ECOLOGICALLY OR BIOLOGICALLY SIGNIFICANT MARINE AREAS

in the Benguela Current Large Marine Ecosystem

Orange Seamount and Canyon Complex

REVISED DESCRIPTION

Benguela CURRENT CONVENTION

MARISMA
Enabling Sustainable Ocean Use in the Benguela Current Region

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of:
Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety
of the Federal Republic of Germany

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ORANGE SEAMOUNT AND CANYON COMPLEX

Revised Description

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NELSON MANDELA UNIVERSITY

Orange Seamount and Canyon Complex (formerly Orange Shelf Edge)

Revised EBSA Description

General Information

Summary

The Orange Seamount and Canyon Complex, occurs at the western continental margin of South Africa and Namibia, spanning the border between the two countries. On the Namibian side, it includes Tripp Seamount and a shelf-indenting canyon. The EBSA comprises shelf and shelf-edge habitat with hard and unconsolidated substrates, including at least eleven ecosystem types. According to recent threat status assessments of coastal and marine habitat in South Africa and Namibia, three ecosystem types represented in the EBSA are threatened, one of which is Endangered and another two that are Vulnerable. However, the area is one of few places where these threatened ecosystem types are in relatively natural/pristine condition. Based on an analysis of long-term trawl-survey data, the Orange Seamount and Canyon Complex is a persistent hotspot of demersal fish biodiversity, which may be a result of the local habitat heterogeneity. In summary, this area is highly relevant in terms of the following EBSA criteria: 'Importance for threatened, endangered or declining species and/or habitats', 'Biological diversity' and 'Naturalness'.

Introduction of the area

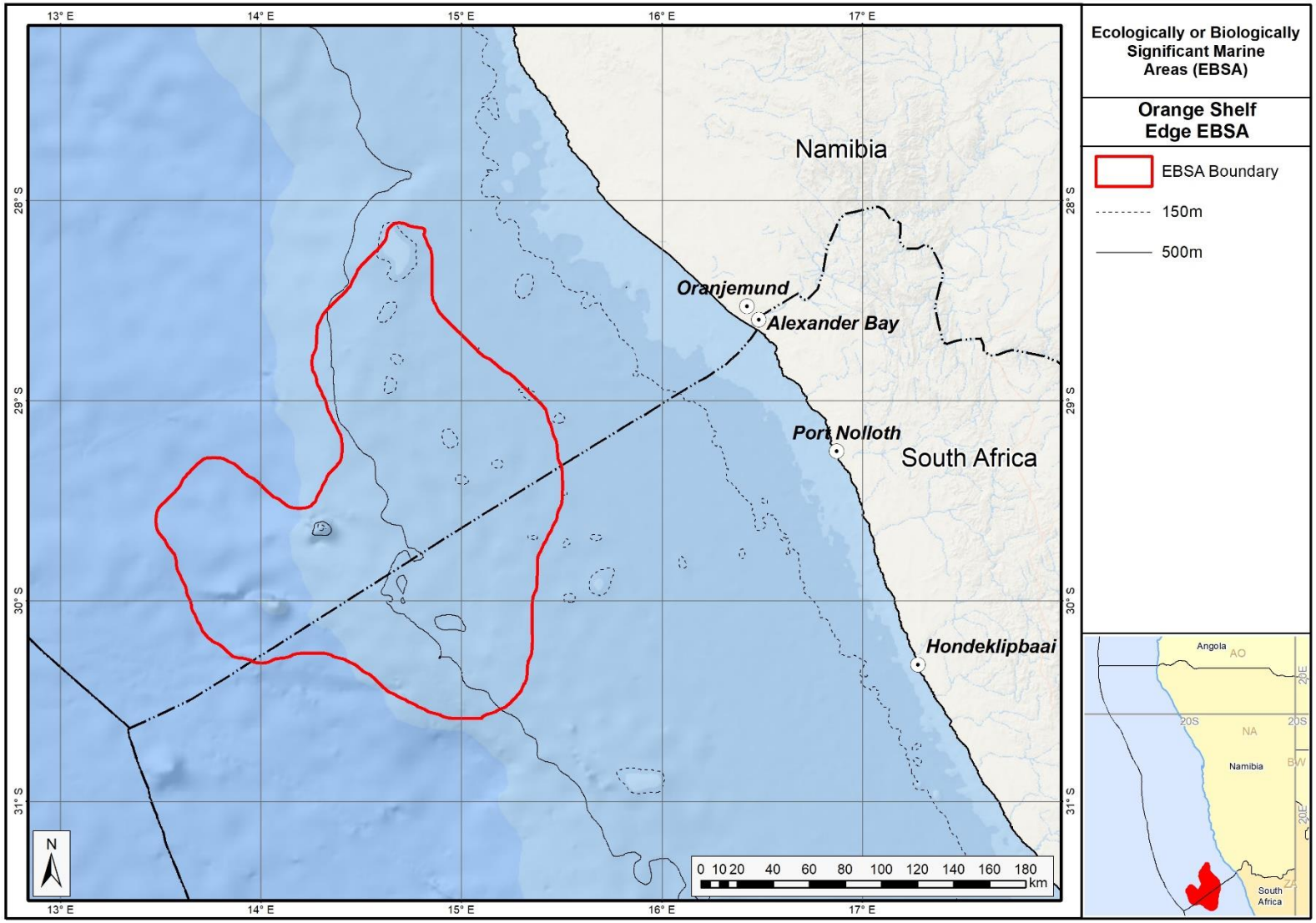
The area occurs at the outer shelf and shelf edge of the western continental margin of South Africa and Namibia, spanning the border between the two countries. It includes hard and unconsolidated (sand) shelf and shelf edge benthic habitat at depths of approximately 350-1200 m on the South African side (Sink et al., 2012, 2019). On the Namibian side, it includes Tripp seamount and a shelf-indenting submarine canyon, providing a heterogeneous habitat (Holness et al., 2014). The pelagic environment in the area is characterized by medium productivity, cold to moderate Atlantic temperatures (SST mean = 18.3 °C) and moderate chlorophyll levels related to the eastern limit of the Benguela upwelling on the outer shelf (Lagabrielle 2009).

Since the original description and delineation, the boundary of this EBSA has been revised largely because of new evidence that has emerged after South Eastern Atlantic Workshop to identify EBSAs in 2013 (UNEP/CBD/RW/EBSA/SEA/1/4). A new map of Namibian Ecosystem Types has been generated, and the new boundary builds on existing (SA) and new (Namibia) spatial assessment and prioritisation (Holness et al., 2014; Sink et al., 2012, 2019). These new datasets, and others (e.g., GEBCO Compilation Group 2019; Harris et al., 2014; Kirkman et al., 2013) have facilitated more accuracy in the boundary definition such that the EBSA now better represents the underlying features that make this site regionally significant for threatened species and habitats and diverse assesmblages, in a highly natural area. Orange Seamount and Canyon Complex is thus proposed as a Type 2 EBSA (sensu Johnson et al., 2018) because it comprises a collection of features and ecosystems that are connected by the same ecological processes.

Description of the location

EBSA Region

South-Eastern Atlantic



Revised delineation of the Orange Seamount and Canyon Complex EBSA.

Description of location

The area occurs at the outer shelf and shelf edge of the western continental margin of South Africa and Namibia, spanning the border between the two countries. It is entirely within the national jurisdiction of the two countries.

Area Details

Feature description of the area

The area includes a high diversity of shelf and shelf-edge habitats with hard or unconsolidated (sand) substrates (Sink et al., 2012, 2019; Holness et al., 2014). It includes eleven ecosystem types that have been identified for South Africa and Namibia (Sink et al., 2019; Holness et al., 2014). On the Namibian side, it includes Tripp seamount and a shelf-indenting canyon. The pelagic environment of the area is characterized by medium productivity, cold to moderate temperatures, and moderate chlorophyll levels related to the limit of the Benguela upwelling on the outer shelf (Lagabrielle 2009).

The area has been subjected to annual demersal fish trawl surveys conducted by the Department of Agriculture, Forestry and Fisheries (now Department of Environment, Forestry and Fisheries) of South Africa (see Atkinson et al., 2011 for details), and under the Nansen Programme in Namibia (see Jonsen and Kathena 2012 for details). Based on spatial modeling of nearly 30 years of distribution and abundance data from these surveys, Kirkman et al., (2013) identified a persistent hotspot of species richness for demersal fish species that coincides with part of the area. This may be related to the local habitat heterogeneity, including the presence of a shelf-indenting submarine canyon and the close proximity of a seamount. Generally, however, seamounts and canyons in the region have been poorly studied (Sink et al., 2011).

Feature conditions and future outlook of the proposed area

Sink et al., (2012, 2019) estimated the threat status of coastal and marine habitats in South Africa by assessing the cumulative impacts of various pressures (e.g., extractive resource use, pollution and others) on each ecosystem type. This analysis was extended to Namibia by Holness et al. (2014). The EBSA has a lot of natural habitat, although there are some portions that have been moderately modified, largely because this area has been subjected to relatively little extractive resource use (e.g., fishing, mining) pressure, and is relatively remote from sources of pollution. Overall, the assessments of Sink et al. (2019) and Holness et al. (2014) classified 73% of the Orange Seamount and Canyon Complex area as being in good condition, with an additional 18% being in fair condition.

Previously, the Orange Seamount and Canyon Complex area was identified by Majiedt et al. (2013) as one of six marine ‘primary focus areas’ for spatial protection in South Africa, with the good condition of threatened habitats and the relative absence of anthropogenic pressures as the major drivers of this selection. This has resulted in two portions of the EBSA being proclaimed as marine protected areas. On the Namibian side, the assessment of Holness et al. (2014) identified the Namibian portions of the EBSA as being of high priority for place-based conservation measures. Tripp seamount on the Namibian side of the border is the location of a productive pelagic pole-and-line tuna fishery (FAO 2007). Although no research is currently planned for this area, it is recommended for this EBSA, particularly towards informing appropriate spatial management of this site.

References

Atkinson L.J., Leslie, R.W., Field, J.G., Jarre, A. 2011. Changes in demersal fish assemblages on the west coast of South Africa, 1986–2009. African Journal of Marine Science, 33: 157–170

Clark, M.R., Tittensor, D., Rogers, A.D., Brewin, P., Schlacher, T., Rowden, A., Stocks, K., Consalvey, M. 2006. Seamounts, deep-sea corals and fisheries: vulnerability of deep-sea corals to fishing on seamounts beyond areas of national jurisdiction. UNEP-WCMC, Cambridge, UK.

Coleman, F.C., Scanlon, K.M., Koenig, C.C. 2011. Groupers on the edge: Shelf edge spawning habitat in and around marine reserves of the northeastern Gulf of Mexico. Professional Geographer, 63: 456-474.

Dearden, P., Topelko, K.N. 2005. Establishing criteria for the identification of ecologically and biologically significant areas on the high seas. Background paper prepared for Fisheries and Oceans Canada. Marine protected Areas Research Group, 50 pp.

De Leo, F.C., Smith, C.R., Rowden, A.A., Bowden, D.A., Clark, M.R. 2010. Submarine canyons: hotspots of benthic biomass and productivity in the deep sea. Proceedings of the Royal Society B, 277: 2783-2792.

FAO. 2007. Namibia: Country Profiles. Food and Agricultural Organisation (FAO) Country Profiles. http://www.fao.org/fi/website/FIRetrieveAction.do?dom=countrysector&xml=FICP_NA.xml&lang=en. (accessed 17 April 2012).

FAO. 2009. Appendix F: International Guidelines for the Management of Deep-sea Fisheries in the High Seas. In: Report of the Technical Consultation on International Guidelines for the Management of Deepsea Fisheries in the High Seas. Rome, 4–8 February and 25-29 August 2008. FAO Fisheries and Aquaculture Report No. 881. Rome, Italy: Food and Agriculture Organization of the United Nations. pp. 39-51.

Gjerde, K.M., Breide, C. 2003. Towards a Strategy for High Seas Marine Protected Areas: Proceedings of the IUCN, WCPA and WWF Experts Workshop on High Seas Marine Protected Areas, 15-17 January 2003, Malaga, Spain.

Harris, P.T., Macmillan-Lawler, M., Rupp, J. and Baker, E.K. 2014. Geomorphology of the oceans. Marine Geology, 352: 4-24.

Holness S., Kirkman S., Samaai T., Wolf T., Sink K., Majiedt P., Nsiangango S., Kainge P., Kilongo K., Kathena J., Harris L., Lagabrielle E., Kirchner C., Chalmers R., Lombard M. 2014. Spatial Biodiversity Assessment and Spatial Management, including Marine Protected Areas. Final report for the Benguela Current Commission project BEH 09-01.

Hutchings, L., van der Lingen, C.D. Shannon, L.J., Crawford, R.J.M., Verheye, H.M.S., Bartholomae, C.H., van der Plas, A.K., Louw, D., Kreiner, A., Ostrowski, M., Fidel, Q., Barlow, R.G., Lamont, T., Cotzee, J., Shillington, F., Veitch, J., Currie, J.C., Monteiro, P.P.S. 2009. The Benguela Current: An ecosystem of four components. Progress in Oceanography, 83: 15 – 32.

Johnsen, E., Kathena, J. 2012. A robust method for generating separate catch time-series for each of the hake species caught in the Namibian trawl fishery. African Journal of Marine Science, 34: 43–53.

Johnson, D.E., Barrio Froján, C., Turner, P.J., Weaver, P., Gunn, V., Dunn, D.C., Halpin, P., Bax, N.J., Dunstan, P.K., 2018. Reviewing the EBSA process: Improving on success. Marine Policy 88, 75-85.

Kirkman, S.P., Yemane, D., Kathena, J., Mafwila, S., Nsiangango, S., Samaai, T., Axelsen, B., Singh, L. 2013. Identifying and characterizing demersal biodiversity hotspots in the BCLME: Relevance in the light of global changes. ICES Journal of Marine Science, 70: 943–954.

Lagabrielle E. 2009. Preliminary report: National Pelagic Bioregionalisation of South Africa. Cape Town: South African National Biodiversity Institute.

Majiedt, P., Holness, S., Sink, K., Oosthuizen, A., Chadwick, P. 2013. Systematic Marine Biodiversity Plan for the West Coast of South Africa. South African National Biodiversity Institute, Cape Town.

McClain, C.R. Barry, J.P. 2010. Habitat heterogeneity, disturbance, and productivity work in concert to regulate biodiversity in deep submarine canyons. Ecology, 91: 964-76.

Moore, S.E., Watkins, W.A., Daher, M.A., Davies, J.R., Dahlheim, M.E., 2002. Blue whale habitat associations in the Northwest Pacific: analysis of remotely sensed data using a Geographic Information System. Oceanography, 15:, 20–25.

Morato, T., Varkey, D.A., Damaso, C., Machete, M., Santos, M., Prieto, R., Santos, R.S. and Pitcher, T.J. 2008. Evidence of a seamount effect on aggregating visitors. Marine Ecology Progress Series, 357: 23-32.

OBIS. 2017. Summary statistics of biodiversity records in the Orange Shelf EBSA. (Available: Ocean Biogeographic Information System. Intergovernmental Oceanographic Commission of UNESCO. www.iobis.org. Accessed: 2017-07-27).

Piatt, J.F., Wetzel, J., Bell, K., DeGange, A.R., Balogh, G.R., Drew, G.S., Geernaert, T., Ladd, C., Byrd G.V. 2006. Predictable hotspots and foraging habitat of the endangered shorttailed albatross (*Phoebastria albatrus*) in the North Pacific: Implications for conservation. Deep-Sea Research II, 53: 387-398.

Pitcher, T.J., Morato, T., Hart, P.J.B., Clark, M.R., Haggan, N., Santos, R.S. (Eds.). 2007. Seamounts: Ecology, Fisheries & Conservation. Blackwell Publishing, Oxford, UK.

Sink KJ, Attwood CG, Lombard AT, Grantham H, Leslie R, Samaai T, Kerwath S, Majiedt P, Fairweather T, Hutchings L, van der Lingen C, Atkinson LJ, Wilkinson S, Holness S, Wolf T. 2011. Spatial planning to identify focus areas for offshore biodiversity protection in South Africa. Unpublished Report. Cape Town: South African National Biodiversity Institute.

Sink, K., Holness, S., Harris, L., Majiedt, P., Atkinson, L., Robinson, T., Kirkman, S., Hutchings, L., Leslie, R., Lamberth, S., Kerwath, S., von der Heyden, S., Lombard, A., Attwood, C., Branch, G., Fairweather, T., Taljaard, S., Weerts, S., Cowley, P., Awad, A., Halpern, B., Grantham, H., Wolf T. 2012. National Biodiversity Assessment 2012: Technical Report. Volume 4: Marine and Coastal Component. South African National Biodiversity Institute, Pretoria.

Sink, K.J., van der Bank, M.G., Majiedt, P.A., Harris, L.R., Atkinson, L., Karenyi, N., Kirkman, S. (eds) 2019. National Biodiversity Assessment 2018 Technical Report Volume 4: Marine Realm. South African National Biodiversity Institute, Pretoria. http://hdl.handle.net/20.500.12143/6372.

Springer, A.M., McRoy, C.P., Flint, M.V. 1996. The Bering Sea green belt: shelf-edge processes and ecosystem production. Fisheries Oceanography, 5: 205-223.

Sydeman, W.J., Brodeur, R.D., Grimes, C.B., Bychkov, A.S., McKinnell, S. 2006. Marine habitat "hotspots" and their use by migratory species and top predators in the North Pacific Ocean: Introduction. Deep-Sea Research Part II, 53: 247-249.

Other relevant website address or attached documents

Summary of ecosystem types and threat status for the Orange Seamount and Canyon Complex. Data from Sink et al., 2019 and Holness et al., 2014.

Threat Status	Ecosystem Type	Area (km^2)	Area (%)
Endangered	Namaqua Shelf Edge	3065.9	10.5
Vulnerable	Southern Benguela Rocky Shelf Edge	751.7	2.6
	Southern Benguela Sandy Shelf Edge	1780.6	6.1
Least Concern	Southeast Atlantic Lower Slope	139.9	0.5
	Southeast Atlantic Mid Slope	993.1	3.4
	Southeast Atlantic Upper Slope	2133.3	7.3
	Southern Benguela Sandy Outer Shelf	3003.1	10.3
	Namaqua Outer Shelf	8702.9	29.7
	Namib Lower Slope	4315.1	14.7
	Namib Seamount	393.1	1.3
	Namib Upper Slope	3988.7	13.6
Grand Total		**29267.4**	**100.0**

Assessment of the area against CBD EBSA criteria

C1: Uniqueness or rarity **Low**

Justification

Neither the benthic nor pelagic ecosystem types that are known to occur in the area are unique to the area (Sink et al., 2011).

C2: Special importance for life-history stages of species **Medium**

Justification

Elsewhere it has been shown that seamounts, shelf breaks and submarine canyons (all of which occur in the EBSA) constitute important foraging habitats for pelagic-feeding vertebrates such as seabirds, cetaceans and large fish species, including migratory species, which exploit elevated primary production and high standing stocks of zooplankton, fish, and other organisms at these features (Dearden and Topelko 2005, Sydeman et al., 2006, Morato et al., 2008). Generally, however, seamounts and canyons in the region have been poorly studied (Sink et al., 2011).

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

Justification

Threat status assessments of ecosystem types by Sink et al. (2012, 2019) and Holness et al., (2014) highlighted several threatened ecosystem types that are represented in the EBSA. Threatened ecosystem types include the Endangered Namaqua Shelf Edge and Vulnerable Southern Benguela Rocky Shelf Edge and Southern Benguela Sandy Shelf Edge. This implies that, although there are sufficient areas of intact biodiversity of these habitats to meet the conservation targets, there has been habitat degradation and some loss of ecosystem processes. The importance of the area for the conserving the threatened ecosystem types represented in the Orange Seamount and Canyon Complex was emphasized by Majiedt et al. (2013) and Holness et al. (2014).

C4: Vulnerability, fragility, sensitivity, or slow recovery **Medium**

Justification

The threatened status of three ecosystem types (Sink et al., 2012, 2019) implies that degradation and some loss of ecosystem processes has been associated with these ecosystem types in other areas, and therefore that they are vulnerable to the effects of human activities. Seamounts, submarine canyons and the shelf break, all of which occur in the area, are all vulnerable and sensitive ecosystems (FAO 2009). Seamount communities are particularly vulnerable to human activities (e.g. trawling) due to intrinsic biological factors that are characteristic of seamount-associated species (e.g. slow growth rate, late maturation), with the likelihood of very long time scales of recovery if damaged (Gjerde & Breide, 2003, Clark et al., 2006).

C5: Biological productivity **Medium**

Justification

The area is at the eastern limit of the Benguela upwelling region (Hutchings et al., 2009), where the pelagic environment is characterized by medium productivity, and moderate chlorophyll levels (Lagabrielle 2009). However, shelf edge environments (e.g. Springer et al., 1996, Piatt et al., 2006, Coleman et al., 2011), seamounts (e.g. Moore et al., 2002, Pitcher et al., 2011) and submarine canyons (e.g. de Leo et al., 2010, McClain and Barry 2010), all of which occur in the proposed area, are associated with elevated productivity and biomass levels, spanning several trophic levels. Tripp

seamount on the Namibian side of the border supports a productive pole-and-line tuna fishery (FAO 2007).

C6: Biological diversity **High**
Justification
Based on spatial modelling of 20-30 years of distribution and abundance data from demersal trawl surveys in Namibian and South African waters, Kirkman et al. (2013) identified the area as a persistent hotspot of species richness for demersal fish species. This may be linked to the habitat heterogeneity of the area, including the shelf edge, the presence of a shelf-indenting submarine canyon and the close proximity of a seamount. Further, 487 species have been recorded in the area (OBIS 2017). Diversity of ecosystem types is also high, with 11 ecosystem types occurring in the area (Sink et al., 2012; Holness et al., 2014).

C7: Naturalness **High**
Justification
The area on the South African side is one of the few areas where the threatened ecosystem types are in good condition (relatively natural/pristine), largely because it has been subjected to relatively low levels of anthropogenic pressures (Sink et al., 2011, 2019). The importance of the area for the conservation of the threatened ecosystem types represented there has therefore been emphasized by Majiedt et al., (2013). Although there are impacted areas, much of the Namibian portion of the area is also in good condition (Holness et al., 2014). Overall, 73% is in good ecological condition, 18% is fair and 9% is poor.

Status of submission

The Orange Shelf Edge EBSA (now Orange Seamount and Canyon Complex) was recognized as meeting EBSA criteria by the Conference of the Parties. The revised boundaries and description still need to be submitted to COP for approval.

COP Decision

dec-COP-12-DEC-22

End of proposed EBSA revised description.

Motivation for Revisions

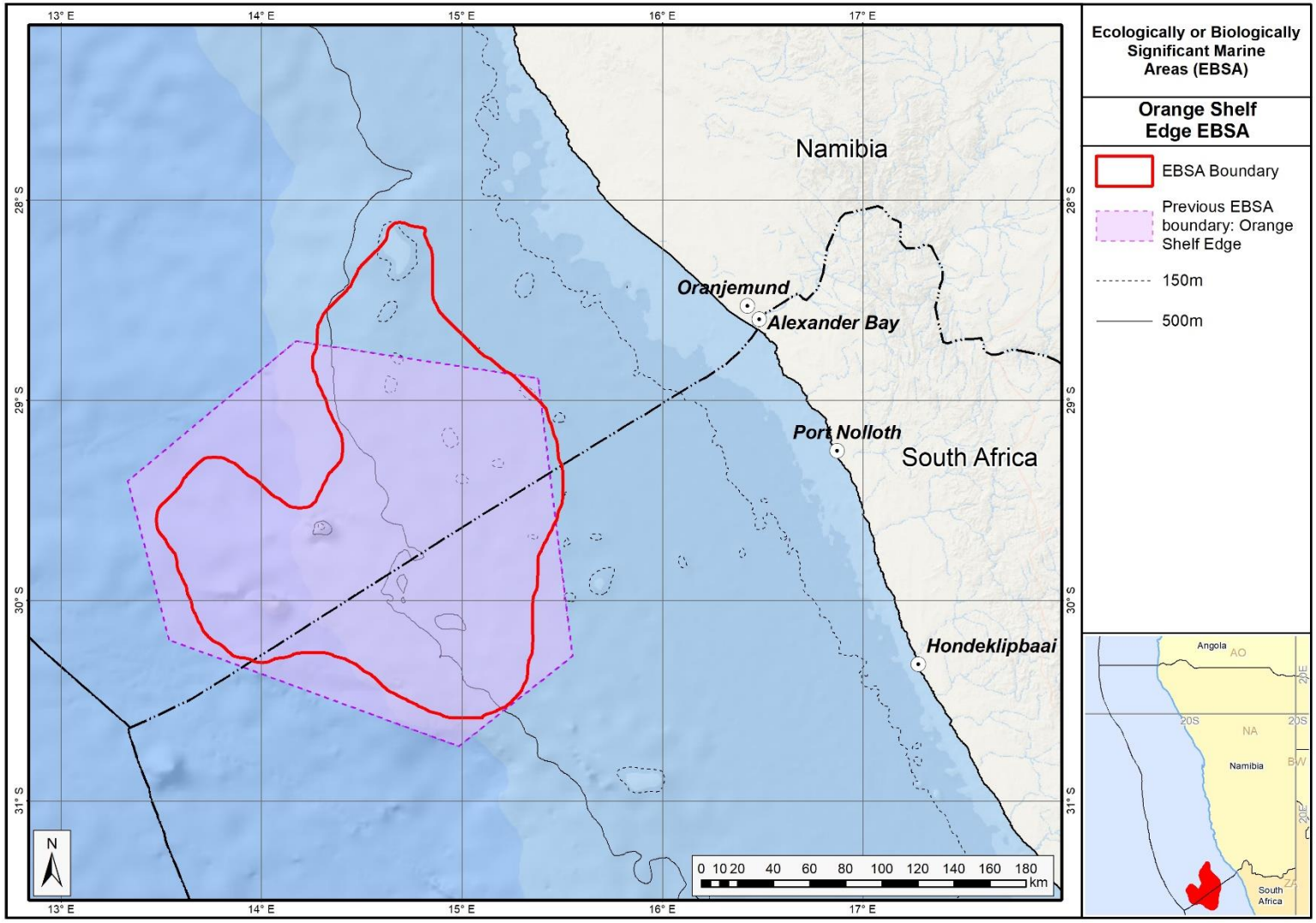
Only slight revision of the EBSA description was done since no new research has been carried on this area since its original adoption in 2014. Small additions, such as biodiversity information from OBIS and updated South African assessments were made, but none of these edits were significant enough to drive a change in the EBSA criteria rankings. A supplementary table of the ecosystem types represented in the EBSA and their associated threat status was also included.

The biggest change to the EBSA was a significant refinement of the EBSA delineation. This was done to focus more closely the EBSA on the key biodiversity features that underpin its EBSA status. The delineation process included an initial stakeholder workshop, a technical mapping process and then an expert review workshop where boundary delineation options were finalised. The delineation

process used a combination of Systematic Conservation Planning (SCP) and Multi-Criteria Analysis methods. The features used in the analysis were:

- Threatened Benthic and Coastal Ecosystems (Holness et al., 2014; Sink et al., 2012, 2019). The analysis focussed on the inclusion of the most threatened ecosystem types found in the area. These types are highlighted in the table in the Other relevant website address or attached documents section. Additional weight was given to the priority shelf edge habitats which are core to the EBSA description.
- Areas of highest fish diversity from Kirkman et al. (2013) were included.
- Areas of high relative naturalness identified in the SCP undertaken for the BCLME by Holness et al. (2014).
- Key physical features such as seamounts and canyons from the BCC spatial mapping project (Holness et al., 2014), GEBCO data (GEBCO Compilation Group 2019), and global benthic geomorphology mapping (www.bluehabitats.org, Harris et al., 2014).
- Irreplaceable and near irreplaceable (i.e. very high selection frequency) sites, as well as primary and secondary focus areas identified in the SCP undertaken for the BCLME by Holness et al. (2014).

The multi-criteria analysis resulted in a value surface. The cut-off value (used to determine the extent of the EBSA) was based on expert input and quantitative analysis of effective inclusion of the above features. This entailed taking an iterative parameter calibration-based approach whereby the spatial efficiency of the inclusion of the targeted features was evaluated. The approach aimed to identify a cut-off that most efficiently included prioritised features while minimizing the inclusion of impacted areas. The final boundaries shown in the map below were validated in a series of national (in both South African and Namibia) and regional (BCC) meetings.



The revised boundary of the Orange Seamount and Canyon Complex EBSA in relation to the original boundary of the Orange Shelf Edge EBSA.