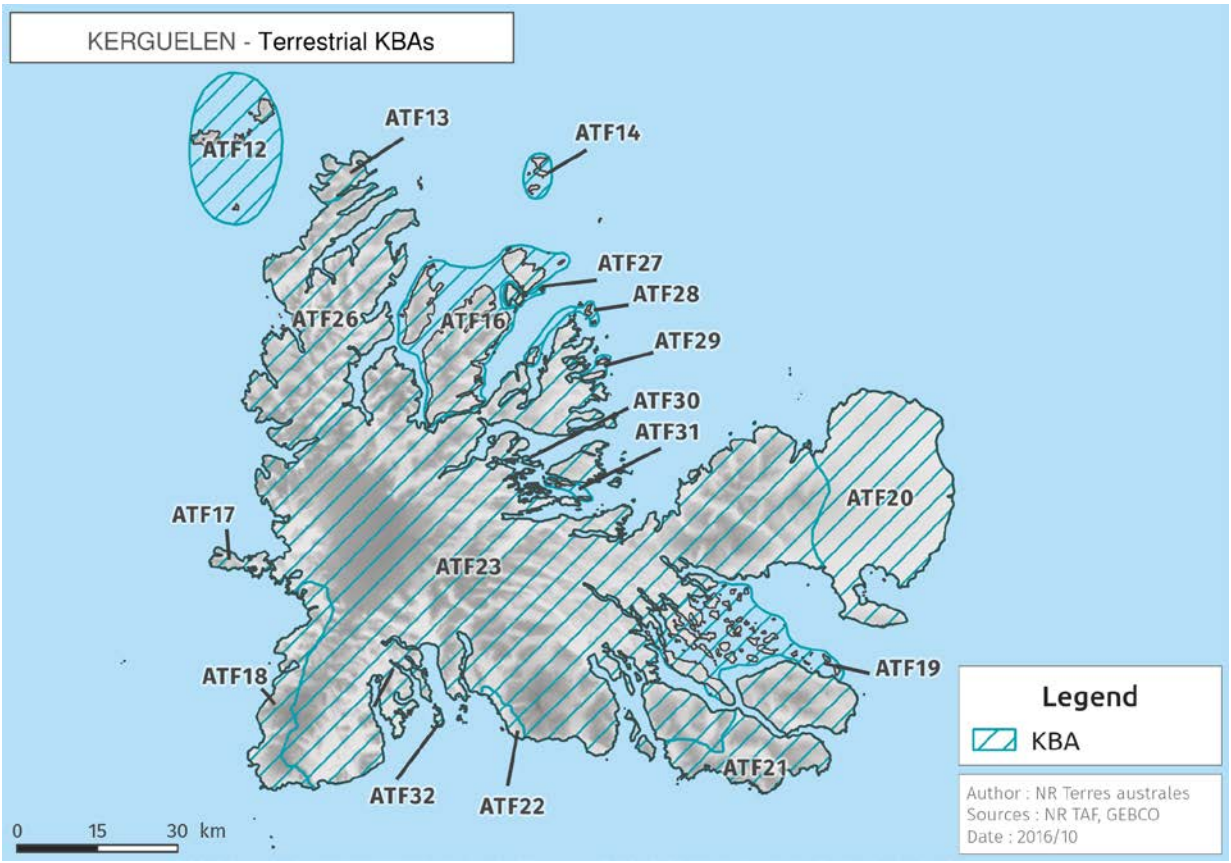


Figure 29. Marine Key Biodiversity Areas in Kerguelen Archipelago

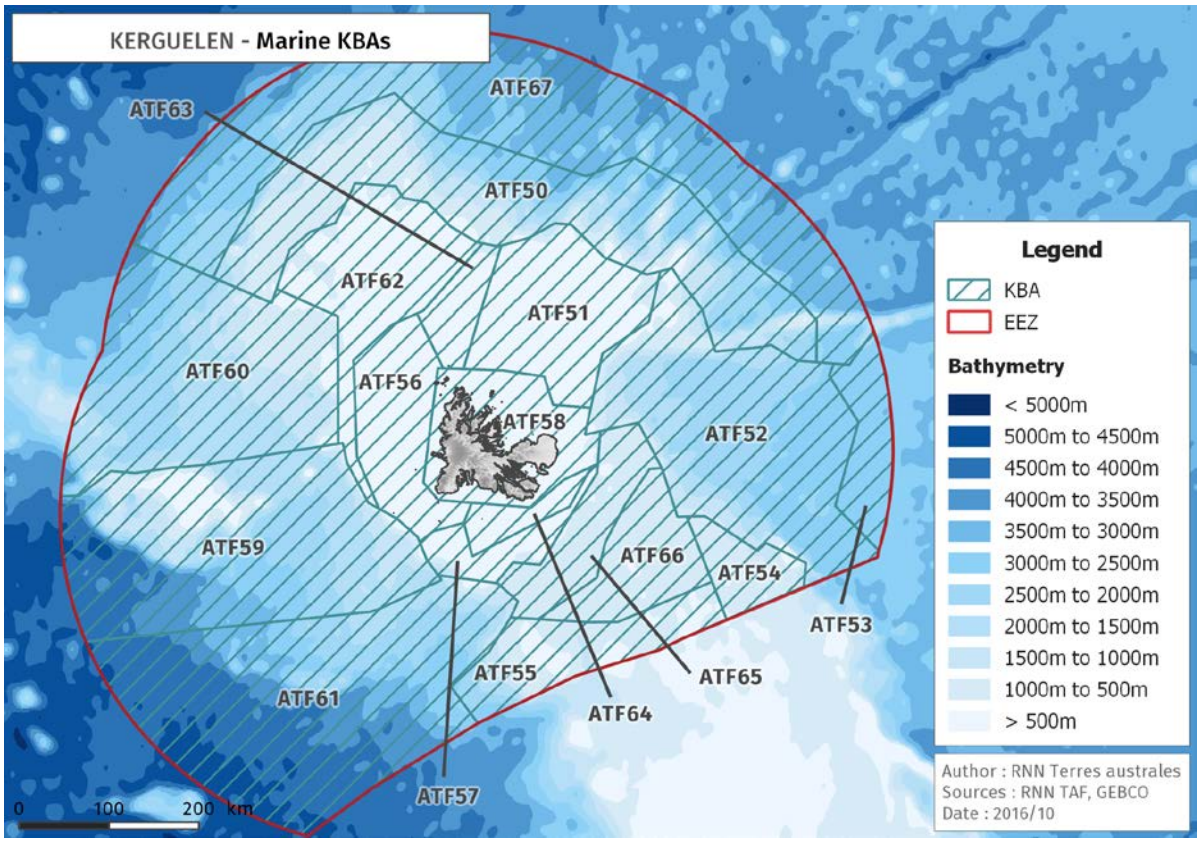


Figure 30. Terrestrial Key Biodiversity Areas in East Crozet archipelago

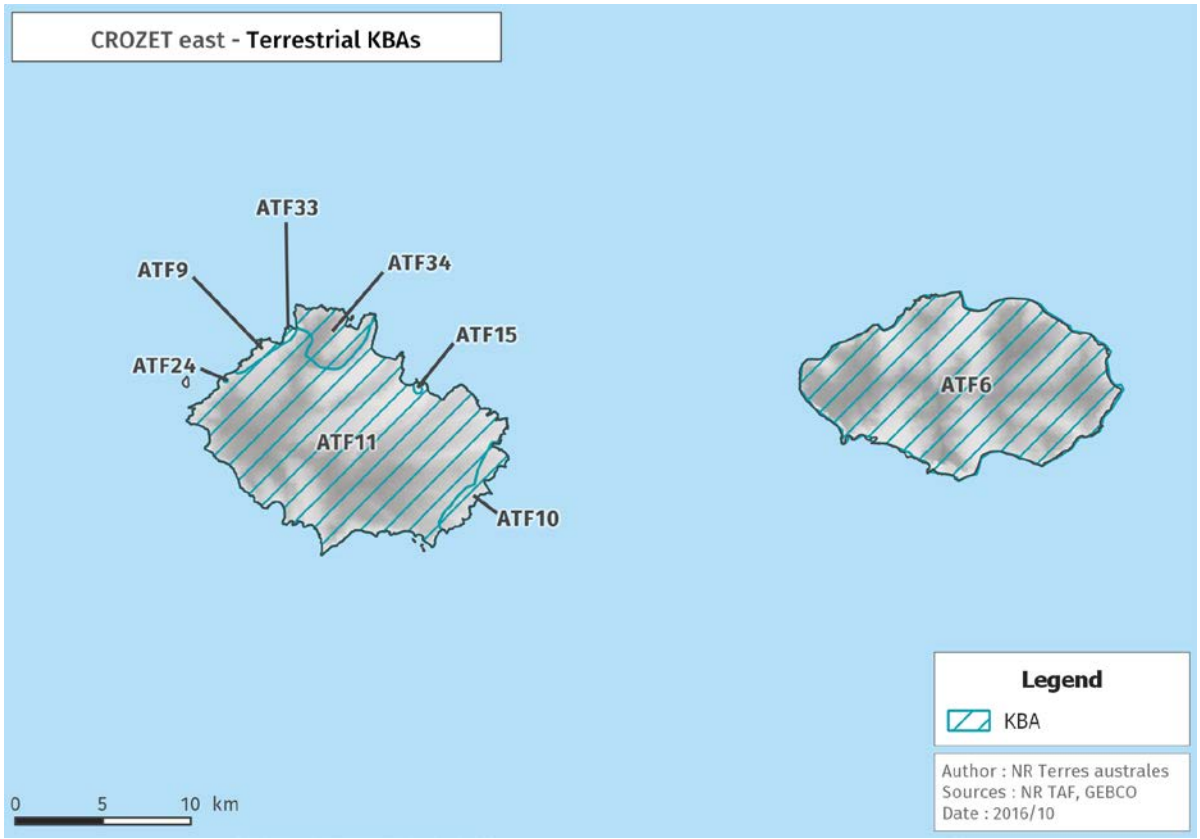


Figure 31. Terrestrial Key Biodiversity Areas in West Crozet archipelago

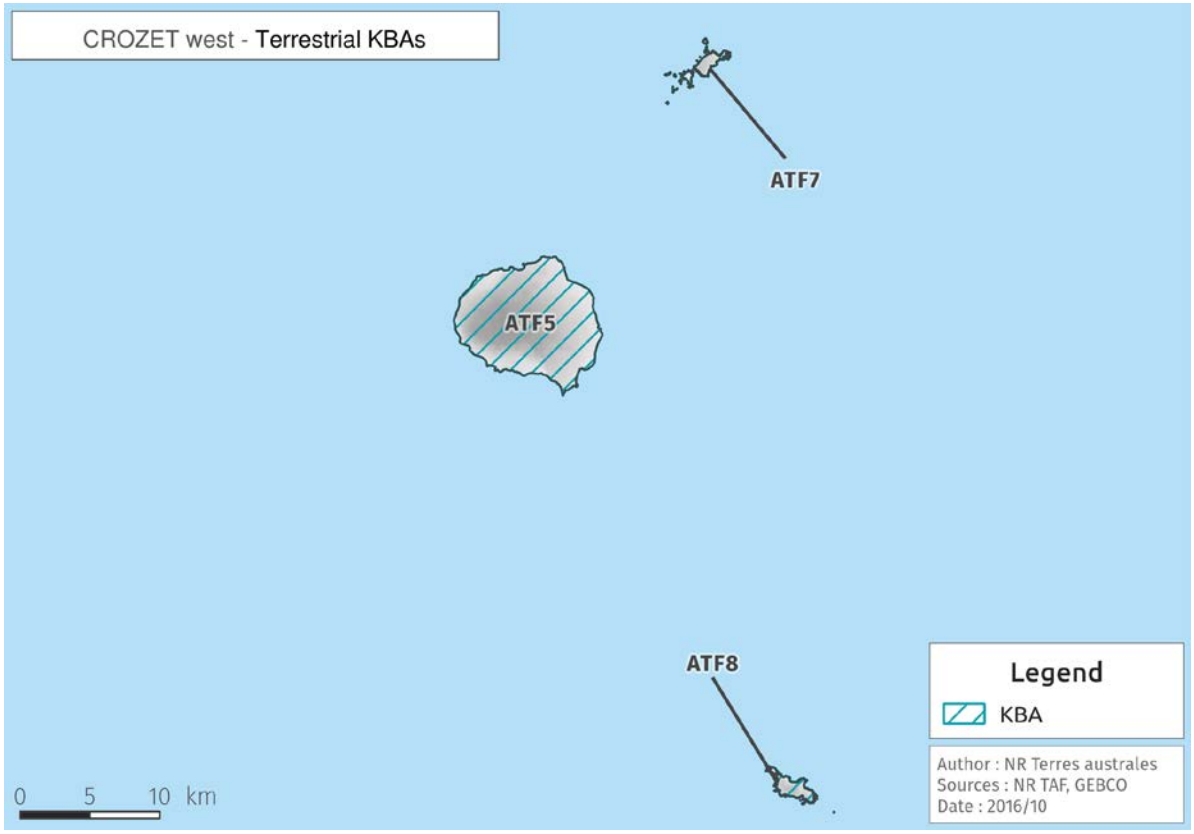


Figure 32. Marine Key Biodiversity Areas in Crozet archipelago

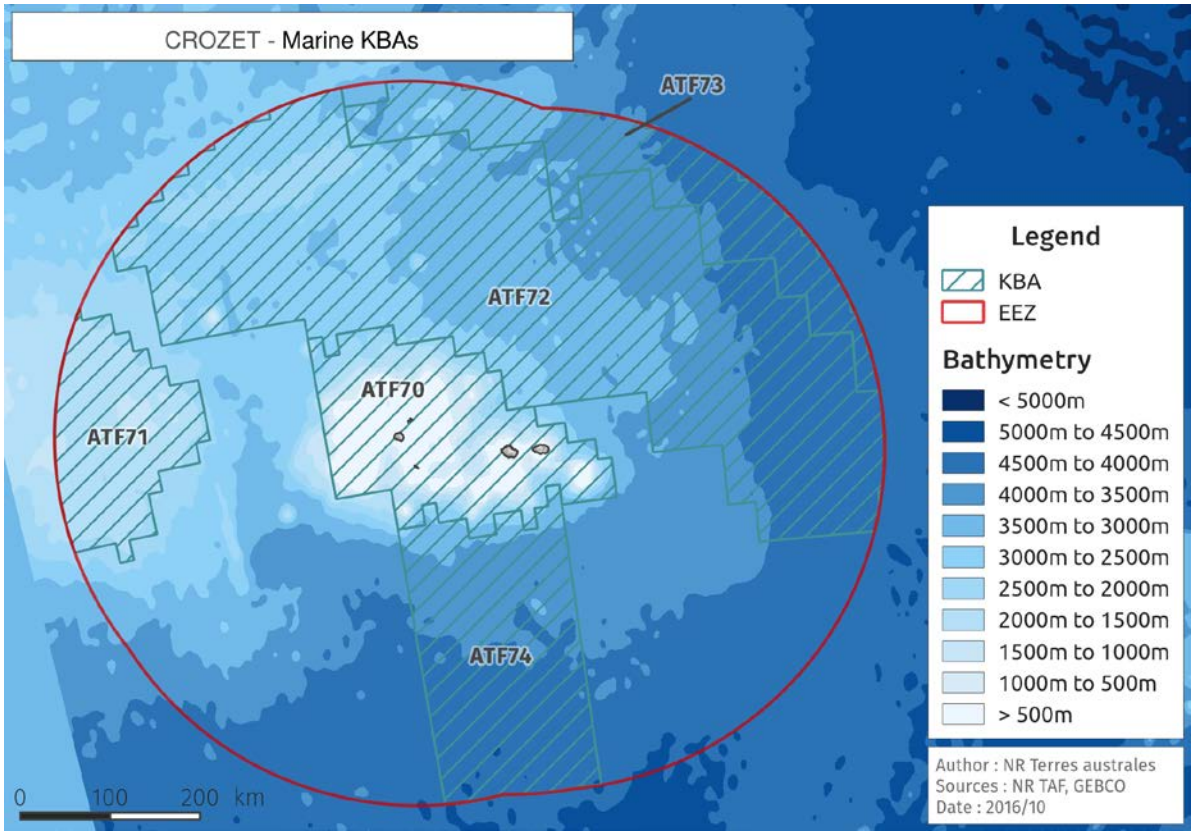


Figure 33. Terrestrial Key Biodiversity Areas in Amsterdam Island

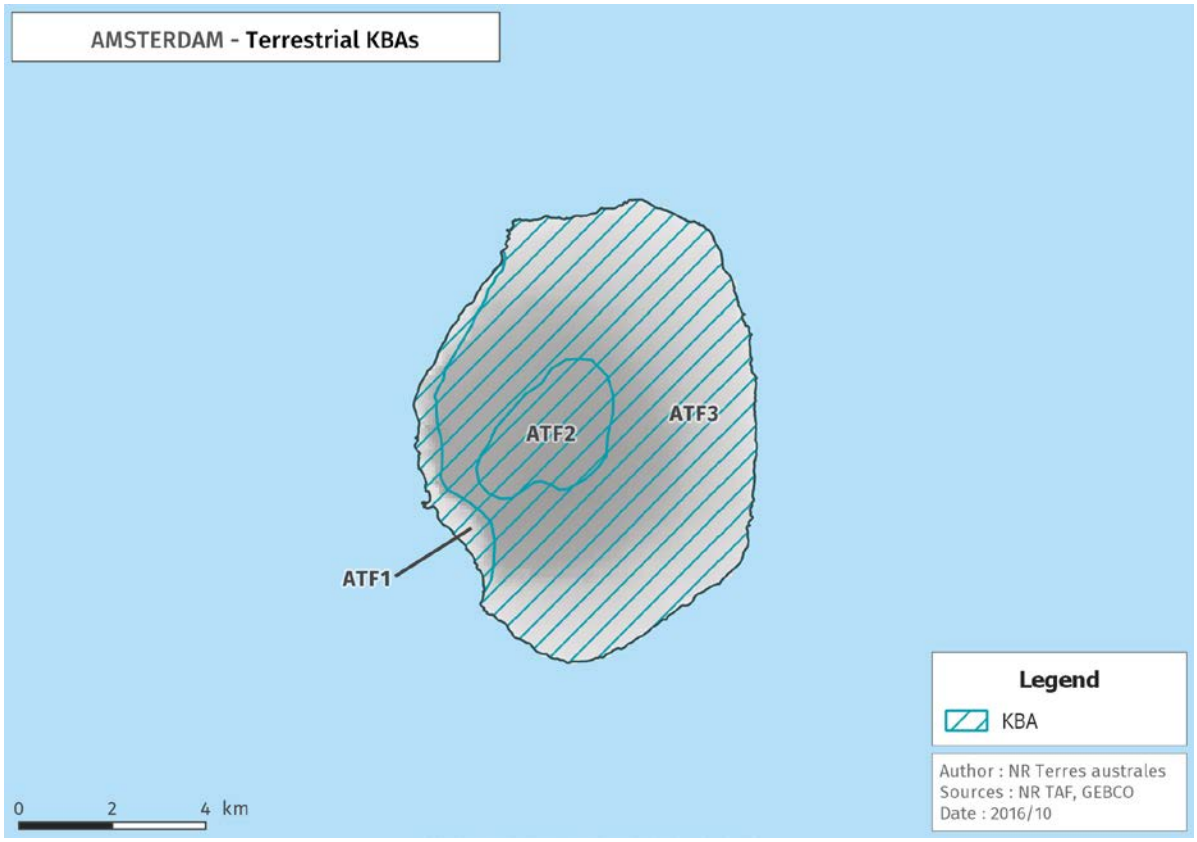


Figure 34. Terrestrial Key Biodiversity Areas in Saint-Paul Island

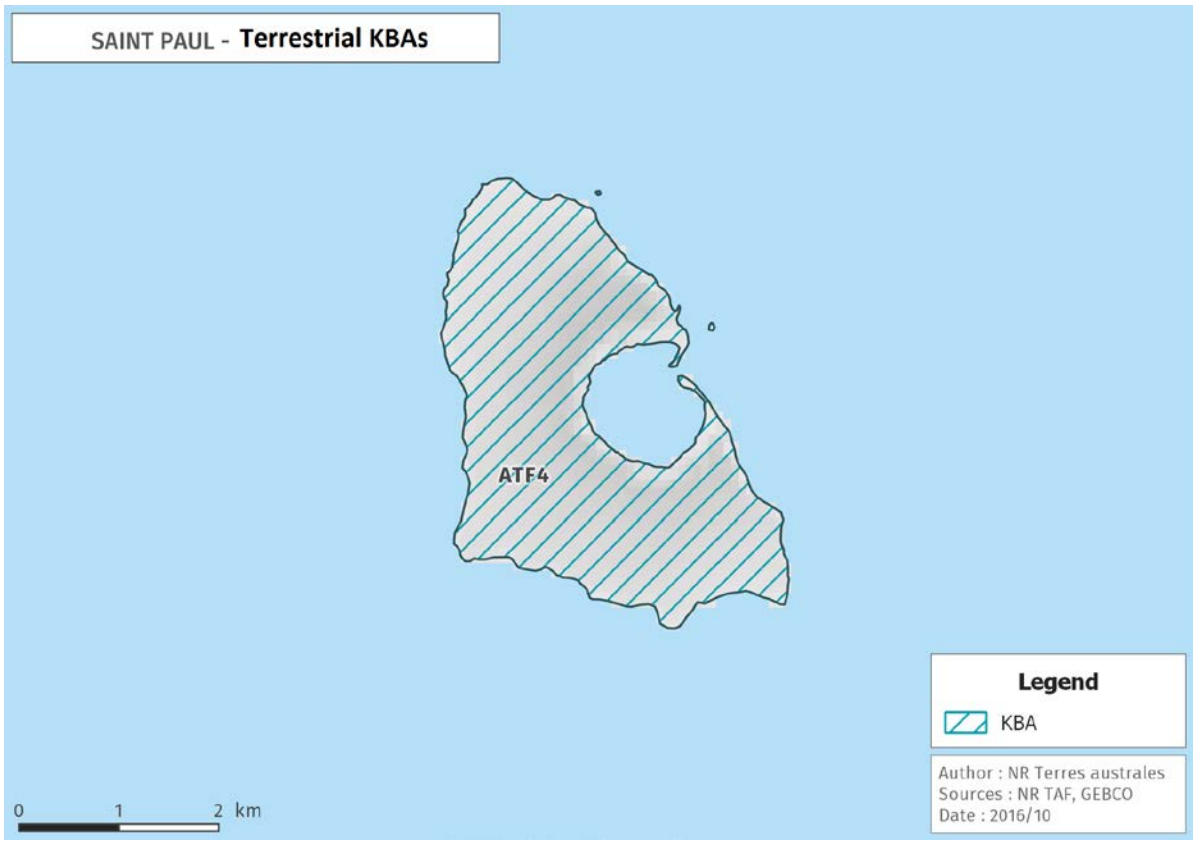
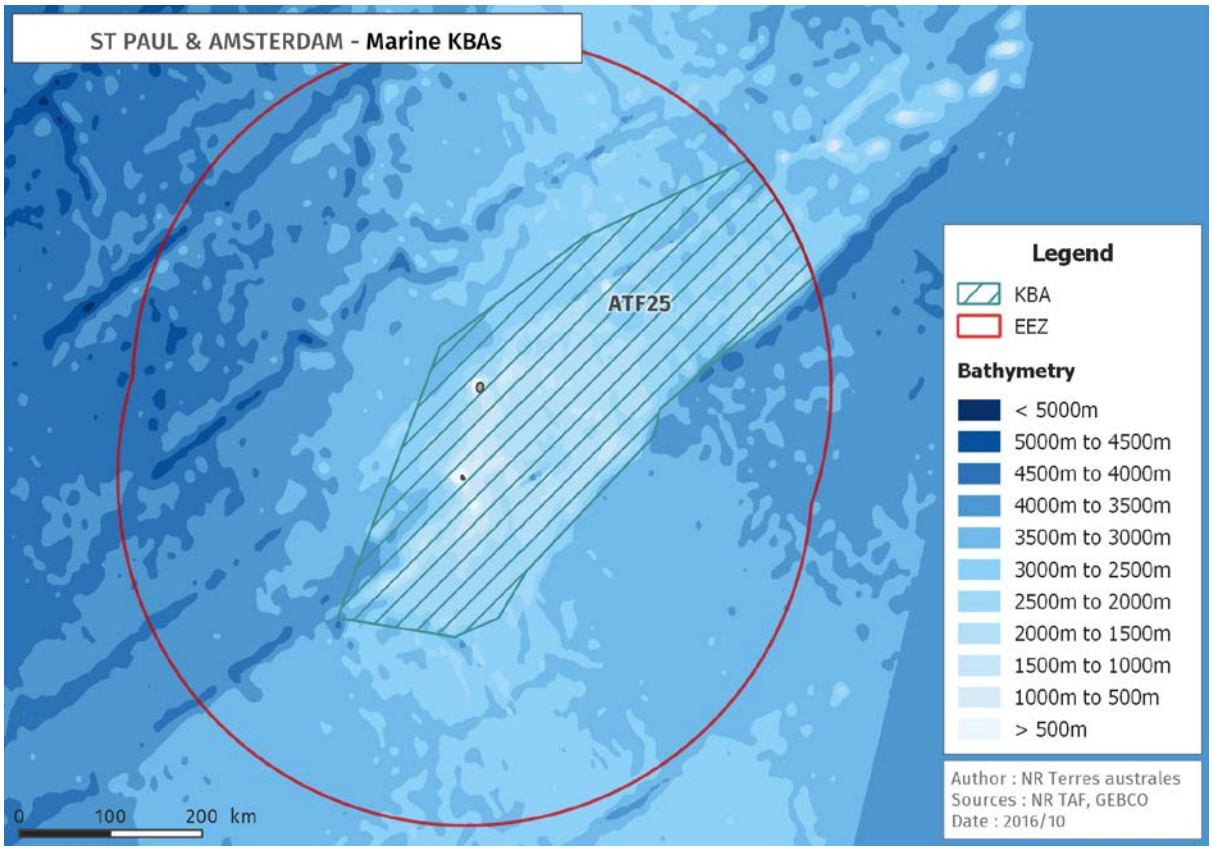


Figure 35. Marine KBA in Amsterdam and Saint-Paul



3. KBA Prioritization

An initial biological prioritization was undertaken according to species irreplaceability, vulnerability and sites vulnerability. After the consultation of experts to refine this list, 13 KBA were assigned to the highest priority level (level 1), 18 sites were assigned to level 2, 8 sites to level 3, 10 to level 4 and 10 to level 5 (Table 16 and annexe 21).

Table 16. Results of KBAs' prioritization in the French Southern Lands

Priority Level	Kerguelen	Crozet	Amsterdam &Saint-Paul	Total
1	8	2	3	**13**
2	7	9	2	**18**
3	6	2	0	**8**
4	7	2	1	**10**
5	8	2	0	**10**
Number of KBAs	**39**	**17**	**5**	**59**

4.3.4 South Georgia and South Sandwich Islands

4.3.4.1 Species outcomes

Twelve species present in South Georgia and South Sandwich Islands are assessed as threatened (CR, EN or VU) on the IUCN Red List.

Table 17. List of threatened species according to the IUCN Global Red List

Phylum	*Latin name*	Commo name	IUCN Cat.
Mammalia	*Balaenoptera musculus*	Blue whale	EN
Mammalia	*Balaenoptera physalus*	Fin whale	EN
Mammalia	*Balaenoptera borealis*	Sei whale	EN
Mammalia	*Physeter macrocephalus*	Sperm whale	VU
Aves	*Diomedea exulans*	Wandering albatross	VU
Aves	*Thalassarche chrysostoma*	Grey-headed albatross	EN
Aves	*Procellaria aequinoctialis*	White chinned petrel	VU
Aves	*Eudyptes chrysolophus*	Macaroni penguin	VU
Pisces	*Lamna nasus*	Porbeagle shark	VU

Photo 46. The blue whale (Copyright L. Bouveret)

In addition 9 endemic species have been identified (2 birds and 7 fishes) and 19 species of seabirds and mammals that are considered to have globally significant congregations on South Georgia and the South Sandwich Islands (Table 18 & annexe 22). It should be noted that using the IUCN Red List species introduce a bias towards birds and mammals. There is also significant biodiversity amongst marine invertebrates (particularly benthic invertebrates), with many endemics and range-edge species (Hogg et al., 2011), but few are assessed by the Red List.

Table 18. Summary of endemic species and species with globally significant congregations in South Georgia and the South Sandwich Islands (Annexe 22).

.	Endemic	GSC	Total
Aves	2	17	19
Mammalia	0	2	2
Pisces	7	0	7
Total	9	19	28

GSC: Globally Significant Congregation

4.3.4.2 Site outcomes

1. Identification of trigger species

In total, 40 species (Tables 19 and annexe 23) are identified as trigger species for Key Biodiversity Areas in South Georgia and South Sandwich Islands.

Table 19. Summary of Trigger Species in South Georgia and South Sandwich Islands

Group	Trigger criteria					
	CR	EN	VU	Endemic	Global Sign.	Total
Mammalia	0	3	1	0	2	6
Birds	0	1	3	2	17	26
Fish	0	0	1	7	0	8
Total	**0**	**4**	**5**	**9**	**19**	**40**

2. Key Biodiversity Areas delineation

South Georgia and the South Sandwich Islands are divided into 18 terrestrial areas (Figure 36) and 19 marine sites (Figure 37), the latter being based on areas defined in the Marine Protected Area Management Plan (See Part 6. Legal and political context). The marine areas distinguish between benthic and pelagic areas encompass the entire EEZ (1.25 million km²). The details of trigger species found in each KBA can be found in annexe 24 & 25 and the description of KBA characteristics in annexe 26.

Figure 36. South Georgia and South Sandwich Islands Terrestrial KBAs

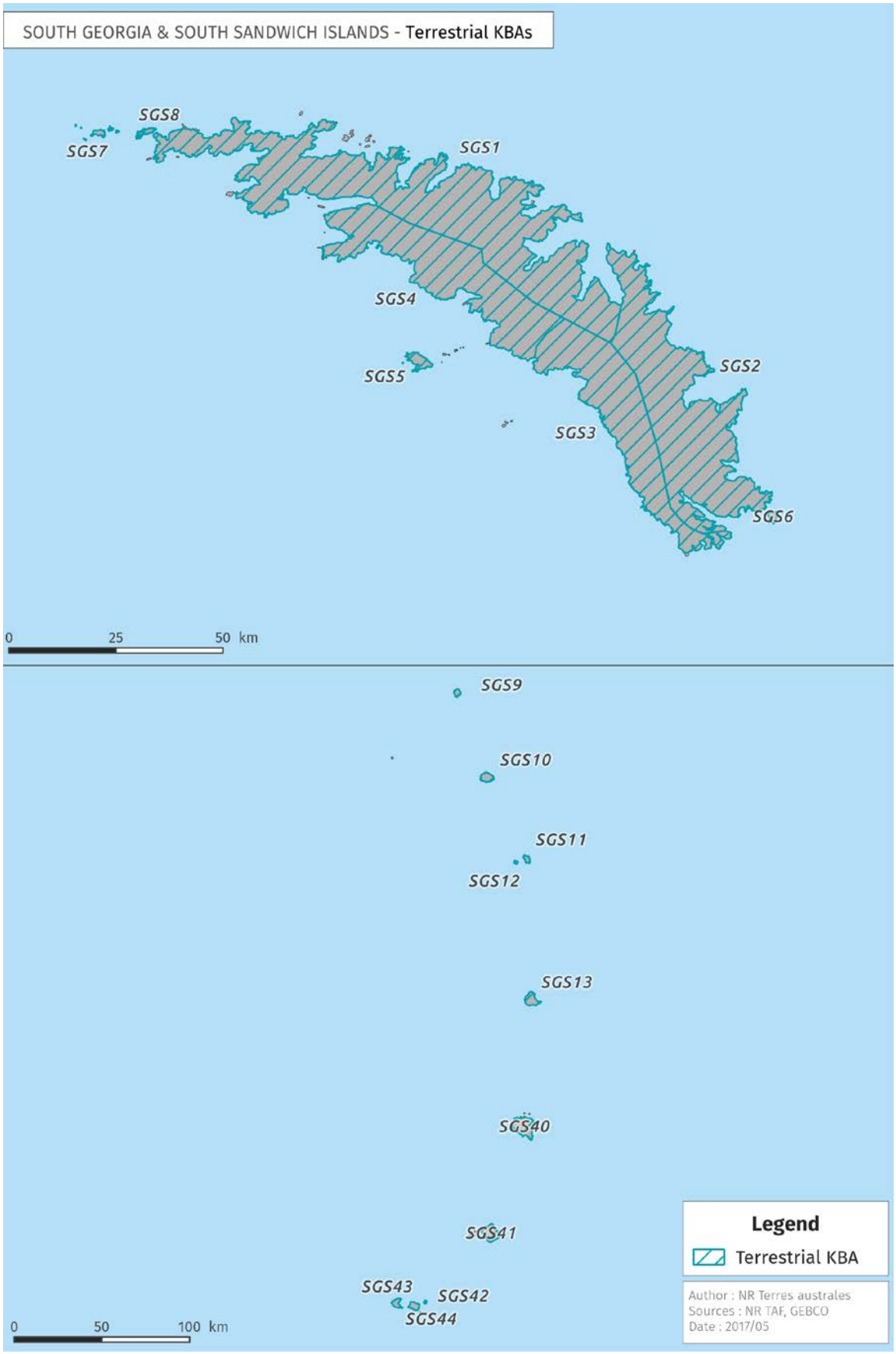
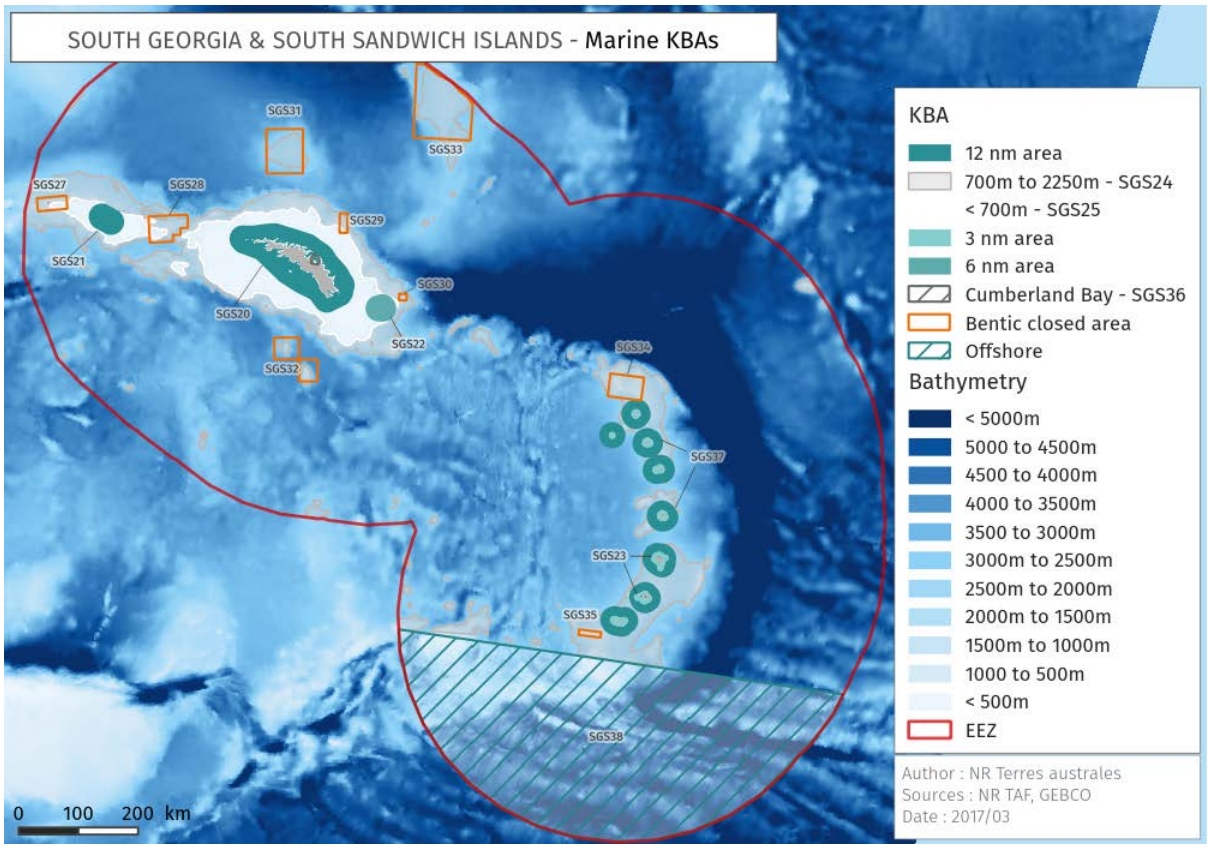


Figure 37. South Georgia and South Sandwich Islands Marine KBAs (based on GSGSSI 2013)



3. Key Biodiversity Areas Prioritization

After undertaking the initial biological prioritization, 10 areas were assigned to the priority level 2, 6 sites were assigned to level 3 and 21 to level 5 (Table 20).

Table 20. Results of KBAs' prioritization in South Georgia and South Sandwich islands

Priority level	Terrestrial	Marine/Coastal	Total
2	8	2	10
3	2	4	6
5	8	13	21
Total	18	19	37

4.3.5 British Antarctic Territory

4.3.5.1 Species outcomes

Only one species breeding in the British Antarctic Territory is assessed as threatened by the IUCN global Red List. It is the macaroni penguin, *Eudyptes chrysolophus* (VU).

Photo 47. The macaroni penguins (Copyright Recherches arctiques)

4.3.5.2. Site outcomes

1. Identification of trigger species

In total, 23 species matching the criteria of trigger species for Key Biodiversity Areas, occur in the British Antarctic Territory (Annexe 27).

Table 21. Summary of trigger Species in the British Antarctic Territory

Taxonomic Group	CR	EN	VU	Other trigger criteria	Total
Birds	0	0	1	17	18
Plantae	0	0	0	5	5
Total	**0**	**0**	**1**	**22**	**23**

2. Delineation of Key Biodiversity Areas

In the British Antarctic Territory, 122 terrestrial KBAs were identified (Figure 38 & annexe 28) (Figure 38-44). For Marine KBAs, ASPAs and ASMAs were used to delineate KBA to overcome the lack of data on species distribution at sea. 9 ASPAs, 2 ASMAs and South Orkney Islands Southern Shelf MPA (designated by CCAMLR, 2009) were identified as marine KBAs.

Figure 38. British Antarctic Territory KBAs overview

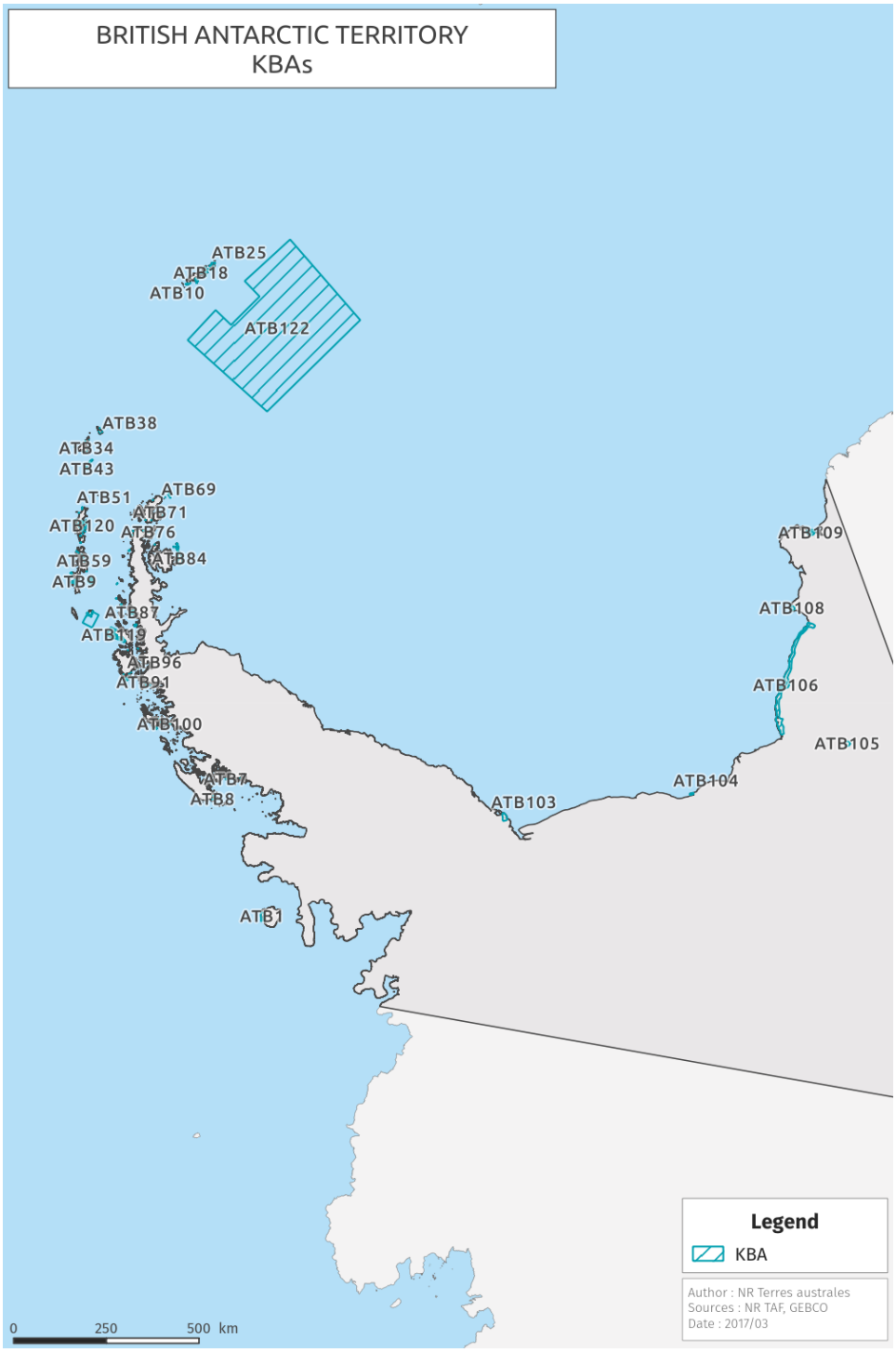


Figure 39. British Antarctic Territory central KBAs

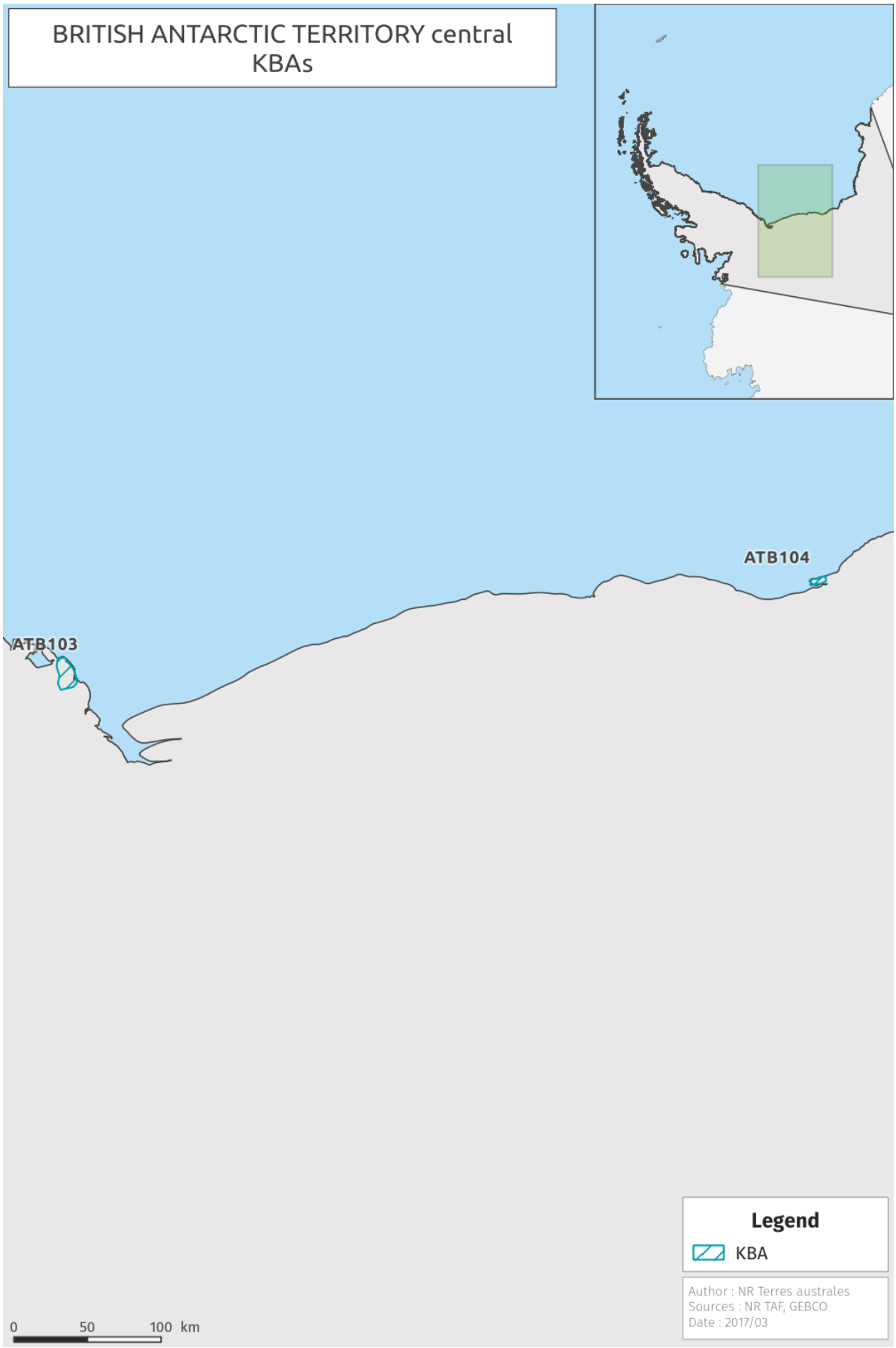


Figure 40. British Antarctic Territory Eastern KBAs

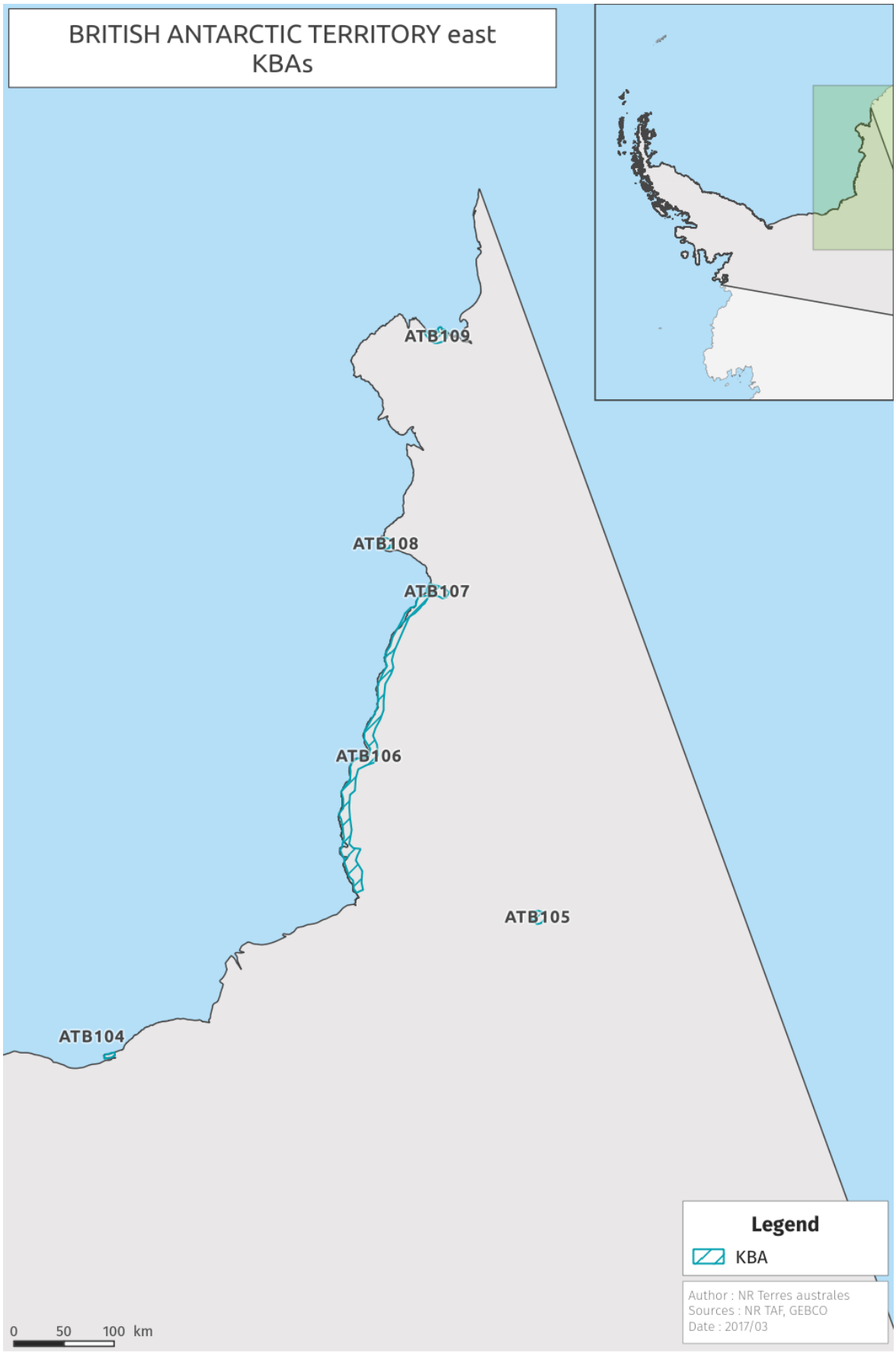


Figure 41. British Antarctic Territory Northern KBAs

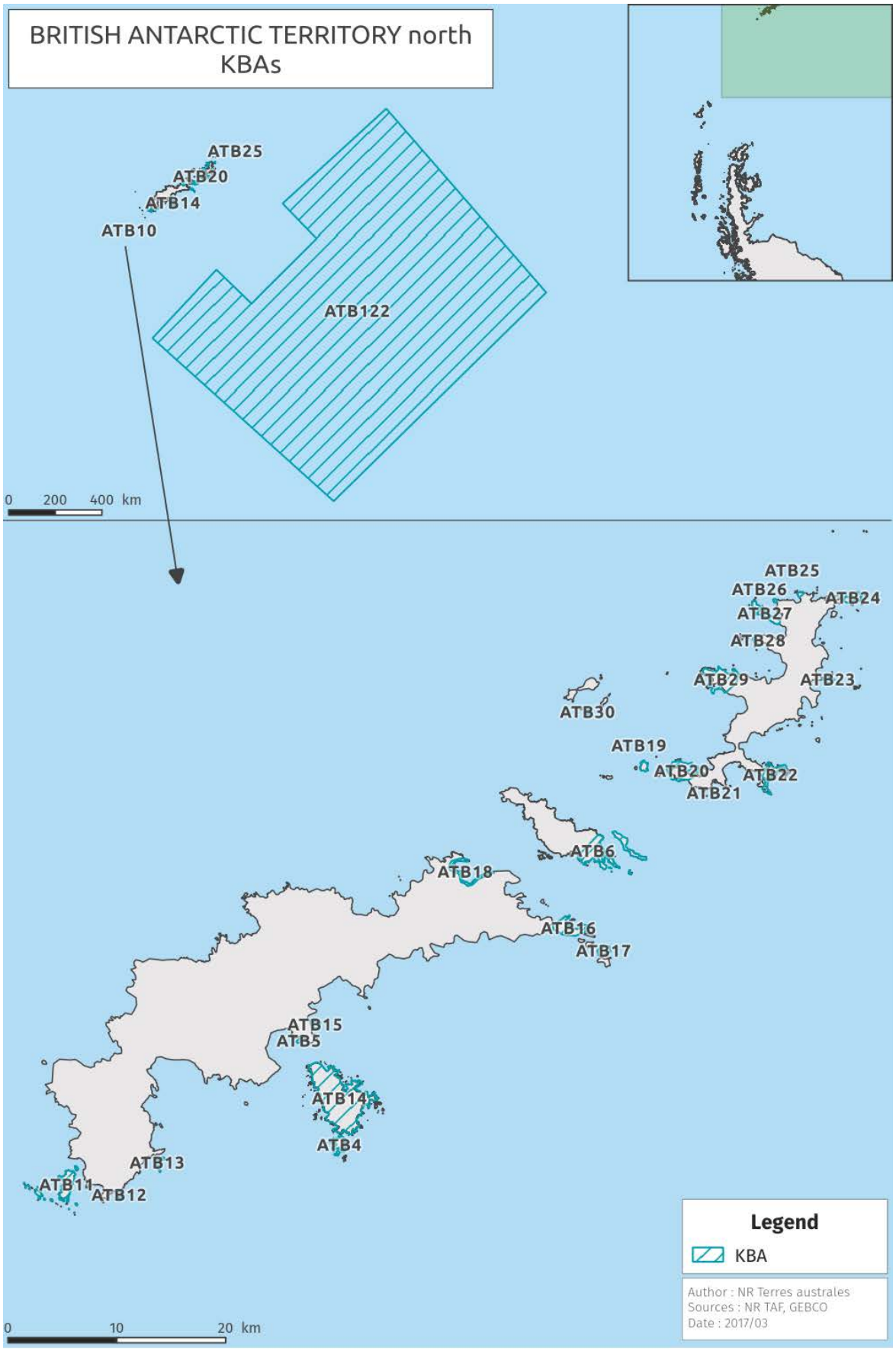


Figure 42. British Antarctic Territory North Northwest KBAs

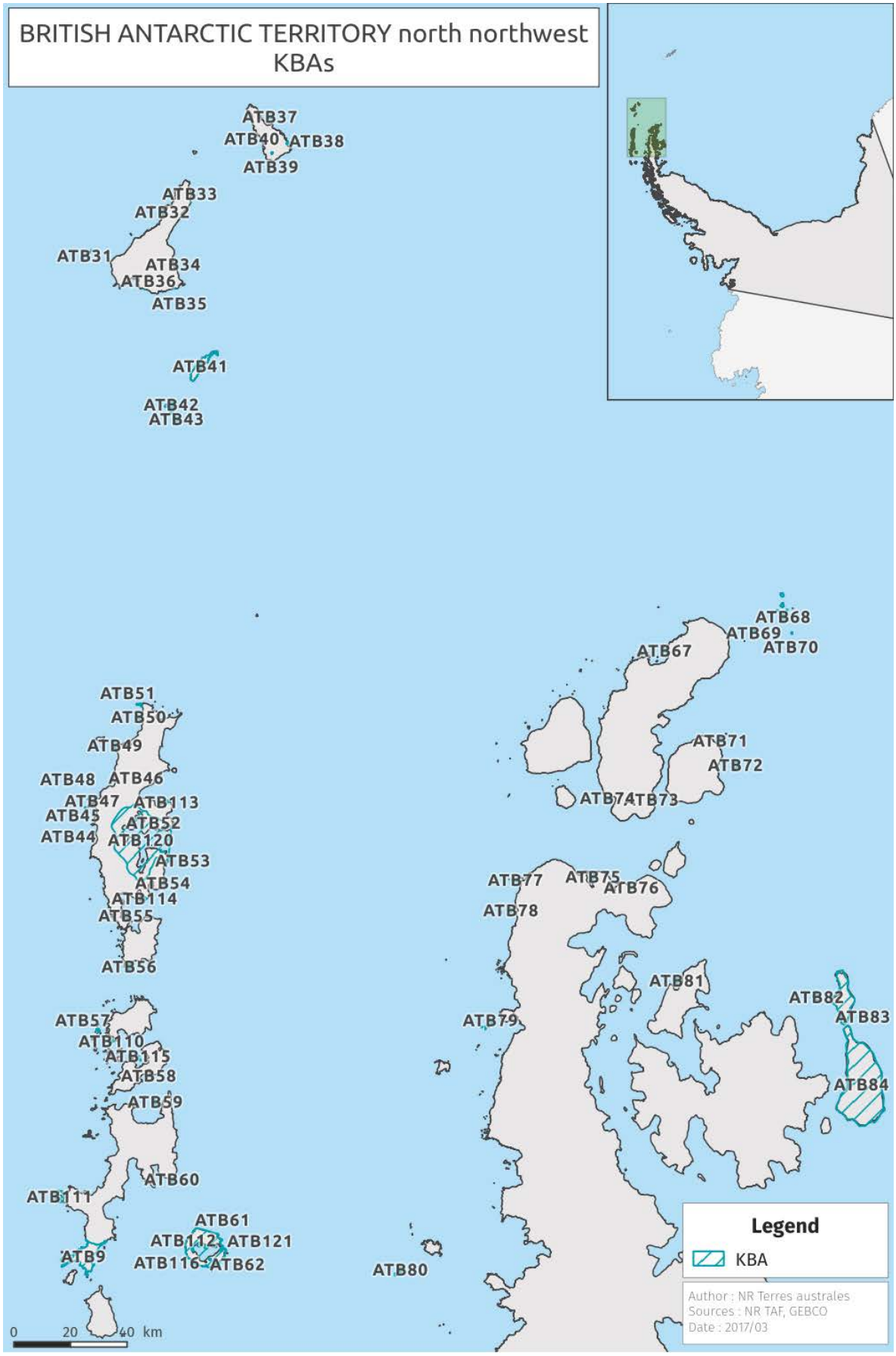


Figure 43. British Antarctic Territory Western KBAs

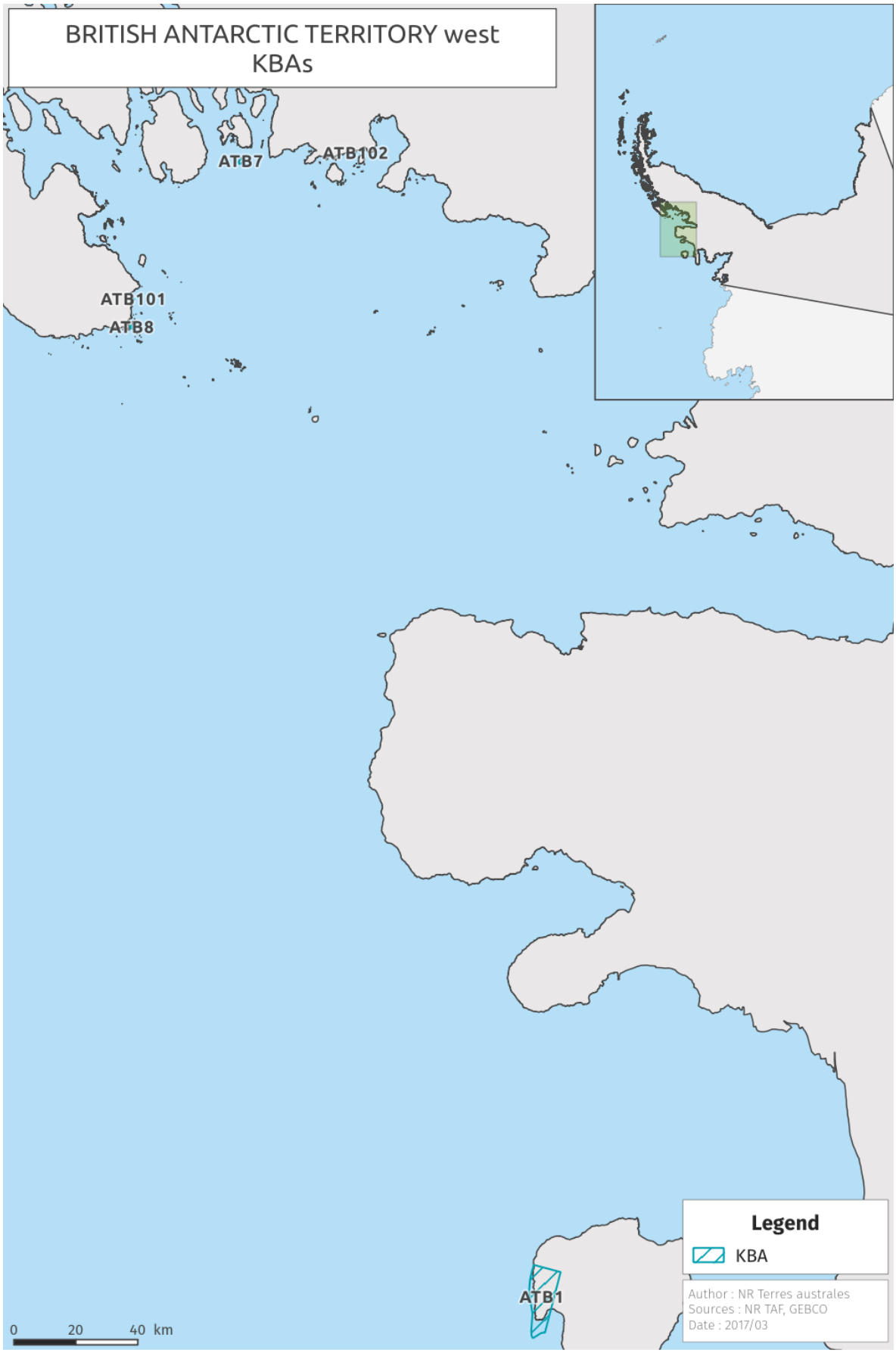
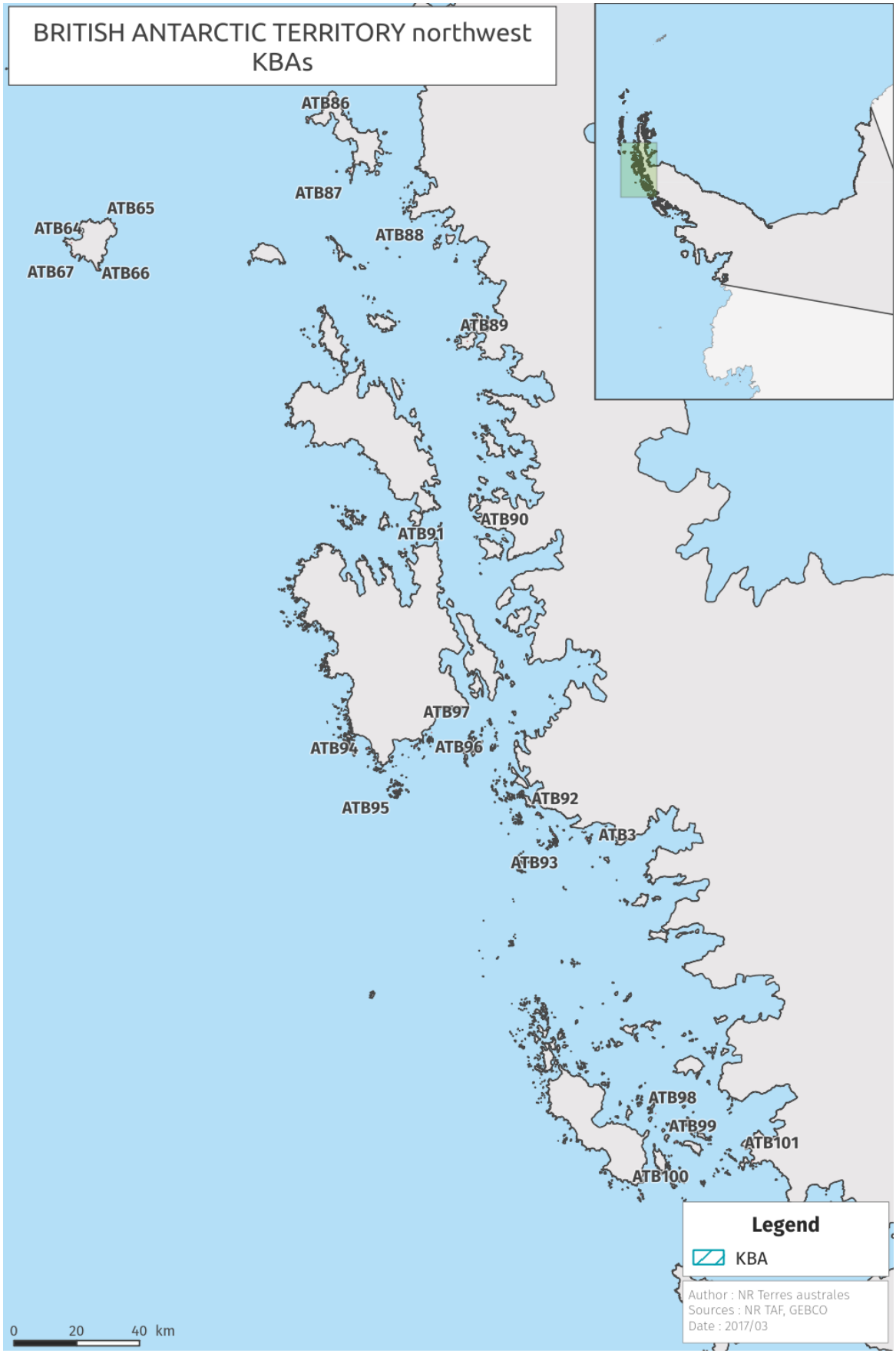


Figure 44. British Antarctic Territory Northwest KBAs



3. KBA Prioritization

After undertaking the prioritization process, all terrestrial Key Biodiversity Areas were assigned to the lowest priority level (level 5) due to the low number of threatened species and low site vulnerability. Climate change in the Antarctic Peninsula region is likely to be the major threat to biodiversity, resulting in changes to the distribution and survival of plant species and the success of predator breeding colonies. Impacts on populations and distributions of marine predators such as penguins may vary between species and are difficult to evaluate. Therefore, they are not considerated as a direct threat. An additional threat is the overlap of the krill fishery with predator foraging areas, particularly where the fishery operates near the coast during the breeding season when foraging ranges are restricted. For this reason, all marine KBAs were assigned to the priority level 3.

Photo 48. Antarctic landscape (Copyright Simon Vacher and Stewart McPherson)

4.3.6. Adélie Land

4.3.5.1 Species outcomes

Five species visiting Adélie Land are assessed as threatened by the IUCN Global Red List: two cetaceans: *Balaenoptera bonaerensis* (EN) and *B. musculus* (EN); and three birds: *Eudyptes chrysocome (VU), E. chrysolophus (VU)* and *E. schlegeli (VU).* As they are not reproducing in Adélie Land, they will not be included in the trigger species list.

4.3.5.2. Site outcomes

1. **Identification of trigger species**

Two species match the criteria of trigger species for key biodiversity areas in Adélie Land, all of them birds: the emperor penguin (*Aptenodytes forsteri*), Adélie penguin (*Pygoscelis adeliae*) (Annexe 29).

Photo 49. Two Emperor penguins in Terre Adélie (Copyright Yan Ropert-Coudert)

2. **Delineation of KBAs**

Five KBAs were identified in Adélie Land, four of them in the coastal area and one marine (Figure 45, Table 22 and Annexe 30).

Figure 45. Adélie Land Key Biodiversity Areas overview

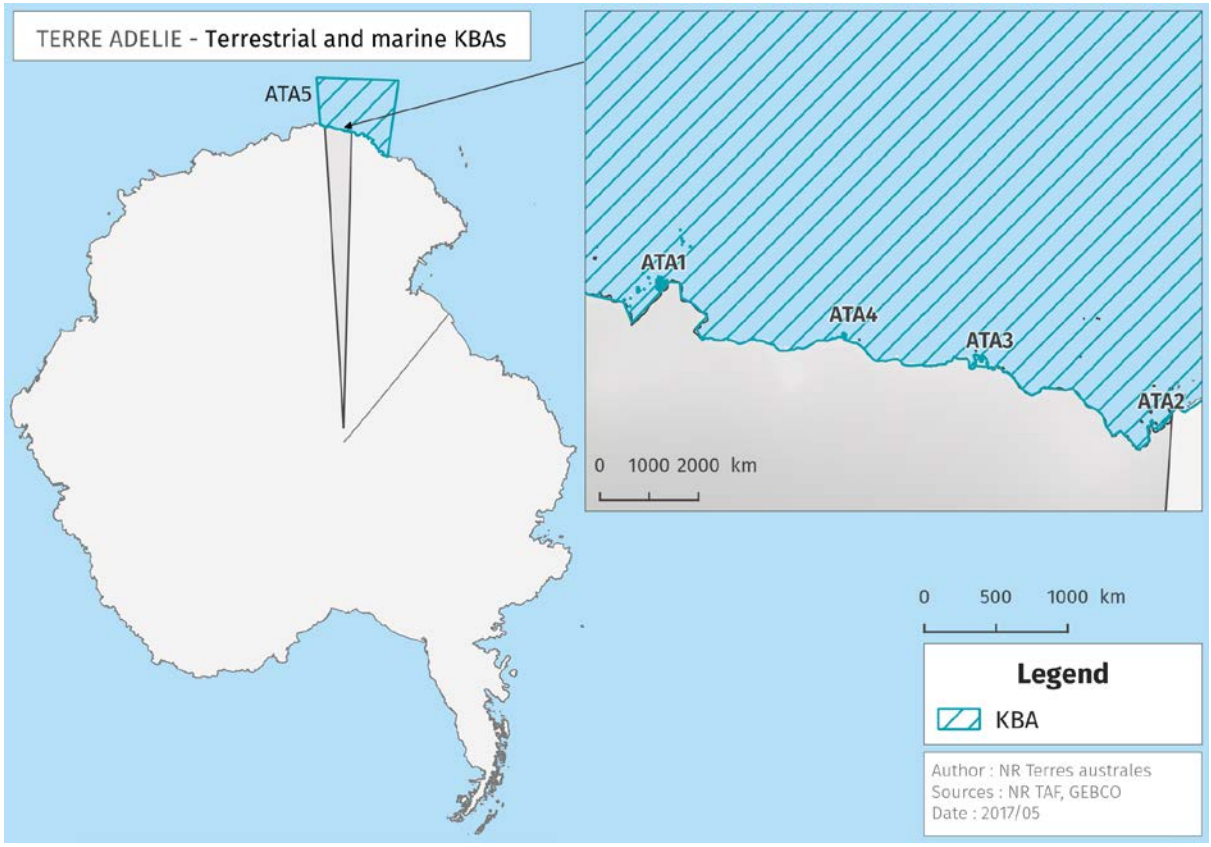


Table 22. Name of Terre Adélie KBAs

ATA1	Terre Adélie. Pointe Geologie
ATA2	Terre Adélie. Ile des Manchots
ATA3	Terre Adélie. Cap Jules
ATA4	Terre Adélie. Cap Bienvenue
ATA5	Terre Adélie. D'Urville Sea-D'Urville-Mertz

3. KBAs Prioritization

After undertaking the initial biological prioritization, all terrestrial KBAs were assigned to the priority level 5, as the two trigger species (*Aptenodytes forsteri* and *Pygoscelis adeliae*) are not threatened according to the IUCN Red List, are known in more than one site, and the sites are not highly vulnerable in the present. The main threat is linked to climate change that can not be evaluated at present day. For the marine KBA, it was assigned to a priority level 3 because there is an increasing interest in fisheries which might impact the marine environment. This KBA is actually part of the proposal for the East Antarctica CCAMLR MPA.

5. SOCIO-ECONOMIC CONTEXT

5.1. Demography

5.1.1 Greenland

Greenland is divided into 18 counties, each with its own capital, and a total of 59 settlements. In 2015, population size was 55,984, 80% of which resided in cities and about 20% in settlements. The majority of the population lives in western Greenland in Paamiut, Nuuk, Maniitsoq and Sisimiut Counties. The southern counties and the sealing and whaling (small whales) regions located in Uummannaq, Upernavik, Qaanaaq as well as Tasiilaq/Ammassalik and Ittoqqortoormiit Counties, are the least populated.

Photo 50. Typical village landscape in Greenland (Copyright Daniel Mitchel)

5.1.2 Saint Pierre and Miquelon

The total population of the islands at the January 2012 census was 6,069, of which 5,456 lived in Saint-Pierre and 624 in Miquelon-Langlade for an average of 25 hab/km2.

Table 23. Demographic characteristics of Greenland and Saint-Pierre et Miquelon

Region	Population	Inhab/km²	GDP/cap €
Greenland	55,984 (2015)	0.003 (0.14 in ice free area)	27,500
St Pierre & Miquelon	5,456 (2011)	25	28,327

5.1.3 The French southern lands

The French Southern Lands don't have a permanent civil population. However, la Possession Island (Crozet), Kerguelen main island, and Amsterdam island host scientific stations where 25 to 70 non-permanent residents live, consisting of military personnel, officials, scientific researchers and support staff.

Photo 51. Alfred Faure station, Crozet, TAF (Copyright Claire-Sophie Azam)

5.1.4 South Georgia and South Sandwich Islands

There is no native population on the islands; the present inhabitants are the British Government Officer, Deputy Postmaster, scientists, museum staff at nearby Grytviken and support staff from the British Antarctic Survey who maintain scientific bases at Bird Island and at the capital, King Edward Point.

A permanently manned Argentine research station was located on Thule Island from 1976 to 1982.

5.1.5 British Antarctic Territory and Adelie Land

The BAT has no local population and the presence in the territory is ensured by the British Antarctic Survey (BAS), who operate three scientific stations at Signy Island, Halley and Rothera. The Signy station only opens during the austral summer, whilst Halley and Rothera operate year round. These stations are occupied by scientists and support staff, ranging from 12 in winter to 100 in summer months. Port Lockroy on Goudier Island is staffed by the UK Antarctic Heritage Trust during the Antarctic summer and receives around 10,000 visitors from cruise ship passengers each year, it is one of the most visited sites on the continent.

In Adélie Land, since January 12, 1956, there has been a manned French research base year-round located at 66°40′S 140°01′E, the Dumont d'Urville Station, with a population of about 30 people in winter, and 80 people during the austral summer.

Table 24. Figures of the non-permanent population of the uninhabited Polar and sub-Polar OCTs

Region/island	Station	Non-permanent residents	
		Austral Winter	Austral Summer
Amsterdam	Martin-de-Viviès	25	45
Crozet	Alfred Faure	25	45
Kerguelen	Port aux Français	70	110
South Georgia	King Edward Point	12	22
	Bird Island	4	10
British Antarctic Territory	Halley	16	70
	Rothera	50	100
	Port Lockroy	0	5
Adelie Land	Dumont d'Urville	30	110

5.2. Economic sectors

5.2.1 Greenland

The first employer in Greenland is the public sector and an important part of Greenland's economy comes from Danish annual grants.

The second employer and first source of income is the fishing industry which represents 87% of all exportation. The commercial fishing fleet consists of approximately 5,000 dinghies, 300 cutters, and 25 trawlers. While cod was formerly the main catch, today the industry centers on cold-water shrimp and Greenland halibut. Due to expectations of warmer sea water and less sea ice, fishery is expected to change and grow. Areas covered by sea ice today may be open water area with access for modern fisheries in the future.

Hunting and whaling, both traditional activities, are still important activities as Greenland is the 2nd seal hunting country in the world and the 3rd for whaling. Today, 10% of the workforce is involved in the hunting industry. Over 144,000 animals, including reindeer, seals, musk oxen and polar bears, are hunted each year. All specimens caught must be reported.

Greenland has a great mining potential as many mineral deposits are known to exist (coal, diamonds, and many metals – including silver, nickel, platinum, copper, molybdenum, iron, niobium, tantalum, uranium, and rare earths). With the effect of global warming and the uncovering of precious metals in the icesheet, the number of prospecting licenses is expected to grow significantly.

Agriculture, once of little importance, is expending since global warming allows longer growing seasons. Tourism is also a growing source of revenue.

Photo 52. Fishing is the first economic activity in Greenland (Copyright Chris Yesson)

5.2.2 Saint Pierre and Miquelon

Cod fisheries used to be the traditional main economic activity In Saint Pierre et Miquelon. This fishery was hit by the collapse of both the cod stock together and the fish processing industries and it is estimated that this impacted 3,000 people on the islands in 2011 while the export of fish and fish products continued to diminish. Nowadays, agriculture and fishery sectors represent less than 1% of national income and beneficiate of a strong budgetary support from France which makes SPM the largest recipient of budgetary support from France of all French OCTs.

Administration and trade sector account for 60% of Saint-Pierre et Miquelon's economy, with trading employing about 15% of the population and the building and construction sector employing more than 10% of the population.

Tourism is seen as a possible further source of income and cruise ships have been multiplying the last few years. There were 7,200 visitors to Saint Pierre et Miquelon in 2012.

An exploratory drilling in 2001 revealed possible hydrocarbon deposits. This could represent a development opportunity for Saint-Pierre et Miquelon's economy, following the experience of offshore oil exploitation in Terre-Neuve et la Nouvelle-Écosse in Canada.

The economic development of Saint-Pierre et Miquelon is managed by the Société de développement et de promotion de l'archipel de Saint-Pierre et Miquelon (Sodepar).

Photo 53. Streets of Saint-Pierre et Miquelon (Copyright DTAM)

5.2.3 The French southern lands

Fishing activity is the main economic activity of the French southern islands. The TAAF administrate three fisheries: the patagonian toothfish fishery, also known as the Chilean Seabass (*Dissostichus eleginoides*) in Kerguelen and Crozet; the mackerel icefish fishery (Champsocephalus gunnari) in Kerguelen,) and the spiny lobster fishery (*Jasus paulensis*) in Saint Paul and Amsterdam. The patagonian toothfish and the mackerel icefish fisheries are conducted from 500m to 2000m) and operated under the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR).

The National Museum of Natural History of Paris advises the TAAF for the determination of Total Allowable Catch for these three target species. It allows the sustainable management of those fisheries.

In 2013, under the auspices of the SARPC (Syndicat des Armements Réunionnais de Palangriers Congélateurs - Reunion Freezer Longliner Shipowners Association), the toothfish fisheries on the Kerguelen plateau have been granted the Marine Stewardship Council (MSC) certification. The fishery's labellisation confirmed the sustainability of the fishery and has led to the consolidation of stock assessment methodologies for Patagonian Toothfish in the southern Indian Ocean.

The TAAF's administration is eligible, and benefits from, donations from the French ministries up to 20% of their budget. Other sources of income complete the budget of TAAF such as philately (6 to 8% of the TAAF's budget), tourism activity (for now very limited 50 visitors per year) and other activities like chartering the Marion Dufresne oceanographic ship to the French Polar Institute (IPEV). TAAF also beneficiate from European Funds (FED-FEDER and BEST).

Photo 54 : Lobser fishery in Amsterdam and Saint-Paul (Copyright TAAF)

5.2.4 South Georgia and South Sandwich Islands

The territory's annual revenue is approximately £6 million, 80% of which is derived from the sale of fishing licenses. The other main sources of income are tourist landing fees (15%) and the sale of postage stamps (3%).

Four fisheries operate in the South Georgia & South Sandwich Islands Maritime Zone. The principal source of income is from licences sold for the Patagonian toothfish (*Dissostichus eleginoides*) longline fishery in South Georgia waters (CCAMLR Subarea 48.3), but a small fishery for Patagonian and Antarctic (*D. mawsoni*) toothfish also operates around the South Sandwich Islands. There is pelagic trawl fishery for mackerel icefish (*Champsocephalus gunnari*) around South Georgia and a pelagic trawl fishery for Antarctic krill (*Euphausia superba*). In 2004, the South Georgia toothfish fishery was the first toothfish fishery to be MSC certified, and was recertified in 2009 and 2014. All MSC certified fisheries must be audited annually, and are reassessed every five years. Currently, the South Georgia Total Allowable Catch is 2,400t, and there are 6 longliner vessels being operated by 4 companies in this fishery. The icefish fishery and some of the vessels operating in the krill fishery are also MSC certified.

Tourism drives significant business growth and generates the second largest source of income for the Government of South Georgia and South Sandwich Islands, with 2015/16 proving the busiest season on record, with 8787 visitors (GSGSSI 2016).

5.2.5. British Antarctic Territory and Adelie Land

Fishing and tourism, both based abroad, account for Antarctica's limited economic activity, although neither industry has any permanent land-based infrastructure. Antarctic fisheries mainly target two species - Antarctic toothfish and Antarctic krill.

The vast majority of tourism activity occurs in the Antarctic Peninsula region (BAT), although tourists occasionally visit Adélie Land (e.g. Dumont D'Urville research station). A total of 44,367 tourists visited the Antarctic Treaty area in the 2016/17 Antarctic summer, down from a peak of 46,265 visitors in 2007-2008 (estimates provided to the Antarctic Treaty by the International Association of Antarctica Tour Operators (IAATO)). Nearly all of them were passengers on commercial (non governmental) ships and several yachts that make trips during the summer.

Despite the lack of permanent inhabitants, the British Antarctic Territory issues its own postage stamps, which represent an important source of income. While some are actually used by visiting tourists and resident scientists, the bulk are sold overseas to collectors. Adélie Land also has some stamps but they are part of the TAAF general philatelic collection.

Photo 55. Adélie Land Stamp, 1996 (the emperor penguin)

6. LEGAL AND POLITICAL CONTEXT

6.1. Greenland

6.1.1. National political system

Greenland's head of state is Margrethe II, Queen regnant of Denmark. The Queen's government in Denmark appoints a High Commissioner (Rigsombudsmand) to represent it on the island. The current commissioner is Mikaela Engell.

The Act on Greenland Self-Government was granted to Greenland on June 21, 2009 (Act no. 473 of 12 June 2009) and was an extension of powers enacted in the Home Rule act of 1979 (Act. No. 577 of 29 November 1978). Through the Home Rule and Self-Government Acts, Greenland has the right to elect its own parliament and government, the latter having sovereignty and administration over the areas mentioned in the Self-Government Act such as education, health, fisheries, environment and climate. Greenlanders elect two representatives to the Folketing, Denmark's parliament, out of a total of 179. The current representatives are Aleqa Hammond of the Siumut Party and Aaja Chemnitz Arnatsiaq Larsen of the Inuit Community Party. The Greenlandic parliament is called “Inatsisartut”. It is composed of 31 members who are elected for a 4-year period and convene for two periods a year (autumn and spring). The Inatsisartut approves the executive government “Naalakkersuisut”, which is responsible for the central administration headed by a Premier with a cabinet.

Greenland abolished its 18 counties in 2009 and has since been divided into four territories known as "municipalities": Sermersooq ("Much Ice") around the capital Nuuk; Kujalleq ("South") around Cape Farewell; Qeqqata ("Centre") north of the capital along the Davis Strait; and Qaasuitsup ("Darkness") in the northwest. The northeast of the island composes the unincorporated Northeast Greenland National Park.

Figure 46. Greenland municipalities’ overview

6.1.2. National environmental framework

Figure 47. Nanoq, the polar bear, the emblem of the country

The Government of Greenland has the overall responsibility fopr managing biodiversity and living resources. Conservation of biodiversity including the living resources is shared between The Ministry of Nature and Environment and Justice and The Ministry of Fishery, Hunting and Agriculture.

As a party of the Convention for Biological Diversity (CBD) signed by Danemark, Greenland has implemented different actions to secure the implementation of the Convention and developed a National Biodiversity Strategies and Action Plan (NBSAP). In 1999, a comprehensive country report was compiled of Greenland's ecosystem by the Greenland Institute of Natural Resources, "The Biodiversity of Greenland – a country study" (Jensen & Christensen 2003).

In 2003, a new Nature Protection Act (Landstings Act no 29 of 18 December 2003 on the Protection of Nature) was adopted. The Act implements a number of obligations that can be derived from the Biodiversity Convention. The overall objective of the law is to conserve biological diversity, including genes, habitats, species and ecosystems and to ensure sustainable exploitation of natural resources. The "law for protection of Nature" protects certain types of nature (e.g saltwater lakes and hot springs) and through this law it is possible to further protect areas or species, as for instance the complete ban on hunting of common seals.

A range of activities has been carried out at national and regional level with close links to the implementation of the NBSAP. Greenland has initiated a national project analyzing existing biodiversity hotspots with financial support from DANCEA (Danish Cooperation for Environment in the Arctic). A report that identifies biodiversity hotspots based on available species and ecosystem data will be published soon and is a platform for an administrative and political process to develop a strategy for protected areas as well as national legislation for specific areas. Included in the strategy is a framework for management planning and monitoring plans for protected areas. The strategy is currently developed and will be implemented thereafter. The report will also be the framework for national conservation priorities.

6.1.3. Protected areas in Greenland

A large portion of Greenland's area has some form of protection. The world's largest national park is in sparsely populated Northeast Greenland and covers 956,000 km. In the National Park everyone, except for individuals from Ittoqqortoormiit and Qaanaaq County, needs a permit to be in the region.

In addition to the National Park, there are 11 other protected areas in Greenland (in accordance with Home Rule legislation no. 11 of 12 November 1989), which together cover about 8100 km2:

- The nature reserve in Melville Bay, established primarily to protect wildlife associated with the marine environment, narwhals, beluga whales and polar bears. In one part of the reserve, professional hunters from counties adjacent to the reserve are allowed to conduct traditional hunting trips. All travel in the remainder of the reserve is prohibited.
- Lyngmark on Qeqertarsuaq has been established primarily for the scientific studies carried out there by the University of Copenhagen. Travel and hunting are not prohibited in the area.
- The valley Arnangarnuup Qoorua: Animals and plants are protected year round and only travel by foot is permitted in the area.
- The Qinngua Valley is protected to preserve this unique environment. Hunting and other activities that can harm the environment are.prohibited.
- Akilia is a small island that is protected to preserve its geological formations. The Home Rule Government can give permission for the collection of rocks and minerals for research purposes.
- Since the 25th of April 2000, the inner part of Ikka Fjord is protected. There are restrictions on sailing with motorized boats, fishing with trawls, or other implements that may damage the columns, and collection and destruction of columns.
- The newest protected area is the Austmannadalen (Home Rule Executive Order no. 23 of 14 July 2008).

In addition to these protected areas, there are twelve areas in Greenland designated as Ramsar sites. Two of these are in the National Park. The remaining nine cover a total area of 12,500 km2. Each Ramsar site is designated as an "area important to wildlife" by the Bureau of Minerals and Petroleum. With this designation a number of regulations related to mineral exploration have to be followed; travel within 5 km of a murre site in the breeding season is prohibited and flying with helicopters and fixed wing airplanes is restricted.

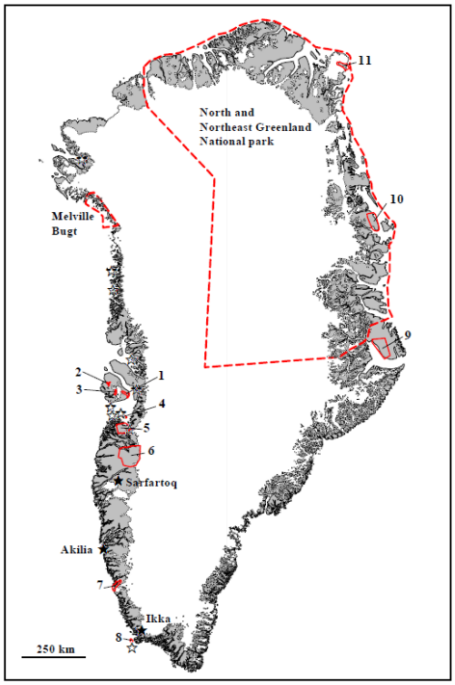


Figure 48. Greenland RAMSAR sites overview

6.1.4 International cooperation

A dedicated Regional Seas Convention exists for the North Atlantic with the **OSPAR Convention**[3], the Convention for the Protection of the marine Environment of the North-East Atlantic that entered into force on 25 March 1998. However, the geographical scope of this convention only partially covers the EU Overseas waters located in two of the five sub-regions: in the Arctic waters, constituting approximately 40% of the OSPAR maritime area, one part of the Greenland marine domain is protected under the OSPAR convention; and in the Wider Atlantic sub-region, the Azores Archipelago benefits from the OSPAR MPA network. According to a 2014 Status Report on the OSPAR Network of MPAs, the highest MPA coverage in the OSPAR area is within territorial waters (24%). While the latest nominations have helped to improve coverage further offshore, this is still only just over 3%. Beyond the exclusive economic zones (EEZ) of contracting parties, 6% is protected (OSPAR, 2015).

Figure 49: Geographical scope of the OSPAR Convention including the Azorean EEZ (region V: Wider Atlantic) and the waters east of Greenland (region I: Arctic Waters)

A dedicated **Arctic Council** was established in 1996 as a voluntary, high-level intergovernmental forum bringing together the eight Arctic countries4 to promote cooperation, coordination and interaction among the Arctic States with the involvement of Arctic inhabitants, including Arctic indigenous peoples on common Arctic issues, in particular issues of sustainable development and environmental protection in the Arctic.

In 2002, the Arctic Council agreed to develop the first Arctic Marine Strategic Plan for the protection of the Arctic marine environment, which was published in 2004. Ten years later, taking into account the speed and spectrum of Arctic changes, the Working Group for the **Protection of the Arctic Marine Environment (**PAME) in cooperation with the Arctic

[3] Convention for the Protection of the Marine Environment of the North-East Atlantic: http://www.ospar.org/site/assets/files/1290/ospar_convention_e_updated_text_in_2007_no_revs.pdf

[4] Canada, Denmark (for Greenland and the Faeroes), Finland, Iceland, Norway, Russia, Sweden and the USA (for Alaska)

Council members, its subsidiary bodies and observers, developed a new marine strategy that includes both short-term and long-term challenges and opportunities, through 40 Strategic Actions comprised under four Strategic Goals.

The Conservation of Arctic Flora and Fauna (CAFF): CAFF is one of the six permanent working groups within the Arctic Council. The aim of the working group is to address the conservation of Arctic biodiversity and to promote practices which ensure the sustainability of the Arctic's living resources. Greenland chaired CAFF from 2006 – 2009 and act as the Head of Delegation for the Kingdom of Denmark in the working group. In this context, Greenland has participated in the Arctic Climate Impact Assessment (ACIA), the Arctic Biodiversity Assessment (ABA) or the CBIRD group, where status, trends and advice for seabirds at a circumpolar level is discussed. Greenland/Denmark from 2013 has become the co-chair (together with the US) of the Circumpolar Biodiversity monitoring programme. The programme was launched in 2006 and is the cornerstone biodiversity monitoring programme of the Arctic Council. In 2015-2017 the first State of Arctic Biodiversity reports is been produced.

The Convention on International Trade of Endangered Species of Wild Fauna and Flora (CITES): The CITES administration is managed by the Ministry of Environment and Nature of the Government of Greenland, and there is cooperation with the Nature Agency in Denmark. The CITES scientific authority of Greenland is the Greenland Institute of Natural Resources. Some 4,800 species of animals and 25,000 species of plants are covered by the convention. The others are subject to special permits for import and export.

The Ramsar Convention: In line with the Convention, Greenland has in the recent years taken different actions to secure the implementation of the Convention. Several projects related to public awareness, education and ecotourism have been initiated and carried out. Greenland also takes an active part in the Ramsar Regional Initiative NorBalWet and acted as the chair in 2013-2014.

International Council for Exploration of the Sea (ICES): Greenland and other countries with surveys in the Atlantic are members of several expert groups (e.g. NWWG, WGNEACS) that provide the scientific basis for advice to policy makers for several commercially exploited species including cod, Greenland halibut (east coast), redfish and capelin.

Northwest Atlantic Fisheries Organization (NAFO): The objective of NAFO is to provide advice that ensures optimum utilization, rational management and conservation of fishery resources. NAFO also manages the fisheries outside the EEZs of the coastal States in the international waters of the Northwest Atlantic. Greenland participates in yearly scientific meetings and provides advice for species such as shrimp and Greenland halibut in west Greenland.

North Atlantic Salmon Conservation Organization (NASCO): The objective of NASCO is to conserve, restore, enhance and manage Atlantic salmon through international cooperation taking account of the best available scientific information. Greenland participates in yearly

meetings, and is a key player, as much of the North Atlantic salmon stock use Greenland waters as feeding grounds.

The International Whaling Commission (IWC): Greenland is represented in IWC via the Kingdom of Denmark. The aim of the IWC is to provide for the proper conservation of whale stocks by ensuring sustainable harvest levels and thus make possible the orderly development of the whaling industry. Greenland has historically been given an Aboriginal Subsistence Whaling (ASW) quota by the IWC to hunt whales.

The North Atlantic Marine Mammal Commission (NAMMCO): Greenland, together with Norway, Iceland and the Faroe Islands, is a member of NAMMCO. NAMMCO works for regional protection, rational management and research on marine mammals in the North Atlantic. Scientific advice is provided by a scientific committee under NAMMCO, which in turn has established several working groups. Canada is not a member of NAMMCO, but NAMMCOs scientific committee has a joint working group with JCNB (see below) for scientific advice regarding narwhal and beluga.

The Joint Committee for Narwhal and Beluga between Canada and Greenland (JCNB): The JCNB provides biological and management advice for populations of narwhal (*Monodon monoceros*) and beluga whale (*Delphinapterus leucas*) shared between Greenland and Canada. Scientific advice is provided by a joint working group with experts from the NAMMCO scientific committee.

The Polar Bear Specialist Group (PBSG): The International Union for the Conservation of Nature (IUCN) harbours a number of specialist groups under its Species Survival Commission. One of those is the Polar Bear Specialist Group (PBSG), who meets every 3-4 years to evaluate the status of polar bear sub-populations. The PBSG has recently become the advisory organ of the Meeting of the Parties to the 1973 Agreement on the Conservation of Polar Bears.

The Meeting of the Parties: Also known as Polar Bear Range States, the Meeting of the Parties to the 1973 Agreement on the Conservation of Polar Bears became active in 2007, after a long period of inactivity. Delegates from USA, Canada, Russia, Norway and Greenland are currently working on an action plan for management and conservation of polar bears across the Arctic.

CPB: The Canada/Greenland Joint Commission on Polar Bears originated from a memorandum of understanding between the governments of Greenland, Nunavut and Canada. It has the mandate of advising the governments of Nunavut and Greenland for the sustainable harvest of the sub-populations of polar bears in Kane Basin and Baffin Bay. It receives biological advice from a scientific working group.

6.2. Saint Pierre and Miquelon

6.2.1. Administrative organization

Since March 2003, Saint Pierre et Miquelon has been an overseas collectivity with a special status. The archipelago has two communes: Saint-Pierre and Miquelon-Langlade. A third commune, Isle-aux-Marins, existed until 1945, when it was absorbed by the municipality of Saint-Pierre. The inhabitants possess French citizenship and suffrage. Saint Pierre and Miquelon send a senator and a deputy to the National Assembly of France in Paris. France appoints the Prefect of Saint Pierre and Miquelon, who represents the national government in the territory. The Prefect is in charge of national interests, law enforcement, public order and, under the conditions set by the statute of 1985, administrative control. The local legislative body, the Territorial Council (French: Conseil Territorial), has 19 members: four councilors from Miquelon-Langlade and 15 from Saint-Pierre.

France claimed a 200-miles exclusive economic zone for Saint-Pierre and Miquelon. In addition to the potential oil reserves, cod fishing rights on the Grand Banks of Newfoundland were at stake. In 1992, an arbitration panel awarded the islands an exclusive economic zone of 12,348 km² to settle a longstanding territorial dispute with Canada, extending to 12 nautical miles on the east, 24 on the west and 200 on the nord west.

Photo 56. Saint-Pierre from the port (Copyright DTAM)

6.2.2. Environmental framework

Saint Pierre and Miquelon has extended all the multilateral environmental agreements (MEA) signed by France, except for the Kyoto Protocol on Climate Change and the Aarhus Convention. The French Environmental Code applies to the archipelago, although Saint Pierre and Miquelon is the only overseas collectivity that does not benefit from any protected areas regulations, except for its game and wildlife reserves.

A State Strategic Action Plan (PASE) was adopted in June 2012 for 2012-2014. The 5 guidelines of this document are to: encourage sustainable development; address economic change; contribute to social cohesion; promote the archipelago's integration into its regional environment; and make the State more effective.

As far as the first guideline "To encourage sustainable development" is concerned, the State will set up a marine and coastal database for Saint Pierre and Miquelon and will develop scientific partnerships with Metropolitan France, and Canada. Its unique biodiversity (petrel colonies, the boreal forest, etc.) will be protected and enhanced. The implementation of the French National Sustainable Development Strategy will primarily rely on the experimental application of an IFREBIOM. The search for endogenous economic development to succeed the sole activity of deep-sea fishing will mobilize the State into action to reform various sectors, whether they involve fishing, aquaculture or agriculture. The development of regional cooperation with its Canadian neighbors will help to find new economic opportunities. The infrastructures, the port in particular, should help apprehending the economic opportunities, such as local development of large cruise market.

The Strategic Development Plan of Saint Pierre and Miquelon 2010–2030 (SDS) of November 2009 preceded the PASE.41. The strategic priorities, agreed upon by the socio-economic actors of the territory, are:

– To emphasize and accelerate the archipelago's integration into the regional and international economic environment;

– To consolidate, modernize and diversify the archipelago's business economy;

– To promote and make full use of human resources and to strengthen social cohesion;

– To lead balanced and sustainable management of the territory;

– To implement effective management of the Development Plan.

The game and wildlife reserves were established by the Prefect following a request by hunting permit holders. There are 3 terrestrial reserves and 2 marine reserve. They extend over public and private properties. The Ministerial Order of 27 June 1985 specifies the list of game species, which can be hunted on the archipelago: in total, it contains 4 species of mammals and 44 species of birds. Since March 29 1989 there is a list of protected species (birds and mammals).

6.2.3. Regional cooperation

The cooperation between Saint Pierre et Miquelon and the Atlantic Canadian Provinces (Nova Scotia, New Brunswick, Prince Edward Island and Newfoundland and Labrador) is based on the agreement signed on 2 December 1994 between the government of the French Republic and the federal government of Canada. There is an administrative committee and working sub-committees for: economic and commercial relations; aquaculture, agriculture and environment; tourism; security; health; as well as society, culture and education.

6.3. The French Southern Lands

6.3.1 The national context

The French southern and antarctic lands (Terres australes et antarctiques françaises, TAAF) are a French overseas territory since 1955. The TAAF have an administrative and financial autonomy, under the supervision on the French Ministry of Overseas. Since December 2004, they are administered from Saint-Pierre headquarters in La Réunion Island by a Prefect, also chief officer. The actual prefect is Cécile Pozzo di Borgo, representing the French government and guaranteeing the French sovereignty over those territories. The TAAF are divided in 5 districts: three represent the French southern lands (Crozet, Kerguelen, Amsterdam and Saint Paul) whereas the two remaining are the Adélie Land (Terre Adélie) and the Scattered Islands (Iles Eparses). Each district is managed by a district chief, whose function is similar to a French mayor and represents the authority of the Prefect on the district. Because there is no permanent population, there is no elected assembly, nor does the territory send representatives to the national parliament. The TAAF are not member of the European Union but are associated to “Overseas countries and Territories” (OCTs).

Photo 57. The headquarter of TAAF in Saint-Pierre, La Réunion (Copyright TAAF)

The National Nature Reserve of the French southern lands was created in 2006. It comprised the entire terrestrial surface of Crozet, Kerguelen, Saint Paul and Amsterdam, the entire territorial waters of Saint-Paul and Amsterdam and a large portion of Kerguelen and Crozet territorial waters. In 2016, the reserve was extended on the marine area, reaching a total surface of 672 979 km2. In 2017, a new regulation extended the regulation of the Nature Reserve to all ZEE (1 662 766 km2) (Figure 50).

For terrestrial land, there are 3 levels of protection:

- Zone of integral protection (no access zone)
- Zone of scientific activities (access only for scientific activities)
- Zone of restricted access (restricted activities)

For marine areas, there are 3 levels of protection:

- No take zone (all activities and polluting discharges forbidden)
- Managed zone (activities regulated and sampling forbidden)
- Protection zone (activities regulated and sampling forbidden on all EEZ)

The Nature Reserve is managed by the prefet of TAAF, with the help of a consultative comity (the consultative council of TAAF) and a scientific council (Le Comité de l'Environnement Polaire).

A management plan (2011-2015) defines the management action to be conducted by the Nature Reserve. The second management plan is to be published in 2017 (2017-2026).

It is the largest nature reserve in France and the largest marine protected area in the world.

All marine mammals and birds are protected by a prefectoral order. A comprehensive list of those species is available on http://www.taaf.fr/Liste-des-especes-protegees.

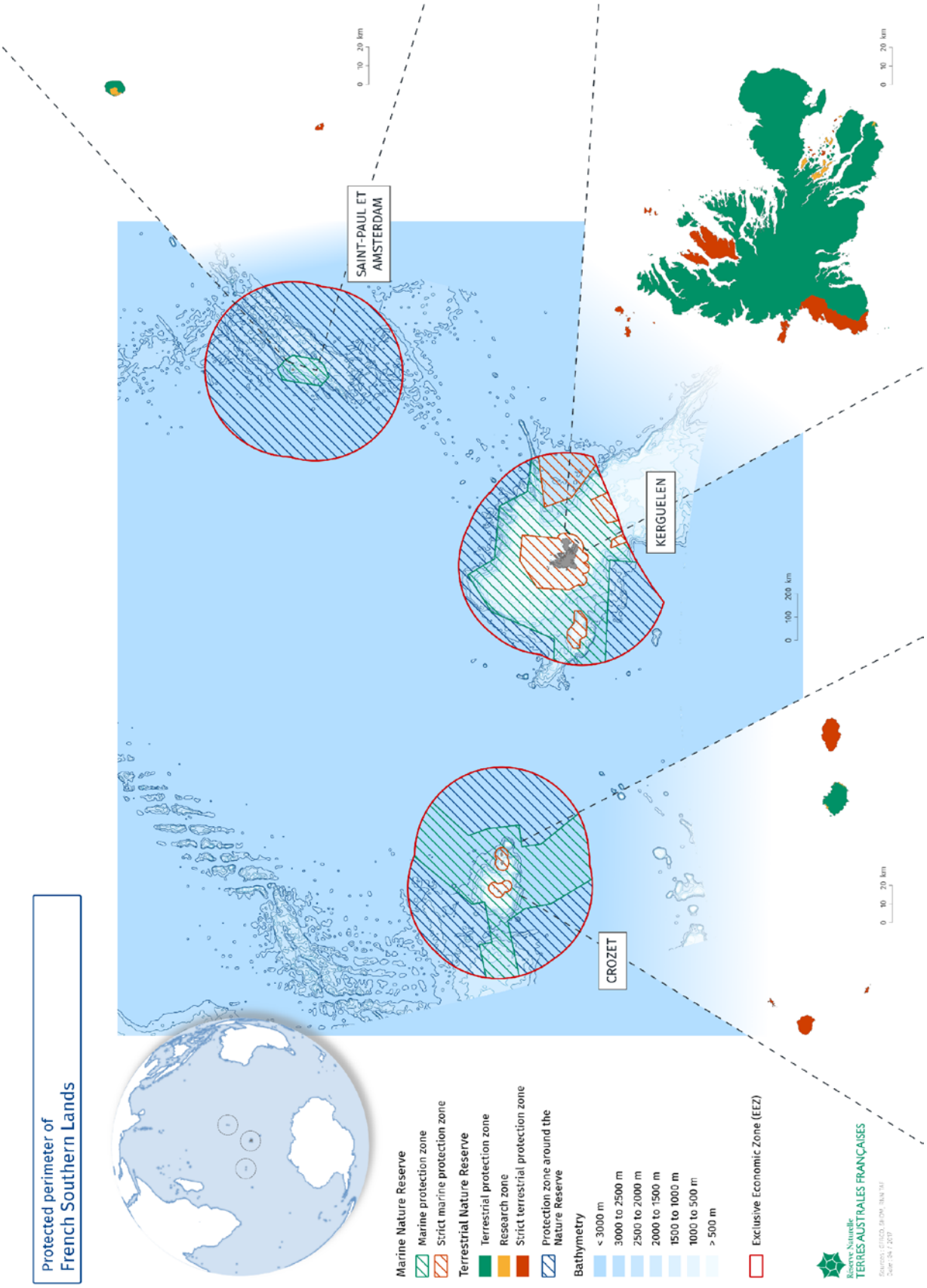
6.3.2 The international context

France has ratified the Ramsar Convention, the Convention on Migratory Species, the Convention on Biological Diversity, the Convention on Climate Change, and participates in UNESCO's Man and Biosphere Programme. France also signed the Antarctic Treaty (1959) and the Protocol on Environmental Protection to the Antarctic Treaty (1991), the Convention for the Protection of Seals (1978), the Agreement on the Conservation of Albatrosses and Petrels (ACAP) and the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR, 1980), which applies to both Crozet and Kerguelen. France is also a contracting party of the SIOFA (South Indian Ocean Fisheries Agreement) and SWIOFC (Southwest Indian Ocean Fisheries Commission). The TAAF's collectivity is present in the French delegation to the Antarctic Treaty Consultative Meeting and to the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR).

The collectivity is also involved in regional cooperation initiative, like the workshop on the development of marine protected areas between Exclusive Economic Zone of French Southern Lands and South Africa (CCAMLR workshop). It also works closely with Australia, mainly on surveillance and enforcement programs for marine areas.

At a European level, the TAAF's collectivity has been selected to coordinate the polar and subpolar hub of the BEST program and it is also coordinating the XIth FED for the Indian Ocean.

Figure 50. Map of protection zones in the French southern lands.



6.4. South Georgia and South Sandwich Islands

6.4.1. Administrative organization

Executive power is vested in the Monarchy of the United Kingdom and is exercised by the Commissioner, a post held by the Governor of the Falkland Islands. The Chief Executive Officer deals with policy matters and is also the Director of Fisheries, responsible for the allocation of fishing licenses. The Financial Secretary and Attorney General of the territory are appointed ex officio similar appointments in the Falkland Islands' Government.

As there are no permanent inhabitants on the islands, there is no legislative council and no elections are held. The UK Foreign and Commonwealth Office manages the foreign relations of the territory.

6.4.2. Environmental framework

The Territory has a full suite of laws, but key environmental laws are the Wildlife and Protected Areas Ordinance (WPAO 2011) and the Fisheries (Conservation & Management) Ordinance (FCMO 2000). The WPAO provides the framework for domestic environmental protection. The Territory also has an Environmental Charter, signed by the Commissioner and the UK Minister for the OTs, which makes certain commitments for the protection of the environment.

The WPAO makes it an offence to kill, capture or handle a bird or mammal. Native plants and invertebrates are also fully protected under the ordinance. It is also an offence to introduce any non-native species to the territory.

The FCMO deals with the management of fisheries in the Maritime Zone, including licensing and inspecting of vessels and aspects relating to the Commission for the Conservation of Antarctic Marine Living Resources.

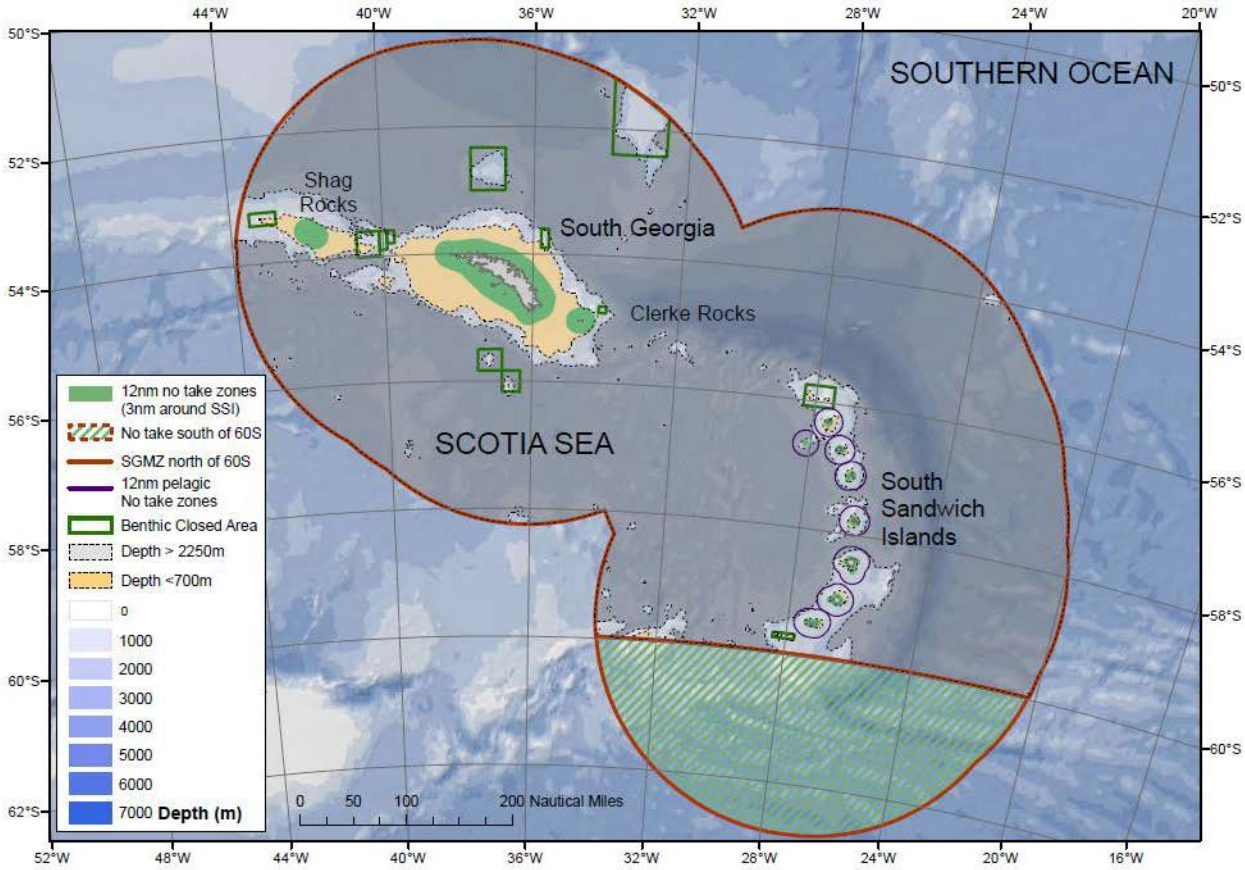
GSGSSI have recently unveiled their strategy for the next five years, with a headline objective of “World class environmental management underpinned by the highest standards of governance”. The full strategy is available on the GSGSSI website (www.gov.gs) and includes the following objectives:

(i) To conserve the Territory’s environment, minimize human impacts and, where practicable, restore the native biodiversity and habitats;
(ii) To manage SGSSI fisheries to the highest international standards of operation, stewardship and sustainability.

6.4.3. South Georgia and South Sandwich Islands Marine Protected Area

The WPAO also includes provision for the declaration (by Order) of Marine and Terrestrial Protected Areas. In 2012 the South Georgia and South Sandwich Islands Marine Protected Area was created. The entire (1.05 million km^2) Maritime Zone (north of 60 S) was declared as a IUCN Category VI (Sustainable Use) MPA, with No-take (IUCN Category I) areas created around each of the islands and around Shag Rocks and Clerke Rocks. Following a detailed scientific analysis further protection in the form of benthic and pelagic closed areas and a seasonal closure of the krill fishery were included in a revised Marine Protection Area Order (2013), which is supported by a Marine Protected Area Management Plan (GSGSSI, 2013). The MPA includes 12 nautical mile No-take Zones (IUCN Category I) around South Georgia, Shag Rocks and Black Rocks, benthic and pelagic closed areas and a seasonal closure of the krill fishery (Map 23). Bottom trawling is prohibited throughout, but longlining is permitted in certain areas. Full details of the closed areas and rationale behind the spatial and temporal closed areas are available in the SGSSI MPA Management Plan (GSGSSI, 2013) and in the associated scientific paper (Trathan et al., 2014).

Figure 51. South Georgia and South Sandwich Islands Marine Protected Area overview (GSGSSI 2013)



6.4.3. International context

Many Multinational Environmental Agreements have been extended (by the UK Government) to South Georgia and the South Sandwich Islands (Annexe 31) such as the Convention on Biological Diversity, which was extended to South Georgia and the South Sandwich Islands in early 2015. As part of the territory's commitment to the CBD it produced a Biodiversity Action Plan, which is available on the GSGSSI web-site.

As part of the UK's commitment to the Agreement on the Conservation of Albatross and Petrels (ACAP), surveys of wandering albatross and black-browed albatross were undertaken in late 2014 and early 2015. In addition, regular monitoring of albatross populations is undertaken at Bird Island (by BAS) and at Albatross and Prion Islands (by GSGSSI).

Fisheries are managed within the framework of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), which is part of the Antarctic Treaty System. As such, CCAMLR agrees the catch limits for each fishery and the methodology and timing of fish capture. GSGSSI fisheries must adhere to CCAMLR Conservation Measures, but can apply additional and more stringent requirements.

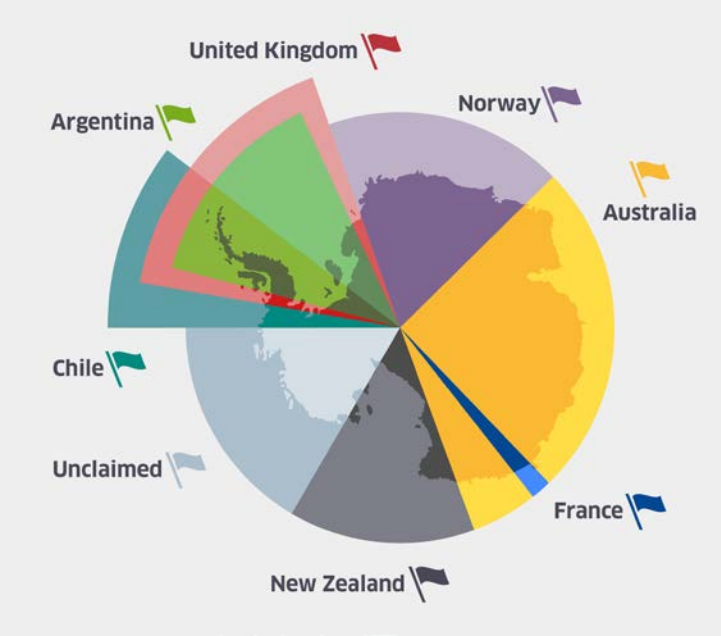
The South Georgia Patagonian toothfish fishery has been certified by the Marine Stewardship Council (MSC) as sustainably managed since 2004, which allows product from the fishery to carry the MSC ecolabel. The fishery was recertified, without conditions, in September 2014. The mackerel icefish fishery has been MSC certified since 2010 and some of the vessels/operators that participate in the krill fishery have also been MSC certified.

6.5. British Antarctic Territory and Adelie Land

6.5.1. The Antarctic Treaty

The British Antarctic Territory and Adelie Land are ruled by the Antarctic Treaty and its instruments, including the Protocol on Environmental Protection to the Antarctic Treaty. The Environmental Protocol was signed in October 4, 1991 and entered into force in 1998. In this document, the entire continent is designated as a "*natural reserve, devoted to peace and science*" (Art.2). Article 3 of the Environmental Protocol sets environmental principles applicable to human activities in Antarctica, and Article 7 prohibits any activity relating to mineral resources, with the exception of scientific research.The Environmental Protocol can only be modified with the unanimous agreement of all Consultative Parties to the Antarctic Treaty. In addition, the prohibition on minerals resources activities cannot be removed until 2048, and unless a binding legal regime is in force (Art. 25.5). The annual Antarctic Treaty Consultative Meeting (ATCM) adopts. Measures, Decisions and Resolutions consensus, which give effect to the principles of the Antarctic Treaty and the Environment Protocol and provide regulations and guidelines for the management of the Antarctic Treaty and the work of the ATCM. Annex 2 to the Protocol on Environmental Protection to the Antarctic Treaty deals specifically with the conservation of Antarctic fauna and flora. It provides the designation of Specially Protected Species, the criteria to identify species for inclusion in the list, and the practical mechanisms for providing the required level of extra protection. Annex V of the Environmental Protocol provides for the designation of Antarctic Specially Protected Areas (ASPAs) and Antarctic Specially Managed Areas (ASMAs). Article 4 of the Antarctic Treaty states "The treaty does not recognize, dispute, nor establish territorial sovereignty claims; no new claims shall be asserted while the treaty is in force". Therefore, most countries do not recognize territorial claims in Antarctica. Nevertheless, seven states have territorial claims in Antarctica, including France and the UK (Figure 52).

Figure 52. Map of territorial claims in Antarctica



6.5.2. British Antarctic Territory and Adélie Land governance structure

British Antarctic Territory was claimed in 1908, and designated as a separate Overseas Territory on 3 March 1962. The area now covered by the Territory includes three regions which, before 1962, were administered by the UK as separate dependencies of the Falkland Islands: Graham Land, the South Orkney Islands, and the South Shetland Islands.

The British Antarctic Territory is administered by the Foreign and Commonwealth Office (FCO). A Commissioner is appointed and is the Head of the FCO's Overseas Territories Department.

The Territory has a full suite of laws, and legal and postal administrations. Given the provisions of the Antarctic Treaty System, the Territory does not enforce its laws on foreign nations who maintain scientific bases within the Territory.

The government of the BAT, in consultation with stakeholders, has developed a five year strategy for the territory which sets out objectives and funding priorities. The headline objectives of the strategy are: to ensure the long-term security of the Territory by supporting the UK's high profile within the Antarctic Treaty System; to promote the UK's sovereignty of the Territory, by increasing awareness of British current and historic interests in the region; to protect the BAT environment and preserve British heritage; to ensure an effective and proportionate legislative and administrative framework which addresses all activities conducted within the Territory; to manage the Territory's finances in accordance with best financial practice.

The Adelie Land is part of the TAAF (French Southern and Antarctic Lands) and as such, follows the same administrative system as the other islands of the collectivity. The prefect of the TAAF is the authority on this territory and delegates his power as a national competent authority (ANC, autorité nationale compétente in French) to a district chief, in charge of coordinating all the activities on this territory. No sovereignty question is raised since France is also a signatory of the Antarctic treaty. Therefore, the TAAF's administration is in charge, as far as the Adélie land is concerned, of all the activities on this land and instructs every request (tourism, science …). The French Polar Institute (IPEV) handles all the scientific activities as well as the shipping process from Hobart (Tasmania, Australia).

6.5.3. Protected areas

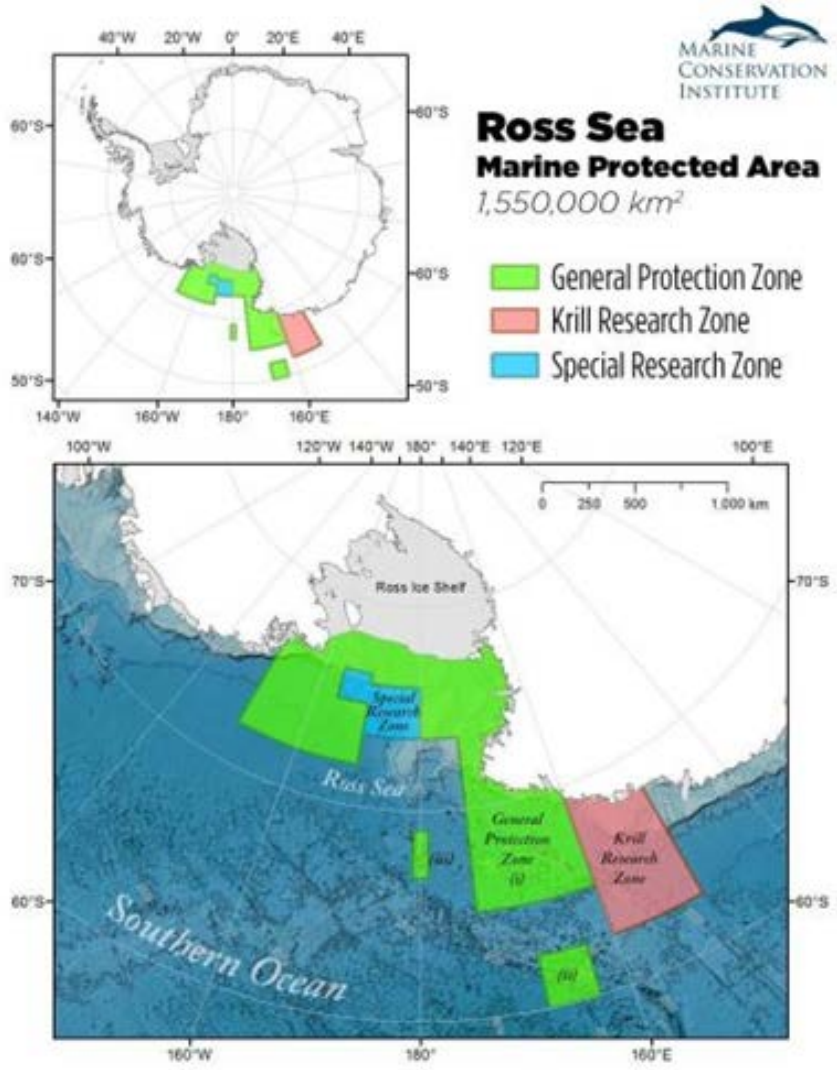
The world's first high seas Marine Protected Area (the South Orkney Islands Southern Shelf MPA) was designated by CCAMLR in 2009 – an area of over 90,000km^2. In 2017, the Ross Sea MPA was created, one of the world's largest MPAs. It is designated for a period of 35 years.

Australia and France are developing a proposal for an East Antarctic Representative System of Marine Protected Areas (EARSMPA). The objective is to include, at least in part, every type of habitat and ecosystem (and the associated biodiversity) that occurs in the East Antarctic and to protect those unique species and ecosystems. The proposal, in the beginning of 2017 (still in progress), is divided in three areas: MacRobertson, Drygalski and D'Urville Sea-D'Urville-Mertz (in front of Terre Adélie). Other proposals are still pending for

the Antarctic MPA network, such as the German-proposed plan to protect an area of 2.8 million km^2 in the Weddell Sea.

Another type of protection is Antarctic Specially Protected Areas (ASPAs) and Antarctic Specially Managed Areas (ASMAs). An area of Antarctica may be designated an ASPA to protect outstanding environmental, scientific, historic, aesthetic or wilderness values, any combination of those values, or ongoing or planned scientific research. An area where activities are being conducted or may be conducted in the future may be designated as an ASMA, to assist in the planning and coordination of activities, avoid possible conflicts, improve cooperation between Parties or minimize environmental impacts. On land, there are 29 ASPAs and 3 ASMAs located in the British Antarctic Territory, and a further 2 ASPAs in Adélie Land. ASPAs and ASMAs are designated and managed internationally under the Environmental Protocol to the Antarctic Treaty.

Figure 53: Ross Sea MPA in the Antarctic (Source: Marine Conservation Institute)



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Keys facts on polar and subpolar hub

Table 25. Summary of Multilateral Environmental Agreements signed up to by each territory

Multilateral Environmental Agreements	GL	SPM	TAAF	SGSSI	BAT
Convention on Biological Diversity (CBD)	✓	✓	✓	✓	✓
Convention on International Trade in Endangered Species (CITES)	✓	✓	✓	✓	✓
Bonn Convention on Migratory Species (CMS)	✓	✓	✓	✓	✓
Ramsar Convention on Wetlands	✓	✓	✓	✓	✓
World Heritage Convention	✓	✓	✓	✓	✓

Table 26. EU Overseas marine protected areas in the polar and subpolar region

	European Overseas waters area	Marine protected areas (MPAs)			No-take zones (NTZs)			Marine mammal/ shark sanctuaries
	km^2	#	Area km2	% of waters area	#	Area km2	% of waters area	km^2
Greenland (DK)	2,353,703	15	95,005	4.0	0	0	0	No
Saint Pierre and Miquelon (FR)	12,423	1	6	0.05	0	0	0	No
French Southern Territories (TAAF district, FR)	1,662,766	1	1,662,766	100	5	127,842	7.7	No*
South Georgia and South Sandwich Islands (UK)	1,230,298	1	1,070,000	87	11	20,431	1.7	No
South Orkney Islands, South Shetland Islands, British Antarctic Territory	**	1	94,000	-	1	94,000	-	No

Source: MPA report 2017 (IUCN)

* While not officially declared marine mammal sanctuary all marine mammals in the TAAF national natural reserve are protected by a ministerial decree (1995).

** According to the Antarctic Treaty, there are no sovereignty rights over these waters

7. CURRENT STATUS OF THE CONSERVATION COMMUNITY

7.1. Greenland

The Government of Greenland has the overall responsibility of the management biodiversity and living resources, shared between the Ministry of Independence, Nature, Environment and Agriculture and the Ministry of Fisheries and Hunting.

The Ministry of Independence, Nature, Environment and Agriculture is responsible for the overall international agreements and conventions regarding biodiversity and nature conservation, including the conservation of habitats and protected areas (among others the National Park and Ramsar sites) and Commission for the International Trade in Endangered Species.

The Ministry of Fisheries and Hunting is responsible for the management of fish, birds and mammals species that are subject to hunting and fishing.

The Greenland Institute of Natural Resources (GINR) carry out research on biodiversity and living resources and, provide biological advice (including recommended sustainable harvest levels) for the Government of Greenland, municipalities and others. The purpose of the GINR is among others to obtain the scientific basis for a sustainable exploitation of the nature resources as well for protecting the environment and biological diversity.

Aarhus University is a Danish university, the second biggest university in the country. Aarhus University is working in close collaboration with the Ministry of Environment and the GINR on spatial conservation planning. They have, amongst other, been major contributor on several reports identifying areas of ecological importance.

The Inuit Circumpolar Council (ICC) is an international Indigenous Peoples' Organization representing approximately 160.000 Inuit living in the Arctic regions of Alaska, Canada, Greenland and Chukotka, Russia. The principal goals of ICC are to strengthen unity among Inuit of the Circumpolar region, to promote Inuit rights and interests on the international level, to ensure and further develop Inuit culture and society for both the present and future generations, to seek full and active participation in the political, economic, and social development in our homelands, to develop and encourage long-term policies which safeguard the Arctic environment , to work for international recognition of the human rights of all Indigenous Peoples.

Kalaallit Nunaanni Aalisartut Piniartullu Kattuffiat (KNAPK) is an association of Fishermen and Hunters in Greenland.

Other organizations involved in Greenland environmental conservation activities include the bird conservation group **Timmiaq, WWF DK, Ocean North, Sustainable Fisheries Greenland and the Environmental Group Avataq.**

7.2. Saint Pierre and Miquelon

The Directorate of Territories, Food and the Sea (DTAM) of Saint Pierre and Miquelon, result from the merger in 2011 of the Directorate of Public Works, the Directorate of Agriculture and Forestry and the Maritime Affairs Service. This Directorate is responsible for environmental issues, with support from operational public institutions (ONCFS and the CELRL). The DTAM is an interdepartmental directorate of the State, which has been placed under the Prefect's authority. The DTAM was made available to the Territorial Collectivity under the organic law of 2007. It manages the assets of the Territorial Collectivity, performs technical engineering tasks and provides support in the exercise of its powers.

A Territorial Natural Heritage Scientific Council (CSTPN) was created in 2007. One of its first activities between 2008 and 2009 was to initiate and supervise an inventory of the archipelago's natural areas of particular interest in terms of ecology and wildlife (ZNIEFF).

The Chamber of Agriculture, Commerce, Industry, Professions and Crafts (CACIMA) is a public institution run by craftsmen, retailers, farmers and business leaders, who have been elected by their peers. The CACIMA performs an advisory role; the public authorities are required to ask its opinion on the following subjects: trade regulations, taxes (trade tax, the local tax code, the customs code, etc.), commercial urban planning, transport and the environment. The General Assembly of 18 elected members defines policies, determines the activities to carry out and votes on the budget. There are several internal commissions (infrastructure, construction, markets and finance) which conduct studies and issue proposals and recommendations.

The House of Nature and the Environment (MNE) (French acronym for *Maison de la Nature et de l'Environnement*) is a territorial service created in 2012/1335, which existed since 2008 first as an association. The MNE has several mandates covering, in particular, education/awareness on the environment and its preservation, as well as interpretation and valorization of biodiversity. It has also set itself the objective of developing eco-tourism activities on the archipelago.

L'Office national de la Chasse et de la Faune Sauvage (ONCFS) is a public institution. Its five missions are the control of territories for the environment and hunting activities; studies and research on wild fauna and their habitats; technical support for public organizations; promoting sustainable hunting practices; examination of hunting licenses. The ONCFS has a local branch based in Saint-Pierre et Miquelon.

The association FNE Saint-Pierre et Miquelon has for objective the study, the protection and the promotion of the natural heritage of SPM archipelago.

The Centre d'Etudes biologiques de Chizé (CEBC) (U.M.R. 7372 - CNRS & Université de La Rochelle) conducts research programmes on the ecology of wild animals, especially marine top predators, in their natural environment.

DFO: Canadian Administration in charge of fisheries and oceans items in the East canadian coasts of Maritimes provinces

Ifremer: French scientific research laboratory on sea and natural sea resources.

The laboratoy Biogemme (Biologie et génétique des Mammifères marins dans leur environnement), université de Brest, studies genetic diversity of marine mammals at the specific and intra specific levels. In particular, this laboratory studies humpback whales genetic diversity in the SPM waters. Genetic analysis laboratory, Brest University, ERCS 4, UFR Sciences et Techniques, Université de Brest, 6 avenue le Gorgeu, 29200 Brest.

Institute of Neurosciences Paris Saclay, University Paris Sud, Bioacoustics Team, building 446, 91405 Orsay, France. Specialized in bioacoustics, especially study of the sounds emitted by cetacean species : behaviors, detection and localization, classification, effects of anthropogenic noises.

7.3. The French southern Lands

The French Southern and Antarctic Lands (Terres australes et antarctiques Françaises, **TAAF**) is a French overseas territory with administrative and financial autonomy. It administrates the archipelagos of Crozet, Kerguelen, the islands of Amsterdam and Saint-Paul in the Southern Ocean, the Terre Adélie (Adélie Land) in the Antarctic and the Iles Eparses (Scattered Islands: the Glorieuses archipelago, Juan de Nova, Europa, Bassas da India and Tromelin) in the Mozambique canal.

The organisation is divided in 4 departments: administrative and financial, technical services, maritime affairs and environment. The Environment Department manages conservation programs on the islands and the National Nature Reserve of southern territories (la Réserve nationale naturelle des Terres australes françaises). The TAAF is associated to the European Union as an Overseas country and territory (OCT) and therefore can access fundings like the European Development Fund.

The Institut polaire français Paul-Emile Victor (IPEV) is a public interest group that aims to provide an administrative framework and a financial, technical and human support to French research in Polar and Subpolar region. Many IPEV programmes are conducted in the French Southern Lands in partnership with research organizations. They include social sciences, Earth and universe sciences, life sciences and oceanography.

Several **research organizations** take actions in the French Southern Lands. They work together in the frame of joined research centers. Here is a list of the main research organizations involved in the TAAF:

The National Museum of Natural History (Le Muséum national d'histoire naturelle (MNHN)) is a French organisation for research and dissemination of scientific culture. It operates under the supervision of the Ministry of Research and the Ministry of Ecology. It has about 2000 employees of which 450 researchers.

The Centre national de la recherche scientifique (CNRS) is a public research placed under the supervision of the Ministries of Education and Research. It develops research in all fields of knowledge (life sciences, chemistry, physics, social sciences, information and technologies, Earth and universe sciences...) in the frame of 1100 joined research centers. It employs about 33000 people (of which 11116 researchers) with an annual budget of 3,29 billion euros.

L'Université Pierre-et-Marie-Curie (UPMC) is a university specialized in sciences and medicine that hosts about 125 research laboratories. It works in partnership with the MNHN.

L'Université de Rennes 1 is a university specialized in social sciences (philosophy, economy, management...) and "hard sciences" (mathematics, biology, medicine...). In the French Southern Lands, it works mainly on terrestrial biota and its changes (biological invasions, climate change).

The main **joined research centers** involved in the French Southern Lands are:

The Centre d'Etudes biologiques de Chizé (CEBC) (U.M.R. 7372 - CNRS & Université de La Rochelle) conducts research programmes on the ecology of wild animals in their natural

environment. In the French Southern Lands, it is mainly involved in seabirds and marine mammals ecology research.

The UMR BOREA (Biology of aquatic organisms and ecosystems) has for objective to study the evolutive biology and ecology of aquatic organisms. In the French Southern Lands, it works mainly on coastal and marine resources and advises the TAAF administration on fishing management.

The Centre d'Ecologie Fonctionnelle et Evolutive (CEFE) (UMR 5175, CNRS - Université de Montpellier - Université Paul-Valéry Montpellier – EPHE) develops research activities on biodiversity, global changes and sustainable development. In the French Southern Lands, its works mostly on birds and other vertebrates ecology.

The Institut Pluridisciplinaire Hubert Curien (IPHC) (UMR7178, CNRS-IN2P3-INC-INEE, Université de Strasbourg) is a pluridisciplinary laboratory involved in ecology, chemistry and subatomic physics. In the French Southern Lands, they work mainly on the ecology of birds.

The Laboratoire d'Océanographie de Villefranche-sur-Mer (LOV) (UMR 7093 – CNRS/UPMC) works on biological oceanography, physics and chemistry.

The laboratory « **Biométrie et Biologie Evolutive** » (UMR 5558 -CNRS - Université Claude Bernard Lyon I) is organized around two thematics: Biometry and evolutive biology. In the French Southern Lands, it works mostly on invasive alien species.

The UMR ECOBIOP (Ecologie Comportementale et Biologie des Populations de Poissons - UMR 1224 (UPPA/INRA)) works on fishes behavioral ecology and and population biology. In the French Southern Lands, it works mostly on salmonids population study.

The UMR ECOBIO (Ecosystèmes, Biodiversité, Evolution – UMR CNRS 6553 – Université de Rennes 1) is a multidisciplinary research unit working on the study and conservation of continental and island ecosystems, from the molecular to the ecosystem. In the French Southern Lands, It works on the impact of alien species and climate change on terrestrial ecosystems.

The UMR 7159, Laboratoire d'Océanographie et du Climat : Expérimentations et Approches Numériques (**LOCEAN**) is a mixte research unit in partnership with the University Pierre et Marie Curie (UPMC), le Centre National de la Recherche Scientifique (CNRS), l'Institut de Recherche pour le Développement (IRD) et le Muséum National d'Histoire Naturelle (MNHN).

The UMR Biogéosciences (UMR CNRS 6282 - Université Bourgogne-Franche-Comté) is a multidisciplinary research unit with main scientific issues focused on climate modeling, paleoenvironmental and environmental studies, biodiversity, ecology, conservation and evolution. In the French Southern Lands, it is involved in marine ecology studies and conservation issues related to marine coastal areas of the Kerguelen Islands.

The UMR « Processus Infectieux en Milieu Insulaire Tropical » (PIMIT – UMR CNRS 9192, INSERM 1187, Université de la Réunion, IRD 249) studies the biology and the ecology of infectious processes.

The Laboratoire d'Ecologie des Hydrosystèmes Naturels et Anthropisés (LEHNA – UMR CNRS 5023 – Université Lyon 1, ENTPE, INRA) is a laboratory working on different topics such as evolution sciences or environmental sciences. Most of the studies ran by the laboratory address marine or freshwater écosystems.

7.4. South Georgia and South Sandwich Islands

The Government of South Georgia and South Sandwich Islands (GSGSSI) is responsible of the management of the territory, including all aspects of the marine and terrestrial environment. The government has a dedicated Environment Officer. It receives support from the **UK government**, especially for legislation and policy implementation and also through funding streams such as Darwin Plus, which funds environmental projects in the UKOTs.

The British Antarctic Survey (BAS), an institute of the Natural Environment Research Council (NERC), delivers and enables world-leading interdisciplinary research in the Polar Regions. Their headquarter is in Cambridge, with bases on South Georgia, Antarctica and the Arctic. BAS also operate two ice-class research and logistics vessels.

The **Centre for Environment Fisheries and Aquaculture Science (CEFAS)** is a scientific research and advisory centre for fisheries management, environmental protection and aquaculture. It is an Executive Agency of the UK Government's Department for Environment, Fisheries and Rural Affairs (DEFRA). CEFAS provide fisheries management advice to GSGSSI.

The Joint Nature Conservation Committee (JNCC) is a public body that provides advice to the UK Government and supports nature conservation in the UK's Overseas Territories.

The **South Georgia Heritage Trust (SGHT)** is a charity, based in Scotland, that supports environmental and heritage projects on South Georgia. The SGHT raised funds and implemented the rodent eradication project on South Georgia (2012-2015) and is leading the subsequent monitoring programme.

The South Atlantic Environmental Research Institute (SAERI) is an academic organisation which conducts research in the South Atlantic (from the tropics to Antarctica). SAERI is also coordinating the South Atlantic hub of the BEST III initiative.

The **South Georgia Association (SGA)** is a membership organization formed to give a voice to those who care for South Georgia. They also fund small conservation and heritage projects on the island.

The UK Overseas Territories Conservation Forum (UKOTCF) aims at promoting the conservation of plant and animal species and natural habitats of the UK Territories Overseas.

The Antarctic Research Trust is a charity registered in the Falkland Islands, Switzerland and USA. It conducts and supports scientific research on Antarctic and subAntarctic animals to provide baseline data for conservation.

The Kew Royal Botanic Gardens is a centre for botanical and mycological knowledge located in London. They have undertaken research on plants in South Georgia and South Sandwich Islands, including work on non-native / invasive species.

7.5. British Antarctic Territory and Adelie Land

7.5.1. British Antarctic Territory Stakeholders

The British Antarctic Survey (BAS) is responsible for almost all of the British Government's scientific research in the Antarctic, South Georgia, and the South Sandwich Islands. The BAS annual budget is around £50 million. The BAS provide UK presence in the BAT while operating three scientific stations in BAT.

The Antarctic Research Trust is a charity registered in the Falkland Islands, Switzerland and USA. It conducts research on Antarctic and Subantarctic animals in link with conservation actors.

The Antarctic Heritage Trust (UKAHT) aims to promote British Antarctic Heritage.

The Kew Royal Botanic Gardens is a centre for botanical and mycological knowledge located in London.

The JNCC is the UK public body that advises the UK government on nature conservation.

The Foreign & Commonwealth Office (FCO) promotes UK's interest overseas.

UKOTCF – the UK Overseas Territories Conservation Forum aims at promoting the conservation of plant and animal species and natural habitats of the UK Overseas Territories.

Scott Polar Research Institute - The Institute is a well-known and long-established centre for research into the polar regions and is part of the University of Cambridge.

World Wide Fund for Nature (WWF) is an international non-governmental organization working in the field of the wilderness preservation and the reduction of humanity's footprint on the environment. Currently, much of its work concentrates on the conservation of oceans, coasts, forests, and freshwater ecosystems. Among other issues, it is also concerned with endangered species, sustainable production of commodities and climate change.

International Association of Antarctica Tour Operators (IAATO) - a member organization founded to advocate, promote and practice safe and environmentally responsible private-sector travel to the Antarctic.

RSPB/Birdlife: The RSPB is a nature conservation charity, protecting threatened birds and wildlife.

CEFAS: The Centre for Environment, Fisheries and Aquaculture Science (Cefas) is a centre for applied marine and freshwater science and research. Their customer base includes the UK government and UK Overseas Territories, international governments, public and private sector organisations, educational and research institutions, as well as non-governmental organisations. They work with industries across a range of sectors including: Aquaculture, fisheries, international government capability development, marine and coastal infrastructure, nuclear energy, offshore renewable energy, oil and gas and shipping.

7.5.2. Adélie Land Stakeholders

The French Southern and Antarctic Lands (Terres australes et antarctiques Françaises, **TAAF**) is a French overseas territory with administrative and financial autonomy. It administers Adélie Land.

The Comité de l'Environnement Polaire (CEP) (Polar environment committee) has for mission to control French humain activities in the polar and subantarctic regions in regard to environmental conservation since 1993. It advises the Ministry of Ecology on programmes' ecological impacts and provides a monitoring of human activities in the region. The CEP has been designated to be the scientific committee of the National Nature Reserve of the French Southern Lands.

The Institut polaire français Paul-Emile Victor (IPEV) is a public interest group that aims to provide an administrative framework and a financial, technical and human support to french research in polar and subpolar region. Many research programmes are conducted in Adélie Land and BAT in partnership with IPEV. They include social sciences, Earth and universe sciences, life sciences and oceanography.

The Centre d'Etudes biologiques de Chizé (CEBC) (U.M.R. 7372 - CNRS & Université de La Rochelle) conducts research programmes on the ecology of wild animals in their natural environment. In the French Southern Lands, it is mainly involved in seabirds and marine mammals ecology research.

The Centre national de la recherche scientifique (CNRS) is a public research placed under the supervision of the Ministries of Education and Research. It develops research in all fields of knowledge (life sciences, chemistry, physics, social sciences, information and technologies, Earth and universe sciences...) in the frame of 1100 joined research centers. It employs about 33000 people (of which 11116 researchers) with an annual budget of 3,29 billion euros.

The National Museum of Natural History (Le Muséum national d'histoire naturelle (MNHN)) is a french organisation for research and dissemination of scientific culture. It operates under the supervision of the Ministry of Research and the Ministry of Ecology. It has about 2000 employees of which 450 researchers.

The Institut Pluridisciplinaire Hubert Curien (IPHC) (UMR 7178, CNRS-IN2P3-INC-INEE, Université de Strasbourg) is a pluridisciplinary laboratory involved in ecology, chemistry and subatomic physics. In the French Southern Lands, they work mainly on the ecology of birds.

L'Université Pierre-et-Marie-Curie (UPMC) is a university specialized in sciences and medicine that hosts about 125 research laboratories.

8. THREATS AND PRESSURES ON BIODIVERSITY

Direct human pressure on biodiversity in the polar and subpolar region is relatively low compared to densely populated territories. However, the effects of human settlements and marine resource exploitation have historically modified both terrestrial and marine environments, and today even regulated human activities impact these remote environments. Alien species, imported by humans in the past and even nowadays, are competing with native species and invade the pristine islands. The exploitation of natural resources, like fisheries or extractive industry (in the Arctic), have a strong impact on the habitats and the structure of the ecosystems. Pollution, through contaminants and wastes, is a primary concern of local managers that cannot always be addressed directly as the sources of pollution are often located outside the territory. Terrestrial and marine ecosystems are thus under considerable anthropogenic pressure which is likely to be exacerbated by climate change.

8.1. Climate change

Since the 1960-1970s, the Arctic has warmed up by 1 to 2°C, depending on the region, and average temperatures could rise by as much as 4.9°C between now and the end of the 21st century. The increase in temperatures will likely be more marked in winter (+6.9°C) than in summer (+2.1°C). In Antarctic, temperature trends vary greatly from one sub-region to another. While the Antarctic Peninsula has warmed significantly over the last 50 years, the region surrounding the geographic South Pole has cooled slightly. Until now, precipitation patterns have not changed significantly in the Arctic, while evidence of decreases has been observed in the sub-Antarctic islands, along with changes in timing and patterns on the western Antarctic Peninsula. However, prediction models suggest that there will be an average increase in annual precipitation of 18% in the Arctic and 14% for the Antarctic. In both Polar Regions, an increase in temperatures and precipitation could result in an increase in the effective length of summers and warmer and more humid winters. Changes in temperature and precipitation could also have an impact on the physical environment, including on the Arctic sea ice and the glaciers of South Georgia, the Kerguelen Islands and Antarctic Peninsula. The extent of multi-year Arctic sea ice in summer has already shrunk by 7.4% [5.0 to 9.8] per decade since 1978. In 2007, its area at the end of the summer reached an alarming record low, being some 40% smaller than during the same season in 1978. Some IPCC scenarios predict the complete disappearance of the Arctic sea ice in the summer between now and the end of the century.

Climate change could have an impact on the population's, individual behavior and phenotypes of marine species. An increase in temperatures could, for instance, cause certain species to migrate towards the Poles and allow other non-native species to migrate inward from more temperate areas. There could also be changes in reproduction and hunting zones, as well as in migration paths. The size and density of the populations are also likely to change, with a possible fragmentation and reduction in genetic diversity. Changes in the phenotypes of species would be a direct consequence of changes in environmental conditions: this could result in changes in dates of arrival of migratory

species, nesting periods, breeding periods, etc. Furthermore, changes in morphology, such as alterations in body mass or reproductive capacity, could take place due to energy constraints or changed physiological capacity. Warming temperatures and changes in sea ice could impact the abundance and distribution of harvested species, such as krill in the Southern Ocean (Atkinson et al., 2004). Changing sea ice concentration could also increase the accessibility of certain areas to fishing vessels (Trathan & Agnew, 2009).

At the terrestrial level, some of the changes will be similar to those affecting the marine ecosystems. Migration of species towards higher latitudes is likely, particularly on land masses like Greenland. In southern Polar Regions such gradual changes in latitudinal range will be limited by the typically isolated nature of the islands. Nevertheless, changes in the spatial distribution of species (native or alien), facilitated by human activity, are likely. The establishment and spread of invasive species will be further facilitated by milder climate conditions. Some species have already begun to colonize large areas of land spurred on by rising temperatures. The retreat of the glaciers could also enable invasive species to colonize previously inaccessible areas. Moreover, the uncovering of territories previously covered by ice open new opportunities for human exploitation (extractive industry of fisheries) with its linked impacts on biodiversity.

Climate change impacts always need to be taken into consideration when planning conservation actions in the polar and subpolar region. Nevertheless, this is an issue that cannot be assessed directly on sites. Instead, mitigation actions that address the following impacts are to be considered.

Photo 58. Iceberg in Nuuk Fjord, Greenland (Copyright Claire-Sophie Azam)

8.2. Invasive Alien Species

Biological invasions are amongst the most significant threats to biodiversity worldwide, threatening species survival and responsible for major changes to ecosystem structure and functioning. Despite Antarctica's isolation and harsh climatic conditions, invasions are now recognised as a serious risk to the region. With rapid climate change occurring in some parts of Antarctica and increased numbers of introductions, an enhanced success of colonisation by aliens are likely, with consequent impacts on ecosystems. This is already visible in the Sub-Antarctic islands where cats and rats cause the diminution of seabirds populations while ungulates or rabbits affect the vegetal communities.

Historically, some species were introduced intentionally (like bovines or plants for food) but also accidentally (rats, mices, plants by boats). Nowadays, programmes exist to limit the introduction of exotic species (biosecurity plans, monitoring, awareness) and regulate or eradicate those species when needed. But efforts still needs to be strengthened to avoid the dissemination of those species between islands, restore native species and habitats and control the dissemination of pathogen agents.

Photo 59. A cat in Kerguelen Island, a major threat for seabirds (Copyright Claire-Sophie Azam)

8.3. Development of extractive industries

Extractive industries in the Antarctic are prohibited by the Protocol on Environmental Protection to the Antarctic Treaty (Madrid Protocol 1961), which defines Antarctica as “a natural reserve, devoted to peace and science”. In contrast, extractive industries have been a significant driving force for ecological and socioeconomic change in the Arctic for over a century. Gold mining has contaminated streams with mercury used to amalgamate gold dust and with increased sediment loads that damage downstream aquatic ecosystems.

Interest in Greenland's oil and gas potential has experienced many ups and downs over the past fifty years. Rising oil prices in the middle 2000s helped to increase interest in Greenland's oil, even though no extracting activity has started yet. Also, as climate change is affecting the ice cover in the arctic, new opportunities could now be arising for entrepreneurs.

8.4. Fisheries

Both climate variability and commercial fishing have caused significant variations in marine mammals and fishes (Finney et al. 2002; AHDR 2004). For example, the stock of Northeast Atlantic regional stocks of cod (*Gadus morhua*) collapsed in the 1990s due to overfishing. In recent years, the stock has begun to increase again, along with the fishery. As sea ice continues to decline, commercial fishing may expand northward, intensifying the pressure on fishes stocks.

Accepted impacts of fisheries include the depletion of the target species, the impact on the habitat (for example the destruction of benthic habitat caused by bottom trawling or long-line fishing), the impact on non targeted species (by catch), the indirect impact on non-target species attracted by fisheries (incidental mortality) and impacts through modification of behavior (for example killer whales learning to take fish from longlines).

In 1999, the fisheries committee of the FAO adopted an International Action Plan for the reduction of avian incidental mortality, obliging States to adopt measures of prevention and conservation. Strict measures to minimize the mortality of albatrosses and petrels in longline fisheries were introduced by CCAMLR, and have been successful in reducing numbers of birds killed in the Southern Ocean each year to almost zero. However, threats remain from the interaction of seabirds with fishing vessels operating outside the CCAMLR area.

Photo 60. Patagonian toothfish fishery, TAF (Copyright TAAF)

8.5. Contaminants

Many environmental contaminants that are produced and released to the environment at low latitudes tend to accumulate in Polar Regions. Persistent organic pollutants, for example, are stable, fat-soluble, carbon-based compounds that volatilize at warm temperatures and are transported poleward by wind, water, and wildlife. Atmospheric transport is the most rapid pathway by which persistent organic pollutants, especially volatile or semivolatile compounds, reach the poles. Once in Polar regions, POPs are deposited on particles or exchanged with water, both processes that are enhanced by low temperature. Oceanic transport occurs more slowly but is an equally or more important pathway for compounds such as hexachlorocyclohexane or toxaphene that partition strongly into water. Global sources of mercury pose the greatest threat in Polar Regions because the global combustion of coal, which is its major source, is expected to continue rising throughout the next century. There are trends of increasing mercury in some Arctic species (AMAP 2004).

Other pollution sources include bad waste management, pollution by vessels or dispersal of fuel during logistic operations.

Photo 61. Example of pollution in the high sea (Copyright TAAF)

8.6. Other human activities impacting biodiversity

Other human activities create disturbance for native flora and fauna, and affect the integrity of habitats. They include scientific activities and associated logistical activities, touristic activities, military activities, transport activities (boats, helicopter), logistical activities for supplying the camps and generation of waste.

Many management measures were implemented in the subantarctic islands to reduce these impacts through biosecurity, establishment of trails, environmental impact studies, waste management policies etc. but the complexity of these impacts are still insufficiently known and handled.

9. ASSESSMENT OF CURRENT INVESTMENTS

9.1. Greenland

Denmark has since 1994 provided environmental support to the Arctic including funding for initiatives to initiate and secure implementation of conventions and international agreements. The scheme is called DANCEA (Danish Cooperation for Environment in the Arctic) and it helps ensure that the commonwealth meets its obligations in the Arctic Council and other international conventions. Part of the aid is implemented in close cooperation with the Government of Greenland. Focus areas include biodiversity and sustainable use of living resources, indigenous Arctic people's participation in environmental cooperation - including funding for the Indigenous Peoples' Secretariat (IPS), activities related to regional cooperation on the protection of the Arctic environment and horizontal dissemination efforts.

One project has been funded by BEST, the PISUNA project which aims at protecting biodiversity and creating multiple benefits for local communities in Greenland. This initiative implements a field-based scheme for monitoring and management of resources developed specifically to enable Greenlandic fishers and hunters themselves to follow trends in living resources and to propose management decisions.

Photo 62. The PISUNA project, Greenland (Copyright Elmer Topp-Jørgensen)

As a response to the Changes in the distribution and abundance of key species, range extensions and cascading effects on species interactions that are currently taking place, influencing Arctic food web structure and the people that depend on it, Arctic Council tasked the Conservation of Arctic Flora and Fauna (CAFF – www.caff.is) the biodiversity working group of the Arctic Council to address this issue through the development of the Circumpolar Biodiversity Monitoring Programme (CBMP – www.cbmp.is). The CBMP provides the coordinated circumpolar infrastructure for continual and ongoing biodiversity monitoring and assessments. In relation to the monitoring, CBMP standards are used where possible, and Greenland feed into circumpolar monitoring of biodiversity and assessments through CBMP.

In a new strategy (2017-2021) GEM will focus on upscaling and societal relevance, by combining detailed ecosystem monitoring with gradient studies, single discipline monitoring sites and remote sensing to fully understand ecosystem dynamics and change and its implications for the Greenlandic society.

CAFF under the Arctic Council is working on a document about invasive species in the Arctic (http://www.caff.is/invasive-species).

There is a specific action plan for Polar Bear and bilateral (Greenland and Canada) management for walrus and beluga.

The marine ecosystem is monitored annually by the Greenland Institute of Natural Resources (GINR). GEM and Greenland Climate Research Center supplements GINRs species monitoring and ecosystem component studies with Marine Ecosystem mapping and process studies (Disko, Nuuk, Zackenberg), and a new GEM strategy seek to include long term marine transects and campaign studies in other locations. GINR has monitoring programs for the stocks of cetaceans, walruses and seabirds that are important for the Greenland Society. Different parts of the country are surveyed every year, in a way that all major stocks are monitored at least once every 10 years. Besides surveys for estimating abundance, GINR runs a number of research projects on the movements, stock structure and ecology of birds and mammals.

9.2. Saint Pierre and Miquelon

9.2.1. Past and current programmes linked to the study and conservation of biodiversity

Several programmes have been implemented in Saint-Pierre et Miquelon.

To improve management of the impacts of climate change, the DTAM has set up in 2009 a comprehensive mechanism to measure and monitor different natural phenomena (erosion, wave height, sea level rising, etc.) within the framework of scientific partnerships with France and Canada.

Several projects to establish protected areas have been launched since 2006. Four scientific missions (between 2006 and 2009) have led to:

– The creation of an inventory of the ZNIEFF (natural areas of particular interest in terms of ecology and wildlife) over the entire territory of the archipelago;

– Studies on seabirds colonies on le Grand colombier are conducted in the objective of the establishment of a natural reserve on Grand Colombier located, which is home to extraordinary colonies of seabirds (in particular, 10,000 pairs of Atlantic puffins and 180,000 pairs of Leach's storm petrels). A project on this thematic is being funded by BEST 2.0 grants.

– The application for the classification of the Grand Barachois lagoon as a wetland, under the Ramsar Convention on wetlands;

– The application for the protection of biotopes at breeding grounds of piping plovers and tern colonies, or at peat marshes and reforestation sites in the Milieu valley in Saint Pierre.

The Territorial Council has developed a new waste disposal plan (PED) adopted in 2011. In 2009, SODEPAR was commissioned to update the 2004 PED and to set up a comprehensive waste disposal sector. Aiming at gathering all the relevant actors in the area of waste management, the Territorial Council is a founding member of the SyGeD: the Joint Association for Waste Management, which includes the Territorial Council, the Municipalities of Saint Pierre and Miquelon and the CACIMA, chaired by the President of the Territorial Council.

In February 2012, a mission of international experts produced an assessment of the amount of fish products available around the two islands. It also proposed a processing operation, which would be included as part of a "bi-localized" PTU project (Single Processing Centre). By visiting different industrial sites, they could determine an infrastructure "overhaul" project, taking into account their size, age and the existing facilities. The mission identified several emergencies as part of its priority measures, both in terms of "priority investments" to allow the sector to work for the current year and a series of "precautionary measures". To carry out its work, the mission relied on the local IFREMER office 53 and the State's services, as well as by listening to all the actors in the sector, from fishermen to processors. The synthesis of this study mentions the presence of many premium species in the waters around Saint Pierre and Miquelon, but it also notes the difficulty of accessing these resources.

In 2015, an assessment of the status of seal populations in Saint-Pierre et Miquelon was funded by the DTAM and carried on by the centre d'Etudes Biologiques de Chizé (CEBC, UMR 7372 CNRS/Université de La Rochelle). This study included the review of the census method, a number of meetings and interviews with fishermen, local stakeholders and users, and the analysis of previous data on the relative abundance of the two seal species. This study highlighted the need for priority actions targeted on the trophic role of the seals in the archipelago, and the mitigation of negative interactions between seals and fisheries activities, already strongly perceived by local managers.

In 2016, a project was granted by BEST 2.0: "Determining the Feeding Areas used by the Community of eabirds Breeding on the Island of Grand Colombier". The project will identify the marine areas used by adult Leach's Storm - petrels and Atlantic Puffins during breeding by tracking a number of individuals using miniaturized GPS devices. The GPS data collected will be used to establish the marine feeding areas utilized by these populations and identify possible management measures for these areas to help maintain a sufficient food supply for seabirds breeding on the Grand Colombier.

9.2.3 European Funds

In March 2011, the European Commission approved the Single Programming Document (SPD) presented by the Territorial Council. This document provides for European funding of €20.7 million for 2010-2013. In accordance with the guidelines of the SDS (the Strategic Development Plan of SPM), the 10th EDF focuses on the modernization of existing businesses and on general support for economic development. About 40% of these funds should be allocated to the activities set out in the State-Territorial Collectivity development contract. In December 2012, the European Commission approved the first payment instalment of €7 million to the budget of the Territorial Council as part of the 10th EDF.

Saint-Pierre and Miquelon, as part of the polar and subpolar hub of the BEST programme, is eligible to BEST 2.0 grants. One project has been financed so far, led by the ONCFS: "Determining the Feeding Areas used by the Community of Seabirds Breeding on the Island of Grand Colombier". It aims to identify feeding areas for marine birds on l'île du Grand Colombier, of which the Leach's Storm Petrel.

Photo 63. The Leach's Storm petrel (Copyright J. Detecheverry)

9.3. The French Southern Lands

9.3.1 Conservation programmes in the French southern islands

Programmes conducted in the French Southern Lands can be divided as follow: conservation programs ran by the TAAF and applied research ran by scientific organizations in close partnership with the TAAF.

Conservation actions conducted by the TAAF are framed by the management plan (TAAF, 2011) and the detail of past and current actions can be found in the evaluation of the management plan that should be published at the end of 2016. They are included in the following thematics:

- Limitation of anthropic impact
  - Limitation of trampling through recommended trails and installation of duckboards
  - Dismantling of fences and old buildings
  - Improvement of waste management
  - Limitation of pollution (chemical, light, acoustic…)
  - Control and enforcement on human activities
- Species and habitats recovery
  - Restauration actions
  - National Action plan for the Amsterdam albatross
  - Restoration of *Phylica arborea* on Amsterdam
  - Research on pathogen contaminations
- Reduce the risks of introduction and dispersion of invasive alien species
  - Biosecurity program on sites and on vessels
  - Monitoring of invasive alien species
  - Eradication programs
- Improvement of knowledge and conservation of terrestrial ecosystem
  - Definition and cartography of habitats
  - Listing and monitoring of species
  - Study on the impact of climate change and invasive alien species on native species and habitats
- Improvement of knowledge and conservation of marine ecosystem
  - Marine resources study and management
  - Reduction of bycatch programs
- Awareness and communication
  - Awareness of users (tourists, researchers, military…)
  - Communication for partners and the general public
  - Diffusion of knowledge

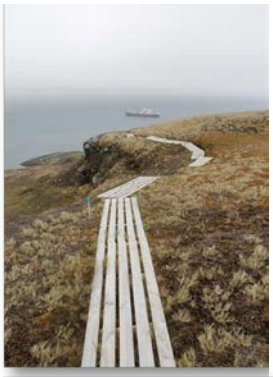


Photo 64. Example of conservation activities in the TAF

The new management plan (2017-2026) will be released in 2017.

Most of applied conservation sciences programs are part of the IPEV programs (Table 27.). They are conducted by research organizations and joined research centers in close collaboration with the TAAF.

Table 27. Research programs in conservation sciences ran in the French Southern Lands (in april 2016)

Program	Title	IPEV Number	Organization
ORNITHOECO	Seabirds and marine mammals as sentinels of global changes in the Southern Ocean	IPEV 109	CEBC-CNRS
ECONERGY	Mediators of individual quality : proximate aspects and fitness consequences	IPEV 119	IPHC-CNRS
PHYSIONERGY	Energetic challenges in penguins: Physiological, Bioenergetics and Molecular Adjustments	IPEV 131	CNRS - Université Lyon 1
SUBANTECO	Subantarctic biodiversity, effects of climate change and biological invasions on terrestrial biota	IPEV 136	Université de Rennes 1 - CNRS
ECOPHY	Adaptive strategies and population dynamics of penguins under environmental constraints	IPEV 137	IPHC-CNRS
POPCHAT	Assessing the dynamic of predator-prey relationships to manage reliably cat populations in the ecosystem of Kerguelen	IPEV 279	LBBE-CNRS
ETHOTAAF	Behavioural ecology of subantarctic birds	IPEV 354	CEFE-CNRS
OISEAUX PLONGEURS	Foraging Ecology and Energetic of Southern Diving Predators in Relation to Climatic Variability	IPEV 394	CEBC-CNRS
HEnergES	Henerges Huddling Energetics of moulting Elephant Seals : thermal ecology of moulting elephant seals	IPEV 1037	CNRS-MNHN
SALMEVOL	Evolutionary ecology of salmonids colonization of the Kerguelen Is.	IPEV 1041	INRA - UPPA
PROTEKER	Effects of global change on coastal marine life in Kerguelen Islands.	IPEV 1044	MNHN
PlantEvol	Plant biodiversity in subantarctic islands: evolution, past, and future, in changing environments	IPEV 1116	Université de Rennes 1 - CNRS
ECOPATH	Circulation of directly transmitted and tick-borne infectious agents in subAntarctic and Antarctic	IPEV 1151	CEFE-CNRS

	colonial vertebrate populations		
BIODIV_AMS	Terrestrial and freshwater biodiversity of Ile Amsterdam and Ile Saint Paul	IPEV 1167	Université de Rennes 1 - CNRS
ASPHALTE	Amsterdam St Paul marine resources study		MNHN
ORCADEPRED	Study of Orcas behaviour in order to fight depredation		CEBC / UMR CNRS 7372 - Université de La Rochelle
Acoustic study of marine mammals	Study of marine mammals's ecology through hydrophones		ENSTA Bretagne / Laboratoire Lab-Sticc
Avian pathogens	Study on contamination by avian pathogens in Amsterdam		PIMIT (UMR CNRS 9192, INSERM 1187, Université de la Réunion, IRD 249)
Programme COPEC	Scientific monitoring of fisheries (including bycatch) and collecting data from fishing boats (of which marine mammals observations).		MNHN
CROMEBA	« *Crozet Marine Ecosystem Based Approach - Approche basée sur l'écosystème de l'environnement marin des îles Crozet* » Ecoregionalization study on the EEZ of Crozet		UPMC-MNHN – UMR BOREA (jusqu'à fin 2017)
POKER	POKER campaigns (POissons de KERguelen) » are fishing ressources assessments aiming to improve knowledge on targeted and bycatch species.		MNHN
PIGE	PIGE campaigns (PoIssons des GlacEs) assessessment campaigns for populations of mackerel Icefish in Kerguelen		MNHN

9.3.2 Funding

The French Southern and Antarctic Lands (TAAF) has an annual budget of approximately 26 millions euros, of which 80% of own resources (taxes, fishing rights, tourism, philately...). It receives each year a budget from the Ministry of Overseas France (Ministère des Outre-Mer) and the Ministry of Ecology, Sustainable Development and Energy (Ministère de l'Environnement, de l'Energie et de la Mer) to support and implement the action of the management plan. The TAAF received other national fundings dedicated to specific programs, as the National Plan of Action (PNA) for *Diomedea amsterdamensis*, but also private fundings.

Research organizations involved in the French Southern Lands received most of their budget from public funds, especially from the Ministry of Research, but they can also apply to private or European funds.

The French Southern Lands are eligible to the European programs LIFE, EDF and BEST 2.0. The BEST 2.0 polar and subpolar hub is coordinated by the TAAF which supports applicants during the application process.

Photo 65. Research activities in TAF (Copyright TAAF)

9.4. South Georgia and South Sandwich Islands

A considerable amount of scientific and environmental research is undertaken on and around South Georgia by British Antarctic Survey and GSGSSI. The environmental research falls into two principal categories: long term monitoring studies and one-off research projects. There have also been a series of habitat restoration projects to eradicate some of the non-native species from the island.

9.4.1. Long-term monitoring programmes

Krill acoustic survey: BAS undertakes an annual acoustic assessment of the biomass of krill in the Western Core Box, which is an important foraging area for fur seals and macaroni penguins from Bird Island. This research links directly with studies of krill-dependent predators and is funded by NERC as part of BAS's core science programme and is part of the UK contribution to CCAMLR.

BAS Bird Island: Bird Island is home to large colonies of seabirds and fur seals. BAS monitor the breeding success of wandering, black-browed & grey-headed albatross, gentoo & macaroni penguins and Antarctic fur seals. Scientists also undertake tracking and foraging studies of many of the species. This is funded by BAS core funds and is part of the UK contribution to CCAMLR.

Prion & Albatross Island: GSGSSI monitor the breeding success of wandering albatross on Prion and Albatross Islands in the Bay of Isles. This is part of the commitment to ACAP.

BAS Maivken: BAS staff from King Edward Point monitor gentoo penguins and Antarctic fur seal breeding success at Maiviken on the Thatcher Peninsula. This is also part of the UK contribution to CCAMLR

Groundfish Surveys: GSGSSI runs a biennial trawl survey on the South Georgia shelf to assess and monitor populations of demersal fish, including mackerel icefish and juvenile Patagonian toothfish. Data from the surveys is reported to CCAMLR.

BAS regularly runs **oceanographic research cruises** in the Scotia Sea, including the SGSSI MZ to investigate the seasonal operation of the pelagic ecosystem (e.g. Murphy et al., 2007; Tarling et al., 2013) and has also undertaken research on the foraging of king penguins at Hound Bay and St Andrews Bay.

In addition there have also been recent projects undertaken to investigate the Shallow Marine environments (funded by the Overseas Territory Environment Programme) and non-native invertebrates (funded by GSGSSI). The Shallow Marine Surveys Group (SMSG).(funded by Darwin Plus) have also conducted work on algae.The JNCC also support a project to examine algal biodiversity in the inshore marine areas of South Georgia.

9.4.2 Recent habitat restoration initiatives

The last decade has seen some major habitat restoration (eradication) projects undertaken on South Georgia.

Rodent eradication: The South Georgia Heritage Trust raised funds for, and implemented, a rodent eradication project on South Georgia. The project ran in three phases (2011, 2013 & 2015) to cover the rodent infested parts of the island, with brodifacoum-laced cereal bait dropped from helicopters. If successful, the eradication of rodents will be of great benefit to small ground nesting birds such, as prions, blue petrels, diving petrels, storm petrels and the South Georgia pipit. The project received support from the UK Government through the Darwin Plus Scheme.

Reindeer eradication: From 2013-2015 GSGSSI funded and implemented the eradication of reindeer from the island. The reindeer, which were introduced by Norwegian whalers in 1911, caused considerable damage to the vegetation in the two areas they inhabited. Over 7000 reindeer were killed in the eradication and the vegetation is already showing signs of recovery.

Non-native plant control: For the last 10 years GSGSSI have been attempting to control and eradicate non-native plants around the old whaling stations. With the eradication of reindeer completed some of the non-natives may be better able to spread around the island. With the support of the UK Government (through Darwin Plus) GSGSSI have developed a Non-native Plant Management Strategy (GSGSSI, 2016).

9.4.3 BEST funded projects

1. Identifying important marine areas for macaroni penguins (*Eudyptes chrysolophus*) in the UK and French Overseas Territories.

The project "Identifying important marine areas for macaroni penguins (*Eudyptes chrysolophus*) in the UK and French Overseas Territories" funded by the EU BEST initiative has lead to a comprehensive overview of the at-sea distribution of macaroni penguins around their major breeding sites South Georgia, Kerguelen and Crozet, allowing the identification of marine Important Bird Areas (mIBAs) for the Vulnerable (shortly changed from Globally Endangered) species. Carried out as a collaborative work between the British Antarctic Survey (UK), the Centre d'Etudes Biologiques de Chizé (France) and BirdLife International, the project lead to the following actions and results:

- Collation of an extensive tracking database including all available data from South Georgia, Kerguelen and Crozet

- Assessment of the at-sea distribution of macaroni penguins during the different stages of their annual cycle

- Identification of most important environmental features influencing macaroni penguin at-sea distribution during their different breeding stages at the different islands

- Development of descriptive habitat models to understand the relationship between observed at-sea distribution and environmental features

- Development of predictive habitat models to infer penguin at-sea distribution around all colonies on South Georgia, Kerguelen and Crozet where tracking data are not available

- Compilation of comprehensive stage- and site-specific maps of macaroni penguin at-sea distribution around the 3 islands

- Identification of mIBAs around the 3 islands based on the distribution predicted by the habitat models.

Photo 66. Macaroni penguins (Copyright Annette Scheffer)

2. Where are they now? Right whales in the South Georgia marine ecosystem

Today, right whales are the most commonly seen whale in South Georgia waters, slowly returning after four centuries of exploitation. Right whales that feed in South Georgia waters in summer have been linked, through photo-identification and satellite tagging, to the wintering ground at Península Valdés in Argentina. However the Península Valdés calving ground has had notably high calf mortalities in the last decade, the cause of which is unknown. A growing body of evidence hypotheses that South Georgia environmental conditions directly influence the low latitude population dynamics of these whales, suggesting foraging success is a primary factor influencing reproductive rates.

The project will develop baseline surveys of right whales in South Georgia waters spanning their period of peak occurrence in summer months. The surveys will investigate their prey sources, habitat use in relation to the krill fishing within the sustainable-use South Georgia and South Sandwich Islands Marine Protected Area (MPA), genetic diversity, population connectivity with calving areas and health status.

The results will be presented to the first scientific review of the South Georgia and South Sandwich Islands MPA in 2018, which assesses whether MPA boundaries and fishery closure timings are appropriate for the right whale feeding ground, and to the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) in order that right whales can be considered in spatial krill fishery management plans and ecosystem models. The project will also investigate migratory connections between South Georgia waters and calving grounds off Argentina and Brazil using photographs and genetics.

This project will begin in April 2017.

Photo 67. Right whale in South Georgia (Copyright BAS)

9.5. British Antarctic Territory and Adelie Land

9.5.1. British Antarctic Territory

The Government of the BAT has directly funded a wide range of environmental projects, which have contributed towards the protection of biodiversity. It has recently commissioned a separated environmental strategy, and funds a number of small projects each year according to 4 priority areas: Environmental protection and minimizing human impacts, education and outreach, heritage, governance and promoting UK sovereignty. Previous projects include production of a Wildlife Awareness Manual, development of a "toolkit" to aid and facilitate management of marine protected areas, a DNA survey to assess distribution of penguin colonies and the impacts of climate change, identification of important bird areas in the Antarctic Peninsula, and identification and development of Marine Protected Areas around BAT.

British Antarctic Survey (BAS) conducts extensive scientific research on behalf of the UK government within the British Antarctic Territory and surrounding areas, including at sea. It operates two year-round stations (Rothera and Halley) and one summer-only station (Signy) within BAT. Research and long-term monitoring is focused on climate change, ocean circulation, space weather, glaciology, geology and biodiversity. Research undertaken by BAS informs UK government policy inputs to the Antarctic Treaty System, including on environmental protection, fisheries management and marine spatial planning across Antarctica and the Southern Ocean.

9.5.2. Adélie Land

In Adélie Land many projects are conducted with the support of the IPEV, most of them mainly based at the Dumont D'Urville station. Table 28 displays a list of programmes on Life sciences.

Some of these research projects are included in wider, international, circumpolar project, like the Census for Antarctic Marine Life (CAML, IPY Project 53) that aimed to investigate the distribution and abundance of Antarctic marine biodiversity and how it will be affected by climate change. It was a major ship-based research programme in the austral summer of 2007e2008 involving scientists from 30 countries and 19 vessels. It culminated in the production of the Biogeographic Atlas of the Southern Ocean (De Broyer et al. 2014), a SCAR (Scientific Committee on Antarctic Research) product (http://atlas.biodiversity.aq/outline.html). The Collaborative East Antarctic Marine Census (CEAMARC) was a multinational contribution to CAML involving scientists and students from several nations using three ships from Australia, Japan and France surveying the one area. This collaboration was a highly coordinated and comprehensive survey of the plankton, fish, benthos, oceanography and geophysical conditions of the waters north of Terre Adelie and George V Land of Eastern Antarctica (Graham et al, 2011).

A work is also being conducted in the frame of CCAMLR to delineate an East Antarctic Representative System of Marine Protected Areas (EARSMPA). Several studies are being conducted to highlight areas of conservation importance (Fretwell & Trathan. 2009;

Southwell et al. 2009; Constable et al. 2011; Koubbi et al. 2011; Douglass et al. 2014; Raymond, B. 2014a; Raymond et al. 2014b, Widmann et al. 2015).

Table 28. IPEV programmes on Life sciences conducted in Adélie Land

Program	Title	IPEV Number	Organization
ECOPHY	Adaptive strategies and population dynamics of penguins under environmental constraints	IPEV 137	IPHC
l'AMMER	Using Adelie penguins as indicators of environmental changes	IPEV 1091	CEBC
OISEAUX PLONGEURS	Foraging Ecology and Energetic of Southern Diving Predators in Relation to Climatic Variability	IPEV 394	CEBC
ORNITHOECO	Seabirds and marine mammals as sentinels of global changes in the Southern Ocean	IPEV 109	CEBC
PHYSIONERGY	Energetic challenges in penguins: Physiological, Bioenergetics and Molecular Adjustments	IPEV 131	CNRS

Photo 68. Scientific station in Terre Adélie (Copyright Yan Ropert-Coudert)

10. PRIORITY AREAS FOR ACTION

264 Key Biodiversity Areas were delineated in each territory on the basis of species of high conservation value (trigger species). Those KBA were prioritized based on species irreplaceability and vulnerability and site-based vulnerability. Experts were consulted to finalize this priority KBA list (See Chapter 4. Conservation Outcomes). It was agreed that KBAs scoring at the priority levels 1 and 2 would be the BEST programme priorities. In total, 54 priority KBAs were identified.

Table 29. Summary table of KBAs and priority KBAs in the polar and subpolar hub

	Terrestrial KBAs	Marine KBAs	Total KBAs	Priority KBAs
Greenland	22	12	34	11
Saint-Pierre et Miquelon	3	3	6	2
TAF	33	28	59	31
South Georgia SSI	18	19	37	10
BAT	110	13	123	0
Adélie Land	4	1	5	0
Total	190	76	264	54

For each territory, priority KBAs and thematic priorities are described in this chapter. It is noteworthy that KBAs of priority level 3, 4 and 5, even if they were not ranked to the maximum priority level, are still areas of high biodiversity conservation value.

Photo 69. Fur Seals in South Georgia (Copyright Dr. Judith Brown)

10.1. Description of Priority Key Biodiversity Areas

10.1.1. Greenland

11 priority KBAs were identified, 1 terrestrial and 10 coastal or marine areas.

Figure 54. Greenland priority KBAs

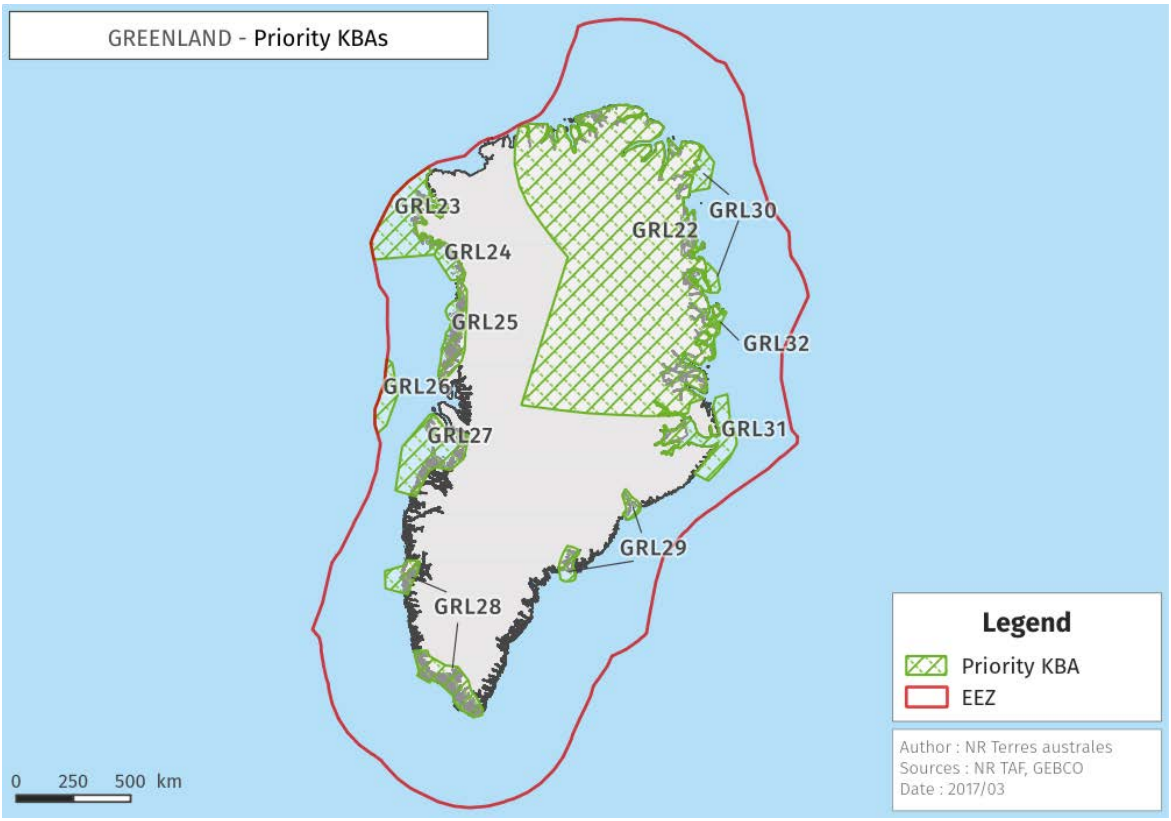


Table 30. List of priority KBAs of Greenland

Priority	code kba	Name
1	GRL23	North Water Polynya
1	GRL25	Northwest Greenland Shelf
1	GRL27	Disko Bay / St. Hellefiskebanke
1	GRL28	Southwest Greenland shelf
1	GRL30	Northeast Water polynya
1	GRL31	Scoresby Sund
2	GRL22	Northeast Greenland National Park
2	GRL24	Melville bay
2	GRL26	Baffin bay / Uummaannaq
2	GRL29	Southeast Greenland / DK str.
2	GRL32	Sirius Water / Young Sund

After the prioritization process, eleven priority KBAs have been designated due to a strong site and species vulnerability. Ten of them were identified according to the PSSA criteria identified in the report "*IDENTIFIKATION AF SÅRBARE MARINE OMRÅDER I DEN GRØNLANDSKE/DANSKE DEL AF ARKTIS".* The report has been prepared by Aarhus University at the request of the Danish Ministry of Environment and is supported by the Ministry through the Program for Environmental Assistance to the Arctic. Those PSSA have been used to identify areas of heightened ecological significance (AMAP 2013) by the AMAP, CAFF and SDWG working groups. The description of the areas below was taken over from this report.

1. Northeast Greenland National Park (GRL22)

The Northeast Greenland National Park (in Greenlandic: Kalaallit Nunaanni nuna eqqissisimatitaq) is the biggest national parc in the world and the only one in Greenland. Reaching a total size of 972 000km2, it represents 44.85% of the territory. This park is designated as a Biosphere reserve by the UNESCO.

The national park hoststhe Musk ox (from 5000 to 15000 individuals/ about 40% of the global population), Arctic fox, stoat, collared lemming and Arctic hare. Reindeers and wolves left the area in 1934 but still visit occasionally the area.

Many marine mammals are present in the surrounding waters such as ringed seal, bearded seal, harp seal and hooded seal as well as narwhal and Beluga whale.

The park is also an important seabird area as it hosts great northern diver, barnacle goose, pink-footed goose, common eider, king eider, gyrfalcon, snowy owl, sanderling, ptarmigan and raven.

This area is a very interesting place for Arctic fauna and flora research due to isolation of the site, as well as historical research as some old inuits settlements have been found near the coast.

With only 40 inhabitants, human impact is very limited inside the national park and the Sirius patrol monitors the area to prevent non-authorized activities inside the park.

The National Park holds numerous glacier influenced fjords and coastal area. The National Park does not include offshore waters, but two of the three polynyas in Northeast Greenland are located close to its borders: The Sirius Water, off the central part of the National Park and the Northeast Water at the far north (the third polynya is south of the National Park, off Scoresbysund).

2. North Water Polynya (GRL23)

The North Water Polynya is the most productive polynya in the Arctic (Deming et al., 2002) and globally unique. Especially in the eastern parts along Greenland, upwelling of nutrient-rich waters and the associated high biological production provides favorable foraging conditions for seabirds and mammals, mostly in the summer, but even some marine mammal populations winter here.

• More than 80% of the world population of little auk is dependent on the North Water Polynya from May to September, when about 30 million pairs are estimated to nest along the Greenland coast (Egevang et al., 2003).

• Over half of Greenland's breeding population of thick-billed murre are nesting in five colonies with a total of about 200 000 breeding pairs (Boertmann et al., 1996). They are dependent on the northeastern parts of the area from mid-May to late August, and during the autumn migration in August–September also on the western (Canadian) side (Falk et al., 2001).

• The endangered ivory gull (Near Threatened globally) occurs scattered throughout the North Water Polynya in summer and breeds on adjacent Ellesmere Island (Gilchrist and Mallory, 2005; Gilchrist et al., 2008; Boertmann and Mosbech, 2011a).

• Seaduck molting areas, especially for king eider, occur along the Greenland coast (Boertmann and Mosbech, 2011a).

The North Water Polynya is critical habitat for beluga: an estimated 14 000 animals (Heide-Jørgensen, 2010) migrate from Lancaster Sound in Canada to the North Water Polynya and adjacent waters, an estimated 2324 (95 % CI 968–5575) belugas overwintered in the Eastern part of the North Water Polynia in 2014 (Heide-Jørgensen et al. 2016) [TB1] .

•• The northernmost parts of the North Water Polynya and Inglefield Bredning are important summer areas for discrete summer populations of narwhal. An estimated population of 8368 individuals (Heide-Jørgensen et al., 2010) exploits Inglefield Bredning. Melville Bay (see Area B5) is the only other summer range in West Greenland. Furthermore some narwhals overwinter in the polynya and the number was estimated to 3059 (95 % CI 1760–5316) in April 2014 (Heide-Jørgensen et al. 2016)[TB1]

•• Bowhead whales utilize the southern parts of the North Water Polynya in spring, and an unknown number winter here (Boertmann and Mosbech, 2011a).

•• The northern parts of the North Water Polynya – Kane Basin – hold a sub-population of a couple of hundred polar bear. Larger sub-populations in Baffin Bay (about 1600 animals) and Lancaster Sound (2500 bears) use the southern and western parts of the polynya. The ice edges anywhere in the North Water Polynya and around Cape York in the southern part of the area are particularly important for wintering Polar bear (Boertmann and Mosbech, 2011a).

•• The North Water Polynya is also an important wintering area for young ringed seal (an important prey for Polar bear) benefitting from the relatively thinner ice in the eastern (Greenland) parts (Born et al., 2004).

•• At least 1500 walrus (2009 estimate; Born et al., 2009b, and NAMMCO, 2009) summer in the North Water Polynya, mainly in the western parts along Ellesmere, and winter mainly in the eastern parts. The entire Baffin Bay population was estimated at 2100 animals in 2009.

3. Melville bay (GRL24)

The Melville Bay area is critical habitat for narwhal in summer, for Polar bear winter and spring, and a migration corridor for whales and seabirds. The shelf area in Melville Bay is one of just two West Greenland summering areas (June to end of October) for the Baffin Bay population of narwhal; an estimated population of 6024 (2007) narwhal utilizes the area (Heide-Jørgensen et al., 2010). Narwhal have high site fidelity to migration routes and summering and wintering grounds, and generally use the same areas year after year. The summer stock from Melville Bay has a narrow migration corridor along the continental shelf south to the winter quarters in central Baffin Bay. In spring they move north through the ice shear zone between Disko Bay and Melville Bay (Boertmann et al., 2010).

Some Polar bear from the Baffin Bay population (total estimate about 1600 animals) occur in this area. Denning is probably rare along the Melville Bay coastline, but in late winter and spring some bears of the Baffin Bay population forage along the ice edge and in the drift ice in the western parts of the area. However, satellite tracking has revealed that the fast-ice edge is not used much in spite of good foraging options, probably because the bears to some extent try to avoid the zone most frequented by hunters, and therefore tend to remain out in the drift ice. However, in recent decades bears have more frequently been taken/hunted in the coastal areas, which is interpreted as a shift in home range induced by the shrinking sea-ice cover and earlier ice break-up in Baffin Bay (Born et al., 2008).

The inner parts of Melville Bay are important breeding areas for ringed seal serving as the principal prey for Polar bear in spring (Rosing-Asvid A., Greenland Institute of Natural Resources, pers. com., 2011). In early spring the partially open water in Baffin Bay (outer parts of the area) is an extension of the ice break-up zone in the area, and important as part of the general migration corridor for thick-billed murre and other seabirds on their way to breeding grounds in the North Water Polynya.

One of Greenland’s largest colonies of Sabine’s gull is situated in this area (Boertmann et al., 1996)

• In this area occurs the following species of the Greenlandic Red List: Polar bear, walrus, Greenland whale, beluga, narwhal, Eider, ride, thick-Sabine's gull, Arctic tern and thick-billed murre. One of Greenland's largest colonies of Sabine's gull is located in the nature reserve. Melville Bay coastal area is protected as a nature reserve - originally mainly identified for the sake of Polar - covering the inner parts of this area, which also is proposed as "EBSA" (Ecologically or Biologically Significant Area). BMP has also appointed narwhal and Polar areas in Melville Bay as 'viktiga area to wildlife'. The entire region is important for respectively narwhal and Polar bear..

4. Northwest Greenland Shelf (GRL25)

The shelf and ice shear zone along the coast of northwestern Greenland is critical habitat for whales as well as an important migration corridor and breeding and staging area for seabirds.

Both common and king eider species are dependent on several undisturbed late summer molting areas in some inner fjord areas, in particular in the southern parts of the area

(Boertmann and Mosbech, 2011a). In early spring, the open water in the ice shear zone along

the entire coastline serves as an important migration corridor for thick-billed murre and other seabirds (Boertmann and Mosbech, 2011a). The area contains a large and diverse seabird fauna. Thickbilled murre from some of Greenland's largest colonies (around 126 000 pairs) are dependent on the region from May to late August. The common eider is dispersed in many colonies (total population about 11 500 nests, increasing) along the outer coast as well as in the fjords in the central parts of the area (Merkel F., Aarhus University, Department of Bioscience, pers. com.) based on data from 2007 in Merkel (2010).

Beluga and narwhal both depend on the area as a migration corridor (Boertmann and Mosbech, 2011a). Polar bears from the Baffin Bay population (total estimate 1600 bears) roam the area when ice is present (Boertmann and Mosbech, 2011a).

5. Baffin bay / Uummaannaq (GRL26)

In the westernmost parts of the Greenland Exclusive Economic Zone (EEZ) and adjacent areas in Canadian waters, the pack ice and leads are especially important for some species for parts of the year.

•• Wintering narwhal (from the population summering in Melville Bay as well as from Canada) areas are found within the 500–1500 m isobaths where they appear to utilize the Greenland halibut stock (Boertmann et al., 2010).

•• In autumn and winter, the entire area is critical habitat for migrating and wintering narwhal and beluga; both species obtain a good part of their annual food intake in the wintering grounds (Boertmann and Mosbech, 2011a).

•• A small proportion of the walrus wintering in West Greenland occur within this area; the specific sites may shift with ice conditions (Boertmann and Mosbech, 2011a).

•• Bowhead whales migrate through the area in spring (Boertmann and Mosbech, 2011a).

•• Polar bears from the Baffin Bay population occur in this area, mainly from October to June (Boertmann and Mosbech, 2011a).

In the area occurs the following species of Greenland's Red List: Polar bear, Greenland whale, beluga and narwhal, two thick, Arctic tern and thick-billed murre.

6. Disko Bay / St. Hellefiskebanke (GRL27)

The Disko Bay and Store Hellefiskebanke area has complex oceanographic and bathymetric conditions where tide induced upwelling forms the basis for a high biological production, although with large inter-year variation. The production provides favorable foraging and breeding conditions for seabirds, and mammals and a range of species are dependent on the resources on the banks on the shelf, in particular on Store Hellefiskebanke. Capelin and sandlance (Ammodytes spp.) are the most important prey species for seabirds and mammals. The high productivity in the area is also the foundation of the richest fishing

grounds in Greenland, fueling both Greenland halibut and northern shrimp productivity. Annual surveys continuously document the area as the most densely populated benthic fish/shellfish community.

•• The entire area, but especially Store Hellefiskebanke is critical habitat for the walrus that winter in West Greenland, estimated at 3240 animals in 2008 (Born et al., 2009b; NAMMCO, 2009). In late winter (February–May) they rely on foraging areas within the 100 m isobath; satellite-tagged individuals utilized a fairly limited area of the northern part of the bank.

•• The entire area is part of the beluga winter range (December) in West Greenland, where about 7000 animals rely entirely on the ice edge and marginal ice zone (Heide-Jørgensen, 2010); the whales follow the marginal ice zone as it retreats northward in spring (Heide-Jørgensen et al., 2009).

•• In summer and autumn this area (like the more southern areas) serves as foraging grounds for harbor porpoise (Phocoena phocoena) and a range of baleen whales (blue, sei, minke, fin, and humpback). Evidence suggests that in particular the western part of the area – off the shelf break – is important to the baleen whales (Laidre et al., 2010b).

•• The bowhead whale has its main spring (March to June) staging area in and just west of Disko Bay, which is used by perhaps about 1000 whales of the Baffin Bay population. Apparently, the Disko Bay area serves as a foraging and staging area primarily for female bowhead whales without calves (Mosbech et al., 2000, 2004). There are data suggesting that in addition to foraging, Disko Bay serves as a mating area for bowhead whale (Stafford et al., 2008; Tervo et al., 2009).

•• Seaducks – mostly king eider, but also common eider, harlequin duck (Histrionicus histrionicus) and red-breasted merganser – have important molting areas (July–September)

in coastal areas and fjords (Boertmann and Mosbech, 2001; Merkel et al., 2010); during wing molt, the birds are flightless and extremely shy.

•• Narwhal are abundant in the deeper basins of the area during November through May. Narwhal winter in the dense pack ice west of Disko as well as in the coastal areas close to the southern entrance to Disko Bay (Mosbech et al., 2000, 2004).

•• Beluga are abundant on the banks of the area from November through May. They arrive from the Canadian summer grounds in November and stay until May (Mosbech et al., 2007).

•• Store Hellefiskebanke – specifically within the 50 m isobath – is critical staging and wintering habitat for 500 000 king eider, which is a major proportion of the flyway population.

•• Store Hellefiskebanke is also a significant winter/spring area – including whelping grounds – for bearded seal (Boertmann D., Department of Bioscience - Arctic Research Centre,

Roskilde, pers. com.).

•• Kitsissunnguit / Grønne Ejland in Disko Bay holds the largest Arctic tern colony in Greenland (about 21 800 pairs in 2006); a number of other colonies in the bay are home to up to 5800 pairs – with large inter-year fluctuations (Egevang and Frederiksen, 2011).

•• Disko Bay has a high diversity of seabirds including thickbilled murre (one colony), black-legged kittiwake (several colonies), cormorants (several colonies), common eider (several colonies), fulmar (one of Greenland's largest colonies) and small populations of Atlantic

puffin and little auk. Finally, the rare Ross's gull occasionally nests here (Mosbech et al., 2007).

•• The area is part of the wintering area for ivory gull (Gilg et al., 2010).

•• Capelin spawning areas occur in the tidal zone several places along the coastline (Mosbech et al., 2000, 2004).

• Lumpfish spawning occurs along most the coast, forming the basis for a lucrative spring fishery.

• The following species present in Disko Bay are threatened in the Greenland Red List: Polar bear, walrus, Greenland whale, beluga, narwhal, Eider, ride, thick-rose gull, Arctic tern and thick-billed murre.

The whole area from Disko Bay and down to the Great Hellefiskebanke is proposed as "Super EBSA" (Ecologically or Biologically Significant Area) . Large Hellefiskebanke and Nordfjord, parts of Diskofjord and Mud Bay is designated as "Important Bird Area" by BirdLife International.

7. Southwest Greenland shelf (GRL28)

Owing to upwelling at the shelf break, the banks along Southwest Greenland are highly productive. The shelf area serves as a resource-rich migration corridor for marine mammals and seabirds during their northward migration in spring, and during summer it serves as a foraging area. The 'open water area' north to around Sisimiut remains largely ice free all year, and from October the shelf area and the ice-free fjord turns into a major wintering area for a huge number of seabirds from Greenland, Iceland and Svalbard. A large proportion of Greenland's commercial fisheries rely on the productive areas at the shelf.

•• Along with coastal areas off Newfoundland in Canada, the 'open water area' along southwestern Greenland is the main wintering area for thick-billed murre from Svalbard, Jan Mayen, Iceland and parts of Greenland; from October to April at least 1.5 million murres (Merkel et al., 2012) are dependent on the fish and zooplankton in the shelf area and fjords.

•• More than half of Greenland's populations of razorbill and Atlantic puffin are distributed in many small colonies along the coast, and Kitsissut Avalliit holds Greenland's largest colony of common murre. The common eider breeds in scattered colonies (Boertmann and Mosbech, 2010) along the coast (Rasmussen, 2010).

•• In addition to the murres, the entire 'open water area' is wintering area for common and king eiders (>500 000 and >300 000, respectively), long-tailed duck (>100 000), redbreasted merganser (<20 000), black guillemot (>250 000), and Iceland gull (>300 000) (Boertmann et al., 2004).

•• Harlequin duck (about 7000; Boertmann and Mosbech 2001) from the small Greenlandic breeding population, and from eastern Canada, are dependent on molting areas along the outer coast of southwestern Greenland from Nuuk southward and with a core area around Arsuk; at least 10 000 winter in the area.

•• The coastline in the southern parts is staging and spring/ summer foraging areas for common eider (Merkel et al., 2010). The whole area serves as overwintering grounds for a

number of bird species, and are considered essential for the populations of: murres, eiders etc.

•• Outside the breeding season, adult black-legged kittiwake (juveniles not studied) from colonies across the North Atlantic are staging/foraging in this area; in August to November mainly the western parts are used (Frederiksen et al., 2012b).

•• In summer and autumn the southern part of West Greenland (from area B3 southward) serves as foraging grounds for harbor porpoise and a range of baleen whales (blue, sei, minke, fin, humpback). Evidence suggests that the areas

right off the shelf break in particular are important to the baleen whales (Frederiksen et al., 2012b).

•• The Western Atlantic harbor seal is listed by the IUCN as Critically Endangered in Greenland and has its stronghold at the coast of the southern tip of Greenland (Rosing-Asvid and Ugarte, 2009). In addition, gray seal has recently been found in this area (Rosing-Asvid et al., 2010).

•• Greenland's isolated breeding population of Atlantic salmon is dependent on access to a single river near Nuuk. During summer, shelf and fjord areas all along the coast north to Disko Bay are key foraging areas for the Atlantic salmon stock from spawning areas in the rivers of eastern Canada, the northeastern U.S.A. and northern Europe (NOAA Fisheries: www.nmfs.noaa.gov/pr/species/fish/atlanticsalmon.htm).

•• The fjords in this area hold local stocks of Atlantic cod, with key spawning sites in small areas at the bottom of the fjords, most notably fjord system around Nuuk and Sisimiut.

•• Capelin spawning areas occur in the tidal zone in several places along most of the coastline and in the fjords (Mosbech et al., 2000).

• The area appears to be a key area for mature Greenland shark (*Somniosus microcephalus*). Greenland shark is the longest living vertebral animal known to science (Nielsen et al. 2016), but the location of spawning areas remain unknown.

• In this area occurs the following species of the Greenland Red List: Polar bear (small numbers of field ice), harbor seals, eider, harlequin duck, ride, black-headed gull, Arctic tern, groves, plain. guillemot, thick-billed murre, salmon. The whole area of Disko Bay and down to Cape Farewell is also proposed as 'EBSA' (Ecologically or Biologically Significant Area). The inner coastal zone out to 5 km from the coastline northern border to Qeqertarsuatsiaat and from Paamiut to Cape Farewell is particularly sensitive. Here, there are occurrences of harbor seals, moulting harlequin ducks, staging eiders, wintering of thick-billed murres, and the scattered seabird colonies. The occurrence of large whales in the northern part of Julianehåb Bay is also included as part of the core region.

6. South East Greenland fjord and offshore water (GRL29)

The South East Greenland marine ecosystems are strongly influenced by changes in climate. Decrease in sea ice cover and thickness as well as increased runoff from the Greenland Ice Sheet strongly alter the marine environment in both fjords and offshore area. Freshening and cooling of the upper layers in fjord and coastal environments changes the ecosystem function and carbon flow within the system. The changes in East Greenland seems to have boosted the productivity in the offshore system adjacent to the Irminger Sea. In recent years, increased appearance of Northeast Atlantic mackerel have been observed in the area at amounts that benefitted the national Greenland economy. Climate change has in this area provided Greenland with new unique opportunities for economical exportation. Though, a deeper marine ecological understanding of the system and the drivers for the increased productivity in the area has not been investigated or identified. Besides increase in mackerel, other species, from tuna fish to fin whales and killer whales have become more abundant in the area. During winter, the offshore waters of southeast Greenland are and important feeding and wintering ground for narwhals, and the sea ice is habitat for polar bears. There are also resident polar bears in most of the fjords of Southeast Greenland. The area is a biodiversity hotspot, and one of the few places where Arctic and Atlantic species can be found relatively close to each other. However, this may change in the near future, as the Arctic warms.

9. Northeast Water polynya (GRL30)

The very large (~45 000 km2) and remote Northeast Water polynya is located off the northeastern corner of Greenland. The polynya is kept more or less open for a major part of the year by the southward current from Fram Strait forming a large local gyre (latent heat polynya). The ice edges and currents contribute to an early primary production important for several species. The coastlines and fjords north and south of the polynya contain important areas for seabirds and marine mammals:

• The northernmost breeding colonies, albeit small, of blacklegged kittiwake (Rissa tridactyla) and northern fulmar are found along the coastline of the polynya (Christensen et al., 2012).

• The biggest known breeding colony of ivory gull (about 300 birds) in Greenland is found on Henrik Krøyer Holme. Other ivory gull colonies are found on Kronprins Christians Land and Peary Land (Boertmann and Mosbech, 2011b).

• Ross's gull (Rhodostethia rosea; in low numbers), Sabine's gull (Xema sabini) and Arctic tern (Sterna paradisaea) breed on Henrik Krøyer Holme. Sabine's gull and Arctic tern also breed in relatively large numbers along the coastline of Kilen (Boertmann and Mosbech, 2011b).

• The northern part is used as staging and foraging area by Ross's gull in July – September (Falk et al., 1997; Meltofte et al., 1981).

• The polynya is a pre-breeding staging area for seaducks and also serves as a feeding area during the breeding period. The banks in the northern part of the polynya (off Kilen) are especially important spring staging areas for king and common eiders (Boertmann and Mosbech, 2011b).

• New observations indicate that relatively large numbers of bowhead whales from the Critically Endangered Spitsbergen stock reside in the area in the summer months (Boertmann et al., 2009).

10. The Scoresbysund Polynia Ecosystem (GRL31)

The fjords and the surrounding sea areas in the Scoresby Sund area are very important to several species. A polynya with a well defined ice edge occurs close to the mouth of the fjord. Also a shear zone may occur (with open cracks and leads) between the landfast ice and the drift ice. In summer the adjacent fjords and coastlines, including the Blosseville Coast, are important for some species.

•• Narwhal of the Northeast Atlantic stock (or stocks) have summering areas in fjords in the Scoresby Sund area and further south along the Blosseville Coast. The population in the southern part of East Greenland (Scoresby Sund, Kangerlussuaq and Tasiilaq) was estimated at 6444 animals (Heide-Jørgensen et al., 2010) in 2008. Narwhal are numerous at the ice edge at the mouth of Scoresby Sund in spring until the fjord opens.

•• The water east of Scoresby Sund is probably an important foraging area for the Critically Endangered Spitsbergen stock of bowhead whale (Gilg and Born, 2005).

•• Polar bear frequently occur in the polynya at the entrance to Scoresby Sund and the Blosseville Coast, and the inner parts of the Scoresby Sund fjord complex are regularly used for maternity denning (Boertmann and Mosbech, 2011b).

•• The polynya at the mouth of Scoresby Sund is an important seabird habitat where high concentrations of seabirds may be found in spring and summer, including common and king eiders and millions of little auks. The polynya is also important staging habitat for migrant waterfowl (some of which breed inland) in spring. The largest concentrations of breeding colonial seabirds in East Greenland are found on the coasts of the Scoresby Sund polynya, where an estimated 3.5 million little auks breed in a large number of colonies, several thousand thick-billed murres breed in two colonies (the only colonies in East Greenland), and a few thousand black-legged kittiwakes also breed in this area (Boertmann and Mosbech, 2011b).

•• Ivory gull breeds in small numbers on nunataks at the Blosseville Coast (Christensen et al., 2012).

•• The coastline along the Blosseville Coast is an important molting and staging area for common and king eiders (Merkel et al., 2010).

11. Sirius Water / Young Sund (GRL32)

This relatively small polynya is located further north from Scoresby Sund in Northeast Greenland. It creates conditions for a relatively diverse and productive ecosystem and the area is an important breeding and staging area for many species:

•• The polynya is important as staging area for spring migrating waterbirds with common eider as the most important species; about 14 000 common eiders, 200 king eiders and 1500 long-tailed ducks were counted here during a survey in spring 2008. It is also important for breeding seabirds with Arctic tern, Sabine's gull, kittiwake and common eider as the most important (Boertmann et al., 2009a). About 3000 pairs of common eider breed in this area (Boertmann and Mosbech, 2011b).

•• Sabine's gull concentrations occur along the coast, including one of the largest colonies in Greenland (about 300 birds) together with Arctic tern in Young Sund (Christensen et al., 2012).

•• High numbers of ivory gulls migrate through the area in spring and autumn (Christensen et al., 2012).

•• The coastal waters and banks in this area are important feeding grounds for walrus. The East Greenland stock (about 1500 animals) use several haul-outs along the coast during the summer season, north from about 75° N (Born et al., 2009a; NAMMCO, 2009).

•• The coast serves as a denning area for Polar bears which also occur in the ice-covered waters off the coast.

•• Bowhead whales from the Critically Endangered Spitsbergen population occur regularly (Boertmann and Mosbech, 2011b).

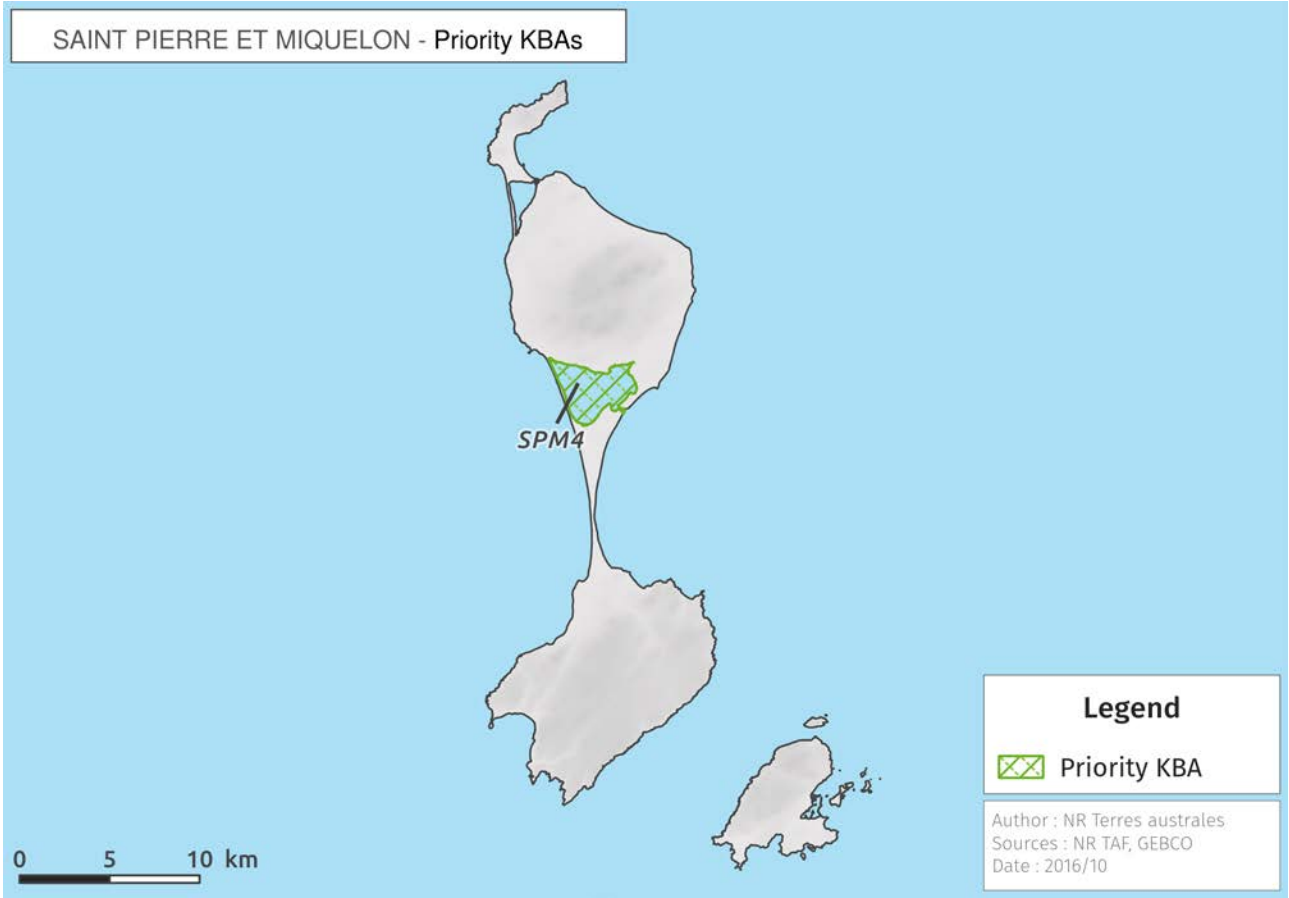
•• In the area occur the following species of Greenland's Red List: Polar bear, walrus, narwhal, Greenland whale, Eider, ride, two thick, Sabine's gull, Arctic tern.

Fjord mouths and coastal zone out to about 5 km from the coastline are walrus gangways and feeding areas in spring and summer, nesting sites for terns and Sabine's gulls and host an important population of staging eiders and long-tailed ducks.

10.1.2. Saint-Pierre et Miquelon

Six KBAs were delineated in Saint-Pierre et Miquelon, both in coastal and marine areas. Two of them, one marine and one coastal, were identified as priority KBAs

Figure 55. Saint-Pierre et Miquelon priority KBA



Le Grand Barachois extends on 900 ha surface and is composed of great sand banks at low tide. It's a zostera marina pool and a great spot for shorebirds and an important nesting area for the terns, gulls, goose. The site is also essential for bird feeding such as ducks and shorebirds, gulls, terns, goose and the piping plover is nesting on the shores. It is also an essential area for fish spawning.

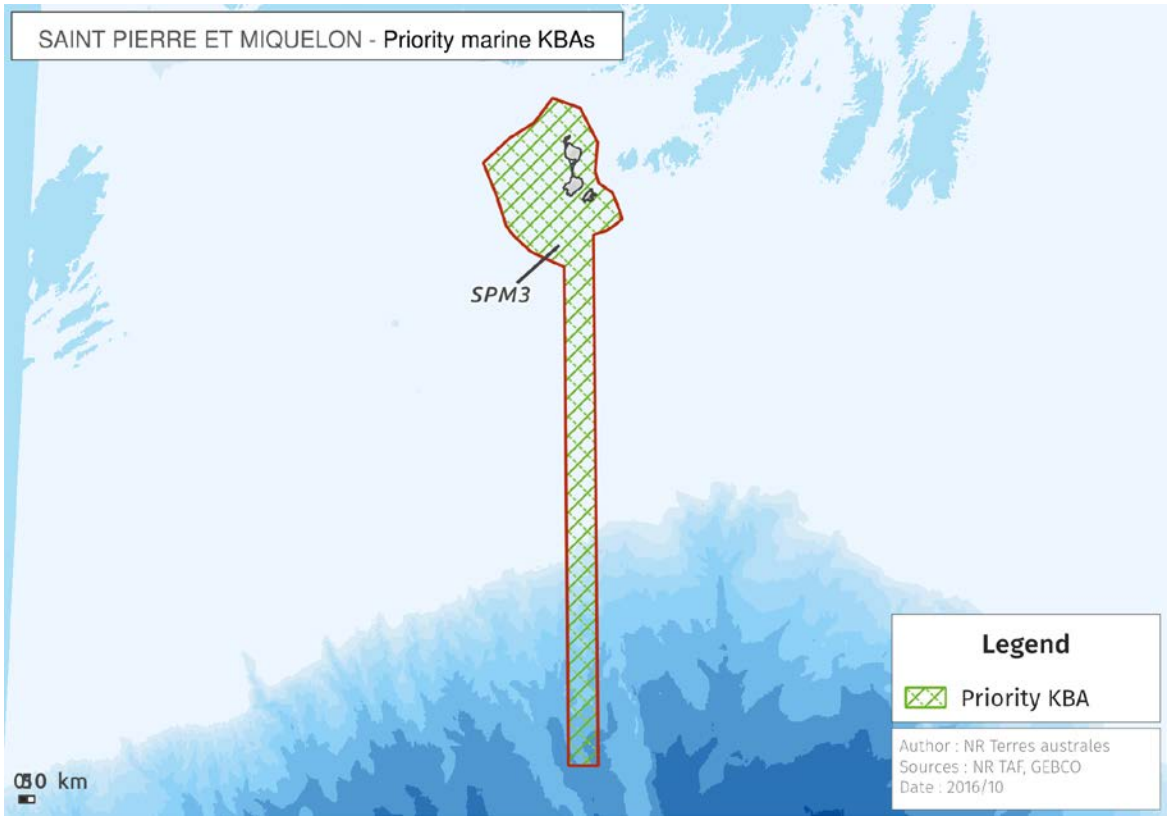
It hosts the harbour seal *(Phoca vitulina)* that calve in there and congregates significantly in the region. The harbour seal is a protected species in France and its population dynamics might be altered by the recent increase in grey seal (*Halichoerus grypus*) numbers. Total seal haulout numbers can reach up to 900 individuals, which represents the highest relative abundance (haulout numbers) for seals in France. The sex and age-Ratio are not known and pup production has not been monitored for several decades. A key threat to this protected marine mammal in the past decades was bycatch in fishing gear. The current bycatch level is thought to be lower than it used to be, but remains unknown. Interactions between seals

and fisheries remain a strong concern locally, mainly because of the high levels of depredation (consumption of fish by the seals in the fishing nets). Mitigating operational interactions between seals and fisheries therefore represents a priority for Saint-Pierre et Miquelon. In addition, grey seal (*Halichoerus grypus*) numbers are thought to increase in the archipelago, most probably coming from the large colonies of Sable Island and/or the St Lawrence Golf (Canada). Their abundance in Le Grand Barachois (and around the islands) is highest during summer, i.e during the harbour seal breeding season. These two sympatric species are potentially competitive, to the detriment of the harbour seal (Lucas & Stobo, 2000 ; Bowen *et al.,* 2003). The impact of the recent increase of the grey seal on the harbour seal colony needs to be studied, in addition to the interactions with human activities. Assessing the trophic role of both seal species (targeted fish species, consumed biomasses, foraging areas) is a key issue in managing interactions between these protected marine mammals and human activities, in addition to the effort to mitigate operational interactions (bycatch, depredation).

Amongst other threats, the site is vulnerable to the erosion of the dunes around the area, the modification of the tributaries trajectories, or the increasing of water temperature and associated green tides and summer housing development on Langlade island (car circulation, quad bikes, stray horses, people rambling into nesting zones…).

This zone was to be proposed as a Ramsar site and has also been proposed as a nature protected reserve.

Figure 56. Saint-Pierre et Miquelon priority marine KBA



Saint-Pierre et Miquelon EEZ hosts an important diversity and biomass of marine species. One major factor of influence is the melt of Gulf Stream waters, Gulf of St Lawrence influence and impact and Labrador stream inside the EEZ: This allows a great diversity of marine species but also a high primary productivity that feeds the whole trophic system. Many birds threatened by extinction by the IUCN Red List feed in this area. The EEZ has been identified as a KBA because it hosts several trigger species: two fishes assessed VU (*Gadus morhua* and *Amblyraja radiate),* two marine mammals assessed EN *(Balaenoptera physalus and Balaenoptera musculus)* and one bird that congregates significantly in the region *(Oceanodroma leucorhoa).* It also hosts some migrating populations, such as eider ducks *(Somateria mollissima and spectabilis)* or Arlequin duck *(Histrionicus histrionicus).* Many marine mammals feed in the area, such as the grey seal and the harbour seal: all seal issues presented in the KBA “”Le Grand Barachois” also exist in the whole EEZ, given the mobility of these species. The extent of their movements, the location of their foraging areas and the areas of strongest interactions with fisheries activities remain unknown and need to be assessed urgently.

The EEZ of highest conservation value have been taken as priority KBAs.

This area includes the “grand Colombier”, an island use for birdnesting. It hosts important birds colonies such as : *Fratercula arctica* (21000 ind), *Alca torda* (5000 ind), *Uria aalge*(20000 ind) and a great population of *Oceanodroma leucorhoa* (600 000 ind).Those birds use the all EEZ surface to feed.

This area could be subdivised in the future when more information on species distribution becomes available.

10.1.3. The French Southern Lands

Table 31. List of priority KBAs of the French Southern Lands

Priority	Code KBA	Name
1	ATF2	Amsterdam. Plateaux des Tourbières
1	ATF1	Amsterdam. Falaise d'Entrecasteaux
1	ATF3	Amsterdam. Zone libre d'accès
1	ATF 70	Crozet shelf
1	ATF 71	Crozet. Benthic areas of Del Cano Rise
1	ATF 58	Kerguelen. Coastal zone
1	ATF 54	Kerguelen. Cold water incursion
1	ATF 53	Kerguelen. Eastern oceanic zone
1	ATF 55	Kerguelen. Kerguelen-Heard seamounts
1	ATF 50	Kerguelen. Northern shelf-break
1	ATF 52	Kerguelen. Polar Front meander
1	ATF 59	Kerguelen. Skiff bank
1	ATF 57	Kerguelen. Southern shelf break
2	ATF 25	Saint-Paul and Amsterdam marine KBA
2	ATF 62	Crozet. High phytoplankton concentrations
2	ATF 73	North of Subtropical Front
2	ATF 74	King penguins passage
2	ATF5	Crozet. Ile aux Cochons
2	ATF11	Crozet. Ile de la Possession. Zone libre d'accès
2	ATF6	Crozet. Ile de l'Est
2	ATF9	Crozet. Pointe basse
2	ATF33	Crozet. Jardin Japonais
2	ATF19	Kerguelen. Iles du golfe du Morbihan
2	ATF13	Kerguelen. Nord de la péninsule Loranchet
2	ATF26	Kerguelen. Péninsule Loranchet
2	ATF51	Kerguelen. North Eastern Shelf Productive area
2	ATF21	Kerguelen. Sud de la péninsule Jeanne d'Arc
2	ATF56	Kerguelen. Western shelf
2	ATF20	Kerguelen. Péninsule Courbet
2	ATF4	Saint Paul

During the Ecosystem Profile process, fifty nine KBAs were identified in the French Southern Lands, 33 terrestrial KBA's and 28 Coastal and Marine KBAs. After a prioritization process based on site and species vulnerability and irreplaceability, 30 KBAs were designed as priority KBAs. Those KBAs have here been regrouped by island or archipelago following geographical and conservation priorities similarities. They are here described.

1. Amsterdam terrestrial area

Figure 57. Amsterdam priority terrestrial KBAs

Amsterdam island is a very special place as it displays unique and diversified ecosystems and landscapes. The "plateau des tourbières" is a plateau bogs which hosts the only population of the Amsterdam Albatross (*Diomedea amsterdamensis*), one of the rarest bird on earth. Assessed critically endangered (CR) by the IUCN Red List, this site qualifies as Alliance for Zero Extinction (AZE). The "Falaise d'Entrecasteaux" is a cliff home to ¾ of the global populations of Indian yellow-nosed albatross, a large population of northern rockhopper penguins and sooty albatross, all endangered species (EN). Forests of *Phylica arborea*, the only tree of the TAAF can also be found. This species, only found on Amsterdam and Tristan da Cunha, was nearly extinct due to fires and bovines but an ongoing restoration programme allowed replanting of more than 3000 individuals.

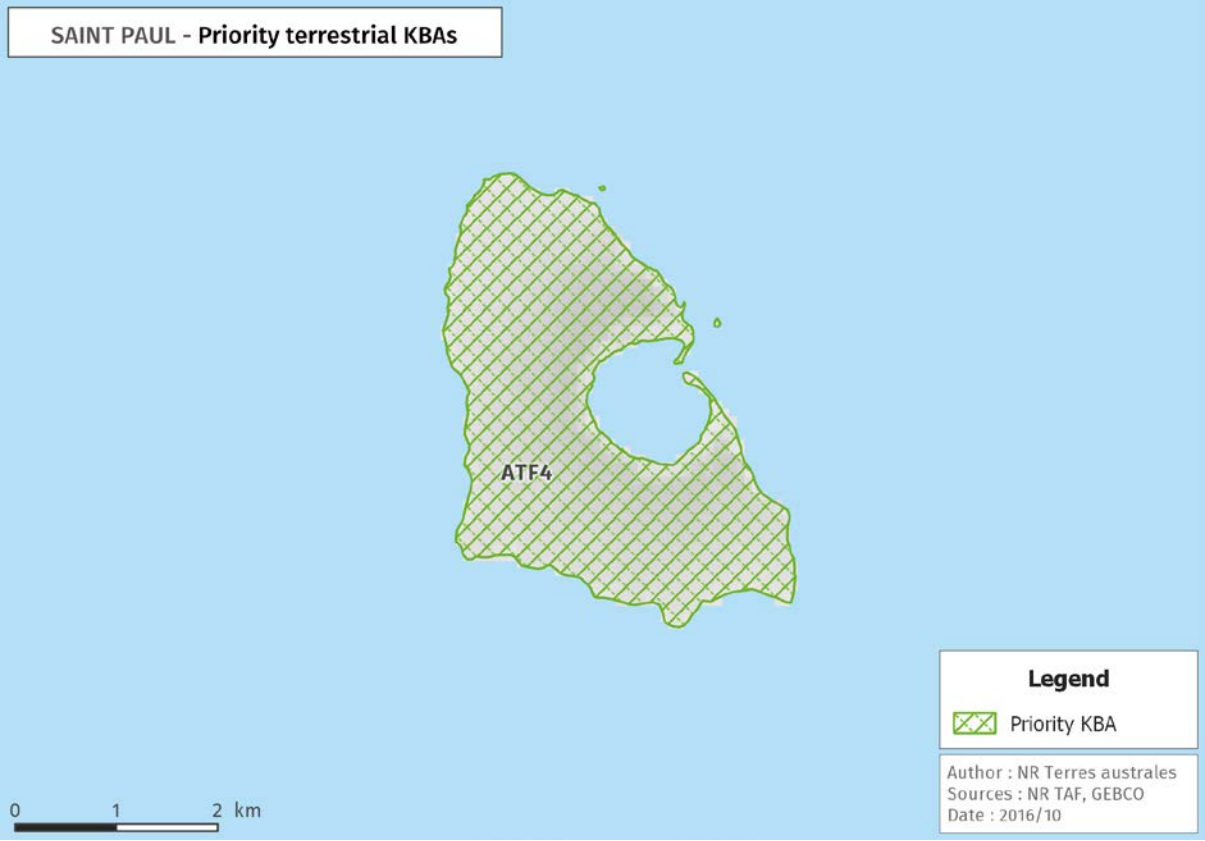
In total, 17 species of birds nest on Amsterdam of which 5 are threatened according to the IUCN Red List and 11 according to the TAAF Red List.

Amsterdam terrestrial land is part of the Nature Reserve and as such, ATF 1 and 2 are scientific research zones while ATF 3 is a restricted area. The principal threat is the presence of invasive alien species (plants, invertebrates, cats, rats and mice) and the transmission of pathogens. Alien plants already invaded most of low altitude ecosystems and some concerns exist for the pristine plateau des Tourbières. Cats, rats and mice prey on seabirds and their chicks with significant impact on the population trend. Avian cholera has been detected on yellow-nosed albatross which caused an important decrease in the population. There are concerns about the transmission of this pathogen to the population of the Amsterdam albatross. One of the hypotheses suggests that rats could be the vector of this disease.

Photo 70. Amsterdam Island (Copyright TAAF)

2. Saint-Paul terrestrial area

Figure 58: Saint-Paul priority terrestrial KBA



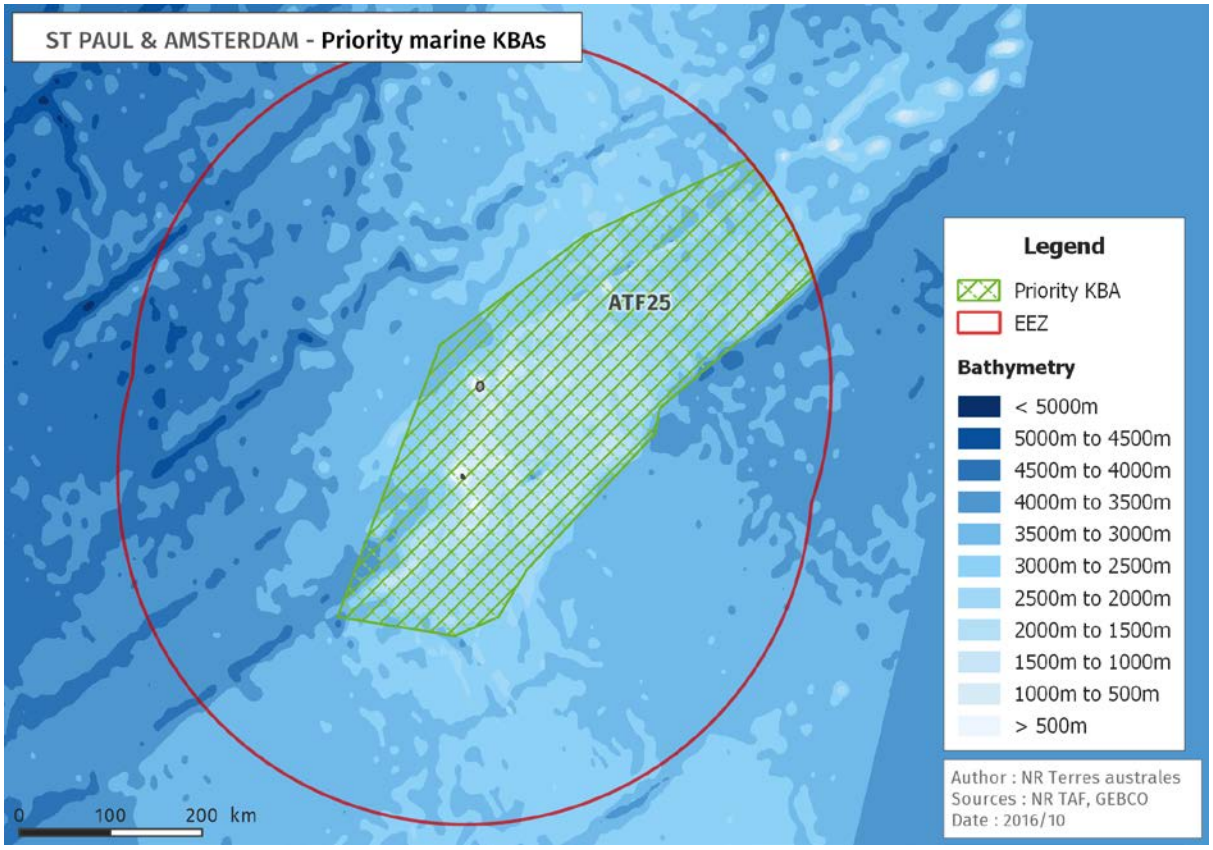
Saint-Paul is a volcano which crater collapsed. Its unique geological characteristics combined with a subtropical climate allowed the development of original ecosystems. They have been strongly impacted by human activities in the 19th and 20th century for fishing and hunting. Invasive alien species brought along with humans caused an important degradation on native flora and flora. Therefore, several eradications have been conducted by the TAAF (rabbits and rats) with success in 1997. Nevertheless, there are some concerns about the development of mice populations with noticeable impact on birds and plants (ex: phylica) which requires more studies. The development of invasive alien plant species is limited compared to the other islands due to the isolation of the site.

Ten species of birds nest on the island, of which two are endangered according to the IUCN Red List: the northern rockhopper penguin (*Eudyptes moseleyi*) and the sooty albatross (*Phoebetria fusca*). There are also populations of Flesh-footed shearwater (*Puffinus carneipes*) and the endemic Salvin's Prion (*Pachyptila macgillivrayi*). The subantarctic fur seal *(Arctocephalus tropicalis)* is also found on this island. There is an important stake for seabirds in Saint-Paul. Knowledge and monitoring on avian population is needed, especially to assess the recovery of populations after eradication actions.

Saint-Paul is an integral protection zone, therefore, access on the island is forbidden except with authorization from the Prefet of TAAF. Therefore, human impact is now very limited and so is the knowledge on biodiversity conservation state.

3. Saint Paul & Amsterdam priority marine KBA

Figure 59. Saint-Paul et Amsterdam priority marine KBAs



The seabed of Saint-Paul and Amsterdam up to 2000m was classified as a priority KBA. The bathymetry of Saint-Paul and Amsterdam is not known precisely yet but according to the GEBCO model, it includes several banks located in the south and at the north-east of Amsterdam and Saint-Paul, along the ridge.

Even though the lack of data does not allow a precise delineation of species geographical range, this area represent a potential habitat for many species, of which two lobster species, *Jasus paulensis* and *Projasus parkeri*, or the southern bluefin tuna *Thunnus maccoyii,* species of high commercial interest. This area is also an important feeding area for birds and marine mammals reproducing in the EEZ.

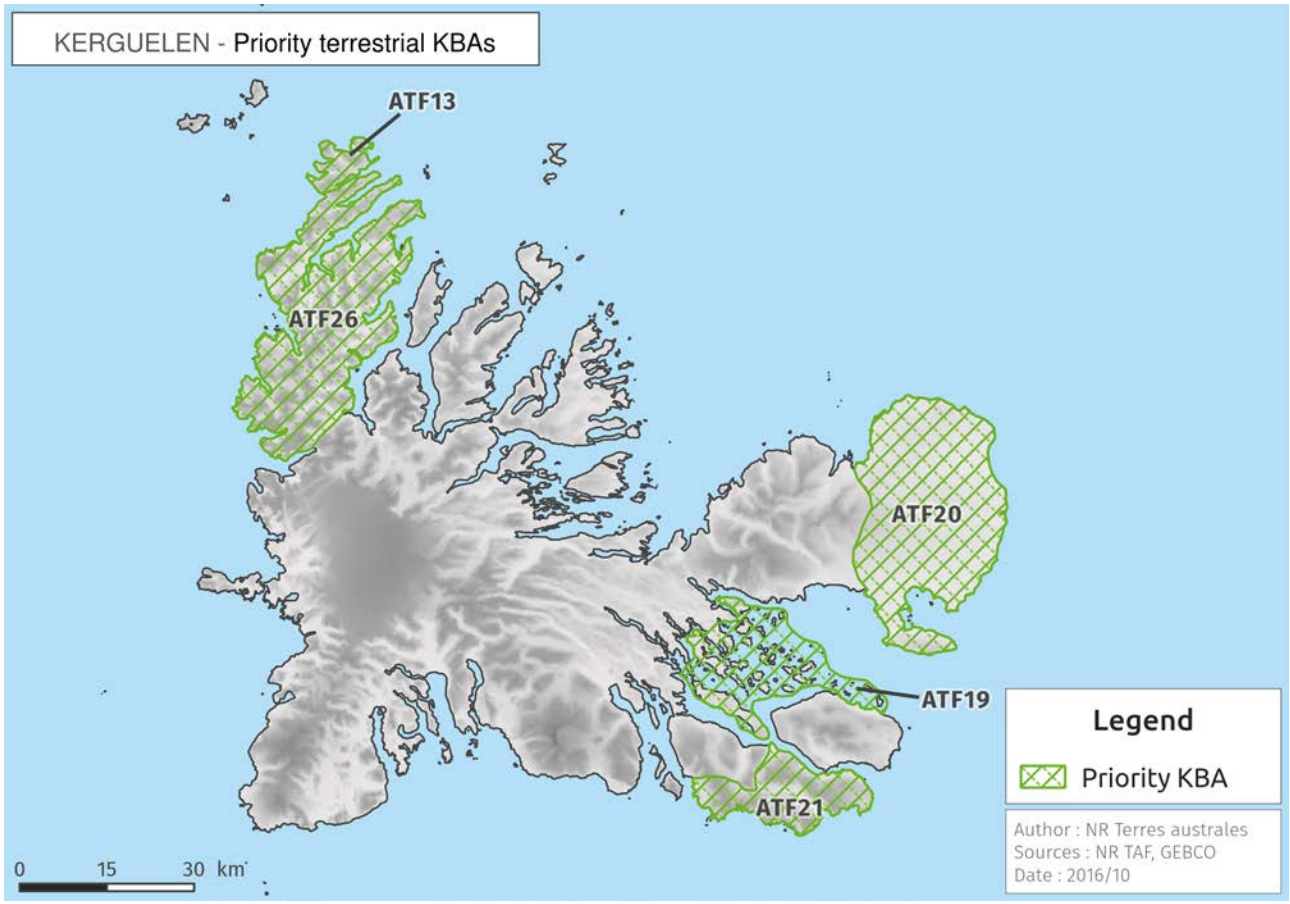
The banks located along the ridge are important connectivity areas, allowing the migration and the reproduction of many marine species from all the Indian Ocean. Also, those shallow areas with special bathymetric and oceanic characteristics (due to the position of the ridge) are favorable habitats for Vulnerable Marine Ecosystems, recognized internationally of high ecological importance. This area extents on a large bathymetric, latitudinal and longitudinal gradient which allows a good representation of species present in Saint-Paul and Amsterdam EEZ.

The area within the 24 nautical miles is integrated in the Nature Reserve. Fishery activities exists in the area below 500m and scientific monitoring of this fishery is provided by the

Museum of Natural History. Nevertheless, data on commercial and bycatch species is still scarce and there are some concerns about fishes and lobster stocks trends. Knowledge improvement in Saint-Paul and Amsterdam EEZ have been identified as a priority action in the Nature Reserve management plan.

4. Kerguelen priority terrestrial KBAs

Figure 60. Kerguelen priority terrestrial KBAs



The priority terrestrial KBAs in Kerguelen are located in the Loranchet peninsula (ATF13 and 26), the south of Jeanne d'Arc Peninsula (ATF21), the islands of the golfe du Morbihan (ATF 19) and the east of peninsula Courbet (ATF 20).

They host six endangered birds: the grey-headed albatross (*Thalassarche chrysostoma*) (EN), the sooty albatross (*Phoebetria fusca)* (EN), the white-chinned petrel (*Procellaria aequinoctialis)* (VU), the Macaroni penguin (*Eudyptes chrysolophus*) (VU), the Southern Rockhopper Penguin *(Eudyptes chrysocome)* (VU), the wandering albatross (*Diomedea exulans*) (VU) and the Eaton's pintail *(Anas eatoni)* (VU). The population of the white-chinned petrel is probably one of the most important in the Indian Ocean. Kerguelen also hosts the second largest colony of Southern elephant seal in the world, with around 50000 females counted on Courbet Peninsula.

The Loranchet peninsula hosts large seabirds colonies, especially in the north, of which the black-browed albatross and the Macaroni penguin. It is a well preserved site, with very few introduced species excepted some rabbits; the reindeer doesn't reach this part of the island. Humid zones can be found in this place; they host very specific flora and fauna species and are very vulnerable to stepping.

In the south of Jeanne d'Arc Peninsula, the cliffs host several colonies of seabirds, especially of black-browed albatross. On the plateau, the endemic *Lyallia kerguelensis* and the Kerguelen cabbage (*Pringlea antiscorbutica*) can be found. The reindeer doesn't seem to reach this site but presence of cat, rabbit and mice populations is confirmed.

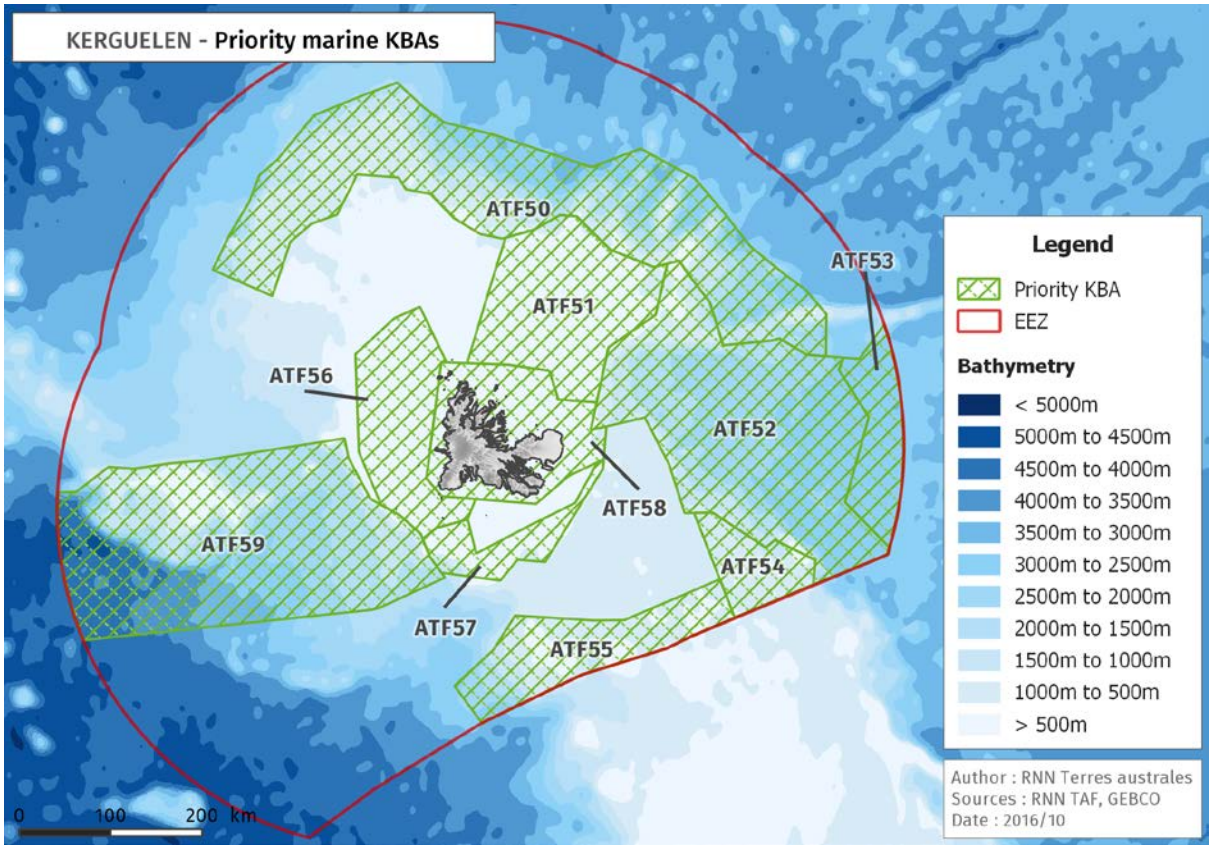
The east of the peninsule courbet hosts important colonies of elephants seals and fur seals but also many seabirds including gentoo penguins, king penguins, Macaroni penguins, light-mantled albatross, Kerguelen shags and Eaton's pintails. The main threats come from cats that prays the eggs and juveniles of seabirds and from pathogens.

The islands of the Golfe du Morbihan host numerous species of plants and seabirds, of which the white-chinned petrel and the endemic Eaton's pintail. Some of the islands are well preserved, with a limited human impact (past or present) and still host very pristine habitats (such as Azorella associations, Kerguelen cabbages, Aceana). Other islands faced the impact of human activities, including logistic activities in Port-aux-français. They are very vulnerable to invasive alien species, flora and mammals species. Ile Longue differs from the other islands by its size and therefore the diversity of habitats it hosts. It is also the most degraded site in term of pollution and invasive alien species, of which the black rats, house mice (*Mus musculus*) and more than 30 alien phanerogam species (Frenot et al 2001). These islands are not the richest sites in Kerguelen in terms of native biodiversity but they can represent a threat to the other islands if the dispersion of IAS is not managed properly. There is an important action opportunity for those places as they are well known and easy to access from Port-aux-Français.

All Kerguelen terrestrial land is included in the Nature Reserve. ATF13, 26, 21, a part of 19 and 20 are under restricted access areas. ATF 19 has a mixed status of integral protection sites and sites restricted to scientific research. The principal threat to those sites is invasive alien species (cats, rabbits, reindeer, mice and rats and plants) and the impact of scientific activities.

5. Kerguelen priority marine KBAs

Figure 61. Kerguelen priority marine KBAs



Kerguelen Plateau is one of the richest area in the subantarctic region. The waters of Kerguelen are very rich in krill, squids and fishes, which are the main trophic resources for marine mammals and birds. The EEZ of Kerguelen hosts four threatened whales (*Balaenoptera borealis, Balaenoptera musculus* and *Balaenoptera physalus),* the sperm whale (VU) *(Physeter macrocephalus)* and two vulnerable fishes (*Channichthys velifer* and *Lamna nasus).*The local Red List also classified the orca *(Orcinus orca)* as endangered (EN). Birds nesting in Kerguelen also rely on this area for food resources, including 18 threatened species.

A workshop gathering 29 scientists from scientific organizations involved in the TAAF were held in Paris in 2016 (Koubbi et al. 2016). During this workshop, ecoregions were defined according to ecological and geomorphological characteristics and ranked according to four level of conservation priority. A detailed description of Kerguelen marine ecoregions, including top predators and the pelagic and benthic realm, is provided in the Report: Ecoregionalisation of the Kerguelen and Crozet islands oceanic zone. Part I: Introduction and Kerguelen oceanic zone. CCAMLR Report WG-EMM- 16/43. 18 june 2016. Those ecoregions have been taken as KBA, as these reports represent the most complete and up-to-date data on marine biodiversity in Kerguelen. All ecoregions considered to be of high conservation concerns (priority level 2 and 3) were taken as priority KBAs.

Priority KBA candidates identified in the EEZ can be described as follow:

ATF50. The Northern Shelf break is located south of the SAF with high intensity of the ACC. A retention zone is observed in the central part of the ecoregion. The north western and south-eastern parts of the ecoregion are areas of high abundance and biodiversity for birds and marine mammals that rely on the available squids. It is also an area of high diversity and abundance of demersal fish including endemic species found over the shelf break.

ATF51. The North Eastern Shelf Productive area is characterised by the high phytoplanktonic biomass. There is a high biomass and diversity of VME indicators taxa. The Commerson's dolphins are present and macaroni penguins rely on this habitat in summer.

ATF52. The Polar Front meander is the northernmost area of the Polar Front in the Indian part of the Southern Ocean and also the northernmost distribution of species assemblages with Antarctic affinity. Iron fertilization is observed. It is the major foraging region of marine birds and mammals consuming mesopelagic resources. The western part of the area is very stable from one year to another promoting foreseeable fishing habitat for top predators.

ATF53. The Eastern oceanic zone is a highly dynamic productive area linked to the Kerguelen panache. It is an important area for elephant seals, rockhopper penguins and petrels.

ATF54. The Cold water incursion ecoregion has the northernmost distribution of Antarctic waters in subsurface, structuring the vertical distribution of micronekton and making mesopelagic preys more accessible to top predators.

ATF55. Kerguelen-Heard seamounts is at the border with the Australian EEZ. It is facing some of the Heard Island and McDonald Island MPA. These habitats are covered with mud. It also covers the prime foraging habitat of juvenile males of elephant seals. *L. squamifrons* has one of its spawning grounds over one of the seamount.

ATF56. The Western shelf shows high taxa diversity of VME indicators. It is a spawning ground of *G. acuta*.

ATF57. The Southern shelf break is a spawning of L. squamifrons and N. rossii.

ATF58. The coastal zone is characterized by unique and mostly pristine habitats such as those found in the fjords with entrance sills, in bays of various sizes, those of deep and blocking mussel beds, and of the shallow waters dominated by kelp forests. It is highly influenced by freshwater runoff from rivers and glacial meltwaters. Among these areas, the Morbihan Bay is the largest bay; the entrance is marked by a shallow sill that conditions water flows between the numerous islands and islets of the bay. It is also the coastal marine area with the best scientific knowledge due to long term studies and also a key breeding and feeding area for many seabirds. The northern areas are characterized by the presence of fjords, bays and islands of various sizes. The bay of Baleiniers is a nursery ground for larval fish. Some fjords show spawning grounds for *Lepidonotothen squamifrons*. All the coastal area is a spawning ground for coastal fish, some of them being endemic to the archipelago. They also are nurseries for neritic fish such as N. rossii.

Along the coasts of the Kerguelen, marine forests of the macroalga *Macrocystis pyrifera* shelter an ecosystem of fundamental biological importance for many species. It is estimated that it would gather about a third of all benthic marine species of the area, that is about 200

invertebrate species, and it represents a nursery zone for 2/3 of the fishes. It also protects the shoreline against erosion by waves and hosts the endemic subspecies of Commerson dolphin (*Cephalorhynchus commersonii kerguelensis*), which occurs in high abundance in Morbihan Bay. The coastal zone shows the presence of VME taxa.

Historically, high concentration of humpback whales has been reported in coastal areas too.

ATF59. The Skiff bank and the surrounding southern oceanic zone gather the entire bathymetric gradient from the top of the bank to the deep areas. The Skiff bank is the largest bank in the area and is an essential area for fish with a spawning ground for icefish and Patagonian toothfish. This ecoregion has a high diversity of indicator taxa that are specific to VMEs.

All of those KBAs are part of the Nature Reserve of French southern lands and a major part of ATF 52, 55, 56, 57, 58, 59 are under a no take protection.The whole EEZ is managed by the TAAF administration, including fisheries (targeting mainly the Patagonian toothfish).

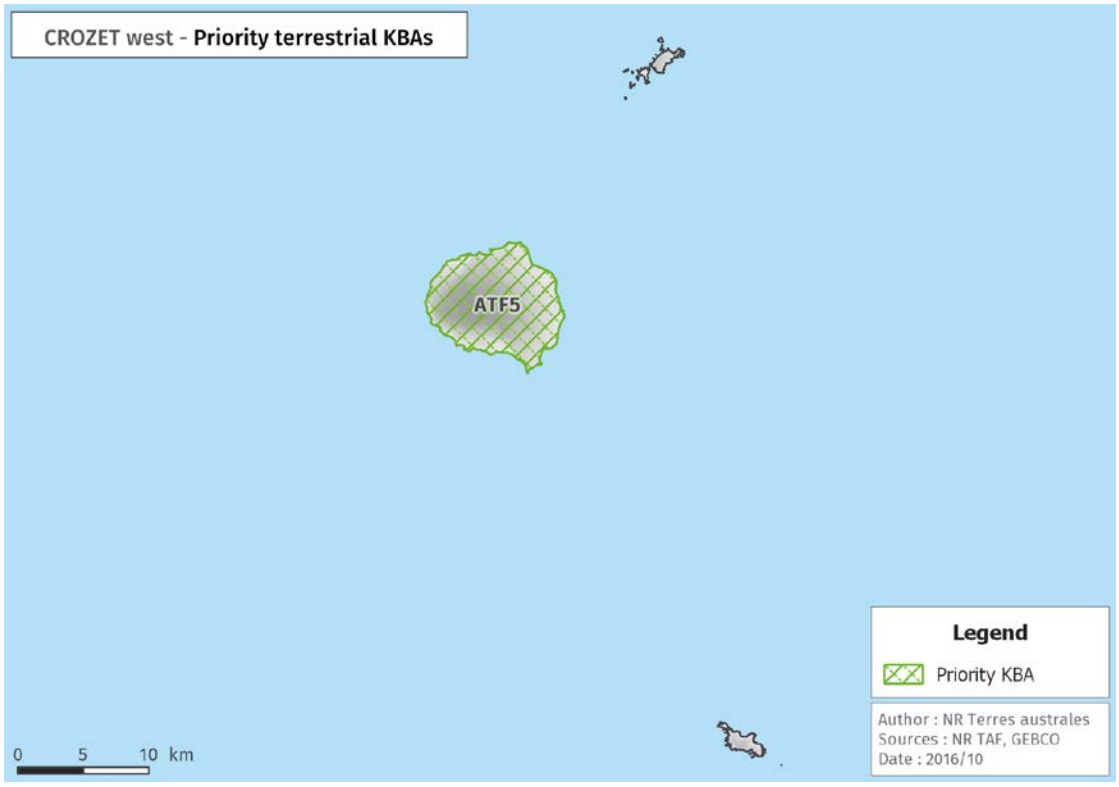
The Patagonian toothfish fishery exists in ATF54, ATF50, ATF59, ATF57 and ATF52, where it received the MSC certification (Marine Stewardship Council), rewarding sustainable managed fisheries. While great progress has been done on avian mortality, bycatch issue still need to be tackled, especially for the three endemic rays of Kerguelen (*Bathyraja irrasa, Bathyraja eatonii* and *Bathyraja murrayi).* A potential threat linked to human activities in that area could be the development of a new exploitation, for example of *Macrocystis pyrifera* or lantern fishes. The impact of climate change on marine biodiversity is also to be considered, as the shifting of oceanic fronts will affect primary production zones and therefore the distribution of all marine species.

Photo 71. Workshop for the Ecoregionalization of Kerguelen, Paris (Copyright TAAF)

6. Crozet priority terrestrial KBAs

Figure 62. Crozet priority terrestrial KBAs – East

Figure 63. Crozet priority terrestrial KBAs - West



The priority terrestrial KBAs in Crozet archipelago include l'île aux cochons (ATF5), Ile de l'Est (ATF6) and a large part of Ile de la Possession (ATF11, ATF 9 and ATF 33).

Crozet archipelago is known as one the richest avifauna area on earth due to the rarity of breeding sites for birds and marine mammals in the highly nutrient-rich waters of the Southern Ocean (Guinet et al., 1996). This archipelago hosts one of the most diverse and abundant populations of seabirds and marine mammals in the Southern Ocean. The Crozet Islands are the breeding site of 36 birds, including 34 species of seabirds (7 of whom are albatrosses species and 19 are petrels species). Some of these species are classified as threatened according to the IUCN Red List: the sooty albatross *(Phoebetria fusca) (EN),* the wandering albatross (*Diomedea exulans*) (VU), the grey-headed albatross *(Thalassarche chrysostoma)* (EN), the macaroni penguin *(Eudyptes chrysolophus)* (VU), the Rockhopper Penguin *(Eudyptes filholi)* (VU) the white-chinned petrel (*Procellaria aequinoctialis*) (VU) and the Eaton's Pintail *(Anas eatoni)* (VU). It also hosts one endemic species (*Phalacrocorax melanogenis)* and two endemic sub-species (*Chionis minor crozettensis and Anas eatoni drygalskii*). The most important colony of King penguins on earth can be found in the "île aux Cochons", where more than 1 million individuals gather for breeding.

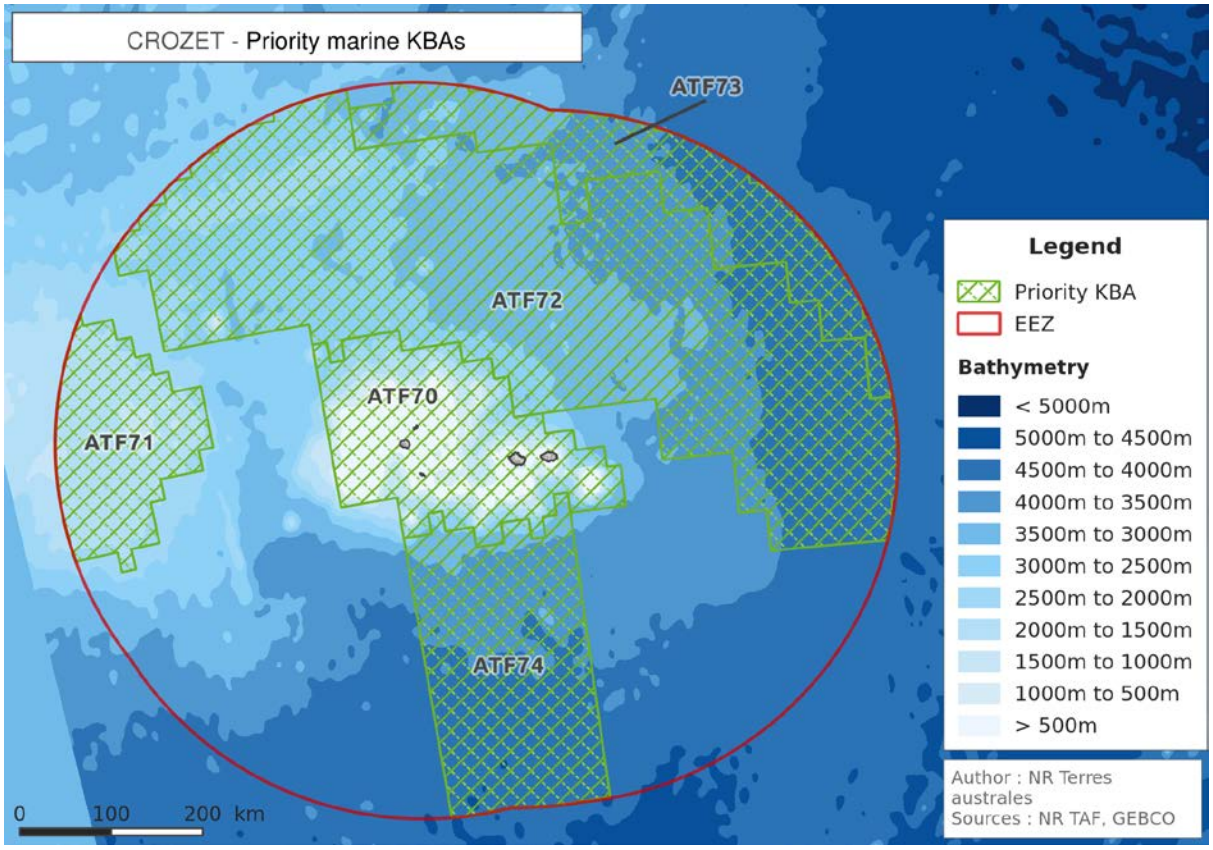
All Crozet Islands are covered by the Nature Reserve. The "Ile aux cochons" and "île de l'Est" are integral reserves (no activities allowed). The "île de la Possession" is a multiple status area: Pointe Basse is located in the zone restricted to research activities while Zone libre d'accès is regulated.

The principal threat is invasive alien species (cat, rabbit, mouse, rat, plants and invertebrates). Climate change is also a major threat as the shifting of oceanic fronts might shift feeding areas of many seabirds. For example, the feeding area of the King penguin is suspected to move from 20 to 40 kms to the south per year in the future (Bost et al. 2015).

Photo 72. La baie Américaine à Crozet (Copyright TAAF)

7. Crozet priority marine KBAs

Figure 64. Crozet priority marine KBAs



The EEZ of Crozet hosts an important diversity and biomass of marine species. One major factor of influence is the relative proximity of three oceanic fronts inside or near the EEZ: the Polar front (south of the EEZ), the subantarctic front (in the middle of the EEZ) and the subtropical front (north of the EEZ). This allows a great diversity of marine species but also a high primary productivity that feeds the whole trophic system. Many birds threatened by extinction by the IUCN Red List feed in this area, including the southern rockhopper penguin (*Eudyptes filholi*), the white-chinned petrel (*Procellaria aequinoctialis*), the wandering albatross (*Diomedea exulans),* the Macaroni penguin *(Eudyptes chrysolophus),* the Sooty albatross *(Phoebetria fusca),* the Indian yellow-nosed albatross *(Thalassarche carteri)* and the grey-headed albatross *(Thalassarche chrysostoma)*. Two threatened marine mammals are also present in the EEZ: the blue whale (*Balaenoptera musculus)* and the sperm whale *(Physeter macrocephalus).*

The scientific program CROMEBA (Crozet Marine Ecosystem Based Management) compiles and analyses the latest available data on Crozet (top predator, pelagic and benthic data). Ecoregions have been identified according to species distribution and oceanographic characteristics (Koubbi et al, 2016b). The ecoregions of highest conservation value have been taken as priority KBAs. They are described bellow.

ATF 72 : The high circulation of waters in this area and the sediments from the plateau causes an important phytoplankton production. This creates an important feeding area for many seabirds and marine mammals, of which macaroni and rockhopper penguins, giant petrels, white-chinned petrels, and elephants seals. This is the only place where the two fronts meet (the subantarctic and subtropical front) which makes the region and associated species very vulnerable to climate change.

ATF 70 : This KBA assembles the five islands of the archipelago. The waters are very rich in iron thanks to the sediments from the plateau and it allows a high primary productivity. This is a very interesting zone in terms of benthic species but also for endemic fish species (Nototheniidae, Liparidae, Rajidae). This is an important feeding zone for many seabirds.

ATF 71 : The Del Cano rise is targeted mainly by wandering albatrosses but also by the sooty albatross, white-chinned petrels, macaroni and rockhopper penguins. This is an important connectivity zone with the south african islands of Marion and Prince Edward.

ATF 73 : This region is very interesting because it is located north of the subtropical front, which implies species assemblages very different from the subantarctic zone. It is less targeted by seabirds apart from sooty albatrosses, white-chinned and giant subantarctic petrels, macaroni and rockhopper penguins which feed in the area.

ATF 74:

The southern passage has been kept as a priority KBAs because it represents a transit zone for many seabirds towards feedings zones located south of the EEZ. In particular, it is used by the king penguins and giant petrels. In a context of climate change and a southern shift of the Polar front, this area represents a strong conservation stake.

More information on these KBAs can be found in Koubbi et al. 2016.

The whole EEZ fisheries are managed by the TAAF administration and a part of those KBAs are covered by the Nature reserve. The Patagonian toothfish exists in ATF70 and ATF71 and to a lesser extent in ATF72 where it is applying to the MSC certification (Marine Stewardship Council), rewarding sustainable managed fisheries. Fishery areas only covered 8% of Crozet EEZ. The main threat in the marine areas is the impact of climate change, including the shifting of oceanic front, the rise of seawater temperature and the acidification of the ocean. This could have dramatic effect on the trophic system, including changes in primary production, the shift of feeding areas, benthic habitats degradation etc. Data on marine ecosystems are scarce compared to Kerguelen. Research is needed to better understand marine ecosystems and implement appropriate management measures.

10.1.4. South Georgia and South Sandwich Islands

Table 32. Priority KBAs

KBA code	KBA Name	Type
SGS1	King Haakon Bay to Cumberland Bay	Terrestrial
SGS2	Cumberland Bay to Drygalski	Terrestrial
SGS3	Drygalski to Ducloz Head	Terrestrial
SGS4	Ducloz Head to King Haakon Bay	Terrestrial
SGS5	Annenkov Island	Terrestrial
SGS6	Cooper Island	Terrestrial
SGS7	Willis Islands	Terrestrial
SGS8	Bird Island	Terrestrial
SGS38	SSI Pelagic Closed areas (within 12 nm of each island).	Pelagic
SGS39	SSI offshore pelagic.	Pelagic

The whole terrestrial part of South Georgia and four islands have been designated as priority KBAs. It hosts 4 threatened species: the grey-headed albatross (EN), the wandering albatross (VU), the macaroni penguin (VU), the white-chinned petrel (VU). It also hosts 18 species that congregrates significantly in the region.

For the marine area, South Sandwich Islands territorial water and its offshore waters have been designated as priority KBAs.

Figure 65. Priority terrestrial KBAs in South Georgia and South Sandwich Islands

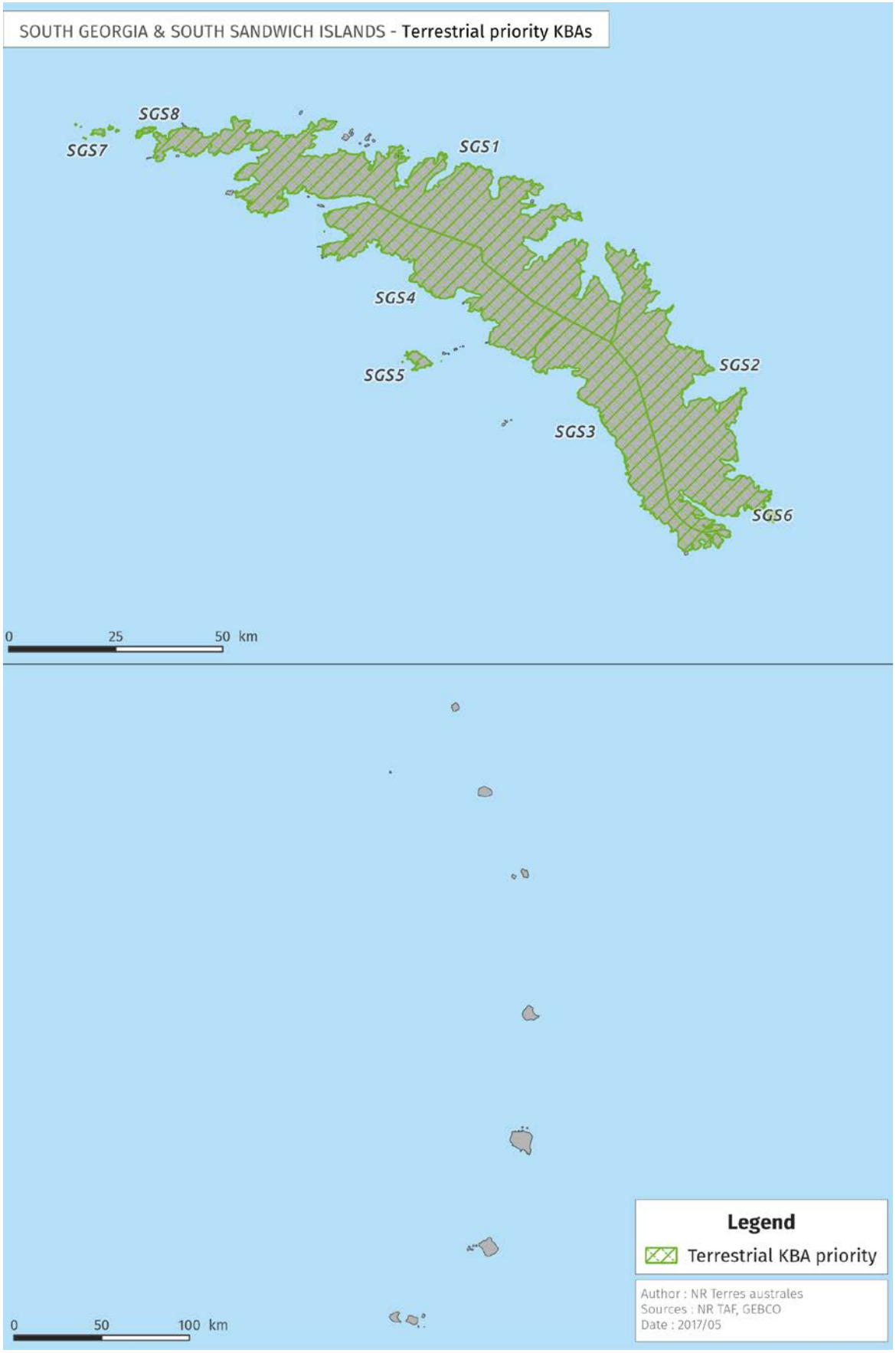
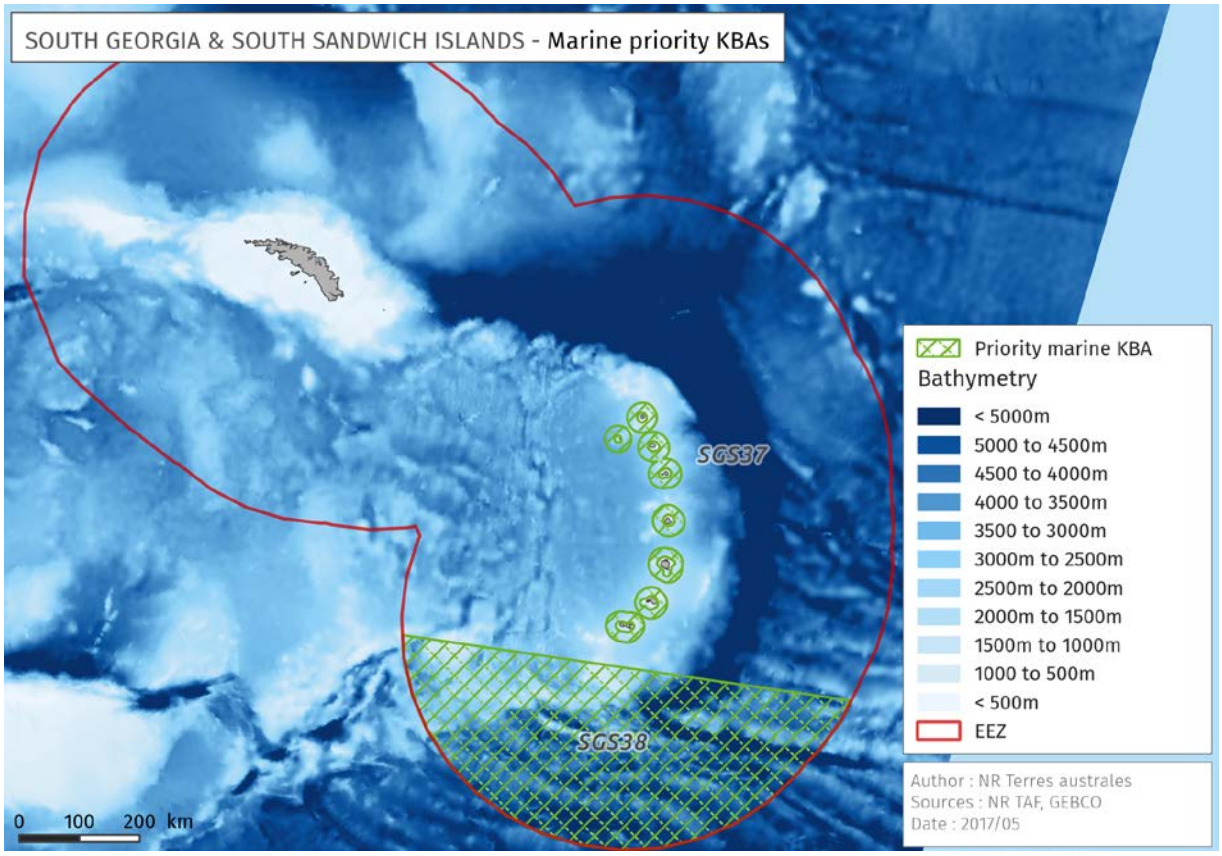


Figure 66. Priority marine KBAs in South Georgia and South Sandwich Islands



10.1.5. British Antarctic Territory and Adélie Land

No KBAs were prioritized for the Antarctic territories because of the low immediate site vulnerability and the absence of threatened species. Nevertheless, climate change represents an important threat, despite the difficulties of accurate evaluation or prediction (but see Jenouvrier et al. 2017). Research on the impact of climate change on biodiversity is therefore a high priority throughout those territories. Also, the impact of fisheries has been recognized as an important threat, and the CCAMLR is developing a risk assessment for krill fishing in the Antarctic Peninsula/South Shetlands/South Orkneys and Durville Sea regions, which suggests that certain areas are at greater risk based on potential impact on predator colonies. Further research is then needed on the whole territory. Additional studies on human presence impact, potential competition with invasive species, as well as impacts of pollutants on the physiology and reproductive status are also needed to complement our knowledge of the resilience of the species in these territories.

10.2. Thematic priorities

The Overseas Countries and Territories in the polar and subpolar regions are some of the world's least disturbed areas, representing an exceptional natural heritage (Chapter 3 - Biological importance). They host numerous threatened and restricted range species inhabiting areas of global conservation importance (Chapter 4. Conservation outcomes). Biodiversity conservation and research in polar-subpolar regions is framed by international conventions (CCAMLR, SCAR, ACAP, CMS, CITES etc.), as well as national and local regulations, including many terrestrial or marine protected areas (Chapter 6. Legal and political context). These territories are under serious threats, mainly caused by invasive alien species, human activities and climate change (See Chapter 8. Threats). Numerous programs for species and ecosystems conservation and research have been implemented to address those threats (See chapter 9. Current investments). Funding is still needed to strengthen those programs and develop new initiatives in the frame of the following thematics:

10.2.1. Improving knowledge about climate change, and other stressors impacts on biodiversity, ecosystems and ecosystem structures

Each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850. The globally averaged combined land and ocean surface temperature data show a warming of 0.85 [0.65 to 1.06] °C over the period 1880 to 2012. Temperature rise is even more significant in Polar regions, with an increase from 1 to 2°C of average temperature in the Arctic since the 1960-1970s. Consequently, the Greenland and Antarctic ice sheets have been losing mass over the period 1992 to 2011, modifying the distribution of species and access to resources.

Modifications of oceanic fronts have also been observed, with for instance a southward shift of the Polar front, joined with the shift of biogeographic regions such as Antarctic area near the Southern Lands (Allan et al. 2013). This leads to changes in the temperature, salinity and composition of water, with predictable impact on coastal ecosystems.

Since the beginning of the industrial era, oceanic uptake of CO2 has resulted in acidification of the ocean; the pH of ocean surface water has decreased from 8,5 to 8,2 and most of the scenarios agree toward an additional decrease of 0,3 units in 100 years. The process of acidification is much faster in cold waters, with subsequent impacts on calcifying organisms (foraminifera, corals, mollusks, bryozoans, echinoderms…), in particular plankton species with calcareous skeleton, with predictable impact on the whole food web (David & Saucède 2015). In particular, this would affect benthic species and vulnerable marine ecosystems, already impacted by fisheries and pollution. Those vulnerable marine ecosystems (VME) have been recognized of global importance (CCAMLR 2009) due to their key role in marine ecosystems (nursery, feeding area, carbon sink, protection against erosion…).

Also, the rise of seawaters temperature resulted in the decrease of reproduction success of some seabirds, such as the king penguins for whom a rise of 0.3°C of water temperature

could lead to a diminution of 9 % of the survival rate of adults (Le Bohec et al. 2008). Prediction also estimate a southward shift of 25 à 41 km per year of the Polar front, resulting to a distance to feeding areas twice as long for King penguins (Peron et al. 2012; Bost et al. 2015). Wind systems also changed, resulting in modifications of some birds species distribution such as the wandering albatross, which southward shift increased their success of reproduction (Weimerskirch et al 2012).

In terrestrial areas, the changes in wind, pluviometry and temperature already affected the soil and the repartition of plants. It also led to the installation of alien species, some of them being invasive (see next section).

Forecasting the impact of global changes on Polar and Subpolar ecosystems is essential to plan effective conservation actions that are relevant in the long term. It is particularly important in Polar and Subpolar regions which are expected to face dramatic changes in the decades to come.

Priority actions include:

- Implementation of additional observatories to follow the changes in climate and others stressors and the effect on biodiversity and ecosystems.
- Assessment of species and habitat sensitivity, vulnerability and resilience to plan the impact of climate change on their dynamics
- Assessing the changes in species habitat preferences to plan adequate conservation actions for the most vulnerable species
- Oceanographic and pelagic monitoring along with the identification of high production areas that will structure the distribution of the whole trophic network
- Monitoring vulnerable marine ecosystems to understand their response to stress and predict and mitigate the effect of global changes on benthic and pelagic ecosystems. Identifying the ecosystem Essential Ocean Variables to implement coordinated censuses throughout the Southern Ocean, in phase with International Programs (Constable et al. 2016).
- Understanding the fluctuations in oceanographic and biological conditions.
- Research on Antarctic and Sub-antarctic nearshore (shallow) and intertidal ecosystems. The SCAR Horizon Scan identified the intertidal zone as one of 80 key priority areas for research in the next 20 years as it is relatively easy to access and monitor (Kennicutt et al. 2014).

10.2.2. Research on and management of invasive alien species

Biological invasions are amongst the most significant threats to biodiversity worldwide, threatening species survival and being responsible for major changes to ecosystem structure and functioning. The IUCN considered Invasive Alien Species (IAS) to be the 2nd cause of species extinction in the world.

Photo 73. Invasive alien species (Copyright TAAF)

The isolation of islands often led to the development of a specific biodiversity, highly adapted to the extreme climate conditions, in the frame of a simplified trophic network. On subantarctic islands, species are not very competitive and did not developed any defense mechanisms against foreign pressures. The late arrival of human strongly impacted those territories, mostly through the foreign species they brought with them. Historically, some species were introduced voluntarily (like bovines or plants for food) but also involuntarily (rats, mices, plants by boats). Some pathogens have also been introduced, mainly hosted by introduced plants and animals.

Temperature increases may allow the implantation of new species that enter in competition with native ones. An increase of both the dissemination and colonisation capacity of plants is then observed (Lebouvier et al. 2009) but also an increase of survival rate of introduced mammals (Tompkins et al. 2013). Impacts are already visible in the Subantarctic islands with for example, cats and rats causing the diminution of seabirds populations while ungulates or rabbits affect the vegetal communities. At lower trophic levels invasive terrestrial invertebrates have been shown to have dramatic effects on the soils and native invertebrate communities.

On Kerguelen and South Georgia, for example, the unintentional introduction of predatory beetles has led to local extinction of most large native invertebrates, including species crucial in the decomposition of organic matter (although other introduced species can lead to increased decomposition rates).

It is particularly important to understand the implications and potential damage these species may have on the terrestrial environment as these may cause further detrimental changes further up the food web.

Improving research on IAS is an essential step to understand and control their dispersion in a more effective way. Biosecurity programs need to be implemented along with a better supervision of human activities. Those programs should

include the strengthening of all stakeholders' participation and awareness. When scientific evidences recommend it, both limitation and eradication actions have to be conducted, in the respect of ethical and ecological principles. Efforts are also needed to restore ecosystems and allow the reestablishment of native species. This should include, in a first stage, a better understanding of the ecosystem composition and resilience.

10.2.3. Research and conservation of threatened and restricted range species and their habitats

The Polar and Subpolar regions host an abundant biomass and very specific species and ecosystems. Seabirds and marine mammals gather in great congregations in these areas where they find important feeding resources. While the Arctic hosts some of the most emblematic marine mammals like the Polar bear and the beluga whale, the Subantarctic islands present the richest avifauna in the world. As for example, the French southern lands host 47 species of birds, five of them being strictly endemic to the islands. The isolation of subantarctic islands led to a high rate of endemism strict or regional, especially for birds, plants and invertebrates. The extreme climate conditions also led to specific adaptation of species, like the Anatalanta aptera, a fly without wings in the southern lands.

Many of these species and habitats are now at threat. The IUCN Red List considers that at least 65 species are threatened with extinction in Polar and Subpolar overseas territories.

The mass extinction of species is mainly due to four major factors:

- The destruction and fragmentation of habitats (deforestation, mining, human constructions…) and the degradation and the pollution of those places
- The multiplication of invasive alien species benefiting from the increase of transports and temperature warming
- The overexploitation of natural resources (fishing, hunting…)
- Climate change and its impact on species distribution and food availability

Many birds and marine mammals in polar and subpolar regions are now protected by national, European or international legislations. Protected areas are established, but work still needs to be done to reach the Aichi 2020 goals to protect 10 % of marine areas and 17% of terrestrial areas. Research on species distribution and habitat preference is essential to ensure that conservation tools are planned adequately and have the desired effect. Important areas for species and ecosystem components need to be identified in finer scale. Species and habitats sensitivity to existing and new emerging stressors needs to be

Photo 74. The Crab eater seal in British Antarctic Territory (Copyright Stewart McPherson)

assessed, along with the development of Red Lists assessment (IUCN or local scale). Threats to species and habitats needs to be identified and managed, if necessary by the establishment of protected or conserved areas. For the most threatened species, specific action plans need to be elaborated and appropriate legislation and regulation need to be settled.

The BEST Ecosystem profile listed 155 species of high conservation concerns in Polar and Subpolar EU overseas territories (threatened, restricted range, important congregation). Those species triggered the delineation of 294 Key Biodiversity Areas (Annexe:map). Those sites are important areas that need to be adequately managed or preserved. In this objective, important investments are needed to implement conservation actions in those remote and hardly accessible areas.

10.2.4. Research on marine ecosystems

Marine populations have declined globally by 49% between 1970 and 2012 according to the Living Blue Planet Report (WWF 2015). Causes are multiple: global changes (rise of seawater temperature, changes in acidity and salinity …) and human activities (fishing pressure, habitat destruction, pollution…). Polar and Subpolar territories are extremely dependant on the ocean (food and nutrient resources, climate regulation…). Moreover, the economic resources of those territories mainly come from fisheries outcomes. For instance, approximately 90% of the Greenland economic export is generated by fisheries.

Knowledge on marine areas is very scarce and it addresses mainly coastal areas or primarly comes from data collected through fishing vessels or in a lesser extent southern polar areas tourism. Nevertheless, data are needed to implement appropriate conservation and management actions. Studies must be conducted on the ecosystems and species in the pelagic and benthic areas. In particular, studying marine vulnerable ecosystems (VME) is a priority in Polar and Subpolar regions. In fact, those ecosystems deliver essential ecosystem services (nursery, feeding areas, carbon sink, protection against erosion etc.) and are really vulnerable to pressures such as climate change, acidification or fisheries.

Marine ecosystems also provide essential ecosystem services at global scale. It offers provisioning services (natural resources), supporting services (primary production, carbon sequestration, nutrient cycle etc.), cultural services (educational, spiritual) and regulating services (climate regulation etc.). As for example, the ocean absorbs more than 30% of anthropogenic carbon dioxide emissions. Those services are poorly known and assessed. However, the evaluation of ecosystem services is a key step to value the ocean and promote its conservation.

10.2.5. Improving sustainable development in the territories

Sustainable development is essential to ensure the balance between human presence and the preservation of natural heritage. In the inhabited territories (Greenland and Saint-Pierre et Miquelon), the local population strongly depend from natural resources and conservation cannot be considered without an important involvement of communities. In Subantarctic and Antarctic territories (TAAF, BAT, SGSSI), most stakeholders are based in Europe (scientists, fishing companies, military, tourism operators…) and only operate in the territories in the frame of scientific, logistic or commercial activities.

Nevertheless, the impact of human activities (extractive activities, fisheries, tourism, research activities) is noticeable in those isolated places. To lessen those impacts, those activities should be subject to environmental impact assessments. These studies can support political and management decisions and foster the reduction of those impacts. Remaining acceptable impacts should be compensated even though the European Directive 2011/92/EU ('Environmental Impact Assessment' – EIA Directive) and the Directive 2001/42/EC ('Strategic Environmental Assessment' – SEA Directive) (Council of the Europe, Council of the European Commission, 1992, 2009) are not applicable to OCTs.

Also, Polar and Subpolar territories rely heavily on fisheries for their economy. In response to increasing recognition of the declining state of fisheries and ocean ecosystems, interest in ecosystem-based management in the marine realm has developed more recently. Ecosystem Based Management is a management approach that considers not only species and habitats but also their interactions between each other and with their environment. This process includes a thorough monitoring and adaptive management measures. Studies on EBM and the implementation of sustainable fisheries are a priority for action in Polar and Subpolar regions. These initiatives should be implemented in an integrated approach, taking into account the social, economic and ecologic stakes.

Finally, sustainable initiatives have to be promoted like the development of renewable energies, the implementation of waste management or biosecurity programs. In the inhabited places (Greenland and Saint Pierre et Miquelon), initiatives that promote alternative sources of income should be supported to lessen the pressure of human economic activities on natural resources.

Photo 75. Fishing activities in Greenland (Copyright Chris Yesson)

10.2.6. Strengthening the network of Marine Protected and Conservation Areas

Marine Protected Areas (MPAs) are an effective way to protect and restore vulnerable ecosystems and marine species biomass. They contribute to the renewal of the marine resources and the maintenance of critical ecosystem services. In the Arctic territories (Greenland and Saint-Pierre et Miquelon), MPAs are poorly developed while in the subantarctic and antarctic territories (TAAF, BAT, SGSSI), MPAs are being increasingly proposed as a conservation tool. In fact, TAAF marine nature reserve is, since 2016, one of the largest MPA in the world.

Through Arctic Council, and the two Arctic Council working groups, Protection of the Arctic Marine Environment (PAME) and Conservation of Arctic Flora and Fauna (CAFF), the arctic states have developed a framework for a pan-arctic network on marine protected areas in 2015. It sets out a common vision for international cooperation in MPA network development and management. For antarctic states, the CCAMLR (Commission for the Conservation of Antarctic Marine Living Resources) adopted Conservation Measure 91-04 (CM 91-04) 'General framework for the establishment of CCAMLR Marine Protected Areas'. It aims to create a large MPA network around antarctica, including national and international waters.

While the importance of building an efficient MPA network in both hemispherea has been recognized internationally, efforts are still needed to make it effective. In the first place, MPA in the Arctic regions should be developed to fit major conservation stakes. Appropriate spatial conservation planning, in both Arctic and antarctic territories, requires the improvement of research to understand zones of high conservation value (ex: seabirds and marine mammals feeding areas) and adopt an ecosystem based management approach. MPA implementation and management can only be considered along with an initial strengthening of local and regional governance.

As biodiversity stakes go beyond national boundaries, the governance has to be thought at regional scale, building international cooperation to ensure the protection of biodiversity hotspots and functional areas, inside and outside national waters. This cooperation allows the sharing of experience and capacity building of local stakeholders. For European OCTs, the cooperation with non European territories is critical.

10.2.7. Capacity building for conservation management

The natural heritage of Polar and Subpolar regions is of global importance. It needs an appropriate management to protect those territories and maintain sustainable human activities. The remoteness, the complex environmental and climatic conditions, the diversity of necessary actions and the lack of funding can be quite challenging for the managers of those places. Capacity building initiatives are needed to support and strengthened the ownership of local and regional actions dedicated to environment conservation.

For inhabited territories, community based conservation is a key approach that integrates local knowledge on biodiversity and value local appropriation of conservation actions. Moreover, it can overcome the logistical and financial difficulties of implementing conservation actions in isolated territories.

10.2.8. Raising awareness and education on environmental conservation

Polar and Subpolar ecosystems are unique ecosystem though poorly known from the general public. Mostly uninhabited, those territories are still impacted by direct and indirect human impacts. At national and European levels, those territories are often left aside, due to the lack of representation in those territories.

Awareness actions are needed to raise concern amongst the global public and stakeholders. It should promote the sustainable uses of natural resources and an appropriate consideration of Polar and Subpolar territories in local/national/international policies and programs. Local stakeholders should be the priority target of those awareness actions, to ensure that conservation and sustainable use of natural resources is adequately integrated in local activities. At global scale, the image of the biodiversity richness of those pristine territories can promote worldwide biodiversity conservation.

Photo 76. Awareness event about subpolar ecosystems, Paris (Copyright TAAF)

CONCLUSION

The polar and subpolar European Overseas Countries and Territories are some of the most biologically important regions on the planet in terms of species richness, abundance and endemism. The extreme isolation of those territories and the absence, or scarcity, of human populations, has kept them relatively preserved. Threats to biodiversity have increased in recent decades including global climate change, dispersion of alien invasive species, development of extractive industry and unsustainable fisheries management.

To mitigate those threats, conservation measures and policies have been implemented at local, national and international scale and local actors gained in skills and ownership of conservation actions. They are now facing funding difficulties to implement appropriate research and conservation programs in those hardly accessible territories.

The BEST initiative aims to support those local initiatives by identifying conservation priorities in those territories for a better orientation of private and public fundings. 53 priority Key Biodiversity Areas have been delineated in marine and terrestrial areas. For those territories, the priority thematics include research and management on the following topics: alien invasive species, marine ecosystems knowledge, Marine Protected Area networks, threatened species, control of human activities, sustainable development, capacity building and awareness.

Photo 77. Nesting King penguins in South Georgia (Copyright Judith Brown)

The purpose of this ecosystem profile is to identify priority areas and actions to support the conservation of biodiversity and sustainable use of ecosystem services including ecosystem-based approaches to climate change adaptation and mitigation. These priorities should guide future investments and ensure that funding will be used accordingly. The Key Biodiversity Areas and priority investment themes identified for the Polar and Subpolar regions are expected to be taken into consideration by applicants to potential future BEST and other funds as well as by other donors and organisations wishing to invest in the conservation of the biodiversity of the polar and subpolar region. More details on investment gaps and opportunities in line with the identified priority areas for action in the 5 EU Overseas entities in this region are outlined in the accompanying document “Regional Investment Strategy” for the Polar and Subpolar region.

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Aarhus University: www.au.dk/en/

BEST initiative:

http://ec.europa.eu/environment/nature/biodiversity/best/funding/index_en.htm

DFO Canada: www.dfo-mpo.gc.ca

Foreign & Commonwealth Office: https://www.gov.uk/.../foreign-commonwealth-office

Agence des Aires Marines Protégées: www.aires-marines.fr

Government of South Georgia & South Sandwich Islands: www.gov.gs

Groupe de Recherche en Ecologie Arctique (GREA): grearctique.free.fr

IFREMER: www.ifremer.fr

Institut Paul Emile Victor (IPEV): http://www.institut-polaire.fr

Institut Pluridisciplinaire Hubert CURIEN (IPHC-CNRS): www.iphc.cnrs.fr/

Institute of Natural Resources of Greenland: www.natur.gl/en/

International for the conservation of Nature (IUCN): www.iucn.org

IUCN Red List: www.iucnredlist.org

JNCC - Joint Nature Conservation Committee: jncc.defra.gov.uk

Kew Royal Botanic Gardens: www.kew.org

Le Conservatoire du Littoral: www.conservatoire-du-littoral.fr

Museum National d'Histoire Naturelle de Paris (MNHN): https://www.mnhn.fr

Office national de la chasse et de la faune sauvage (ONCFS): www.oncfs.gouv.fr

South Atlantic Environmental Research Institute (SAERI): www.south-atlantic-research.org

SPM Frag'iles: spmfragiles.wix.com/

Terres Australes et Antarctiques Françaises (TAAF): www.taaf.fr

The Antarctic Research Trust: www.antarctic-research.de

The British Antarctic Survey: https://www.bas.ac.uk

The Centre d'Etudes Biologiques de Chizé, CEBC-CNRS: www.cebc.cnrs.fr

The CNRS - Université de Bourgogne, UMR 6282 Biogéosciences: biogeosciences.u-bourgogne.fr

UK Overseas Territories Conservation Forum: www.ukotcf.org

Université Lyon 1: www.univ-lyon1.fr

UMR 8195, CNPS-CNRS: www.cb.u-psud.fr

Université Pierre et Marie Curie (UPMC): www.upmc.fr

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ANNEXES

Annexe 1. South Georgia and the South Sandwich Islands: details of location and areas of the principal islands and regions.

Region	Location	Area (km^2)	Notes
South Georgia - NW	King Haakon Bay to Cumberland Bay		Includes Paryadin Peninsula and areas with blackbrow, grey-headed and wandering albatross. Also king penguins at Salisbury Plain and Fortuna.
South Georgia -NE	Cumberland Bay to Drygalski Fjord		Includes St Andrews Bay (kings) and Gold Harbour.
South Georgia - SE	Drygalski Fjord to Ducloz Head		Area always free of rats and mice.
South Georgia -SW	Ducloz Head to King Haakon Bay		
Bay of Isles (all islands)			Includes Albatross & Prion islands, with wandering albatross.
Annenkov Island	54°29′S 37°5′W		Always rat free; wandering albatross, macaroni, chinstrap and Gentoo penguins.
Cooper Island	54°48′S 35°47′W		Black-browed albatross; always rat free
Willis Islands	54°0′S 38°11′W		Macaroni penguins, black-browed albatross, grey-
Bird Island			Macaroni & gentoo penguins, wandering, black-browed and grey-headed albatross.
Shag Rocks	53°33′S 42°02′W	0.2	
Black Rock	53°39′S 41°48′W	-	
Zavodovski	56°18′S 27°34′W	25	Major chinstrap colony
Visokoi	56°42′S 27°13′W	35	Major chinstrap colony
Leskov	56°40′S 28°08′W	0.3	
Candlemas	57°05′S 26°39′W	14	Major chinstrap colony
Vindication	57°06′S 26°47′W	5	Major chinstrap colony
Saunders	57°48′S 26°28′W	40	Major chinstrap colony; Adelie penguins
Montagu	58°25′S 26°23′W	110	
Bristol	59°03′S 26°30′W	46	
Thule	59°27′S 27°18′W	20	Major chinstrap colony
Cook	59°26′S 27°09′W	14	
Bellingshausen	59°25′S 27°05′W	1	

Annexe 2. The principal marine areas in the South Georgia and South Sandwich Islands, including areas protected in the Marine Protected Area. The BCAs are benthic closed areas.

Habitat	Area	Depth range	Area (km^2)	Detail
Benthic	South Georgia shelf area (12 nm)	0-250 m		Large shelf area, highly diverse invertebrate fauna (Hogg et al., 2011), fishing prohibited.
	Shag Rocks shelf (12 nm)	0-250 m		Demersal ichthyofauna distinct from South Georgia shelf (Gregory et al., 2016). Toothfish recruitment area. Fishing prohibited.
	SSI shelf (3 nm)	0-400 m	2,272	Ssall shelf area is small around each island, fishing prohibited.
	Clerke Rocks shelf (6 nm)	0-200		Unique serpulid worm reefs in the area (Ramos & San Martin 1999).
	Kemp Seamount & Calderas BCA.		352	Area of hydrothermal activity, which supports a unique fauna dominated by a species of yeti crab (Rogers et al., 2012).
	West Shag BCA		1,039	Closed to protect vulnerable marine fauna and provide refugia for adult toothfish. It was an area of high benthic by-catch (gorgonians, bryozoans and corals).
	West Gully BCA		2,236	
	Northern BCA		441	Selected as a refugia for spawning adult toothfish and to protect vulnerable benthic fauna (notably gorgonians, sponges and corals).
	Eastern BCA		143	Closed to protect vulnerable taxa such as bryozoans, corals and gorgonians.
	Southern Seamounts BCA		1,575	The area had been occasionally fished with longlines, but was closed to provide a refugia for adult toothfish and to protect the largely unknown benthic fauna.
	North Georgia Rise BCA		4,950	This BCA is intended to provide a refugia for adult toothfish and protect the largely unknown benthic fauna.
	North-east Georgia Rise BCA		9,853	Very limited data on the benthic fauna, but the large closed area is likely to include a range of habitats and taxa and also provides refugia for adult toothfish.
	Protector Shoals BCA		1,935	Benthic fauna not well documented; likely stepping stone for Patagonian toothfish migrations.
	Cumberland East Bay	0-200 m		Identified as having very high benthic biodiversity (Hogg et al., 2011).
	Benthic area > 2250 m			Closed to bottom fishing.
	Benthic area < 700 m			Closed to bottom fishing.
Pelagic	Shag Rocks shelf pelagic	n/a		Pelagic area around Shag Rocks and Black Rock in which fishing is prohibited.
	South Georgia shelf pelagic	n/a		Pelagic area around South Georgia, Shag Rocks and Clerke Rocks that is closed to fishing.
	South Georgia offshore pelagic	n/a		Pelagic area beyond 12 nm of South Georgia, Shag Rocks and Clerke Rocks, which is open to pelagic fishing.
	SSI Pelagic Closed areas (with 12 nm of each island).	n/a	18,041	Pelagic area surrounding each island in which pelagic fishing is prohibited.
	SSI offshore pelagic.	n/a		Open ocean area in which pelagic krill fishing is permitted.

Annexe 3. Saint-Pierre-et-Miquelon archipelago marine mammals IUCN Red List status

Order	Sub-order	Species	Name	SPM	IUCN global Red List status
Cetacea	Mysticeti	*Eubalaena glacialis*	North Atlantic Right whale	x	EN
		Balaena mysticetus	Bowhead whale		LC
		Megaptera novaeangliae	Humpback whale	x	LC
		Balaenoptera musculus	Blue whale		EN
		Balaenoptera physalus	Fin whale	x	EN
		Balaenoptera borealis	Sei whale	x	EN
		Balaenoptera acutorostrata	Minke whale	x	LC
	Odontoceti	*Physeter macrocephalus*	Sperm whale	x	VU
		Hyperoodon ampullatus	Northern bottlenose whale	x	DD
		Mesoplodon bidens	Sowerby's beaked whale	x	DD
		Delphinaptera leucas	Beluga whale	x	NT
		Monodon monoceros	Narwhal		NT
		Tursiops truncatus	Common bottlenose dolphin	x	DD
		Orcinus orca	Killer whale	x	DD
		Globicephala melas	Long-finned pilot whale	x	LC
		Delphinus delphis	Short-beaked common dolphin	x	LC
		Lagenorhynchus acutus	Atlantic white-sided dolphin	x	LC
		Lagenorhynchus albirostris	White-beaked dolphin	x	LC
		Stenella coeruleoalba	Striped dolphin	x	LC
		Grampus griseus	Risso's dolphin	x	LC
		Phocoena phocoena	Harbour porpoise	x	LC
Carnivora	Pinnipedia	*Phoca groenlandica*	Harp seal	x	LC
		Phoca vitulina	Harbour seal	x	LC
		Cystophora cristata	Hooded seal	x	VU
		Halichoerus grypus	Grey seal	x	LC
		Phoca hispida	Ringed seal		LC
		Erignathus barbatus	Bearded seal		LC
		Odobenus rosmarus	Walrus		DD

Annexe 4. Red List status of birds nesting in the French Southern Islands

Order	Species	Name	AMS	SPA	CRO	KER	IUCN global Red List status	Trend	TAAF Red List status
Anseriformes	*Anas eatoni*	Eaton's Pintail			x	x	VU	↘	DD
	Anas marecula	Amsterdam Island Duck		x			EX		EX
Charadriiformes	*Chionis minor*	Black-faced Sheathbill			x	x	LC	↘	LC
	Larus dominicanus	Kelp Gull			x	x	LC	↗	LC
	Stercorarius antarcticus	Brown Skua	x	x	x	x	LC	→	LC
	Sterna virgata	Kerguelen Tern			x	x	NT	→	DD
	Sterna vittata	Antarctic Tern	x	x	x	x	LC	→	DD
Procellariiformes	*Aphrodroma brevirostris*	Kerguelen Petrel			x	x	LC	→	LC
	Daption capense	Cape Petrel			x	x	LC	→	DD
	Diomedea amsterdamensis	Amsterdam Albatross	x				CR	↘	CR
	Diomedea exulans	Wandering Albatross			x	x	VU	↘	VU
	Fregetta grallaria	White-bellied Storm Petrel		x			LC	↘	EN
	Fregetta tropica	Black-bellied Storm Petrel			x	x	LC	↘	LC
	Garrodia nereis	Grey-backed Storm Petrel			x	x	LC	↘	DD
	Halobaena caerulea	Blue Petrel			x	x	LC	→	LC
	Macronectes giganteus	Southern Giant Petrel			x	x	LC	↗	LC
	Macronectes halli	Northern Giant Petrel			x	x	LC	↗	LC
	Oceanites oceanicus	Wilson's Storm Petrel			x	x	LC	↘	LC

	Pachyptila belcheri	Thin-billed Prion			x	x	LC	→	LC
	Pachyptila desolata	Antarctic Prion			x	x	LC	↘	LC
	Pachyptila macgillivrayi	Saint Paul prion		x			NE		VU
	Pachyptila salvini	Salvin's Prion			x		LC	→	LC
	Pachyptila turtur	Fairy Prion		x	x	x	LC	→	LC
	Pelagodroma marina	White-faced Storm-petrel	x				LC	↘	RE
	Pelecanoides georgicus	South Georgia Diving Petrel			x	x	LC	↘	LC
	Pelecanoides urinatrix	Common Diving Petrel			x	x	LC	↘	LC
	Phoebetria fusca	Dark-mantled Sooty Albatross	x		x	x	EN	↘	EN
	Phoebetria palpebrata	Light-mantled Sooty Albatross			x	x	NT	↘	DD
	Procellaria aequinoctialis	White-chinned Petrel			x	x	VU	↘	VU
	Procellaria cinerea	Grey Petrel	x	x	x	x	NT	↘	EN
	Pterodroma lessonii	White-headed Petrel			x	x	LC	↘	LC
	Pterodroma macroptera	Great-winged Petrel	x	x	x	x	LC	↘	LC
	Pterodroma mollis	Soft-plumaged Petrel	x	x	x	x	LC	→	LC
	Puffinus assimilis	Little Shearwater	x	x	x		LC	→	EN
	Puffinus carneipes	Flesh-footed Shearwater		x			LC	→	VU
	Thalassarche chrysostoma	Grey-headed Albatross			x	x	VU	→	DD
	Thalassarche melanophris	Black-browed Albatross			x	x	NT	↗	NT

	Thalassarche salvini	Salvin's Albatross			x		VU	?	CR
	Thalassarche carteri	Indian Yellow-nosed Albatross	x	x	x	x	EN	↘	EN
Sphenisciformes	*Aptenodytes patagonicus*	King Penguin			x	x	LC	↗	LC
	Eudyptes chrysocome/ Eudyptes Filholi	Rockhopper Penguin			x	x	VU	↘	DD
	Eudyptes chrysolophus	Macaroni Penguin			x	x	VU	↘	LC
	Eudyptes moseleyi	Northern Rockhopper Penguin	x	x			EN	↘	EN
	Eudyptes schlegeli	Royal Penguin			x	x	VU	→	DD
	Pygoscelis papua	Gentoo Penguin			x	x	NT	↘	NT
Suliformes	*Morus capensis*	Cape Gannet	x	x			VU	↘	CR
	Morus serrator	Australian Gannet		x			LC	↗	CR
	Phalacrocorax melanogenis	Crozet Shag			x		LC	?	DD
	Phalacrocorax verrucosus	Kerguelen Shag				x	LC	?	DD

Annexe 5. Red List status of marine mammals in the French Southern Islands

Name of species		Red List Status		Presence		
French	**Latin**	**IUCN**	**TAAF**	**Crozet**	**Kerguelen**	**Saint-Paul and Amsterdam**
Antarctic fur seal	*Arctocephalus gazella*	LC	LC	x	x	
Subantarctic Fur seal	*Arctocephalus tropicalis*	LC	LC			x
Blue whale	*Balaenoptera musculus*	EN	NE	x	x	
Commerson Dolphin	*Cephalorhynchus commersonii*	DD	EN		x	
Long finned pilot whale	*Globicephala melas*	DD	DD	x	x	
Hourglass dolphin	*Lagenorhynchus cruciger*	LC	DD	x	x	
Southern right whale dolphin	*Lissodelphis peronii*	DD	DD	x	x	
Humpback whale	*Megaptera novaangliae*	LC	NE	x	x	x
Elephant seal	*Mirounga leonina*	LC	LC	x	x	
Orca	*Orcinus orca*	DD	EN	x	x	x
Sperm whale	*Physeter macrocephalus*	VU	NE	x	x	

Annexe 6. South Georgia and the South Sandwich Islands breeding birds, with estimated breeding pairs and IUCN status (from Clarke et al., 2013; GSGSSI, 2013; Lynch et al., 2016).

Name	Species	SG	SSI	IUCN Red list status	Endemic
Speckled teal	*Anas flavirostris*	10	0	LC	
Pintail duck	*Anas georgica georgica*	1	0	LC	✓
South Georgia pipit	*Anthus antarcticus*	3	0	NT	✓
King penguin	*Aptenodytes patagonicus*	450000	2	LC	
Snowy sheathbill	*Chionis alba*	2	0	LC	
Cape petrel	*Daption capense*	10	✓	LC	
Wandering albatross	*Diomedea exulans*	1,55	0	VU	
Macaroni penguin	*Eudyptes chrysolophus*	1,000,000	95	VU	
Black-bellied storm petrel	*Fregetta tropica*	10	✓	LC	
Antarctic fulmar	*Fulmarus glacialoides*	0	✓	LC	
Blue petrel	*Halobaena caerulea*	70	0	LC	
Kelp gull	*Larus dominicanus*	2	✓	LC	
Kerguelen petrel	*Lugensa brevirostris*	rare	0	LC	
Southern giant petrel	*Macronectes giganteus*	7,6	1900	LC	
Northern giant petrel	*Macronectes halli*	17	✓	LC	
Wilson's storm petrel	*Oceanites oceanicus*	600	✓	LC	
Antarctic prion	*Pachyptila desolata*	22,000,000	0	LC	
Fairy prion	*Pachyptila turtur*	1	0	LC	
Snow petrel	*Pagadroma nivea*	3	✓	LC	
South Georgia diving petrel	*Pelicanoides georgicus*	2,000,000	0	LC	
Common diving petrel	*Pelicanoides urinatrix*	3,800,000	0	LC	

Blue-eyed shag	*Phalacrocurax atriceps*	10,3	✓	LC	
Light-mantled sooty albatross	*Phoebetria palpebrata*	8,7	0	NT	
White chinned petrel	*Procellaria aequinoctialis*	670	0	VU	
Adelie penguin	*Pygoscelis adeliae*	2	125	LC	
Chinstrap penguin	*Pygoscelis antarcticus*	12	1,300,000	LC	
Gentoo penguin	*Pygoscelis papua*	105	✓	NT	
Antarctic tern	*Sterna vitata*	2,5	✓	LC	
Brown skua	*Sterrcorarius antarcticus*	2	✓	LC	
Grey-headed albatross	*Thalassarche chrysostoma*	48	0	EN	
Black browed albatross	*Thalassarche melanophris*	75,5	0	NT	

Annexe 7. Marine mammals that occur in the South Georgia and South Sandwich Islands Maritime Zone, their IUCN status and the estimated breeding numbers.

Order	Species	Name	Breeding	IUCN Red list status	Other
Carnivora	*Arctocephalus gazella*	Antarctic fur seal	3,000,000	LC	GSC
Cetacea	*Balaenoptera bonaerensis*	Minke whale		LC	
Cetacea	*Balaenoptera borealis*	Sei whale		EN	
Cetacea	*Balaenoptera musculus*	Blue whale		EN	
Cetacea	*Balaenoptera physalus*	Fin whale		EN	
Cetacea	*Berardius arnuxii*	Arnoux's beaked whale		DD	
Cetacea	*Eublanaena australis*	Southern right whale		LC	
Cetacea	*Globicephala melas*	Long-finned pilot whale		DD	
Carnivora	*Hydrurga leptonyx*	Leopard seal		LC	
Cetacea	*Hyperoodon planifrons*	Southern bottlenose whale		LC	
Cetacea	*Lagenorhynchus cruciger*	Hourglass dolphin		LC	
Carnivora	*Leptonychotes weddellii*	Weddell seal	100	LC	
Carnivora	*Lobodon carcinophagus*	Crabeater seal		LC	
Cetacea	*Megaptera novaeangliae*	Humpback whale		LC	
Cetacea	*Mesoplodon layardii*	Strap-toothed whale		DD	
Carnivora	*Mirounga leonina*	Elephant seal	400	LC	GSC
Cetacea	*Orcinus orca*	Killer whale		DD	
Cetacea	*Phocoena dioptrica*	Spectacled porpoise		DD	
Cetacea	*Physeter macrocephalus*	Sperm whale		VU	

Annexe 8. Species number and record counts across 22 phyla of marine invertebrates on the South Georgia shelf (from Hogg et al., 2011).

Phylum	Species	Records	Endemics (%)	Range Edge (%)
Crustaceans	283	4767	23.7	36.2
Nematodes	170	460		
Annelids	147	725		
Molluscs	161	588	45.9	53.3
Echinoderms	119	1160		
Chordates	114	8201	8.5	21.3
Bryozoans	112	354	55.6	29.6
Chelicerates	93	530		
Sponges	81	294	2.7	21.6
Cnidarians	78	358	44.2	55.8
Platyhelmenthes	33	52		
Nemertea	15	60		
Acanthocephala	12	19		
Chaetognatha	5	92		
Entoprocts	5	n/a		
Sipuncula	4	55		
Tardigrades	3	4		
Brachiopods	3	3		
Cephalorhyncha	2	4		
Hemichordates	2	n/a		
Ctenophora	2	n/a		
Echiura	1	6		

Annexe 9. The families of ichthyofauna found in the South Georgia and South Sandwich Islands Maritime Zone, with numbers of species and, where known, IUCN status.

Family	Species No.	IUCN Threatened or Endemic Species
Achiropsettidae	1	
Anopteridae	1	
Artididraconidae	1	*Artidedraco miras (Endemic)*
Bathydraconidae	5	*Psilodraco breviceps; Parachaenichthyis georgianus (Endemics)*
Batylagidae	3	
Bathylutichthyidae	1	*Bathylutichthys taranetzi (Endemic)*
Carapidae	1	
Centrolophidae	1	
Cetominidae	1	
Channichtyidae	4	
Gadidae	1	
Gempylidae	1	
Gonostomatidae	2	
Harpagiferidae	3	*Harpagifer permitini*
Liparidae	7	
Macrouridae	7	
Melamphidae	2	
Microstomidae	1	
Moridae	3	
Muraenolepididae	2	
Myctophidae	19	
Nemichtydae	1	
Notosudidae	1	
Nototheniidae	16	*Trematomus vicarius; Gobionotothen angustifrons* (endemics)
Oneirodidae	1	
Ophididae	1	
Paralepididae	4	
Scopelarchidae	2	
Stemoptychidae	1	
Stomiidae	3	
Zoarcidae	8	
Rajidae	2	
Lamnidae	2	Lamna nasus (IUCN VU)
Petromyzontidae	1	

Annexe 10. Bird IUCN global Red List status of British Antarctic Territory and Adélie Land

Order	Species	Name	BAT	AL	IUCN global Red List status	TAAF regional Red List
Charadriiformes	*Stercorarius maccormicki*	South Polar Skua	x	x	LC	VU
	Stercorarius antarcticus	Brown Skua	x	x	LC	EN Ssp. lonnb
	Larus dominicanus	Kelp Gull	x		LC	NA
	Sterna vittata	Antarctic Tern	x		LC	NA
Procellariiformes	*Oceanites oceanicus*	Wilson's Storm Petrel	x	x	LC	DD
	Daption capense	Cape Petrel	x	x	LC	VU
	Fulmarus glacialoides	Antarctic Fulmar	x	x	LC	VU
	Macronectes giganteus	Southern Giant Petrel	x	x	LC	CR
	Pagodroma nivea	Snow Petrel	x	x	LC	LC
	Thalassoica antarctica	Antarctic Petrel	x		LC	NE
	Fregetta tropica	Black-bellied Storm Petrel	x		LC	NE
	Pachyptila desolata	Antarctic Prion	x		LC	NE
	Chionis alba	Greater Sheathbill	x		LC	NE
	Phoebetria palpebrata	Light-mantled Sooty Albatross	x		NT	NA
Sphenisciformes	*Aptenodytes forsteri*	Emperor Penguin	x	x	NT	VU
	Pygoscelis adeliae	Adelie Penguin	x	x	NT	LC
	Pygoscelis antarctica	Chinstrap penguin	x		LC	NA
	Pygoscelis papua	Gentoo Penguin	x		NT	NE
	Eudyptes chrysolophus	Macaroni Penguin	x		VU	NA
Suliformes	*Phalacrocorax [atriceps] bransfieldensis*	Imperial (Antarctic) Shag	x		LC	NE

Annexe 11. British Antarctic Territory and Adelie Land marine mammals IUCN Red List and TAAF Regional RL status

Order	Sub-order	Species	Name	AL	BAT	IUCN global Red List status	TAAF Regional RL – Adélie Land
Cetacea	Mysticeti	*Balaenoptera musculus*	Blue Whale	x	x	EN	NE
		Balaenoptera bonaerensis	Antarctic minke whale	x	x	DD	NE
		Balaenoptera physalus	Fin Whale	x	x	EN	NE
		Balaenoptera borealis	Sei whale		x	EN	NA
		Megaptera novaeangliae	Humpback Whale	x	x	LC	NE
		Eubalaena australis	Southern right whale		x	LC	NE
	Odontoceti	*Lagenorhynchus cruciger*	Hourglass dolphin	x	x	DD	NE
		Orcinus orca	Killer whale	x	x	DD	NE
		Physeter macrocephalus	Sperm whale	x	x	VU	NE
	Ziphiidae	*Berardius arnuxii*	Arnoux's beaked whale		x	DD	NA
		Hyperoodon planifrons	Southern bottlenose whale		x	LC	NE
Carnivora	Pinnipedia	*Mirounga leonina*	Southern Elephant Seal		x	LC	NE
		Hydrurga leptonyx	Leopard Seal	x	x	LC	LC
		Leptonychotes weddellii	Weddell Seal	X	x	LC	LC
		Lobodon carcinophaga	Crabeater Seal	X	x	LC	LC
		Ommatophoca rossii	Ross Seal	x	x	LC	LC

Annexe 12. List of threatened species according to the IUCN Red list present in Greenland

Taxonomy	Latin Name	RedList category
BIRD	Clangula hyemalis	VU
BIRD	Fratercula arctica	VU
FISH	Amblyraja radiata	VU
FISH	Cetorhinus maximus	VU
FISH	Gadus morhua	VU
FISH	Hippoglossus hippoglossus	EN
FISH	Lamna nasus	VU
FISH	Melanogrammus aeglefinus	VU
FISH	Salmo salar	VU on local redlist
FISH	Sebastes fasciatus	EN
FISH	Squalus acanthias	VU
MAMMALIA	Balaenoptera borealis	EN
MAMMALIA	Balaenoptera musculus	EN
MAMMALIA	Balaenoptera physalus	EN
MAMMALIA	Cystophora cristata	VU
MAMMALIA	Delphinapterus leucas	VU
MAMMALIA	Eubalaena glacialis	EN
MAMMALIA	Odobenus rosmarus rosmarus	EN-NT Local Red List
MAMMALIA	Phocoena phocoena	VU
MAMMALIA	Physeter macrocephalus	VU
MAMMALIA	Ursus maritimus	VU
MAMMALIA	Balaena mysticetus (Svalbard-Barents Sea (Spitsbergen) subpopulation)	CR
PLANTAE	Amerorchis rotundifolia	VU Local Red List

Annexe 13. Greenland trigger species list

Taxonomy	Latin Name	Trigger criteria	Comments
BIRD	*Alle alle*	Globally significant congregation	80% global population
BIRD	*Anser albifrons flavirostris*	Globally significant congregation	Endemic species, EN local Red List
BIRD	*Anser brachyrhynchus*	Globally significant congregation	>30% global population in Greenland
BIRD	*Branta bernicla hrota*	Globally significant congregation	østatlantisk population: >20% Global population, NT Local RL - LC global RL; østcanadisk højarktisk population: 100% global population, LC Local Red List - LC Global Red List
BIRD	*Branta leucopsis*	Globally significant congregation	
BIRD	*Bubo scandiacus*	IBA criteria	
BIRD	*Calidris alba*	Other (trigger)	
BIRD	*Calidris canutus*	Globally significant congregation	Population Calidris canutus islandica: >50% of Global population in Greenland
BIRD	*Carduelis h. hornemanni*	Globally significant congregation	>50% global population
BIRD	*Cepphus grylle*	Globally significant congregation	30-50% global population
BIRD	*Clangula hyemalis*	VU	
BIRD	*Falco rusticolus*	IBA criteria	Biome restricted species, NT Local RL
BIRD	*Fratercula arctica*	VU	NT local Red List
BIRD	*Gavia stellata*	Globally significant congregation	
BIRD	*Haliaeetus albicilla groenlandica*	Globally significant congregation	Endemic subspecies, VU Local RL
BIRD	*Histrionicus histrionicus*	Globally significant congregation	Endemic of Greenland, NT local RL
BIRD	*Larus glaucoides*	Globally significant congregation	Endemic of Greenland
BIRD	*Mergus serrator*	Globally significant congregation	
BIRD	*Pagophila eburnea*	Globally significant congregation	VU local Red List, NT Global RL
BIRD	*Phalaropus fulicarius*	IBA criteria	Biome restricted species
BIRD	*Somateria mollissima*	Globally significant congregation	75% of global population. NT Global RL, VU local Red List
BIRD	*Somateria spectabilis*	Globally significant congregation	
BIRD	*Stercorarius longicaudus*	IBA criteria	Biome restricted species
BIRD	*Sterna paradisaea*	Globally significant congregation	NT local Red List

BIRD	*Uria lomvia*	Globally significant congregation	VU local Red List
FISH	*Amblyraja radiata*	VU	
FISH	*Cetorhinus maximus*	VU	
FISH	*Gadus morhua*	VU	
FISH	*Hippoglossus hippoglossus*	EN	
FISH	*Lamna nasus*	VU	
FISH	*Melanogrammus aeglefinus*	VU	
FISH	*Salmo salar*	VU on local redlist	Outdated Global Red List assessment : LC (1996)
FISH	*Sebastes fasciatus*	EN	
FISH	*Squalus acanthias*	VU	
FISH	*Somniosus microcephalus*	NT	Longevity of this species, responsibility of Greenland for this species
MAMMALIA	*Balaenoptera borealis*	EN	DD Local Red List
MAMMALIA	*Balaenoptera musculus*	EN	DD Local Red List
MAMMALIA	*Balaenoptera physalus*	EN	LC Local Red List
MAMMALIA	*Cystophora cristata*	VU	LC Local Red List
MAMMALIA	*Delphinapterus leucas*	VU	CR on local redlist
MAMMALIA	*Eubalaena glacialis*	EN	CR on local redlist
MAMMALIA	*Monodon monoceros*	Globally significant congregation	DD Global RL; Western population: CR on local redlist; Eastern population: DD local RL
MAMMALIA	*Odobenus rosmarus rosmarus*	EN Local Red List	DD Global RLS - sp: Northern population: NT on local redlist, western population: EN
MAMMALIA	*Ovibos moschatus*	Globally significant congregation	
MAMMALIA	*Phocoena phocoena*	VU	DD Local Red List
MAMMALIA	*Physeter macrocephalus*	VU	NA Local Red List
MAMMALIA	*Ursus maritimus*	VU	VU Local Red List, 20% global population
MAMMALIA	*Balaena mysticetus*	CR	(Svalbard-Barents Sea (Spitsbergen) subpopulation)
PLANTAE	*Amerorchis rotundifolia*	VU on local redlist	NE global RL, VU on local redlist (D2 small population)

Annexe 14. Summary characteristics of Key Biodiversity Areas in Greenland (CRS = EPSG:5938)

Code	Key Biodiversity Area Name	Total area km2
GRL01	Coastline from Robertson fjord to Foulke Fjord	799
GRL02	Booth Sund area	198
GRL03	Itsako	139
GRL04	Appatsiaat	2
GRL05	Salleq	5
GRL06	Qingartarsuaq	6
GRL07	Innarsuaq	11
GRL08	Naternaq (Lersletten)	955
GRL09	Eqalummiut Nunaat-Nassuttuup Nunaa	1450
GRL10	Itinneq	99
GRL11	Taateraat in Evighedsfjorden	2
GRL12	Sermilinnguaq	13
GRL13	Sondre Isortoq	14
GRL14	Ikkattoq fjord and islands	252
GRL15	Kap Brewster and Volquart Boon's coast	886
GRL16	Liverpool Land coast and mouth of Scoresby Sund	1150
GRL17	Heden	2394
GRL18	Kjoveland	194
GRL19	Orsted Dal and Coloradodal	634
GRL20	Enhjorningens Dal and Pingel Dal	317
GRL21	Albrecht Sletten (Storsletten), Wollaston Forland	360
GRL22	Northeast Greenland National Park	972000
GRL23	North water Polynya	64698
GRL24	Melville bay	10821
GRL25	Northwest Greenland Shelf	16502
GRL26	Baffin bay / Uummaannaq	16911
GRL27	Disko bay / St. Hellefiskebanke	44066
GRL28	Southwest Greenland shelf	21957
GRL29	Southeast Greenland / DK str.	7774
GRL30	Northeast Water polynya	25758
GRL31	Scoresby Sund	42398
GRL32	Sirius Water / Young Sund	6699
GRL33	Southwestern Greenland Sea and drift ice	175209
GRL34	Labrador Sea drift ice and marginal ice zone	343227

Annexe 15. Priority level of Key Biodiversity Areas in Greenland

Priority	Code KBA	Name
1	GRL23	North Water Polynya
1	GRL25	Northwest Greenland Shelf
1	GRL27	Disko Bay / St. Hellefiskebanke
1	GRL28	Southwest Greenland shelf
1	GRL30	Northeast Water polynya
1	GRL31	Scoresby Sund
2	GRL22	Northeast Greenland National Park
2	GRL24	Melville bay
2	GRL26	Baffin bay / Uummaannaq
2	GRL29	Southeast Greenland / DK str.
2	GRL32	Sirius Water / Young Sund
3	GRL33	Southwestern Greenland Sea and drift ice
3	GRL34	Labrador Sea drift ice and marginal ice zone
4	GRL03	Itsako
4	GRL04	Appatsiaat
4	GRL11	Taateraat in Evighedsfjorden
4	GRL14	Ikkattoq fjord and islands
4	GRL15	Kap Brewster and Volquart Boon's coast
4	GRL16	Liverpool land coast and mouth of Scoresby Sund
4	GRL17	Heden
4	GRL18	Kjoveland
4	GRL19	Orsted Dal and Coloradodal
4	GRL20	Enhjorningen Dal and Pingel Dal
5	GRL01	Coastline from Robertson fjord to Foulke fjord
5	GRL02	Booth Sund area
5	GRL05	Salleq
5	GRL06	Quingartarsuaq
5	GRL07	Innarsuaq
5	GRL08	Naternaq (Lersletten)
5	GRL09	Eqalummiut Nunaat - Nassuttuup Nunaa
5	GRL10	Itinneq
5	GRL12	Sermilinnguaq
5	GRL13	Sondre Isortoq
5	GRL21	Albrecht Sletten (Storsletten), Wollaston Forland

Annexe 16. Saint-Pierre-et-Miquelon trigger species

TAXONOMY	Latin Name	RedList category
AVES	Clangula hyemalis	VU
AVES	Euphagus carolinus	VU
AVES	Melanitta fusca	EN
AVES	Oceanodroma leucoroa	Globally significant congregation
AVES	Podiceps grisegena	Globally significant congregation
MAMMALIA	Balaenoptera musculus	EN
MAMMALIA	Balaenoptera physalus	EN
MAMMALIA	Phoca vitulina concolor	Globally significant congregation
PISCES	Gadus morhua	VU
PISCES	Amblyraja radiata	VU
REPTILIA	Dermochelys coriacea	VU
REPTILIA	Chelonia mydas	EN

Annexe 17. Summary of Key Biodiversity Areas characterics in Saint-Pierre-et-Miquelon

Code	Key Biodiversity Area	Total Area (hectares)
SPM1	Grand Colombier	59
SPM2	Reserve de chasse et de faune sauvage du Sud Saint Pierre	1,358
SPM3	Saint Pierre et Miquelon zone marine	1,215,000
SPM4	Grand Barachois	1052
SPM5	Clangula hyemalis coastal aggregation	23,400
SPM6	Etang de Mirande	188

Annexe 18. List of threatened species present in the French Southern Lands

Taxonomic group	Latin Name	Red List category
AVES	*Diomedea amsterdamensis*	CR
AVES	*Eudyptes moseleyi*	EN
AVES	*Phoebetria fusca*	EN
AVES	*Thalassarche carteri*	EN
AVES	*Thalassarche chrysostoma*	EN
AVES	*Anas eatoni*	VU
AVES	*Diomedea exulans*	VU
AVES	*Eudyptes chrysolophus*	VU
AVES	*Eudyptes chrysocome/ E. Filholi*	VU
AVES	*Eudyptes schlegeli*	VU
AVES	*Procellaria aequinoctialis*	VU
AVES	*Thalassarche salvini*	VU
MAMMALIA	*Balaenoptera borealis*	EN
MAMMALIA	*Balaenoptera musculus*	EN
MAMMALIA	*Balaenoptera physalus intermedia*	EN
MAMMALIA	*Physeter macrocephalus*	VU
PISCES	*Thunnus maccoyii*	CR
PISCES	*Channichthys velifer*	VU
PISCES	*Lamna nasus*	VU

Annexe 19. The French Southern Lands trigger species list

"Restricted range species" refers to the criteria "Restricted Range Species (or Species with large but clumped distributions) - 5% global population at one site".

"Globally significant congregation" refers to the criteria "Globally significant congregation (or source population) - 1% of Global Population".

The Red List assessments (VU, EN, CR) refer to the IUCN global Red List assessment. Local assessment are noted "(status) local Red List".

Taxonomic group	Latin Name	Trigger criteria	Comments
ANNELIDA	*Brania robusta*	Restricted range species	Endemic species
ANNELIDA	*Nereiphylla gruai*	Restricted range species	Endemic species
ARTHROPODA	*Drepanopus pectinatus*	Restricted range species	Endemic species
BIRD	*Anas eatoni*	VU local Red List	Endemic species, VU local Red List, not assessed at global scale
BIRD	*Aphrodroma brevirostris*	Globally significant congregation	
BIRD	*Aptenodytes patagonicus*	Restricted range species	
BIRD	*Chionis minor*	Restricted range species	Endemic species. Two subspecies: *Chionis minor minor et Chionis minor crozettensis*
BIRD	*Diomedea amsterdamensis*	CR	
BIRD	*Diomedea exulans*	VU	Also Globally significant congregation
BIRD	*Eudyptes chrysolophus*	VU	
BIRD	*Eudyptes moseleyi*	EN	
BIRD	*Eudyptes chrysocom/* *E. Filholi*	VU	
BIRD	*Eudyptes schlegeli*	VU	
BIRD	*Fregetta tropica*	Globally significant congregation	
BIRD	*Garrodia nereis*	Globally significant congregation	
BIRD	*Halobaena caerulea*	Globally significant congregation	
BIRD	*Larus dominicanus*	Globally significant congregation	
BIRD	*Macronectes giganteus*	Globally significant congregation	
BIRD	*Macronectes halli*	Globally significant congregation	
BIRD	*Oceanites oceanicus*	Globally significant congregation	

BIRD	*Pachyptila belcheri*	Globally significant congregation	
BIRD	*Pachyptila desolata*	Globally significant congregation	
BIRD	*Pachyptila macgillivray*	Restricted range species	Endemic species
BIRD	*Pachyptila salvini*	Globally significant congregation	
BIRD	*Pachyptila turtur*	Globally significant congregation	
BIRD	*Pelecanoides georgicus*	Globally significant congregation	
BIRD	*Pelecanoides urinatrix*	Globally significant congregation	
BIRD	*Phalacrocorax melanogenis*	Restricted range species	Endemic species
BIRD	*Phalacrocorax verrucosus*	Restricted range species	Endemic species
BIRD	*Phoebetria palpebrata*	Restricted range species	NT local Red List
BIRD	*Phoebetria fusca*	EN	
BIRD	*Procellaria aequinoctialis*	VU	
BIRD	*Procellaria cinerea*	Globally significant congregation	EN Local Red List
BIRD	*Pterodroma lessonii*	Globally significant congregation	
BIRD	*Pterodroma macroptera*	Globally significant congregation	
BIRD	*Pterodroma mollis*	Globally significant congregation	
BIRD	*Puffinus assimilis*	Globally significant congregation	EN Local Red List
BIRD	*Puffinus carneipes*	Globally significant congregation	VU local Red List
BIRD	*Pygoscelis papua*	Globally significant congregation	
BIRD	*Stercorarius antarcticus*	Globally significant congregation	
BIRD	*Sterna virgata*	Globally significant congregation	DD Local Red List
BIRD	*Sterna vittata*	Globally significant congregation	DD Local Red List
BIRD	*Thalassarche carteri*	EN	EN Local Red List
BIRD	*Thalassarche chrysostoma*	EN	
BIRD	*Thalassarche melanophris*	Globally significant congregation	
BIRD	*Thalassarche salvini*	VU	CR Local Red List

FISH	*Apagesoma australis*	Restricted range species	Endemic species (from Crozet)
FISH	*Bathyraja eatonii*	Restricted range species	Endemic species
FISH	*Bathyraja irrasa*	Restricted range species	Endemic species
FISH	*Bathyraja murrayi*	Restricted range species	Endemic species (from Kerguelen)
FISH	*Careproctus crozetensis*	Restricted range species	Endemic species
FISH	*Careproctus discoveryae*	Restricted range species	Endemic species
FISH	*Channichthys rhinoceratus*	Restricted range species	Endemic species (from Kerguelen)
FISH	*Channichthys velifer*	VU	
FISH	*Harpagifer crozetensis*	Restricted range species	Endemic species (from Crozet)
FISH	*Indonotothen cyanobrancha*	Restricted range species	Endemic species (from Kerguelen)
FISH	*Lamna nasus*	VU	
FISH	*Lepidonotothen mizops*	Restricted range species	Endemic species
FISH	*Lycenchelys hureaui*	Restricted range species	Endemic species
FISH	*Pachycara cousinsi*	Restricted range species	Endemic species
FISH	*Pachycara priedei*	Restricted range species	Endemic species
FISH	*Paraliparis operculosus*	Restricted range species	Endemic species (from Kerguelen)
FISH	*Paraliparis wolffi*	Restricted range species	Endemic species
FISH	*Thunnus maccoyii*	CR	
MAMMALIA	*Balaenoptera borealis*	EN	
MAMMALIA	*Balaenoptera musculus*	EN	
MAMMALIA	*Balaenoptera physalus*	EN	
MAMMALIA	*Cephalorhynchus commersonii kerguelensis*	Restricted range species	EN local redlist, subspecies endemic from Kerguelen
MAMMALIA	*Orcinus orca*	EN local Red List	DD Global Red List
MAMMALIA	*Physeter macrocephalus*	VU	
MAMMALIA	*Mirouga leonida*	Globally significant congregation	2nd population in the world
MOLLUSCA	*Malletia gigantea*	Restricted range species	Endemic species
MOLLUSCA	*Neomenia crenagulata*	Restricted range species	Endemic species
MOLLUSCA	*Portlandia isonota*	Restricted range species	Endemic species
MOLLUSCA	*Sputoherpia fissitubata*	Restricted range species	Endemic species
PLANTAE	*Agrostis delislei*	Restricted range species	Endemic species
PLANTAE	*Colobanthus diffusus*	Restricted range species	Endemic species
PLANTAE	*Lyallia kerguelensis*	Restricted range species	Endemic species
PLANTAE	*Macrocystis pyrifera*	M-C	Ingenior species
PLANTAE	*Pentaschistis insularis*	Restricted range species	Endemic species
PLANTAE	*Plantago pentasperma*	Restricted range species	Endemic species

PLANTAE	*Plantago stauntonii*	Restricted range species	Endemic species
PLANTAE	*Poa novarae*	Restricted range species	Endemic species
PLANTAE	*Pringlea antiscorbutica*	Restricted range species	Endemic species
PLANTAE	*Apium australe*	Restricted range species	
PLANTAE	*Ficinia nodosa*	Restricted range species	
PLANTAE	*Phylica arborea*	Restricted range species	Amsterdam and Tristan Da Cunha
PLANTAE	*Poa kerguelensis*	Restricted range species	Endemic species
PLANTAE	*Ranunculus pseudotrullifollius*	Restricted range species	
PLANTAE	*Ranunculus moseleyi*	Restricted range species	
PLANTAE	*Spartina arundinacea*	Restricted range species	
PLANTAE	*Uncinia brevicaulis*	Restricted range species	
PLANTAE	*Deschampsia antarctica*	Restricted range species	
PLANTAE	*Colobanthus kerguelensis*	Restricted range species	Endemic species
PLANTAE	*Festuca contracta*	Restricted range species	

Annexe 20. Summary of Key Biodiversity Areas characteristics in the French Southern Lands

Code KBA	Key Biodiversity Areas	Total area (ha)
ATF01	Amsterdam. Falaise d'Entrecasteaux	302
ATF02	Amsterdam. Plateaux des tourbières	555
ATF03	Amsterdam. Zone libre d'accès	4389
ATF04	Saint Paul	827
ATF05	Crozet. Ile aux Cochons	6683
ATF06	Crozet. Ile de l'Est	12650
ATF07	Crozet. Ile des Apôtres	259
ATF08	Crozet. Ile des Pingouins	335
ATF09	Crozet. Pointe basse	160
ATF10	Crozet. Possession. Falaises situées entre la Crique de Noël et la Crique de la Chaloupe	552
ATF11	Crozet. Ile de la Possession. Zone libre d'accès	13106
ATF12	Kerguelen. Iles Nuageuses	2224
ATF13	Kerguelen. Nord de la péninsule Loranchet	5505
ATF14	Kerguelen. Ile Leygues	692
ATF15	Crozet. Ile de la Possession. Baie américaine	21
ATF16	Kerguelen. Ile Foch, Ile Sainte Lanne Gramont, Ile Howe	29425
ATF17	Kerguelen. Ile de l'Ouest	3127
ATF18	Kerguelen. Péninsule Rallier du Baty	21166
ATF19	Kerguelen. Iles du golfe du Morbihan	11523
ATF20	Kerguelen. Péninsule Courbet	79253
ATF21	Kerguelen. Sud de la péninsule Jeanne d'Arc	23230
ATF22	Kerguelen. Baie Larose	2396
ATF23	Kerguelen. Zone libre d'accès	459256
ATF24	Crozet. Ile de la Possession. Mare aux éléphants	3
ATF25	Amsterdam et Saint Paul. Plateau. (Bathymétrie (m) : < -500)	1135823
ATF26	Kerguelen. Péninsule Loranchet	76467

ATF27	Kerguelen. Ile Mac Murdo, Ilot Baudin, Ilots Hallet	870
ATF28	Kerguelen. Iles Sibbald, Iles du Veau Marin, Iles Bethell	505
ATF29	Kerguelen. Ile Marron, Ile Francis	519
ATF30	Kerguelen. Ile du Passage	352
ATF31	Kerguelen. Ile du Canard et Iles Normandes	367
ATF32	Kerguelen. Iles du Prince de Monaco	331
ATF33	Crozet. Jardin Japonais	55
ATF34	Crozet. Petit Caporal	983
ATF50	Kerguelen. Northern shelf-break	6469170
ATF51	Kerguelen. North Eastern Shelf Productive area	2620754
ATF52	Kerguelen. Polar Front meander	5507563
ATF53	Kerguelen. Eastern oceanic zone	991759
ATF54	Kerguelen. Cold water incursion	757123
ATF55	Kerguelen. Kerguelen-Heard seamounts	1757139
ATF56	Kerguelen. Western shelf	1802363
ATF57	Kerguelen. Southern shelf break	677693
ATF58	Kerguelen. Coastal zone	2302692
ATF59	Kerguelen. Skiff bank	6532550
ATF60	Kerguelen. Western oceanic zone	5626650
ATF61	Kerguelen. South West oceanic zone	7696237
ATF62	Kerguelen. North western shelf and western shelf-break	2617681
ATF63	Kerguelen. North neritic zone	616320
ATF64	Kerguelen. Southern shelf	441885
ATF65	Kerguelen-Heard passage	1305636
ATF66	Kerguelen. Productive southern area	1454560
ATF67	Kerguelen. Northern oceanic zone	8136768
ATF70	Crozet shelf	4703152
ATF71	Crozet. Benthic areas of Del Cano Rise	2920560
ATF72	Crozet. High phytoplankton concentrations	1905684

ATF73	Crozet. High mesopelagic Fish diversity	4128723
ATF74	Crozet. King pinguins passage	5455394

Annexe 21. Priority level of Key Biodiversity Areas in the French Southern Lands

Priority	Code KBA	Name
1	ATF2	Amsterdam. Plateaux des Tourbières
1	ATF1	Amsterdam. Falaise d'Entrecasteaux
1	ATF3	Amsterdam. Zone libre d'accès
1	ATF70	Crozet shelf
1	ARF71	Crozet. Benthic areas of Del Cano Rise
1	ATF58	Kerguelen. Coastal zone
1	ATF54	Kerguelen. Cold water incursion
1	ATF53	Kerguelen. Eastern oceanic zone
1	ATF55	Kerguelen. Kerguelen-Heard seamounts
1	ATF50	Kerguelen. Northern shelf-break
1	ATF52	Kerguelen. Polar Front meander
1	ATF59	Kerguelen. Skiff bank
1	ATF57	Kerguelen. Southern shelf break
2	ATF72	Crozet. High phytoplankton concentrations
2	ATF5	Crozet. Ile aux Cochons
2	ATF11	Crozet. Ile de la Possession. Zone libre d'accès
2	ATF6	Crozet. Ile de l'Est
2	ATF9	Crozet. Pointe basse
2	ATF33	Crozet. Jardin Japonais
2	ATF19	Kerguelen. Iles du golfe du Morbihan
2	ATF13	Kerguelen. Nord de la péninsule Loranchet
2	ATF51	Kerguelen. North Eastern Shelf Productive area
2	ATF21	Kerguelen. Sud de la péninsule Jeanne d'Arc
2	ATF56	Kerguelen. Western shelf
2	ATF 20	Kerguelen. Péninsule Courbet
2	ATF 26	Kerguelen. Péninsule Loranchet
2	ATF4	Saint Paul

2	ATF 25	Saint-Paul et Amsterdam plateau (>2000m)
2	ATF74	Crozet. King penguins prey area
2	ATF73	Crozet. High mesopelagic Fish diversity
2	ATF74	Crozet. Intermediate oceanic region
3	ATF34	Crozet. Petit Caporal
3	ATF10	Crozet. Possession. Falaises situées entre la Crique de Noël et la Crique de la Chaloupe
3	ATF22	Kerguelen. Baie Larose
3	ATF16	Kerguelen. Ile Foch, Ile Sainte Lanne Gramont, Ile Howe
3	ATF18	Kerguelen. Péninsule Rallier du Baty
3	ATF66	Kerguelen. Productive southern area
3	ATF64	Kerguelen. Southern shelf
3	ATF23	Kerguelen. Zone libre d'accès
4	ATF67	Kerguelen. Northern oceanic zone
4	ATF25	Amsterdam et Saint Paul. Plateau. (Bathymétrie (m) : < -500)
4	ATF7	Crozet. Ile des Apôtres
4	ATF8	Crozet. Ile des Pingouins
4	ATF12	Kerguelen. Iles Nuageuses
4	ATF63	Kerguelen. North neritic zone
4	ATF62	Kerguelen. North western shelf and western shelf-break
4	ATF61	Kerguelen. South West oceanic zone
4	ATF60	Kerguelen. Western oceanic zone
4	ATF65	Kerguelen-Heard passage
5	ATF15	Crozet. Ile de la Possession. Baie américaine
5	ATF24	Crozet. Ile de la Possession. Mare aux éléphants
5	ATF17	Kerguelen. Ile de l'Ouest
5	ATF31	Kerguelen. Ile du Canard et Iles Normandes
5	ATF30	Kerguelen. Ile du Passage
5	ATF14	Kerguelen. Ile Leygues
5	ATF27	Kerguelen. Ile Mac Murdo, Ilot Baudin, Îlots Hallet
5	ATF29	Kerguelen. Ile Marron, Ile Francis
5	ATF32	Kerguelen. Iles du Prince de Monaco
5	ATF28	Kerguelen. Iles Sibbald, Iles du Veau Marin, Iles Bethell

Annexe 22. List of endemic species and species with globally significant aggregations in South Georgia and the South Sandwich Islands.

Phylum	Latin name	Common name	Category
Aves	*Anas georgica georgica*	Pintail duck	Endemic
Aves	*Aptenodytes patagonicus*	King penguin	GSC
Aves	*Chionis alba*	Snowy sheathbill	GSC
Aves	*Daption capense*	Cape petrel	GSC
Aves	*Fregetta tropica*	Black-bellied storm petrel	GSC
Aves	*Fulmarus glacialoides*	Antarctic fulmar	GSC
Aves	*Halobaena caerulea*	Blue petrel	GSC
Aves	*Macronectes giganteus*	Southern giant petrel	GSC
Aves	*Macronectes halli*	Northern giant petrel	GSC
Aves	*Oceanites oceanicus*	Wilson's storm petrel	GSC
Aves	*Pachyptila desolata*	Antarctic prion	GSC
Aves	*Pagodroma nivea*	Snow petrel	GSC
Aves	*Pelicanoides georgicus*	South Georgia diving petrel	GSC
Aves	*Pelicanoides urinatrix*	Common diving petrel	GSC
Aves	*Phalacrocurax atriceps georgianus*	Blue-eyed shag	Endemic
Aves	*Pygoscelis antarcticus*	Chinstrap penguin	GSC
Aves	*Pygoscelis papua*	Gentoo penguin	GSC
Aves	*Sterna vitata*	Antarctic tern	GSC
Aves	*Sterrcorarius antarcticus*	Brown skua	GSC
Mammalia	*Artocephalus gazella*	Antarctic fur seal	GSC
Mammalia	*Mirounga leonina*	Elephant seal	GSC

Pisces	*Artidedraco miras*		Endemic
Pisces	*Bathylutichthys taranetzi*		Endemic
Pisces	*Gobionotothen angustifrons*		Endemic
Pisces	*Harpagifer permitini*		Endemic
Pisces	*Parachaenichthyis georgianus*		Endemic
Pisces	*Psilodraco breviceps*		Endemic
Pisces	*Trematomus vicarius*		Endemic

Annexe 23. South Georgia and South Sandwich Islands trigger species list

Taxonomic group	Latin name	Common name	Trigger criteria	Comments
Birds	*Diomedea exulans*	Wandering albatross	VU	
	Thalassarche melanophris	Black-browed albatross	NT	
	Eudyptes chrysolophus	Macaroni penguin	VU	
	Thalassarche chrysostoma	Grey-headed albatross	EN	
	Procellaria aequinoctialis	White-chinned petrel	VU	
	Macronectes giganteus	Southern giant petrel	Globally significant congregation	GSC
	Macronectes halli	Northern giant petrel	Globally significant congregation	GSC
	Daption capense	Cape petrel	Globally significant congregation	GSC
	Fulmarus glacialoides	Antarctic fulmar	Globally significant congregation	GSC
	Halobaena caerulea	Blue petrel	Globally significant congregation	GSC
	Pachyptila desolata	Antarctic prion	Globally significant congregation	GSC
	Oceanites oceanicus	Wilson's storm petrel	Globally significant congregation	GSC
	Fregetta tropica	Black-bellied storm petrel	Globally significant congregation	GSC
	Pelecanoides urinatrix	Common diving petrel	Globally significant congregation	GSC
	Pelecanoides georgicus	South Georgia diving petrel	Globally significant congregation	GSC
	Pygoscelis papua	Gentoo penguin	Globally significant congregation	GSC
	Pygoscelis antarcticus	Chinstrap penguin	Globally significant congregation	GSC
	Aptenodytes patagonicus	King penguin	Globally significant congregation	GSC
	Phalacrocorax atriceps	Blue-eyed shag	Globally significant congregation	GSC
	Stercorarius antarcticus	Brown skua	Globally significant congregation	GSC
	Chionis albus	Snowy sheathbill	Globally significant congregation	GSC
	Anas acuta	Pintail duck	Globally significant congregation	GSC

	Sterna vittata	Antarctic tern	Globally significant congregation	GSC
	Phoebetria palpebrata	Light-mantled albatross	NT	
	Anthus antarcticus	South Georgia pipit	NT	
	Pagodroma nivea	Snow petrel	Globally significant congregation	GSC
Mammals	*Balaenoptera musculus*	Blue whale	EN	
	Balaenoptera physalus	Fin whale	EN	
	Balaenoptera borealis	Sei whale	EN	
	Physeter macrocephalus	Sperm whale	VU	
	Arctocephalus gazella	Antarctic fur seal	GSC	
	Mirounga leonina	Elephant seal	Globally significant congregation	
Fish	*Artidedraco miras*	Artidedraco miras	Restricted range species	Endemic
	Psilodraco breviceps	Psilodraco breviceps	Restricted range species	Endemic
	Parachaenichthyis georgianus	Parachaenichthyis georgianus	Restricted range species	Endemic
	Bathylutichthys taranetzi	Bathylutichthys taranetzi	Restricted range species	Endemic
	Gobionotothen angustifrons	Gobionotothen angustifrons	Restricted range species	Endemic
	Trematomus vicarius	*Trematomus vicarius*	Restricted range species	Endemic
	Harpagifer permitini	*Harpagifer permitini*	Restricted range species	Endemic
	Lamna nasus	Porbeagle	VU	
Benthic invertebrates			Restricted range species	Endemic

Annexe 24. Number of trigger species in each of the terrestrial regions of South Georgia and the South Sandwich Islands.

Location	IUCN EN	IUCN VU	GSC	Total
South Georgia NW	1	3	17	21
South Georgia NE	0	2	18	20
South Georgia SE	0	3	17	20
South Georgia SW	0	2	17	19
Annenkov Island	0	3	16	19
Cooper Island	0	1	15	16
Willis Islands	1	2	15	18
Bird Island	1	3	15	19
Shag Rocks	0	0	1	1
Black Rock	0	0	0	0
Zavodovski	0	1	10	11
Visokoi	0	1	8	9
Leskov	0	0	6	6
Candlemas	0	1	10	11
Vindication	0	1	5	6
Saunders	0	1	8	9
Montagu	0	0	7	7
Bristol	0	0	7	7
Bellingshausen	0	0	6	6
Thule	0	0	9	9
Cook	0	0	5	5

Annexe 25. Number of trigger species in each of the marine regions of South Georgia and the South Sandwich Islands.

Habitat	Area	IUCN EN	IUCN VU	Endemic	GSC	Total
Benthic	South Georgia shelf area (12 nm)	0	1	7+	3	11+
	Shag Rocks shelf (12 nm)	0	1	1+	3	5+
	SSI shelf (3 nm)	0	1	0	1	2
	Clerke Rocks shelf (6 nm)	0	1	7+	3	11+
	Kemp Seamount & Calderas BCA.	0	1	1+	0	2+
	West Shag BCA	0	1	0	1	2
	West Gully BCA	0	1	0	1	2
	Northern BCA	0	1	0	1	2
	Eastern BCA	0	1	0	1	2
	Southern Seamounts BCA	0	1	0	1	2
	North Georgia Rise BCA	0	1	0	1	2
	North-east Georgia Rise BCA	0	1	0	1	2
	Protector Shoals BCA	0	1	0	1	2
	Cumberland East Bay	0	1	7+	3	11+
	Benthic area > 2250 m	0	1	0	0	1
	Benthic area 700-2250 m	0	1	1	1	2
	Benthic area < 700 m, outside 12 nm	0	1	0	1	2
Pelagic	Shag Rocks shelf pelagic	4	5	0	18	27
	South Georgia shelf pelagic	4	5	0	19	28
	South Georgia offshore pelagic	4	5	0	15	24
	SSI Pelagic Closed areas (within 12 nm of each island).	4	1	0	15	20
	SSI offshore pelagic.	4	1	0	12	17

Annexe 26. Summary Key Biodiversity Areas characteristics of South Georgia and South Sandwich islands

Code	Terrestrial Key Biodiversity Area	Total Area (hectares)
SGS1	King Haakon Bay to Cumberland Bay	141859
SGS2	Cumberland Bay to Drygalski	90943
SGS3	Drygalski to Ducloz Head	56459
SGS4	Ducloz Head to King Haakon Bay	62397
SGS5	Annenkov	1349
SGS6	Cooper Island	420
SGS7	Willis Islands	430
SGS8	Bird Island	441
SGS9	Zavodovski	1146
SGS10	Visokoi	2975
SGS11	Vindication	263
SGS12	Candlemas	1069
SGS13	Saunders	4080
SGS40	Montagu	104.74
SGS41	Bristol	63.09
SGS42	Bellingshausen	1.82
SGS43	Thule	18.27
SGS44	Cook	20.21

Code	Marine Key Biodiversity Area	Total Area (hectares)
SGS20	South Georgia shelf area (12nm)	1387751
SGS21	Shag Rocks shelf area (12nm)	233404
SGS22	Clerk Rocks shelf area (6nm)	192153
SGS23	South Sandwich islands shelf area (3nm)	225346
SGS24	Benthic area 700 - 2250m	9403138
SGS25	Benthic area < 700m, outside 12nm	3148869*
SGS26	Benthic area > 2250m	92905967
SGS27	West Shag benthic closed area	110873
SGS28	West Gully benthic closed area	248454
SGS29	Northern benthic closed area	43876
SGS30	Eastern benthic closed area	14236
SGS31	North Georgia rise benthic closed area	461665
SGS32	Southern seamounts benthic closed area	154858
SGS33	Southern seamounts benthic closed area	115087
SGS34	Northeast Georgia rise benthic closed area	973102
SGS35	Protector shoals benthic closed area	222034
SGS36	Kemp seamount & calderas benthic closed area	34853
SGS37	Cumberland East bay	18736
SGS38	South Sandwich islands pelagic closed areas (12nm)	1458541
SGS39	South Sandwich islands offshore pelagic	17721511

* 12 outside nm

Annexe 27. British Antarctic Territory trigger species list

Taxonomy	Latin Name	Trigger criterion	Comments
BIRD	Aptenodytes forsteri	Significant congregation	
BIRD	Chionis alba	Significant congregation	
BIRD	Daption capense	Significant congregation	
BIRD	Eudyptes chrysolophus	VU	
BIRD	Fregetta tropica	Significant congregation	
BIRD	Fulmarus glacialoides	Significant congregation	
BIRD	Larus dominicanus	Significant congregation	
BIRD	Macronectes giganteus	Significant congregation	
BIRD	Oceanites oceanicus	Significant congregation	
BIRD	Pagodroma nivea	Significant congregation	
BIRD	Phalacrocorax atriceps	Significant congregation	
BIRD	Pygoscelis adeliae	Significant congregation	
BIRD	Pygoscelis antarctica	Significant congregation	
BIRD	Pygoscelis papua	Significant congregation	
BIRD	Stercorarius antarcticus	Significant congregation	
BIRD	Stercorarius maccormicki	Significant congregation	
BIRD	Sterna vittata	Significant congregation	
BIRD	Thalassoica antarctica	Significant congregation	
PLANTAE	Brachythecium austrosalebrosum	Restricted Range species	Endemic
PLANTAE	Schistidium deceptionensis sp . nov.	Restricted Range species	Endemic
PLANTAE	Schistidium leptoneurum sp.nov.	Restricted Range species	Endemic
PLANTAE	Colobanthus quitensis	Restricted Range species	Endemic
PLANTAE	Deschampsia antarctica	Restricted Range species	Endemic

Annexe 28. Summary of Key Biodiversity Areas in British Antarctic Territory

Code KBA	Name KBA	Surface (Ha)
ATB1	Marion Nunataks. Charcot Island	15100
ATB3	Green Island. Berthelot Island	17
ATB4	Moe Island, South Orkney Islands	125
ATB5	Lynch Island, South Orkney Islands	11
ATB6	Southern Powell Island and adjacent islands, South	556
ATB7	Lagotellerie Island, Marguerite Bay, Graham Land	167
ATB8	Avian Island, Marguerite Bay, Antarctic Peninsula	67
ATB9	Byers Peninsula, Livingston Island, South Shetland	6222
ATB10	Inaccessible Islands	96
ATB11	Larsen Island. Moreton Pt. Western Coronation Isla	279
ATB12	Return Point. Cheal point . Coronation Island	27
ATB13	Gosling Islands	41
ATB14	Signy Island	1913
ATB15	Shingle Cove. Coronation Island	45
ATB16	Robertson Islands	277
ATB17	Atriceps Island	72
ATB18	Gibbon Bay, Coronation Island	145
ATB19	Eillium Island	53
ATB20	Cape Robertson. Laurie Island	375
ATB21	Islet SW of Cape Davidson, Laurie Island	3
ATB22	Point Martin, Laurie Island	192
ATB23	Cape Whitson, Laurie Island	39
ATB24	Ferrier Peninsula / Graptolite Island, Laurie Isla	97
ATB25	Buchanan Point, Laurie Island	18
ATB26	Fraser Point, Laurie Island	8
ATB27	Watson Peninsula, Laurie Island	138
ATB28	Ferguslie Peninsula, Laurie Island	55
ATB29	Pirie Peninsula, Laurie Island	448

ATB30	Weddell Islands	12
ATB31	Seal Islands	52
ATB32	Saddleback Point, Elephant Island	52
ATB33	Point west of Walker Point, Elephant Island	2
ATB34	Mount Elder, Elephant Island	30
ATB35	Point west of Cape Lookout, Elephant Island	19
ATB36	Point Wordie, Elephant Island	5
ATB37	Sugarloaf Island, Clarence Island	94
ATB38	Cape Bowles, Clarence Island	58
ATB39	Craggy Point, Clarence Island	40
ATB40	Chinstrap Cove, Clarence Island	6
ATB41	Gibbs Island	1970
ATB42	Aspland Island / Eadie Island	609
ATB43	O'Brien Island	168
ATB44	Eastern Litwin Bay, King George Island	5
ATB45	Tartar Island, King George Island	20
ATB46	Kellick Island, King George Island	12
ATB47	Owen Island, King George Island	17
ATB48	Pottinger Point, King George Island	56
ATB49	False Round Point, King George Island	121
ATB50	Milosz Point / Czeslaw Point, King George Island	78
ATB51	North Foreland, King George Island	99
ATB52	Point Hennequin, King George Island	40
ATB53	West Admiralty Bay, King George Island	32
ATB54	Potter Peninsula, King George Island	45
ATB55	Ardley Island, King George Island	126
ATB56	Harmony Point, Nelson Island	302
ATB57	Heywood Island	76
ATB58	Yankee Harbour, Greenwich Island	15

ATB59	Half Moon Island	162
ATB60	Barnard Point, Livingston Island	178
ATB61	Baily Head, Deception Island	16
ATB62	Vapour Col, Deception Island	11
ATB63	Cape Wallace, Low Island	1001
ATB64	Cape Hooker, Low Island	26
ATB65	Cape Garry, Low Island	133
ATB66	Jameson Point, Low Island	63
ATB67	Ambush Bay, Joinville Island	92
ATB68	Danger Islands	424
ATB69	Brash Island, Danger Islands	86
ATB70	Earle Island, Danger Islands	20
ATB71	Eden Rocks	53
ATB72	Paulet Island	266
ATB73	D'Urville Monument, Joinville Island	89
ATB74	Madder Cliffs, Joinville Island	113
ATB75	Hope Bay	77
ATB76	Brown Bluff	53
ATB77	Gourdin Island	70
ATB78	Duroch Islands	21
ATB79	Tupinier Islands	123
ATB80	Pearl Rocks	117
ATB81	Devil Island	111
ATB82	Cockburn Island	362
ATB83	Penguin Point, Seymour Island	7581
ATB84	Snow Hill Island	35222
ATB85	Cape Wollaston, Trinity Island	224
ATB86	SW Trinity Island	453
ATB87	Cierva Point & offshore islands, part of ASPA 134	6012

ATB88	Bluff Island	1906
ATB89	Cuverville Island	82
ATB90	Islet E of Guépratte Island	6
ATB91	Petermann Island	100
ATB92	Uruguay Island	39
ATB93	Islet south of Gerlache Island	54
ATB94	Joubin Island	312
ATB95	Litchfield Island	38
ATB96	Cormorant Island	15
ATB97	Islet S of Bates Island	0
ATB98	Island N of Dodman Island	11
ATB99	Armstrong Reef	110
ATB100	Cape Evensen	56
ATB101	Ginger Islands	2
ATB102	Stonington Island	0
ATB103	Smith Peninsula	20481
ATB104	NW Berkner Island (Gould Bay)	4074
ATB105	Coalseam Cliffs / Mount Faraway	14192
ATB106	Luitpold Coast	253916
ATB107	Dawson-Lambton Glacier	19704
ATB108	Brunt Ice Shelf (‘Halley Bay’)	10920
ATB109	Stancomb-Wills Glacier	20006
ATB110	Coppermine Peninsula, APSA 112	66
ATB111	Cape Shirreff, ASPA 149	966
ATB112	Parts of Deception Island, South Shetland Islands	255
ATB113	Lions Rump, ASPA 151	131
ATB114	Narebski Point, ASPA 171	89
ATB115	Greenwich and South Shetland Islands, ASPA 144	66
ATB116	Port Foster, Deception Island, ASPA 145	223

ATB117	Doumer Island, Palmer Archipelago, ASPA 146	95
ATB118	Western Bransfield Strait, ASPA 152	90747
ATB119	Eastern Dallmann Bay, ASPA 153	60484
ATB120	Admiralty Bay, King George Island, ASMA 1	36066
ATB121	Deception Island, ASMA 4	14059
ATB122	South Orkney Islands Southern Shelf MPA	9305647

Annexe 29. Adélie Land trigger species list

TAXONOMY	Latin Name	Trigger criteria	Comments
BIRD	Aptenodytes forsteri	Significant congregation	VU Red List TAAF
BIRD	Pygoscelis adeliae	Significant congregation	NT Global Red List

Annexe 30. Summary of Key Biodiversity Areas characteristics in Adélie Land

Code	Key Biodiversity Area	Total Area (hectares)
ATA1	Pointe Geologie	37
ATA2	Ile des Manchots	12
ATA3	Cap Jules	185
ATA4	Cap Bienvenue	28
ATA5	Terre Adélie. D'Urville Sea-D'Urville-Mertz	3 1600 000

Annexe 31. The multinational environmental agreements that have been extended to South Georgia and the South Sandwich Islands.

Title (Abbreviated)	Title (Full)
CBD	Convention on Biological Diversity
CMS (Bonn Convention)	Convention on the Conservation of Migratory Species of Wild Animals
CMS ACAP	Convention on the Conservation of Migratory Species of Wild Animals - Agreement on the Conservation of Albatrosses and Petrels (ACAP)
London Convention	Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter
RAMSAR	Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar)
ICRW(a)	International Convention on the Regulation of Whaling (a)
Vienna Convention	Vienna Convention for the Protection of the Ozone Layer
PEPAT Madrid Protocol	Protocol on Environmental Protection to the Antarctic Treaty
Protocol ICCLOPD	Protocol to amend the International Convention on Civil Liability for Oil Pollution Damage of 29.11.1969
Protocol ICCOPD	Protocol to amend the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage of 18.12.1971
UNCLOS (UNC Fish Stocks)	Agreement for the Implementation of the Provisions of UNCLOS (10.12.1982) relating to the conservation & management of straddling fish stocks & highly migratory fish stocks
UNESCO WHC	Convention concerning the Protection of the World Cultural and Natural Heritage
Aarhus Convention	Access to information, public participation in decision-making and access to justice in environmental matters
Montreal Protocol	Montreal Protocol on Substances that Deplete the Ozone Layer