# Prince Edward Islands, Del Cano Rise and Crozet Islands

## General Information

## Summary

The area covers a northern section of the South African and French EEZs, around the Prince Edward and Crozet islands, respectively, and includes components of the Del Cano Rise, which lies between the two EEZs. In the west, the area includes the southern flank of the NE-SW trending Southwest Indian Ridge. The Prince Edward and Crozet Islands are relatively pristine and have a high level of endemism. The region constitutes the foraging and breeding areas for many threatened bird species and is important in terms of connectivity between land and sea, and among bathymetric features. The area lies between the Subtropical Front to the north and the Antarctic Polar Front (APF) to the south with the Subantarctic Front in between. The Agulhas Return Current has a strong influence on the northern part of the region. The Antarctic circumpolar current flows in most of the area. There is considerable pelagic and benthic habitat heterogeneity with potentially sensitive habitats and vulnerable species including reef-forming cold-water corals. Island mass effects are observed with iron enrichment and retention that favours planktonic production to the north of the Crozet Islands but not Prince Edward Island (Pollard et al., 2007). While waters around the two islands have similar geomorphological features, they have different surface water productivity regimes to the north of the islands owing to natural iron fertilisation only to the north of the Crozet archipelago (Pollard et al., 2007, 2009). Habitats include seamounts, transform faults and fracture zones, deep trenches, hydrothermal vents, abyssal plains and several pelagic habitat types.

## Introduction of the area

The Prince Edward Islands, Del Cano Rise and Crozet Islands comprises a pristine area that surrounds two islands within the South African Prince Edward Islands territory (Marion and Prince Edward islands), and four islands within the French Crozet Archipelago territory (îlot des Apôtres, Cochons, Pingouins and l’Est islands). These are connected by the western end of the relatively low-relief, east-west trending Del Cano Rise, which is linked to the features within the EEZ of South Africa surrounding the Prince Edward Islands, i.e., the Africana Rise. Here, the Del Cano Rise merges with the southern flank of the northeast-southwest trending Southwest Indian Ridge (SWIR), including the Prince Edward Islands. The SWIR exhibits some of the most rugged underwater terrain in the world. The generally north-south trending ridges and valleys of the Prince Edward and Marion transform fault and fracture zones reach elevations of <500 m and depths >5000 m and provide a conduit for the northern movement of cold Antarctic bottom currents across the Del Cano Rise (Pollard 2007b). The SWIR forms a nearly continuous connection with the Central Indian Ocean Ridge that extends northwards up to the Red Sea, and southwards to ~60 degrees south, where it joins with the mid-Atlantic Ridge that extends northward past the equator up to the Arctic Ocean. The junction of the Del Cano Rise with the SWIR is also linked northward via the Discovery II Fracture Ridge to the South Madagascar Plateau, which extends north up to the southern coast of Madagascar.

The Prince Edward Islands, Del Cano Rise and Crozet Islands lies in the sub-Antarctic zone, between the Subtropical Front (STF) and the Sub-Antarctic Front (SAF) and in the Polar Frontal Zone (PFZ) between the SAF and the Antarctic Polar Front (APF). North of it, the subtropical regions are separated by their water-mass characteristics and intense flow, related to the Agulhas Return Current. There is high frontal interaction with shallow oceanic features (Lombard et al., 2007, Koubbi et al., 2012). The highly productive pelagic waters are a consequence of the unique bathymetry, iron enrichment from insular sources, frontal meanders and island-mass effects. This contrasts strongly with high nutrient - low chlorophyll (HNLC) areas farther south.

The area comprises two benthic ecoregions, Del Carno and Atlantic Basin, the former of which is far more prevalent in the Prince Edward Islands, Del Cano Rise and Crozet Islands than is the latter (Douglass et al., 2014). Distinct benthic assemblages separate the Del Carno ecoregion from surrounding ecoregions, primarily due to ecological barriers to dispersal, including the different frontal zones. The shallow oceanic areas associated with the plateaus and Subantarctic islands correspond with the warmest seabed temperatures in the Southern Ocean and also zones of high frontal activity (Koubbi et al., 2012). There is considerable habitat heterogeneity in the area, with potentially sensitive habitats and vulnerable species, including reef-forming cold-water corals. Habitats include many seamounts, transform fault ridges and deep trenches, hydrothermal vents, shallow abyssal plain and several pelagic habitat types. Abyssal plain communities to the east of the Crozet archipelago (c. 4200m depth) under productive surface waters show very significant differences to seabed communities at the same depth in HNLC waters to the south of the islands. Differences in seabed biomass reflect differences in the Particulate Organic Carbon flux between the two areas (Wolff et al., 2011). Highly significant differences also occur in species, principally in megafaunal holothurians (Wolff et al., 2011). The islands and surrounds have a high level of endemism, include important breeding and foraging habitats, and provide critical linkages for life history phases for albatrosses, penguins, other seabirds and marine mammals, some of which are globally threatened.

## Description of the location

## EBSA Region

Southern Indian Ocean

## Description of location

Bounded by 43°to 48° to the south and 32.73° to 55° to the east.

## Geo-Location

SIO\_26\_EBSA.geojson

## Area Details

## Feature description of the area

The Prince Edward Islands, Del Cano Rise and Crozet Islands includes rugged underwater terrain, volcanic islands and important pelagic foraging habitat around these features (as a component of the SWIR). Here, the generally north-south trending ridges and valleys of the Prince Edward and Marion transform fault and fracture zones, reach elevations of <500 m and depths of >5000 m, and provide a conduit for the northern movement of cold Antarctic bottom currents across the barrier of the SWIR. This pristine area includes islands with a high level of endemism and constitutes breeding and foraging habitat and critical linkages for life history phases for albatrosses, penguins, other seabirds and marine mammals, some of which are globally threatened. Another important factor relating to migration of marine life is that the Southwest Indian Ridge forms a nearly continuous connection with the Central Indian Ocean Ridge, which extends northwards up to the Red Sea, and southwards to ~60° south, where it joins with the Mid-Atlantic Ridge, which extends northward past the equator up to the Arctic Ocean. The junction of the Del Cano Rise with the SWIR is also linked northward via the Discovery II Fracture Ridge to the South Madagascar Plateau, which extends north up to the southern coast of Madagascar.

The area lies in the Subantarctic zone, between the Subtropical Front (STF) and the Subantarctic Front (SAF) and in the Polar Frontal Zone (PFZ) between the SAF and the Antarctic Polar Front (APF). North of it, the subtropical regions are separated by their water mass characteristics and intense flow related to the Agulhas Return Current. There is high frontal interaction with shallow oceanic features (Lombard et al., 2007, Koubbi et al., 2012). The highly productive pelagic waters are a consequence of the unique bathymetry, iron enrichment from insular sources, frontal meanders and island-mass effects. This contrasts strongly with high nutrient-low chlorophyll areas further south (Pollard et al., 2007a).

The islands included within this area meeting EBSA criteria are globally significant for a large diversity of seabirds, including the endemic Crozet shag (*Phalacrocorax*), about 70% of the world population of wandering albatross (*Diomedea exulans*), 54% of king penguin (*Aptenodytes patagonicus*), 33% of Indian yellow-nosed albatross (*Thalassarche carteri*), 33% of Subantarctic fur seal (*Arctocephalus tropicalis*), 27% of sooty albatross (*Phoebetria fusca*) and 21% of the world’s southern rockhopper penguin (*Eudyptes chrysocome*). The waters surrounding these islands are significant for all these species during their respective breeding seasons and have been identified as marine IBAs by BirdLife International. Several species present in the area are threatened, including the Endangered sooty, black-browed (*Thalassarche melanophris*) and Indian yellow-nosed albatrosses; Vulnerable southern rockhopper and macaroni penguins, wandering and grey-headed albatrosses (Thalassarche chrysostoma), and white-chinned petrel (Procellaria aequinoctialis); and near threatened light-mantled albatross (*Phoebetria palpebrata*), grey petrel (*Procellaria cinerea*), and Kerguelen tern (*Sterna virgate*).

In the Crozets, Île de l'Est holds the most diverse community of seabirds in the world, comprising 32 species, of which 19 are hole-nesting petrels. Many are believed to number tens of thousands of pairs. Three taxa are particularly abundant, namely the South Georgian (*Pelecanoides georgicus*) and common (*P. urinatrix*) diving petrels and Salvin’s prion (*Pachyptila salvini*). Estimates of the population sizes of each are of several million pairs, which, in the case of Salvin’s prion, represents 80% of its global population. The Île aux Cochons IBA is extremely important for its large penguin populations: it holds the world’s largest rookery of king penguins and the largest colony of wandering albatross in the Indian Ocean. Despite the presence of cats, large populations of small petrels still nest on the island, notably four million pairs of Salvin’s prion, and one million pairs of South Georgian diving petrel. Île de la Possession holds at least 28 breeding seabird species, 14 in globally significant numbers. Île des Pingouins holds at least 29 species, 12 in globally significant numbers. This site has an exceptionally high density of seabirds, notably including six species of albatross. Îles des Apôtres holds at least 25 breeding species, notably including six species of albatross, and 10 species occur in globally significant numbers.

The Prince Edward Islands together support c. 2.5 million pairs of 28 species of breeding seabirds, and may support up to 8 million pairs in total. This site has the second-highest seabird species richness in the world, after Île de l'Est. Twenty-four species occur in globally significant numbers and meet one or more Important Bird Area criteria. Six species of albatross breed here, as do extremely large numbers of Salvin’s prions and *Pterodroma* petrels. Only one other island group in the world, the Crozets, holds more species of breeding seabirds.

In terms of abyssal plain ecosystems, new species known only from the region have been described (Cross et al., 2009; Rogacheva et al., 2009a, b). The most abundant megafaunal species, the holothurian (*Peniagone crozeti*), occurred only in abundance at the eastern productive site (in all samples), indicating that the productive waters around Crozet are home to unique species. Biogeochemical barriers, rather than geomorphological barriers, may lead to speciation in the deep ocean (Wolff et al., 2011). Another abyssal holothurian species, *Peniagone horrifer*, known previously from a few specimens collected by the Challenger Expedition (Théel 1882; Hansen 1975), was rediscovered in abundance around the Crozet Islands. Some abyssal species to the south of the Crozet Islands have opportunistic life history characteristics indicating that they may be adapted to episodic POC fluxes (Wolff et al., 2011).

## Feature conditions and future outlook of the proposed area

South Africa annexed the sub-Antarctic Prince Edward Islands (Marion and Prince Edward) in 1948, and from that time this island has had limited anthropogenic impacts on its ecosystems. Marion Island is home to a meteorological base, and activities are limited to environmental and meteorological research, whilst Prince Edward Island is rarely visited and has no permanent structures. France and South Africa established EEZs around the Crozet and Prince Edward Archipelagos at the end of the 1970s. The Crozet Archipelago (îlot des Apôtres, Cochons island, Pingouins island and l’Est island) are integrally protected as natural reserves; their territorial seas (12 NM) are “no take areas” for fisheries, and access to these islands is strictly controlled. A fifth island, Possession Island, is also within the terrestrial reserve, and human activity is authorized for scientific purposes. The territorial sea of Possession Island is not included within the marine reserve but TAAF regulations forbid fisheries activities in adjacent waters.

Key pressures in the area include climate change, as these islands are at the northern limit of the Southern Ocean. The exact mechanisms are not well understood but these changes are thought to be related to increasing temperatures affecting oceanographic conditions (upwelling, areas of high productivity) and prey availability of top predators (Koubbi et al.2012).

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www.seabirdtracking.org

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## Other relevant website address or attached documents

Additional\_figures\_SIO\_26.pdf (/api/v2013/documents/CB84D032-5979-C145-0243-7FF6405378DE/attachments/Additional\_figures\_SIO\_26.pdf)

SIO\_26\_EBSA-GIS shapefile.zip (/api/v2013/documents/CB84D032-5979-C145-0243-7FF6405378DE/attachments/SIO\_26\_EBSA-GIS%20shapefile.zip)

## Status of submission

Areas described as meeting EBSA criteria that were considered by the Conference of the Parties

## COP Decision

dec-COP-12-DEC-22

## Assessment of the area against CBD EBSA criteria

C1: Uniqueness or rarity High

Justification

The Prince Edward and Crozet islands together host the entire population of Crozet shag, about 70% of the world’s population of wandering albatross, 54% of king penguin, 33% of Indian yellow-nosed albatross, 33% of Subantarctic fur seal, 27% of sooty albatross and 21% of the world’s southern rockhopper penguin. They are two of only three localities (the other being the Kerguelen archipelago) where both species of *Phoebetria* albatrosses breed. The islands are at the northern limit of the breeding distribution of gentoo penguin. Seamounts and hydrothermal vents occur within the areas but are poorly researched. This area includes the only location of the pelagic region 19 in the CCAMLR region. The area has high endemism for benthos with new species, i.e. Lithodid crab (Macpherson, 2004) and fish (Nototheniid *Gobionotothen marionensis*, Bothid *Pseudomancopsetta andriashevi*, Rajid *Raja taaf*; Lombard et al., 2007, Koubbi et al., 2012). In terms of abyssal plain ecosystems the Crozet region has unique species (Cross et al., 2009; Rogacheva et al., 2009a,b). The most abundant megafaunal species, the holothurian *Peniagone crozeti*, occurred only at the eastern productive site (in all samples), where it was super abundant for abyssal ecosystems (Billett, 1991; Billett et al., 2010), indicating that the productive waters around Crozet are home to unique species. This may indicate that biogeochemical barriers, rather than geomorphological barriers, may lead to speciation in the deep ocean (Wolff et al., 2011). Another abyssal holothurian species (*Peniagone horrifer*), known previously from a few specimens collected by the Challenger Expedition (Théel 1882; Hansen 1975) was rediscovered in abundance around the Crozet Islands. Some abyssal species to the south of the Crozet Islands have opportunistic life history characteristics indicating that they may be adapted to episodic POC fluxes (Wolff et al., 2011).

C2: Special importance for life-history stages of species High

Justification

This area constitutes breeding and foraging grounds for albatrosses, penguins, other seabirds and marine mammals. The area includes critical linkages between breeding and feeding areas for both inshore and offshore foragers including terrestrial and marine links and links between different marine habitats that represent important connectivity between life history stages for these species. Satellite tracking data and habitat predictions show the importance of the area to top predators. Island mass effects and iron enrichment from lands are known to be in favour of concentration of plankton and retention of early life stages of fish. Another important factor relating to migration of marine life is that the Southwest Indian Ridge forms a nearly continuous connection with the Central Indian Ocean Ridge, which extends northwards up to the Red Sea, and southwards to ~60° south, where it joins with the Mid-Atlantic Ridge, which extends northward past the equator up to the Arctic Ocean. The junction of the Del Cano Rise with the SWIR is also linked northward via the Discovery II Fracture Ridge to the South Madagascar Plateau, which extends north up to the southern coast of Madagascar. (Lombard et al., 2007, Koubbi et al., 2012). Abyssal ecosystems to the north and east of the Crozet Islands have species that are proposed to be dependent on productive waters and occur only in abundance in a restricted area to the north and east of the islands.

C3: Importance for threatened, endangered or declining species and/or habitats High

Justification

This area is important for globally threatened and near-threatened seabirds and seals (near-threatened species are not listed here), including: sooty albatross (*Phoebetria fusca*, Endangered), Indian yellow-nosed albatross (*Thalassarche carteri*, Endangered), wandering albatross (*Diomedea exulans*,Vulnerable), grey-headed albatross (*Thalassarche chrysostoma*, Vulnerable), white-chinned petrel (*Procellaria aequinoctialia*, Vulnerable) and southern rockhopper penguin (*Eudyptes chrysocome*, Vulnerable; BirdLife International 2008, Lombard et al., 2007, Ryan et al., 2009).

C4: Vulnerability, fragility, sensitivity, or slow recovery High

Justification

This area includes a relatively high proportion of potentially sensitive habitats with steep shelves, seamounts, ridges and gullies, and hydrothermal vents. Reef-building cold-water corals have been collected (Iziko South African Museum), and observers in the Patagonian toothfish fishery report habitat-forming sponges, black corals and cold-water corals (Lombard et al., 2007 and references therein). Habitats and species are vulnerable to climate change impacts, particularly those that are impacted by changes in the position of the SAF. Populations of long-lived seabirds, including albatrosses and petrels, many of which have a late age at maturity, breed biennially and have a small clutch, may be rapidly depleted. Outbreaks of disease at these and other Subantarctic islands have caused high mortality of seabirds and seals. Introduced predators (cats, rats and mice) and rabbits have also had devastating impacts at Marion and the Crozet islands; Prince Edward Island is free of any alien mammals (Angel et. al. 2009).

C5: Biological productivity High

Justification

This area includes two major frontal systems: the Subantarctic Front (SAF) and the Antarctic Polar Front (APF) and the southern SAF, which lies between them. As such there are three major water masses: Subantarctic surface waters (north of the SAF), Northern Polar Frontal waters (between the SAF and the SSAF), and Southern Polar Frontal waters (between the SSAF and the APF). Elevated plankton and fish biomass are associated with these major frontal systems, and the front areas constitute important foraging habitat for seabirds and marine mammals because planktonic and micronektonic prey are more accessible for predators in this area. There is high frontal interaction with shallow oceanic features in the area. Mesoscale eddies north of the islands also constitute important feeding grounds for top predators (Lombard et al., 2007 and Koubbi et al., 2012). The shelves around the Prince Edward Islands and Crozet receive considerable nutrient and iron input from the islands, ensuring relatively high primary and secondary production (Lombard et al., 2007, Koubbi et al., 2012).

C6: Biological diversity High

Justification

This area has high habitat heterogeneity, with islands, steep shelves, seamounts, transform ridges (extending up to 500 m in places) and trenches (as deep as 5000 m in places), hydrothermal vents, shallow abyssal plains and some of the warmest seabed habitat in the Southern Ocean. Higher fish species richness has been reported on the Del Cano Rise and around the PE Islands. The area includes several pelagic habitats according to the transition from the polar frontal zone to the subtropical zone in a relative small latitudinal gradient (pelagic regions17, 19, 20 of CCAMLR; Lombard et al., 2007, Koubbi et al., 2012). Diverse abyssal communities and differences around the Crozet archipelago have been detailed by Wolff et al., 2011).

C7: Naturalness High

Justification

There is limited anthropogenic influence. Much of the area is still pristine (Lombard et al., 2007, Chown and Froneman 2008).