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Applying the CBD 'EBSA' criteria for identifying ecologically or biologically significant marine areas in need of protection (CBD COP IX Resolution IX/20) to the Nazca and Salas y Gomez submarine ridges

1. Background

The Salas y Gomez and Nazca ridges are two sequential chains of submarine mountains of volcanic origin located in the Southeastern Pacific Ocean, which together have an extension of 2,900 km. The Salas y Gomez ridge lies in a west-east orientation localized between 23°42' S and 29°12' S and the 111°30' W and 86°30' W. In its western end it intersects the East Pacific Rise inside the Chile insular EEZ (Easter Island) and its eastern end adjoins to the western end of Nazca ridge.

The Nazca ridge spreads in a southwest-northeastern direction and is localized between the parallels 15°00' S and 26°09' S and between the meridians 86°30' W and 76°06' W. In its southern end involves part of the Chile insular EEZ (San Felix Island) and in its northern end is introduced all the way to the Peru-Chile subduction zone (Peru EEZ).

The area beyond national jurisdiction under analysis covers about 1,246,608 km^2, which represent approximately 5.04% of the international waters surface in the FAO area No. 87. Further, it contains about 110 seamounts with summits between the sea surface level and 2,000 m depth (fishable depths), which represent some 41% of the seamounts in the Southeastern Pacific Ocean. The area is a hotspot with one of the highest levels of marine biological endemism (41.2% in fishes and 46.3% in invertebrates) in the World and also is considered a stepping stone for some marine mammals (e.g., blue whale, Rodrigo Hucke-Gaete personal communication). It has been described as recruitment and nursery area for swordfish (*Xiphias gladius*) (Yañez et al., 2004, 2006, 2009) and it is part of the breeding zone described for Chilean jack mackerel (*Trachurus murphyi*) (Arcos et al., 2001; Anon., 2007).

Until now the area has been subject of minor, localized and sporadic activities, like bottom fishing and geological surveys and, therefore, a high degree of naturalness is expected for many seamounts into the area.

The area to which we have applied the criteria does not consider the zone inside the EEZ of Chile and Peru. It is circumscribed by the polygon of vertexes and semi-curves (see Fig.):

(A) 79º 12' 27" W and 19º 11' 20" S;
(B) 81º 07' 24" W and 19º 11' 20" S;
(C) 85º 44' 56" W and 23º 08' 36" S;
(D) the northern intersection formed by the meridian 102º 34' 07" W and the arc produced by EEZ of Salas y Gomez Island;
(E) the Eastern arc generated by EEZ of Salas y Gomez Island between the vertex (D) and (F);
(F) the southern intersection formed by the meridian 104º 29' 45" W and the arc produced by EEZ of Salas y Gomez Island;
(G) the southern intersection formed by the meridian 82º 30' 13" W and the arc produced by EEZ of San Felix Island;
(H) the western arc generated by EEZ of San Felix Island between the vertex (G) and (I);
(I) the northern intersection generated by the meridian 81º 26' 00" W and the arc produced by EEZ of San Felix Island.

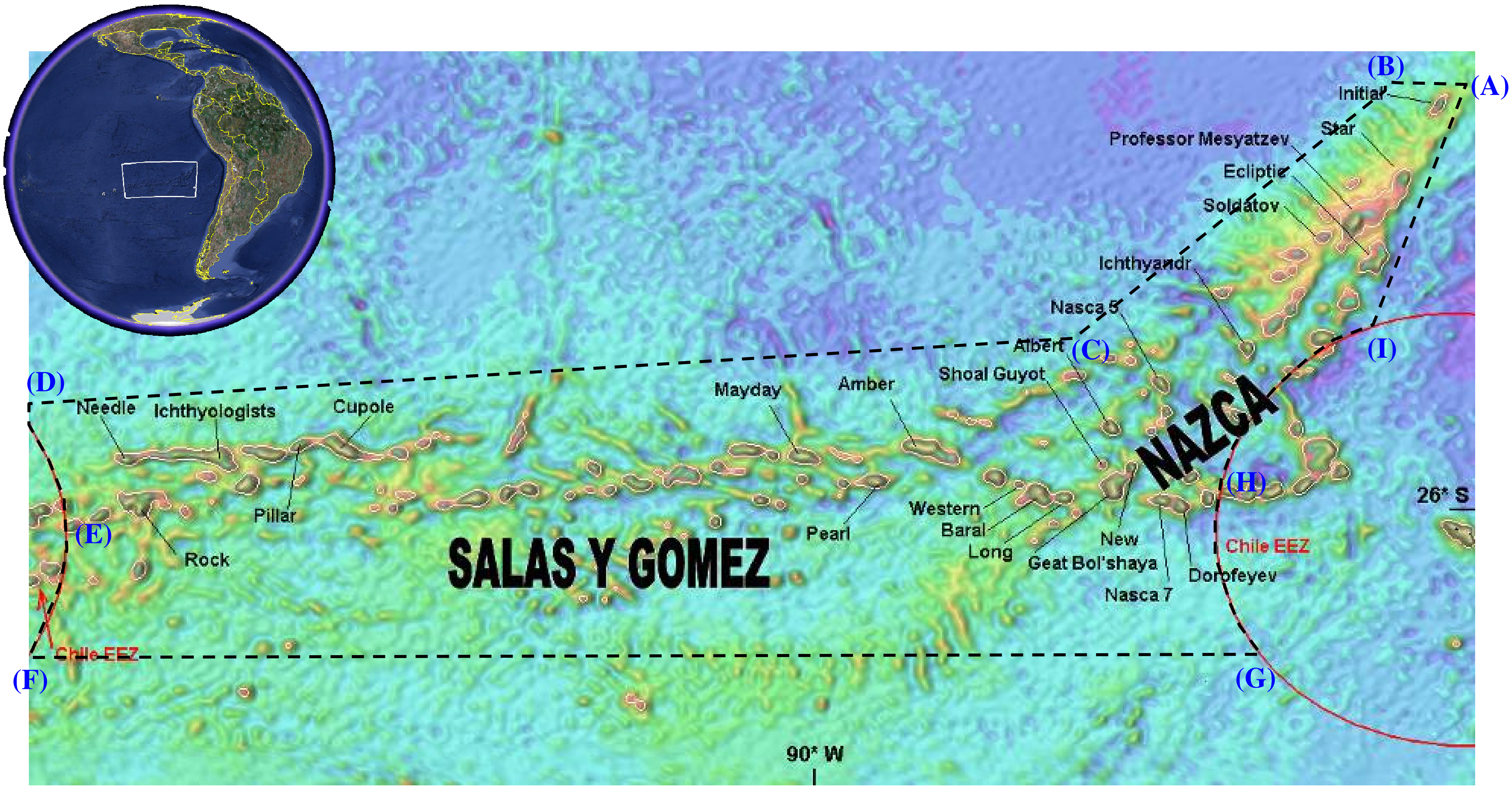

Figure: Location of Nazca and Salas y Gomez seamounts and area (dotted line) of application of criteria. The seamounts' names for which biological information is available are identified.

2. Checking Nazca and Salas y Gomez (N&SG) submarine ridges against the CBD 'EBSA' criteria

Criterion	Nazca & Salas y Gomez ridges
Uniqueness or rarity	The seamounts of N&SG are unique in that they constitutes a biogeographical province much more closely related to the Indo-West Pacific than to the eastern Pacific. Findings in the area shown high endemism rates, reached to 41.2% in fishes and 46.3% in invertebrates associated to the bottom (Parin *et al*., 1997; Mironov *et al*., 2006). These endemism rates are the higher found in seamounts, and surpass rates of ecosystems associated with hydrothermal vents, one of the most isolated in the Ocean (Richer de Forges *et al*., 2000).
Special importance for life history stages of species	Nazca ridge and the eastern end of Salas y Gomez ridges are considered to be the main recruitment area for Chilean jack mackerel and a nursery zone for swordfish (Yañez *et al*., 2004, 2006). Almost half of all invertebrates recorded live in those seamounts; therefore, the habitat provided by these seamounts is required for invertebrate populations to survive and thrive. It provides the only extensive hard substrate available for propagation of benthic suspension feeders like Antipatharians and Scleractinians.
Importance for threatened endangered or declining species and/or habitats	Much of the fauna recorded in Nazca and Salas y Gomez ridges is endemic to their seamounts. Therefore, due the scarce information most of benthic or benthopelagic species inhabiting these ridges are not evaluated in their status or are data deficient classified in the IUCN Red List. However, the ridges offer habitat for a number of low resilient and long-living species like deep water sharks (Parin and Kotlyar, 2007), oreos, alfonsino, and reef-builder coral (e.g., *Madrepora oculata*). If these species are adversely affected they may easily become threatened.
Vulnerability, fragility, sensitivity or slow recovery	In particular deep water species and biogenic habitats such as formed by cold water corals and sponges are considered vulnerable (Koslow, 2007), as often fragile, and slow (if at all) to recover due to slow growth, retarded maturity and high generation length, as well as population characteristics of high diversity at low biomass. Please see below for illustration: "Significant changes were noted between 1979-1980 and 1987 in the structure of bottom communities. Antipatharians were destroyed by the bottom otter-trawl […], and [cirripedes] were lost with their substratum animals, [while] populations of sea urchin [, who feed over cirripedes,] declined following the destruction" (Parin *et al*., 1997: 178)

Biological productivity	Daneri *et al* (2000) have shown strong evidence that may support the formation of Taylor columns over the seamounts of Nazca ridge, and the occurrence of local upwelling process in Nazca area, making this area particularly more productive than the surrounding South-eastern Pacific Ocean. The Nazca area is slightly influenced by the eastern boundary currents of the South Pacific anticyclonic gyre. The Chile Current arises in the Subantarctic region. Thus, it carries "equatorward", along the coast of Chile, Subantarctic Water. When it reaches approximately 20° S, influenced by the southeast trade winds and coastal configuration, turns westward, away from the coast influencing Nazca area with rich-nutrients waters (Galvez, in press).
Biological diversity	Few comprehensive studies have been conducted on the N&SG ridges. Taking into account only the Russian research, we know that 192 species of benthopelagic and benthic invertebrates and 171 species of fishes inhabit the 22 explored seamounts of the Nazca and Salas y Gomez ridges (Parin et al., 1997). If we consider that the area comprise at least 110 seamounts, then we can expect to discover a much higher biodiversity. It is important to note that the bottom of Nazca and Salas y Gomez ridges has not been biologically sampled. Elevations and depths ranging from abyssal soft sediment plains and trenches to the hard bottom peaks of seamounts and hills on the ridges may provide for an extensive range of ecological niches.
Naturalness	It can be assumed that most seamounts along the Nazca ridge were at least explored once. There is evidence of sporadic deep fishing (trawling and pots) by Russian and Chilean fleet (Galvez, in press) There are indications that big branches of gorgonias were destroyed by trawlers (Parin et al., 1997). However, from beyond fishing depth, no significant human impacts are known. In the case of Salas y Gomez ridge, most of the fishing activity carried out is on pelagic layer (Vega et al., 2009). Only the former URSS scientific expeditions and Chilean fishing fleet are know to fish in this area (Galvez, in press)..

3. Conclusion

WWF finds that the area under study fulfills the criteria adopted by the CBD. In applying the criteria to what WWF had considered to be an ecologically and biologically significant area before, we find that the criteria served their purpose well and cover the main aspects that should be considered when identifying such areas.

4. Literature reviewed

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