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Domain 1 Marine Protected Area Preliminary Proposal – PART C: Biodiversity Analysis by MPA zones

Delegations of Argentina and Chile

The only change in this revision is an updated version of Figure 9.

EN

Domain 1 Marine Protected Area Preliminary Proposal

PART C: Biodiversity Analysis by MPA zones

On behalf of Argentina and Chile

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Abstract

Conservation objects comprise different extensions and are distributed differently in Doman 1; while some of them occupy very small areas –such as polynyas– others extend over larger areas -like benthic ecoregions. In general, it is complicated to protect all spatial features especiallywhen their distribution is complex. The Domain 1 MPA model was generated based on priority areas for conservation and taking into consideration the krill fishery and climate change. The model achieved the targets for almost 90% of the conservation objects, including the protection for all the areas considered to be important for birds, mammals and fishes. The proposed MPA fulfils the level of protection agreed by the international community for Domain 1. Substantial reductions of this MPA could potentially compromise - at least at some degree – the protection of the conservation objectives established by the Convention for the designation of MPA in Antarctica.

Introduction

A systematic conservation planning process has to ensure the persistence of the biodiversity in the long term. The biodiversity is fully protected not only when the most visible objectives - such as important areas for life cycle of predators- are included, but also when the objectives related to benthic and pelagic habitats and processes are considered, thus ensuring the health of the entire ecosystem (Segan et al. 2011).

In a MPA planning process the concept of complementarity is fundamental in order to understand the extent in which zones complement each other, representing the full range of biodiversity. This may require a network of protected areas aimed to achieve the conservation objectives (Sarkar et al., 2006).

Marxan software guides the design of marine protected areas by efficiently identifying priority areas for conservation where spatial features are captured, based on their established conservation targets. Generally, it is challenging to protect all the areas identified by Marxan; and even more so when the distribution of spatial features is complex. The process then requires the design of models that, based on the results of Marxan, incorporate other relevant information to, for example, assist with the management of the area. In this sense, Marxan

*Funded by ASOC

does not provide unique solutions for reserve systems and, as such, it should be used as a part of a systematic conservation planning process in collaboration with other forms of knowledge (Ardron et al., 2010).

For the Domain 1 MPA proposal, the final model included not only aspects of biological / ecological representation (priority areas for conservation) but also aspects of size and shape, location, position of boundaries and zoning based on considerations of the krill fishery and climate change (see Domain 1 MPA proposal – PART A, WG-17/XX).

The aim of this document is to provide further details on the factors that led to the design of a large, comprehensive, adequate, and representative MPA in Domain 1. We examine the conservation objectives and object representation in the final model by means of a detailed analysis by zone, including the General Protection Zones (GPZ) and Special Fishery Management Zones (SFMZ), to assist Members in the process of understating the rationale towards the development of the Domain 1 MPA proposal.An analysis by conservation objective, in which spatial representation can be seen at the level of each conservation objective, is also provided for interested Members (Annex 2) but are not discussed extensively in this paper.

Material and methods

Once priority areas for conservation were identified (PART A WG EMM 17/XX), Domain 1 model was built and polygons defining each zone were associated with the planning unit shapefile, identifying which planning units correspond to each zone (Fig. 1 and Table 1). The percentage of each conservation object (feature) that occurred in each zone was calculated and afterwards compared with the level of protection (conservation target) agreed for each feature (Annex 1).

Achievement of conservation target was granted to features that reached at least 90% of their target. For easier interpretation, figures for each conservation objective emphasize features that missed their targets; in many cases targets were overreached. This do not necessarily implies Marxan results are not efficient but, on the contrary, it relates to the very nature of the spatial distribution of features and their agreed conservation targets, as different features occupy large areas or are exclusively associated with small and specific areas in Domain 1, and all are requested to be protected at some degree.

Analyses were done using the Summarize Zone tool of ZONAE COGITO version 1.74, software design to extend the capabilities of Marxan allowing for easier parameter calibrations and modifications of results, including their visualization, toward support for an iterative, interactive, and transparent planning process.

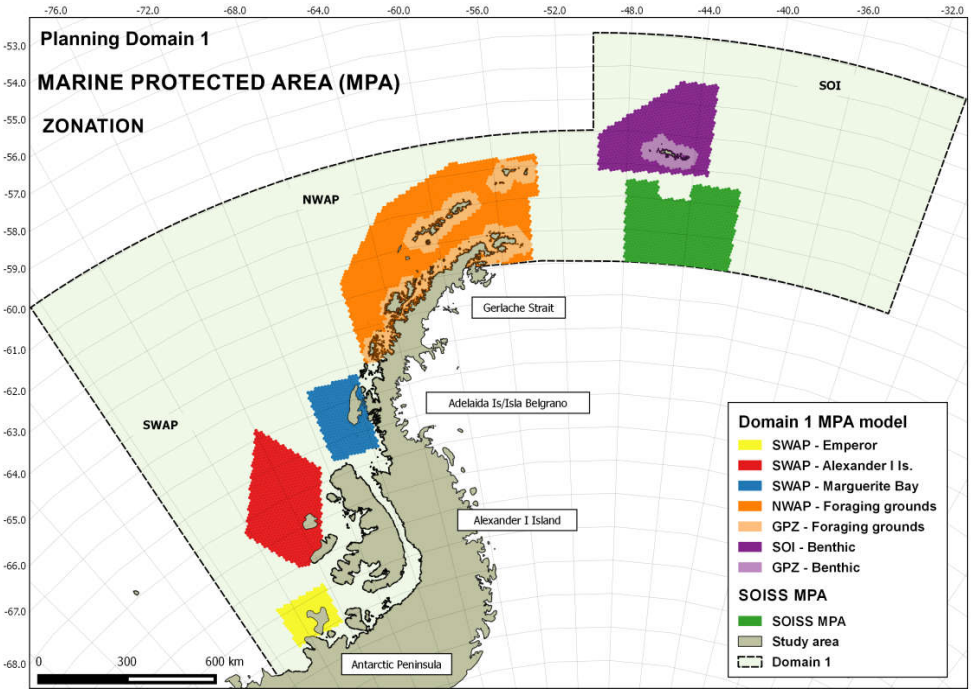

Figure 1. Map of Domain 1 MPA model

Bioregion	Zones	Management
SWAP	SWAP – Emperor	GPZ - Emperor
SWAP	SWAP - Alexander I Is.	GPZ - Alexander I Is.
SWAP	SWAP – MargueriteBay	GPZ - MargueriteBay
NWAP	NWAP – Foraging grounds	GPZ - Foraging grounds
		SFMZ - Foraging grounds
SOI	SOI - Canyons	GPZ – Benthic
		SFMZ - Benthic
	SO SOI - MPA	SO SOI - MPA

Table 1. Description of zones and type of management defined in Domain 1 MPA model. SO SOI MPA is included to provide further details on conservation objectives covered in the entire extension of Domain 1.

Results

Conservation objects captured by Domain 1 MPA model

Domain 1 MPA met the targets for 86% of the spatial features (n=123), and even more for objectives 5 (important areas for birds and mammals) and 6 (important areas for fish life cycles) all of the conservation objects were 100% capture by the model (Figure 2).

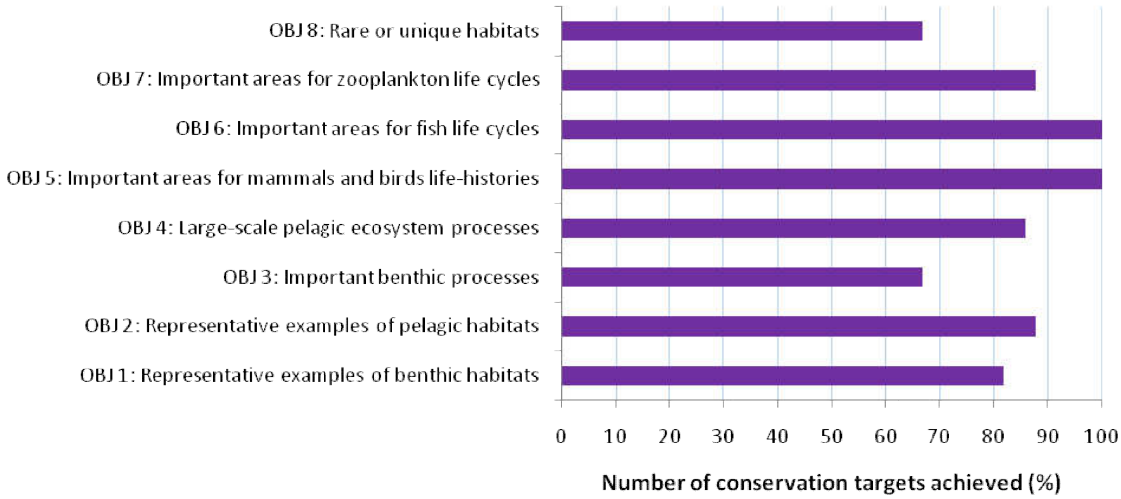

Figure 2. Percentage of the number of conservation targets achieved within each conservation objective. Note that achievement was granted to objects that reached at least 90% of their targets (see Methods)

Level of non-compliance was variable (Table 3). For 5 features belonging to objectives 1 (benthic habitats), 2 (pelagic habitats), 4 (ecosystem process) and 7 (zooplankton areas) over the 68% of their targets were achieved. In particular, although polynyas (objective 4) are included in the analyses as a separate conservation object it is worth noting that they are also represented in the pelagic bioregion 2 (Raymond, 2011) which is completely captured by the model.

In other 5 cases, targets achievement was in the range of 19-39% for features in objectives 1 (benthic habitats), 3 (benthic process) and 8 (rare or unique habitats). Although Domain 1 MPA fails to fully capture ice-shelves, marine areas following ice-shelf retreat or collapse could potentially by protected according to CM 24-04 recently agreed by the Commission.

Ten conservation objects were not captured by the model mostly belonging to Objective 1 (n=9) and Objective 2 (n=1). Many of these features are located in areas of Domain 1 far away from the coast and do not coincide spatially with many other conservation objects such as the Pacific Basin or the Pelagic Bioregion 16 (deep oceanic waters bounded approx on the north by the subantarctic front, based on Raymond 2011), and as such, could not be captured by the model. This is also the case for some of the objects not fully captured by the model such as Seamounts > 2000m in the Antarctic Peninsula. As stated before, it is a hard-to-achieve challenge to protect all spatial features even more so when the distribution of them is complex. In this regard, compromises need to be made assuring the protection of those objects deemed more relevant for the Domain 1 region.

Conservationobject	Target agreed	Target met (%)
Objects captured by the model in > 68% of their target		
Obj4_Polynyas	50	86.78
Obj1_Bank:-1000m to -1500m	10	85.9
Obj7_Belling_N_krill_nursery	20	74.9

Obj1_Rugose Ocean Floor:-3000m to -4500m	10	72.8
Obj2_Bioregion_Pelagica_12	10	68.3
Objects captured by the model in the 19-39% of their target		
Obj1_Rugose Ocean Floor:-2000m to -3000m	10	38.7
Obj1_Abyssal Plain:-2000m to -3000m	10	32.3
Obj3_Iceshelves	20	24.1
Obj8_Seamounts>2000m AP	10	21.7
Obj1_Rugose Ocean Floor:4500m+	10	19.6
Objects not captured by the model		
Obj1_Seamount Ridge:-1500m to -2000m	10	0.3
Obj1_Margin Ridge:-100m to -200m	10	0
Obj1_Pacific Basin	10	0
Obj1_Rugose Ocean Floor:-1500m to -2000m	10	0
Obj1_Seamount Ridge:-500m to -1000m	10	0
Obj1_Seamount:-1000m to -1500m	10	0
Obj1_Seamount:-1500m to -2000m	10	0
Obj1_Seamount:-3000m to -4500m	10	0
Obj1_Upper Slope:-200m to -500m	10	0
Obj2_Bioregion_Pelagica_16	10	0

Table 3. Conservation objects that are not fully capture by the model. The percentage of the total target agreed is shown as an indicative of the shortfall (Target met).

Conservation objects captured by zones

Domain 1 MPA model includes five zones that overall protect most of the different conservation objectives although spatial features are not equally captured by each zone. In this sense, zones can be characterized based on the features they mainly protect (Figs. 3 to 7). South Orkney Islands southern shelf (SS SOI MPA) was included in the summarize zone analysis as it already protects several conservation objects of Domain 1 (Fig. 8).

SWAP-Emperor mainly protects the emperor colony located at Smiley Island and important benthic habitats located at the Antarctic Peninsula shelf. Over 50% of the targets are also met for several pelagic bioregions and large-scale pelagic ecosystem processes such as polynyas and sea ice extension during summer (Fig. 3).

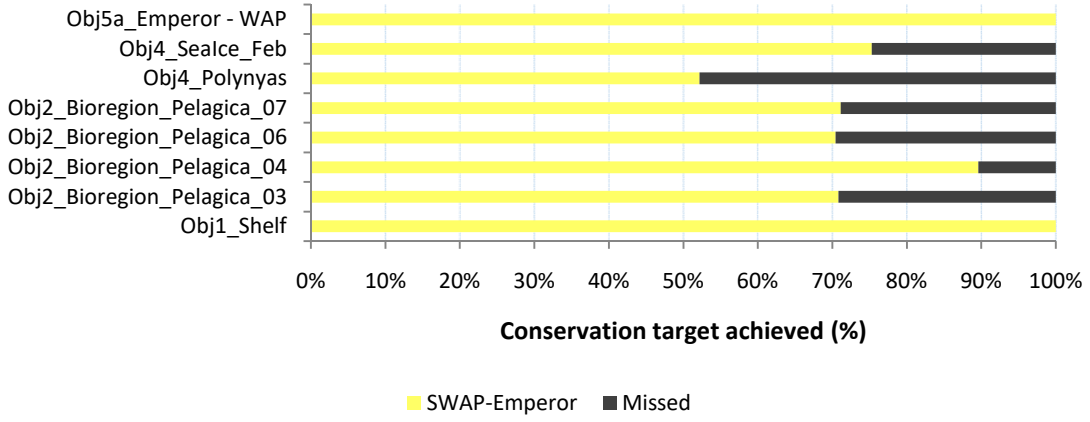

Figure 3. Percentage of the conservation target achieved by conservation object captured for the SWAP-Emperor. For easier visualization, conservation objects that met at least 50% of their total targets are

plotted. Missed bars represent the percentage of the conservation target that is not captured by the zone.

SWAP-Alexander I Is. is mainly characterized for protecting several important benthic habitats, almost 40% of the important pelagic bioregions, large-scale pelagic ecosystem processes such as southern parts the Antarctic Circumpolar Current front, important areas for life cycles of fishes and krill by protecting occurrence areas for exploited fish species and krill nurseries in the Bellingshausen region (Fig. 4).

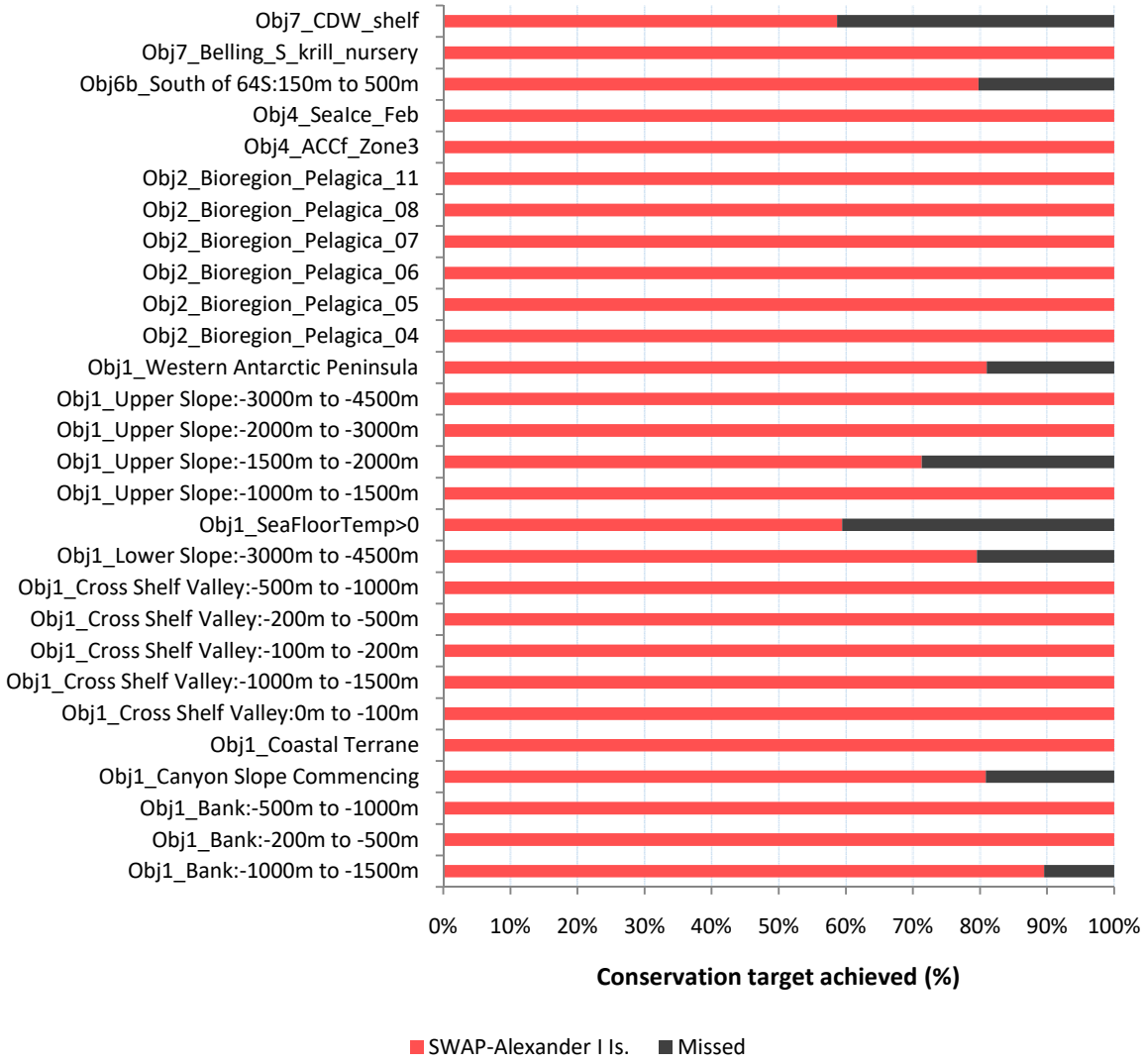

Figure 4. Percentage of the conservation target achieved by conservation object captured for the SWAP-Alexander I Is. For easier visualization, conservation objects that met at least 50% of their total targets are plotted. Missed bars represent the percentage of the conservation target that is not captured by the zone.

SWAP-Marguerite Bay covers mainly few benthic and pelagic bioregions and important areas for birds and mammals, particularly associated with breeding foraging distribution of Adélie penguin, parts of the distribution of crystal krill and over 50% of the non-breeding foraging distribution of killer whales type B1 (Fig. 5). Spawning/early stages habitat fishes are also protected at some extent (Fig. 5).

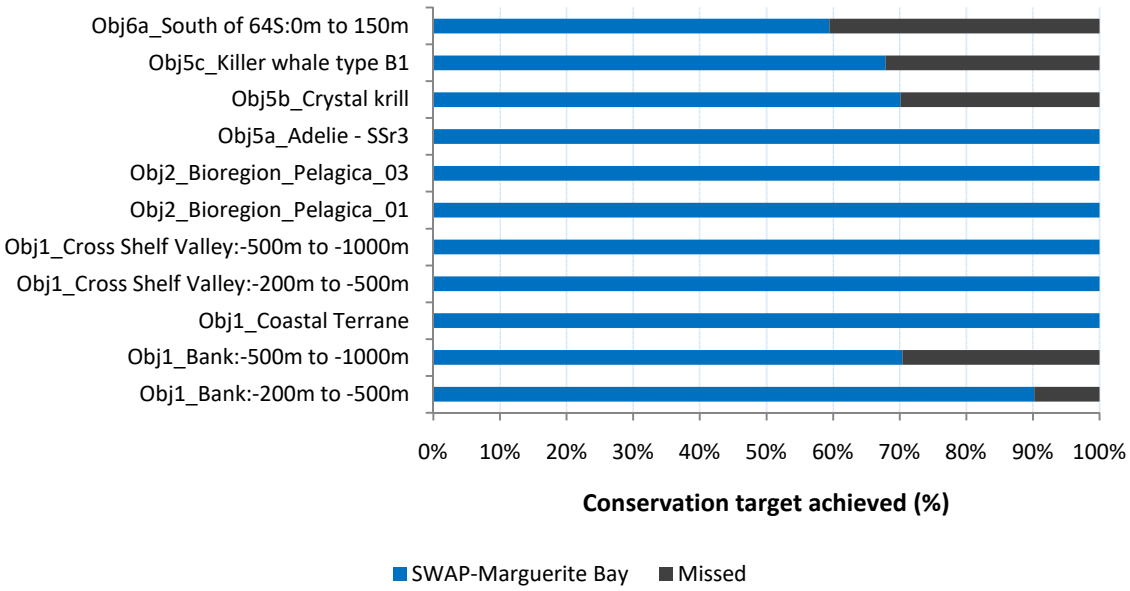

Figure 5. Percentage of the conservation target achieved by conservation object captured for the SWAP-Marguerite Bay. For easier visualization, conservation objects that met at least 50% of their total targets are plotted. Missed bars represent the percentage of the conservation target that is not captured by the zone.

NWAP-Foraging grounds, including both management zones GPZ and SFMZ, comprise the protection of a large quantity of conservation objects but it is mainly characterized by covering important areas for birds and mammals, including breeding foraging distribution of fur seals, and Adélie, chinstrap and gentoo penguins; and non-breeding foraging distribution of humpback, minke and killer whales (types A, B1 and B2), and Weddell and leopard seals (Fig. 6). It also protects important areas for fish life cycles such as spawning/early stages habitat and occurrence areas for exploited species; and important areas for zooplankton life cycles, including the Gerlache and Weddell krill nurseries and the section of the Circumpolar Deep Water located in the Bransfield Strait / Mar de la Flota (Fig. 6).

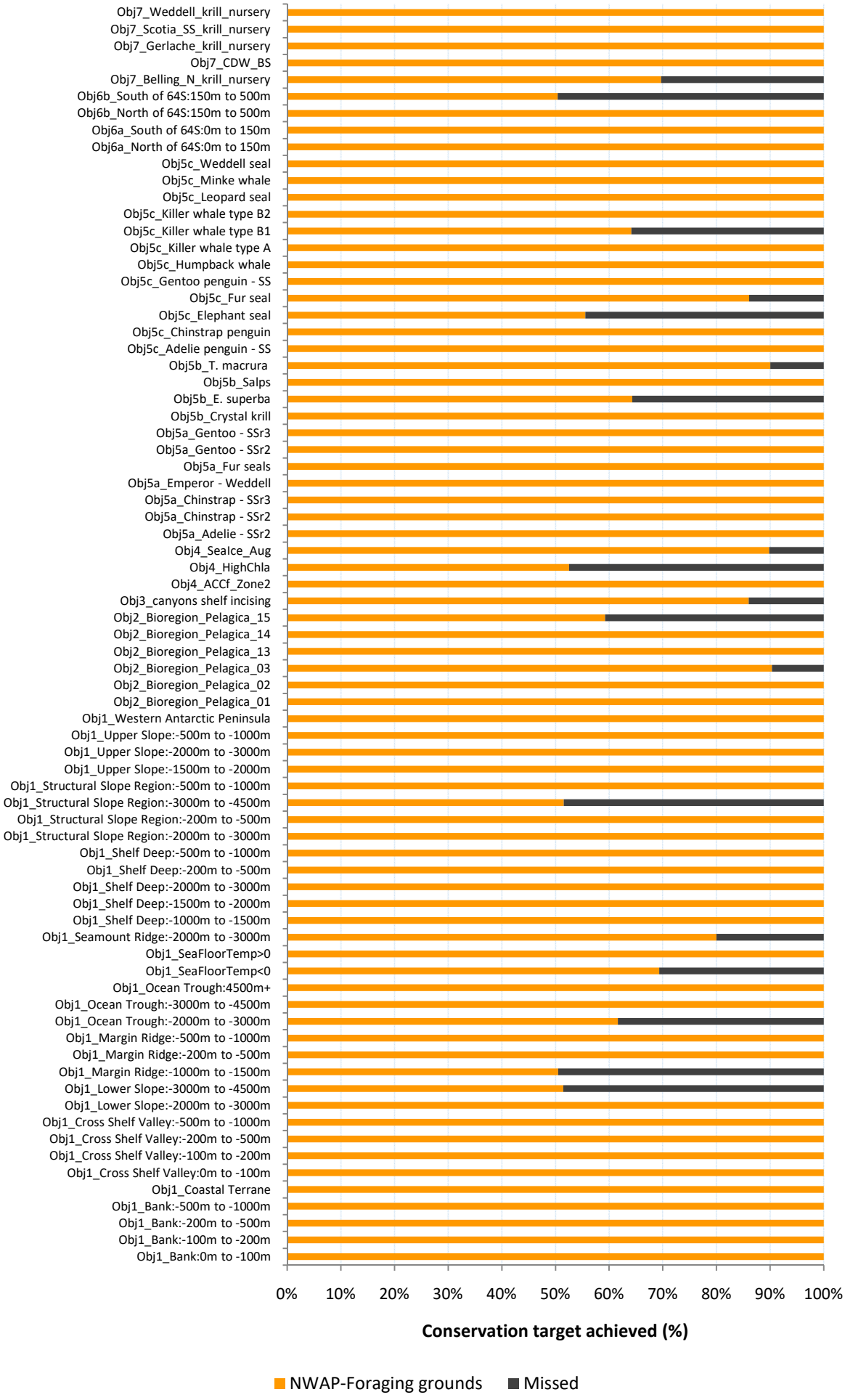
Obj7_Weddell_krill_nursery
Obj7_Scotia_SS_krill_nursery
Obj7_Gerlache_krill_nursery
Obj7_CDW_BS
Obj7_Belling_N_krill_nursery
Obj6b_South of 64S:150m to 500m
Obj6b_North of 64S:150m to 500m
Obj6a_South of 64S:0m to 150m
Obj6a_North of 64S:0m to 150m
Obj5c_Weddell seal
Obj5c_Minke whale
Obj5c_Leopard seal
Obj5c_Killer whale type B2
Obj5c_Killer whale type B1
Obj5c_Killer whale type A
Obj5c_Humpback whale
Obj5c_Gentoo penguin - SS
Obj5c_Fur seal
Obj5c_Elephant seal
Obj5c_Chinstrap penguin
Obj5c_Adelie penguin - SS
Obj5b_T. macrura
Obj5b_Salps
Obj5b_E. superba
Obj5b_Crystal krill
Obj5a_Gentoo - SSr3
Obj5a_Gentoo - SSr2
Obj5a_Fur seals
Obj5a_Emperor - Weddell
Obj5a_Chinstrap - SSr3
Obj5a_Chinstrap - SSr2
Obj5a_Adelie - SSr2
Obj4_SeaIce_Aug
Obj4_HighChla
Obj4_ACCf_Zone2
Obj3_canyons shelf incising
Obj2_Bioregion_Pelagica_15
Obj2_Bioregion_Pelagica_14
Obj2_Bioregion_Pelagica_13
Obj2_Bioregion_Pelagica_03
Obj2_Bioregion_Pelagica_02
Obj2_Bioregion_Pelagica_01
Obj1_Western Antarctic Peninsula
Obj1_Upper Slope:-500m to -1000m
Obj1_Upper Slope:-2000m to -3000m
Obj1_Upper Slope:-1500m to -2000m
Obj1_Structural Slope Region:-500m to -1000m
Obj1_Structural Slope Region:-3000m to -4500m
Obj1_Structural Slope Region:-200m to -500m
Obj1_Structural Slope Region:-2000m to -3000m
Obj1_Shelf Deep:-500m to -1000m
Obj1_Shelf Deep:-200m to -500m
Obj1_Shelf Deep:-2000m to -3000m
Obj1_Shelf Deep:-1500m to -2000m
Obj1_Shelf Deep:-1000m to -1500m
Obj1_Seamount Ridge:-2000m to -3000m
Obj1_SeaFloorTemp>0
Obj1_SeaFloorTemp<0
Obj1_Ocean Trough:4500m+
Obj1_Ocean Trough:-3000m to -4500m
Obj1_Ocean Trough:-2000m to -3000m
Obj1_Margin Ridge:-500m to -1000m
Obj1_Margin Ridge:-200m to -500m
Obj1_Margin Ridge:-1000m to -1500m
Obj1_Lower Slope:-3000m to -4500m
Obj1_Lower Slope:-2000m to -3000m
Obj1_Cross Shelf Valley:-500m to -1000m
Obj1_Cross Shelf Valley:-200m to -500m
Obj1_Cross Shelf Valley:-100m to -200m
Obj1_Cross Shelf Valley:0m to -100m
Obj1_Coastal Terrane
Obj1_Bank:-500m to -1000m
Obj1_Bank:-200m to -500m
Obj1_Bank:-100m to -200m
Obj1_Bank:0m to -100m
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Conservation target achieved (%)
NWAP-Foraging grounds
Missed

Figure 6. Percentage of the conservation target achieved by conservation object captured for the NWAP-Foraging grounds. For easier visualization, conservation objects that met at least 50% of their total targets are plotted. Missed bars represent the percentage of the conservation target that is not captured by the zone.

SOI-Benthic, including both management zones GPZ and SFMZ, is mainly characterized by the protection of important benthic areas, with near 40% of them covered in at least 50% of their target (Fig. 7). High protection is also given to important areas for birds and mammals including breeding foraging distribution of pygoscelid penguins, and important areas for zooplankton life cycles including the SOI krill nursery (Fig. 7).

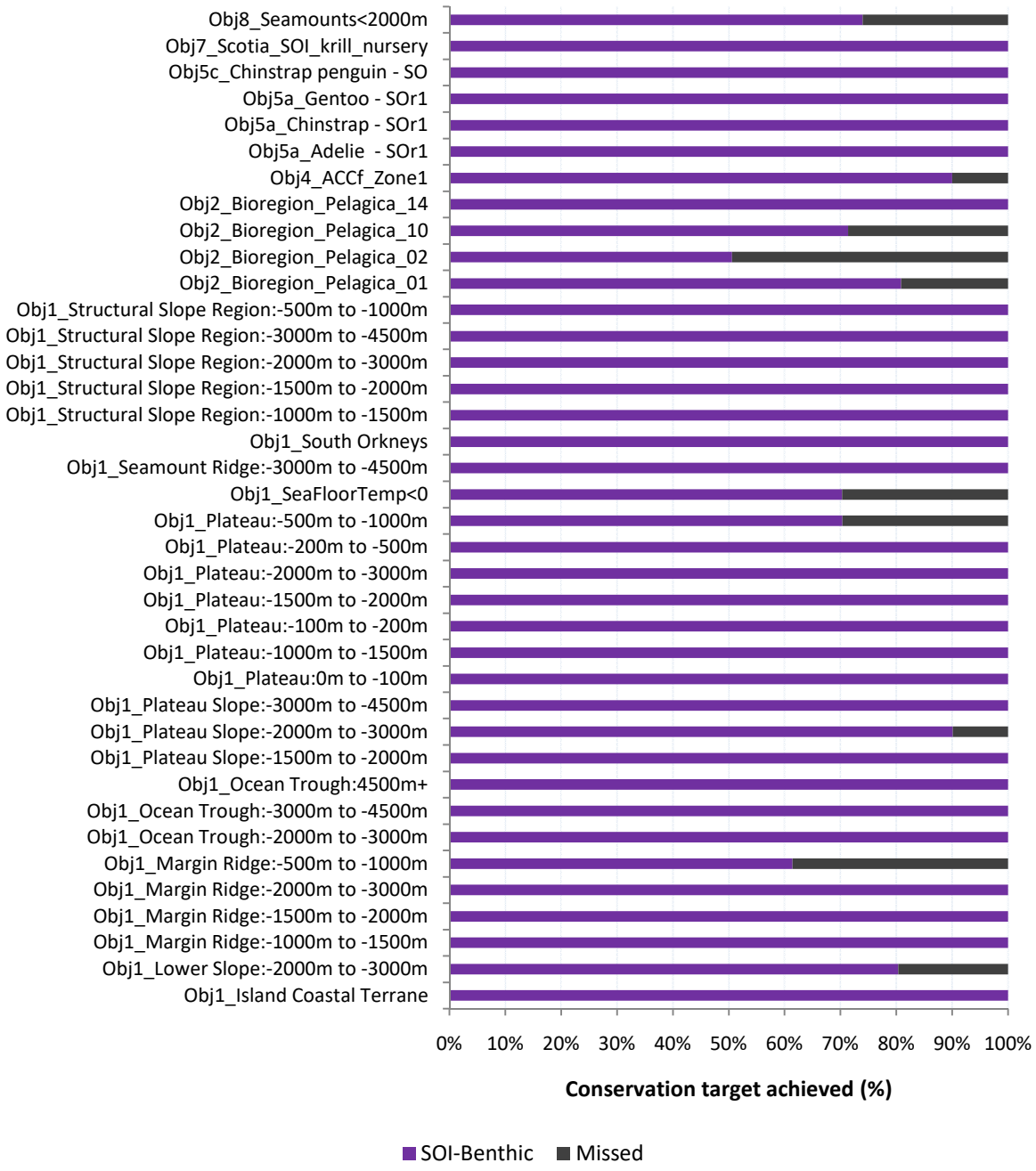

Figure 7. Percentage of the conservation target achieved by conservation object captured for the SOI-Benthic. For easier visualization, conservation objects that met at least 50% of their total targets are plotted. Missed bars represent the percentage of the conservation target that is not captured by the zone.

SS SOI MPAmainly protects important benthic habitats including the plateau, the plateau slope at different depths; seamounts > 2000m and seamount ridge (Fig. 8). Two pelagic bioregions and non-breeding foraging distribution of Adélie penguins are also captured by this area.

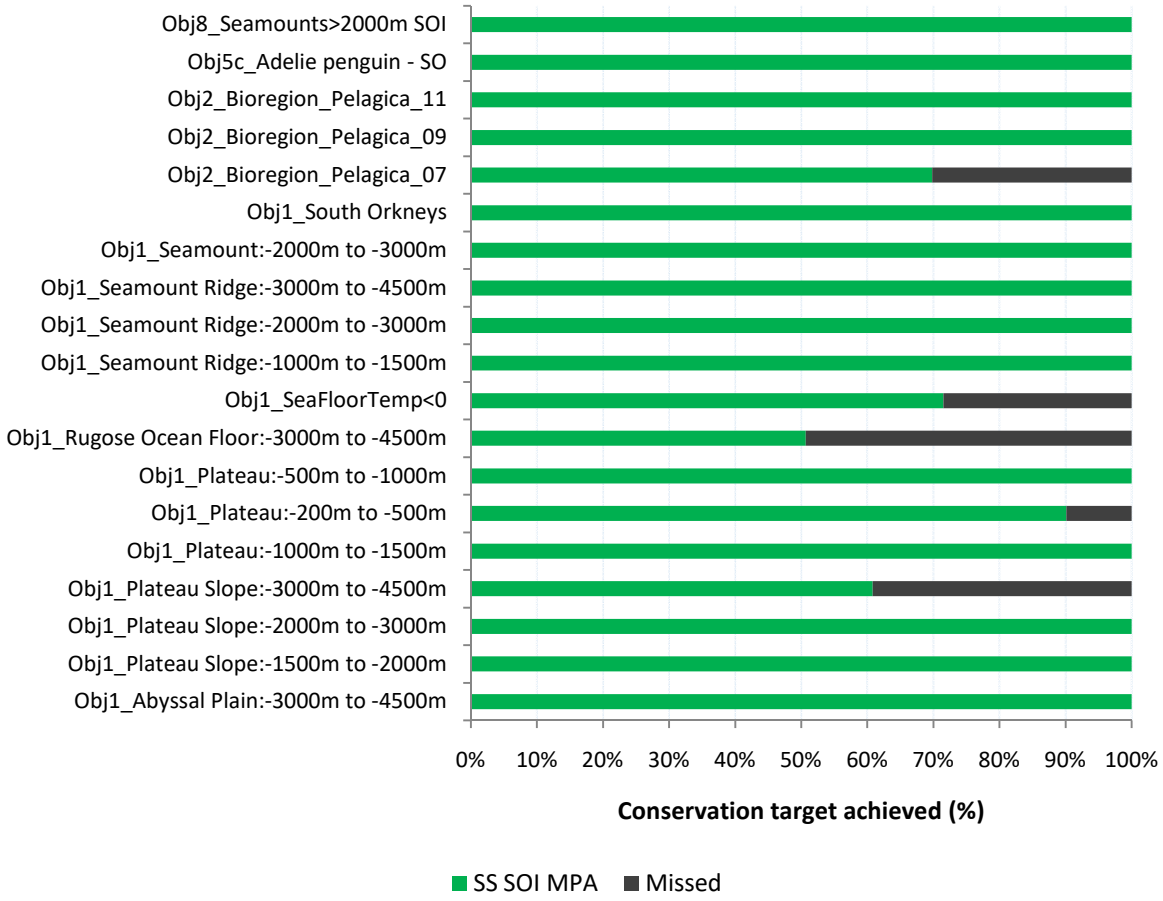

Figure 8. Percentage of the conservation target achieved by conservation object captured for the SS SOI MPA. For easier visualization, conservation objects that met at least 50% of their total targets are plotted. Missed bars represent the percentage of the conservation target that is not captured by the zone.

Conservation objects captured by General Protection Zone (GPZ)

Since Domain 1 MPA zones are not proposed to be managed in the same way, it is worthwhile to examine what proportion of features are protect when only considering the General Protection Zone inside NWAP-Foraging grounds and SOI-Benthic (Figs. 9 and 10). This could provide a better assessment of what it is protected in areas where only research fishery would be allowed.

GPZ-Foraging grounds, comprised by a 30km buffer zone around the South Shetland Islands and around west Antarctic Peninsula, mainly protects coastal areas associated to benthic and pelagic habitats where mammals and birds distribute in foraging activities during the breeding and non breeding season, also allowing for the protection of important areas for

spawning/early stages of fishes and important areas for zooplankton such as the Gerlache krill nurseries (Fig. 9).

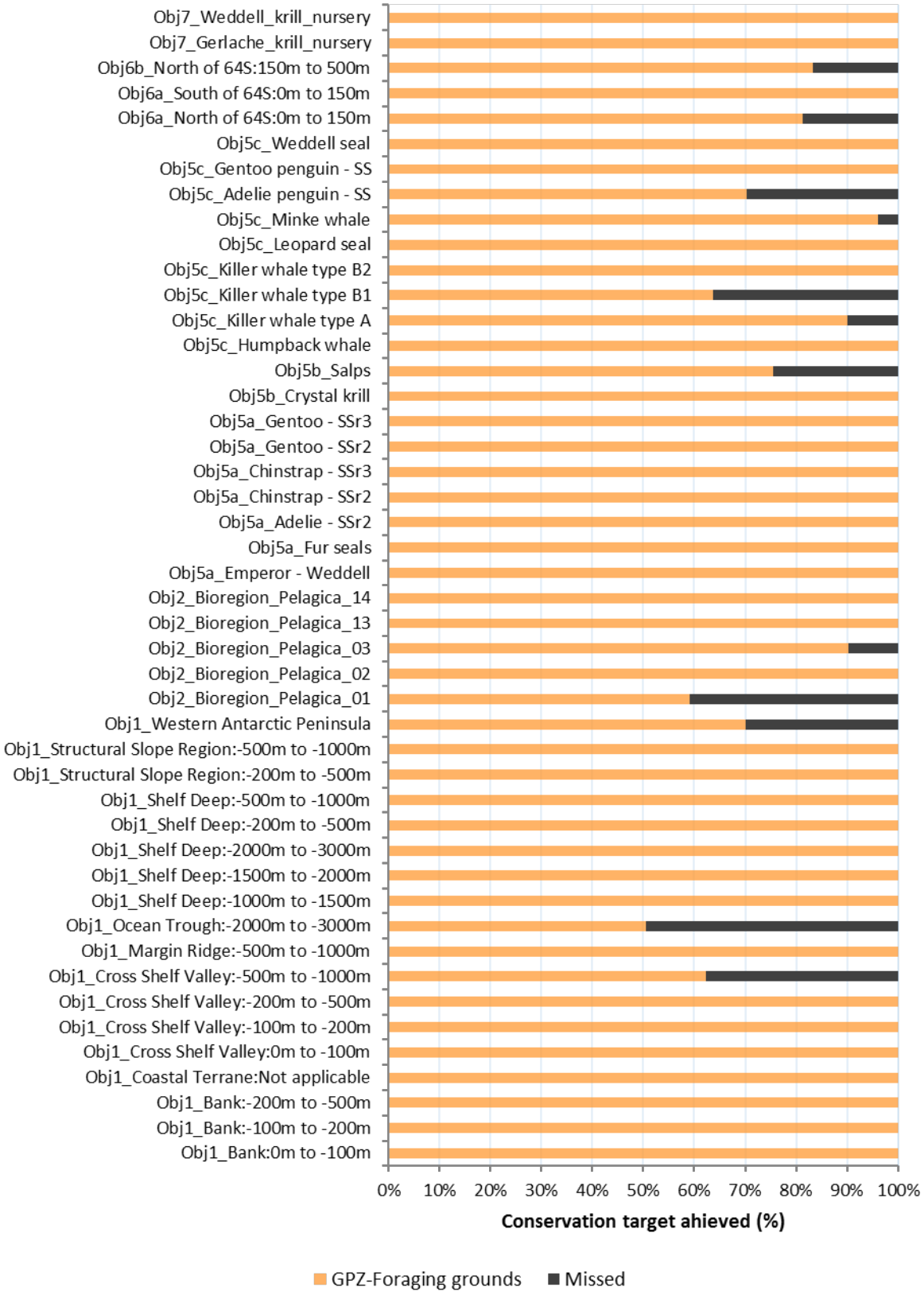

Figure 9. Percentage of the conservation target achieved by conservation object captured for the GPZ-Foraging grounds. For easier visualization, conservation objects that met at least 50% of their total targets are plotted. Missed bars represent the percentage of the conservation target that is not captured by the zone.

GPZ-Benthic, comprise by a 30km buffer zone around the South Orkney Islands, mainly protect important areas for birds and mammals mostly associated with the protection of foraging distribution during breeding for Adélie, chinstrap and gentoo penguins (Fig. 10).

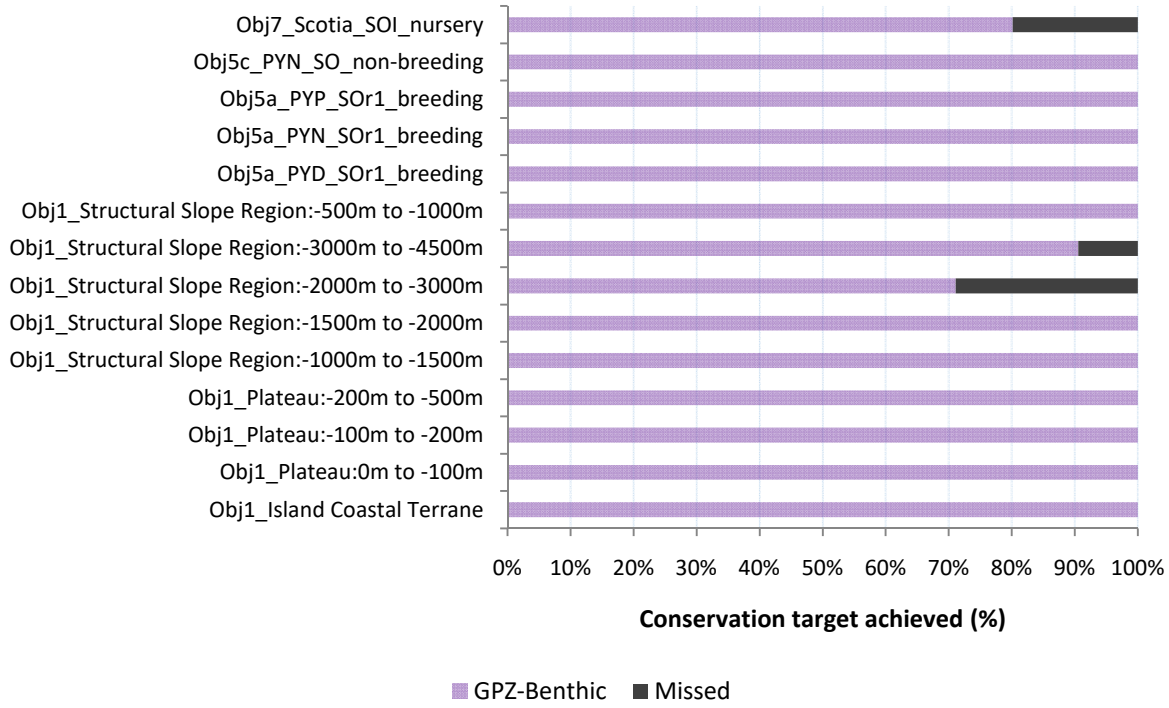

Figure 10. Percentage of the conservation target achieved by conservation object captured for the GPZ-Benthic. For easier visualization, conservation objects that met at least 50% of their total targets are plotted. Missed bars represent the percentage of the conservation target that is not captured by the zone.

Discussion

Spatial features comprise different extensions and are distributed differently in Doman 1. While some conservation objectives occupy very small areas – such as polynyas – others extend over larger areas - like benthic ecoregions (see maps in Annex 1, PART B WG-17/XX). Moreover, this also can be observed for spatial features within the same conservation objective, for instance, the 16 pelagic habitat considered for Conservation Objective 2 differ greatly in area and location (see maps in Annex 1, PART B. WG-17/XX).

This intrinsic spatial variability among conservation objects is in agreement with the differential representation of each of them in the Domain 1 MPA zones. Accordingly, each zone covers only a certain amount of objects and could be characterized by the most representative features that protect. For instance, NWAP-Foraging grounds is represented mostly by foraging areas of top predators, spawning /early habitat for fishes and distribution of very important krill nurseries, like the Gerlache Strait. Meanwhile, SWAP-Emperor mostly protects emperor penguins located at Smiley Island, important benthic habitats in the Antarctic Peninsula shelf and several pelagic bioregions.

The Domain 1 MPA model achieved the targets for almost 90% of the conservation objects. In this sense, all areas proposed in the model are necessary to the fulfilment of the level of protection agreed by the international community for each conservation feature. Consequently, the reduction or elimination of one or more proposed zones of the model could potentially compromise - at least at some degree – the protection of the conservation objectives established by the Convention for the designation of MPA in Antarctica

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Annex 1. Conservation objectives, objects and targets agreed for Domain 1 MPA planning process.

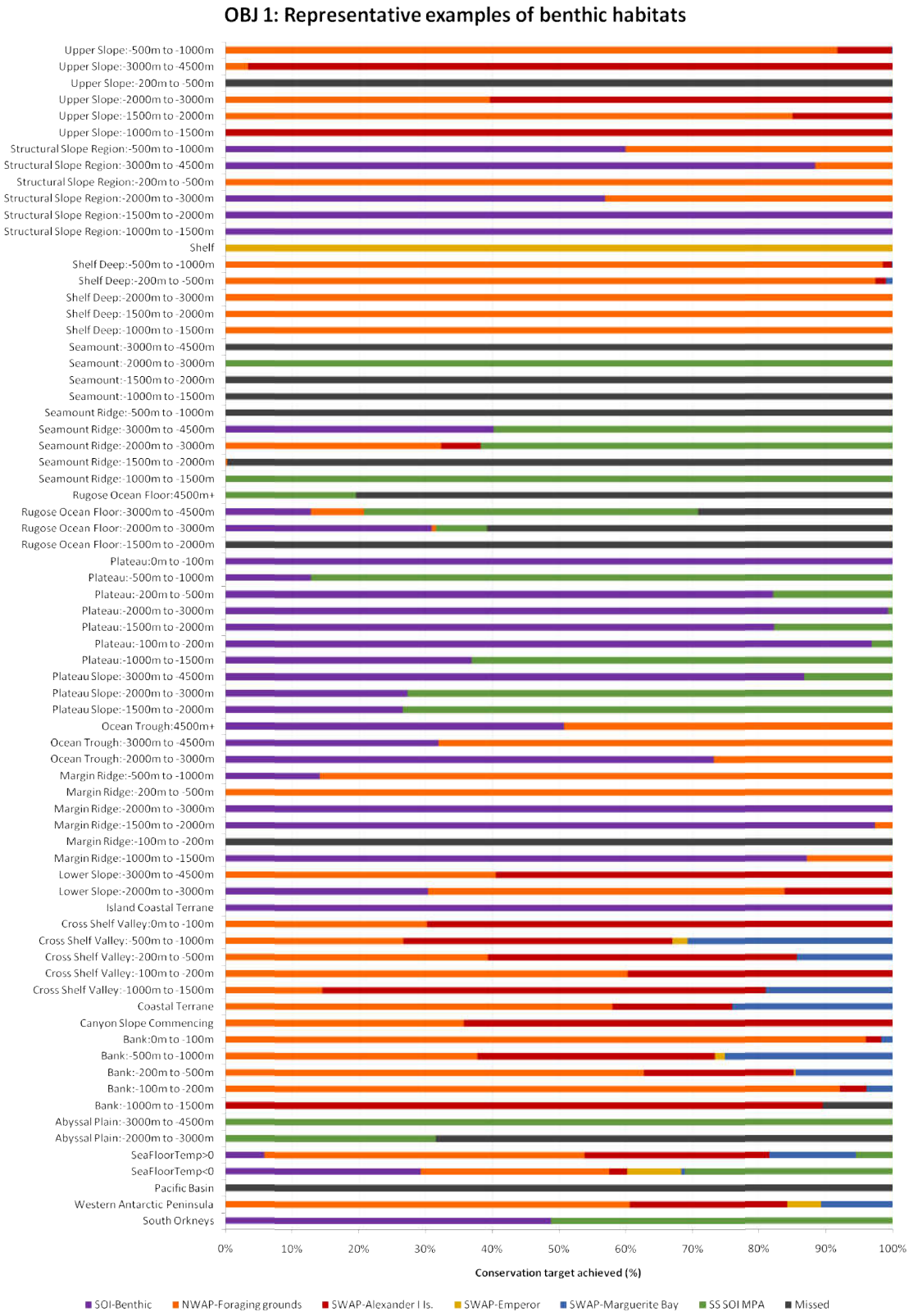
CONSERVATION OBJECTIVE		CONSERVATION OBJECT	CONSERVATION TARGET
OBJECTIVE 1: Representative examples of benthic habitats	Benthic ecoregions	South Orkneys	10
		Western Antarctic Peninsula	10
		Pacific Basin	10
	Bottom temperature	Sea floor temp <0°C	10
		Sea floor temp >0°C	10
	Benthic environment types	Benthic bioregionalization (66 features)	10
OBJECTIVE 2: Representative examples of pelagic habitats	Pelagic environment types	Pelagic bioregions (16 features)	10
OBJECTIVE 3: Important benthic processes	Benthic areas under ice shelves	Ice-shelves	20
	Canyons	Canyons shelf incising	50
		Canyons blind	50
	Frontal features (Antarctic Circumpolar Current Front)	ACCf_Zone1	20
		ACCf_Zone2	20
		ACCf_Zone3	20
OBJECTIVE 4: Large-scale pelagic ecosystem processes	Highly productive areas	High Chla	30
	Marginal ice zone	SeaIce_Aug	20
		SeaIce_Feb	20
	Polynyas	Polynyas	50
OBJECTIVE 5: Important areas for mammals and birds life-histories	5a: Breeding foraging distribution	Adelie penguin - SOr1	50
		Adelie penguin - SSr2	50
		Adelie penguin - SSr3	50
		Chinstrap penguin - SOr1	50
		Chinstrap penguin - SSr2	50
		Chinstrap penguin - SSr3	50
		Gentoo penguin - SOr1	50
		Gentoo penguin - SSr2	50
		Gentoo penguin - SSr3	50
		Emperor penguin - Weddell	50
		Emperor penguin - WAP	50
		Fur seals	50
	5b: Prey distribution	Crystal krill	20
		E. superba	20
		Salps	20
		T. macrura	50
	5c: Non-breeding foraging distribution	Adelie penguin - SS	50
		Adelie penguin - SO	50

		Gentoo penguin - SS	50
		Chinstrap penguin	50
		Chinstrap penguin - SO	50
		Fur seal	50
		Leopard seal	50
		Weddell seal	50
		Elephant seal	50
		Minke whale	50
		Humpback whale	50
		Killer whale type A	50
		Killer whale type B1	50
		Killer whale type B2	50
OBJECTIVE 6: Important areas for fish life cycles	6a: Spawning/early stages habitat	North of 64S:0m to 150m	80
		South of 64S:0m to 150m	20
	6b: Occurence areas for exploited species	North of 64S:150m to 500m	30
		South of 64S:150m to 500m	20
OBJECTIVE 7: Important areas for zooplankton life cycles	Krill nursery	Bellinghausen_N_nursery	20
		Bellinghausen_S_nursery	20
		GerlacheStrait_nursery	100
		Weddell Sea_nursery	20
		Scotia Sea_SS_nursery	20
		Scotia Sea_SOI_nursery	5
	Circumpolar deep water	CDW_shelf	70
		CDW_BS	70
OBJECTIVE 8: Rare or unique habitats	Seamounts	Seamounts <2000m	50
		Seamounts >2000m AP	10
		Seamounts >2000m SOI	10

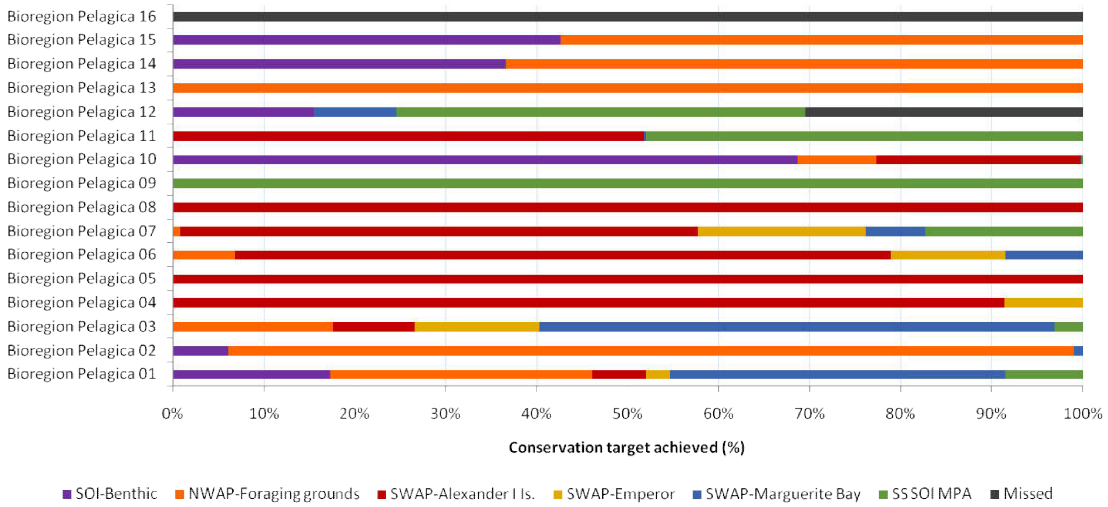
Annex 2. Spatial features captured by Domain 1 MPA model – an analysis by Conservation Objective.

Figures in this Annex show the percentage of conservation target achieved by each spatial feature within each Conservation Objective for the Domain 1 MPA model.

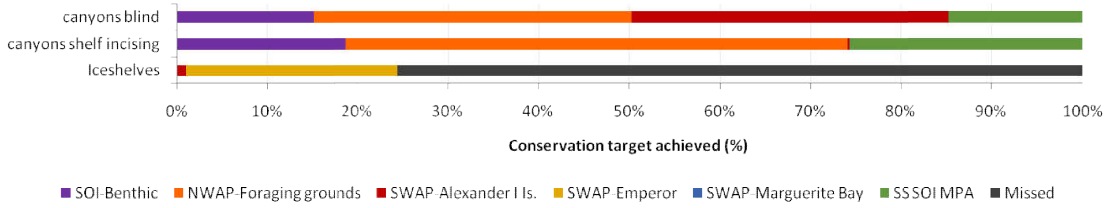
Level of non-compliance across and within conservation objectives was variable. While some objectives met the targets for all their spatial features (objective 5 and 6) others did not although the number of objects was not even neither across objectives (see Table 2). Compliance within conservation objects also varied spatially. Some spatial features reached their targets in only one MPA zone (such as breeding foraging distribution for many of the birds and mammals species covered in NWAP-Foraging grounds) meanwhile others – more widely distributed – achieved their conservation levels across a bigger number of zones (like blind canyons across NWAP-Foraging grounds, SWAP-Alexander I Is., SOI-Benthic, and even SS SOI MPA).


OBJ 1: Representative examples of benthic habitats
Upper Slope:-500m to -1000m
Upper Slope:-3000m to -4500m
Upper Slope:-200m to -500m
Upper Slope:-2000m to -3000m
Upper Slope:-1500m to -2000m
Upper Slope:-1000m to -1500m
Structural Slope Region:-500m to -1000m
Structural Slope Region:-3000m to -4500m
Structural Slope Region:-200m to -500m
Structural Slope Region:-2000m to -3000m
Structural Slope Region:-1500m to -2000m
Structural Slope Region:-1000m to -1500m
Shelf
Shelf Deep:-500m to -1000m
Shelf Deep:-200m to -500m
Shelf Deep:-2000m to -3000m
Shelf Deep:-1500m to -2000m
Shelf Deep:-1000m to -1500m
Seamount:-3000m to -4500m
Seamount:-2000m to -3000m
Seamount:-1500m to -2000m
Seamount:-1000m to -1500m
Seamount Ridge:-500m to -1000m
Seamount Ridge:-3000m to -4500m
Seamount Ridge:-2000m to -3000m
Seamount Ridge:-1500m to -2000m
Seamount Ridge:-1000m to -1500m
Rugose Ocean Floor:4500m+
Rugose Ocean Floor:-3000m to -4500m
Rugose Ocean Floor:-2000m to -3000m
Rugose Ocean Floor:-1500m to -2000m
Plateau:0m to -100m
Plateau:-500m to -1000m
Plateau:-200m to -500m
Plateau:-2000m to -3000m
Plateau:-1500m to -2000m
Plateau:-100m to -200m
Plateau:-1000m to -1500m
Plateau Slope:-3000m to -4500m
Plateau Slope:-2000m to -3000m
Plateau Slope:-1500m to -2000m
Ocean Trough:4500m+
Ocean Trough:-3000m to -4500m
Ocean Trough:-2000m to -3000m
Margin Ridge:-500m to -1000m
Margin Ridge:-200m to -500m
Margin Ridge:-2000m to -3000m
Margin Ridge:-1500m to -2000m
Margin Ridge:-100m to -200m
Margin Ridge:-1000m to -1500m
Lower Slope:-3000m to -4500m
Lower Slope:-2000m to -3000m
Island Coastal Terrane
Cross Shelf Valley:0m to -100m
Cross Shelf Valley:-500m to -1000m
Cross Shelf Valley:-200m to -500m
Cross Shelf Valley:-100m to -200m
Cross Shelf Valley:-1000m to -1500m
Coastal Terrane
Canyon Slope Commencing
Bank:0m to -100m
Bank:-500m to -1000m
Bank:-200m to -500m
Bank:-100m to -200m
Bank:-1000m to -1500m
Abyssal Plain:-3000m to -4500m
Abyssal Plain:-2000m to -3000m
SeaFloorTemp>0
SeaFloorTemp<0
Pacific Basin
Western Antarctic Peninsula
South Orkneys
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Conservation target achieved (%)
SOI-Benthic
NWAP-Foraging grounds
SWAP-Alexander I Is.
SWAP-Emperor
SWAP-Marguerite Bay
SS SOI MPA
Missed

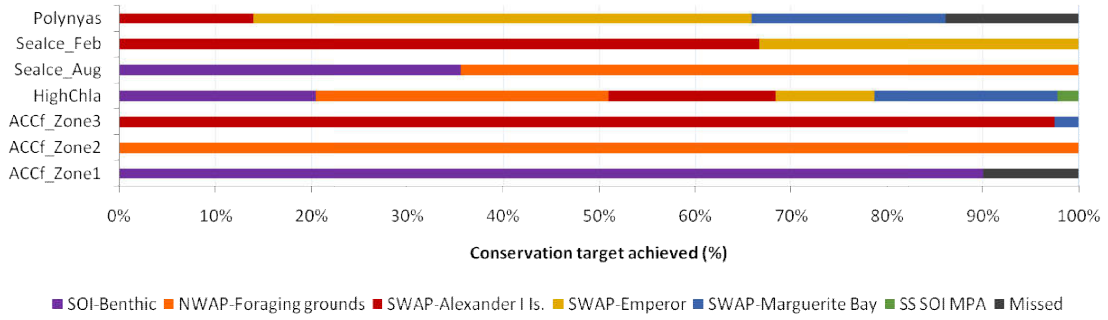
OBJ 2: Representative examples of pelagic habitats



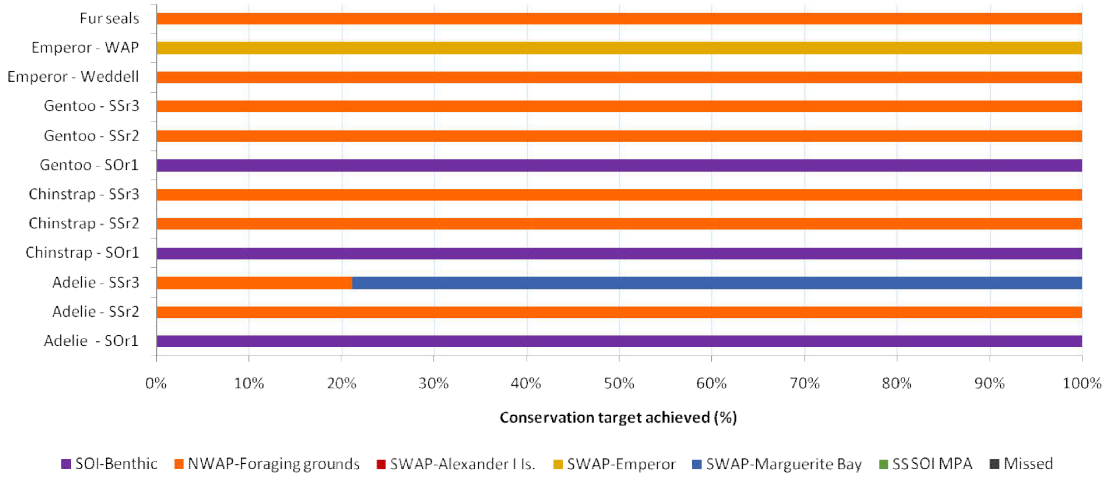
OBJ 3: Important benthic processes



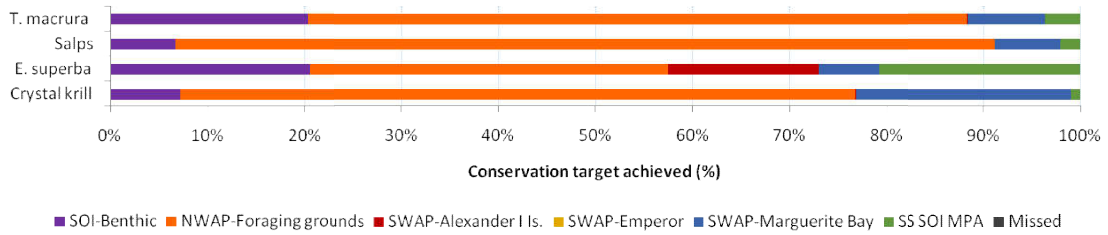
OBJ 4: Large-scale pelagic ecosystem processes



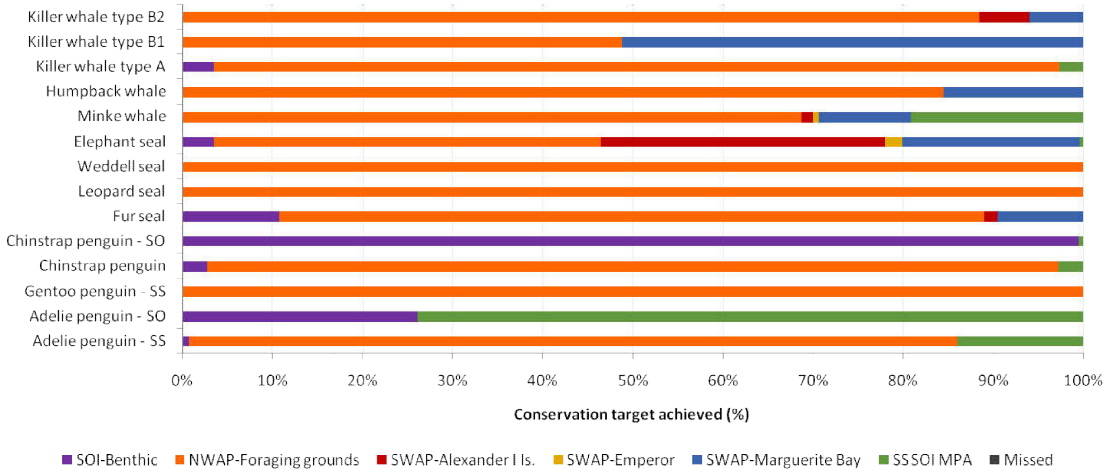
OBJ 5a: Breeding foraging distribution mammals and birds



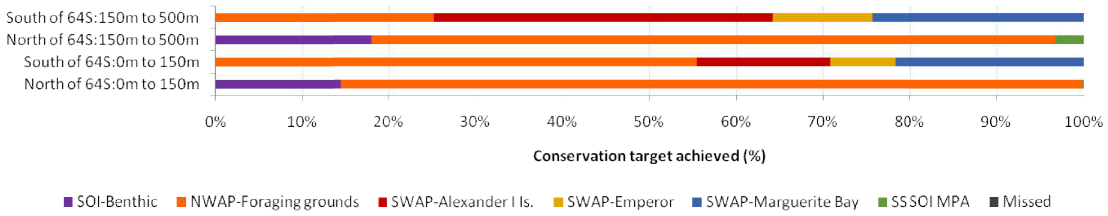
OBJ 5b: Prey distribution for mammals and birds



OBJ 5c: Non-breeding foraging distribution mammals and birds



OBJ 6: Important areas for fish life cycles



OBJ 7: Important areas for zooplankton life cycles