

13th MEETING OF THE SCIENTIFIC COMMITTEE

8 to 13 September 2025, Wellington, New Zealand

SC13 - SGN 02

**Proposed protocol for evaluating Salas y Gomez and Nazca Ridge area(s) for
enhanced levels of protection/management**

Chile

SPRFMO proposed protocol for evaluating Salas y Gomez and Nazca Ridge area(s) for enhanced levels of protection/management

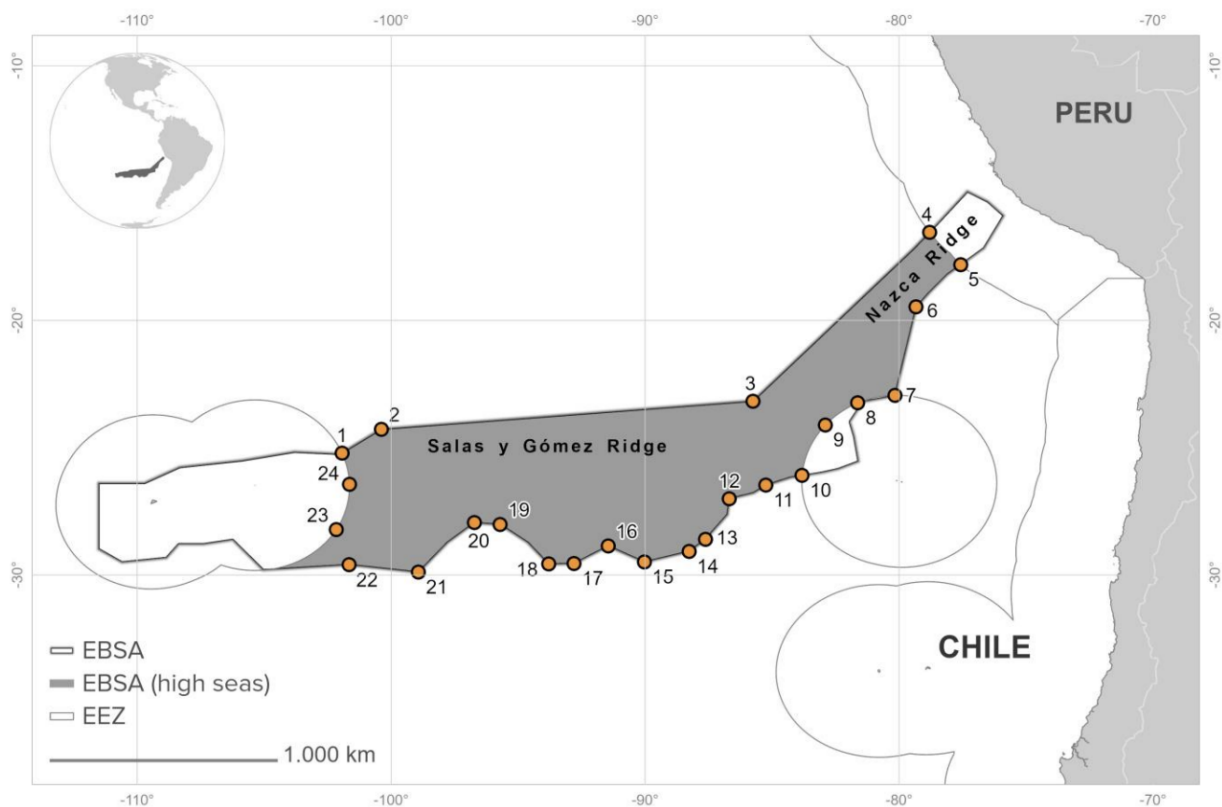
The area should be clearly identified in terms of its ecological, biological, and cultural value. It must also be precisely defined with coordinates and accompanied by a detailed map, including a shapefile for GIS analysis. Any proposed subareas should be described, and if they differ significantly, each should have its own table (see below).



For the purposes of this proposed evaluation protocol, the Salas y Gómez and Nazca Ridges are defined as the high seas portion of the ecologically and biologically significant area (EBSA) designated by the Convention on Biological Diversity (CBD). This area extends within the following coordinates:

- Salas y Gómez Ridge: between 23°42' S and 29°12' S, and between 111°30' W and 86°30' W.
- Nazca Ridge: between 15°00' S and 26°09' S, and between 86°30' W and 76°06' W.

For the exact coordinates, please refer to the figure and table below (Appendix I, COMM 12 – Prop 20):



Point	Latitude	Longitude
1	-25.211512	-101.933915
2	-24.277359	-100.384911
3	-23.171855	-85.748889
4	-16.534979	-78.789679
5	-17.807870	-77.574806
6	-19.471695	-79.326597
7	-22.940783	-80.166460
8	-23.242129	-81.624576
9	-24.104733	-82.896111
10	-26.088117	-83.816938
11	-26.471023	-85.244218
12	-27.001524	-86.687409

13	-28.593028	-87.628621
14	-29.069173	-88.263112
15	-29.484802	-90.027482
16	-28.857328	-91.453560
17	-29.541845	-92.794074
18	-29.570367	-93.792329
19	-28.009486	-95.702721
20	-27.944638	-96.727198
21	-29.884104	-98.923359
22	-29.590651	-101.657308
23	-28.215516	-102.161216
24	-26.434649	-101.642708

The shapefiles for ArcGIS application or similar, in .shp or .kmz formats are available to download in the attached email.

Objectives

The objective/s for the area must be clearly stated and the proposal clearly demonstrates which of the criteria are met.

The proposal should state which of the evaluation criteria meet the objectives by completing the table below and noting that the evaluation criteria list has no particular ranking of importance.

Evaluation Criteria

1. Bioregional representation

- a. Area is known to contain unique, rare or distinct habitats or ecosystems that fishing operations will disturb.
- b. Areas with a comparatively higher degree of naturalness due to zero or a low level of human-induced disturbance or degradation from, for example, historical fishing activity.

2. Geographic and/or geomorphological representation

- a. The area provides for important or desirable geographic representation within the SPRFMO area.
- b. The area proposed is known to contain unique or unusual geomorphological features that fishing operations may damage.

3. Biodiversity representation

- a. The area is known to contain unique or rare (occurring in only a few locations) species, populations or communities.
- b. The area is known to contain a high diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.
- c. The area is known to contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.

4. Uniqueness and rarity

- a. The area warrants conservation and preservation due to their unique features, resources, and/or characteristics.

5. Vulnerability, fragility, sensitivity, or slow recovery/resilience

- a. Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.

6. Area is of special significance for threatened or important species or ecosystem properties

- a. There is evidence that the area is of special importance for life history stages of species and/or threatened species.
- b. There is evidence that the area contains habitat for the survival and recovery of endangered, threatened, declining species or is an area with significant assemblages of such species.

7. **VMEs are known to occur and/or triggering of VME indicator thresholds reported for the area proposed**
 - a. Known or consistent triggering of VME indicator thresholds occurs.
 - b. VMEs have been observed through non-fishing operations.
8. **Cultural Significance**
 - a. The area has an exceptionally rich and long history and cultural significance
9. **Scientific interest**
 - a. The area has scientific research interest associated with understanding ecosystem, biological, geological and biodiversity processes in the SPRFMO region.

Evaluating Criteria

Area Name	Salas y Gomez and Nazca Ridges
Proponents	Chile
Geographic Description	Physical description The Salas y Gomez and Nazca Ridges are two connected underwater volcanic mountain chains in the Southeast Pacific Ocean spanning over 2,900km, from the Peruvian EEZ to Rapa Nui. <u>Seamount Composition:</u> The region encompasses over 110 seamounts accounting for over 40% of the seamounts in the southeastern Pacific (Wagner et al., 2021). <u>Volcanic Origin:</u> These volcanic ridges formed between 2 and 27 million years ago due to a geological hotspot located on the western edge of the Salas y Gomez Ridge (Georgian et al., 2021). The shallow waters of the Salas y Gomez and Nazca Ridges span across three different ecoregions, including Easter Island, the Humboldtian, and Desventuradas ecoregions (Wagner et al., 2021) <u>Crustal Thickness:</u> The Nazca Ridge stands out for its abnormally thick basaltic ocean crust, averaging 18 ± 3 kilometers in thickness, which is significantly thicker than the average oceanic crust (Woods & Okal, 1994) <u>Isolation Factors:</u> The unique ecosystems of the Salas y Gomez and Nazca Ridges are isolated by the Atacama Trench, the Humboldt Current, and the South Pacific Gyre (Chavez-Molina et al., 2023; Galvez-Larach, 2009). Water clarity in the central portion of this region, particularly around the Salas y Gómez Ridge, is exceptionally high, allowing sunlight to reach greater depths than in other parts of the ocean. Photosynthetic marine communities in this region occur below 300 m depth, one of the deepest recorded on Earth (Wagner et al., 2021; Easton et al. 2024; Sellanes et al. 2024; Gaymer et al., 2025). Biological description <u>Biodiversity hotspot:</u> The Salas y Gomez and Nazca Ridges are marked by one of the highest levels of marine endemism on Earth (Chavez-Molina et al., 2023). They also host a rich array of marine life including dozens of endemic corals, fish, and invertebrates, contributing significantly to global marine biodiversity (Friedlander et al., 2021; Friedlander et al., 2013; Wagner et al., 2021; Wagner et al., 2020a; Wagner et al., 2020b). <u>Coral and sponge communities:</u> These ridge support extensive assemblages of deep sea corals and sponges, providing essential habitats for mollusks, echinoderms, and benthic communities (Georgian et al., 2021). <u>Migratory pathways:</u> These ridges serve as critical migratory routes for pelagic species, such as tunas, sharks, cetaceans, and even the

	commercially sought after jumbo flying squid. These seamount ecosystems provide important habitats and ecological stepping stones for whales, sea turtles, corals, and a multitude of other ecologically important species, including 93 species that are threatened or endangered (Gaymer et al., 2025) <u>Productivity Zones:</u> The upwelling and current systems around these ridges enhance nutrient availability, fueling high primary production and supporting food webs across the vertical zonation of seamount ecosystems (Gaymer et al., 2025) Coordinates Salas y Gómez Ridge: between 23°42' S and 29°12' S, and between 111°30' W and 86°30' W. Nazca Ridge: between 15°00' S and 26°09' S, and between 86°30' W and 76°06' W. The area encompasses ~1,243,476 km², which represents only ~1.9% of the total SPRFMO area (COMM 12 – Prop 20).
Evaluation Criteria	1. Bioregional Representation The Salas y Gomez and Nazca Ridges comprise 2 ecoregions (Easter Island and Desventuradas) with extremely high value ecosystems that are global biodiversity hotspots (Friedlander et al. 2016, Gaymer et al. 2025). 2. Geographic and/or geomorphological representation <u>Extent and Location:</u> The Salas y Gómez and Nazca Ridges are two interconnected underwater volcanic chains extending over 2,900 km in the southeastern Pacific Ocean, from the East Pacific Rise to the South American continental margin (Yáñez et al., 2009). <u>Geological origin:</u> Seamounts located on the Salas y Gómez and Nazca ridges are all thought to have been produced by a common hotspot that is located close to the present location of Salas y Gómez Island. (Ray et al., 2012; Rodrigo et al. 2014). Moving eastward along the Salas y Gómez and Nazca ridges, the sea mounts become progressively older, from 2 million years on the western portion of the chain, to over 27 million years towards the northeastern end (Gaymer et al. 2025). <u>Seamount Distribution:</u> The ridges contain more than 110 seamounts and guyots, forming one of the most extensive and densely concentrated seamount chains in the world, where some of them are connected and form continuous structures of hundreds of kilometers (Wagner et al., 2021; Gaymer et al. 2025). <u>Depth and Range:</u> The ridges exhibit a broad depth range, with seamount summits rising from abyssal depths of over 4,000 meters to as shallow as

20 meters below the surface, creating diverse habitats for a myriad of species (Gálvez-Larach, 2009; Gaymer et al. 2025). The average depth of these ridges is 2100 m, with most of the ridge ranging in depth between 2000 - 2500m, but with some portions reaching into the photic zone (Wagner et al., 2021). Seamounts tend to be deeper within the Nazca region, that is the oldest one (Gaymer et al. 2025).

Water clarity: Due to ultra oligotrophic conditions of the waters around Nazca and Salas y Gomez ridges, light penetration reaches over 300 meters.

3. Biodiversity Representation

Habitat for Endangered Species: The area is home to 93 species classified as endangered, near threatened, or vulnerable, highlighting its conservation significance (SPRFMO, 2022). This includes 25 species of sharks and rays, 21 species of birds, 16 species of corals, 7 species of marine mammals, 7 species of bony fishes, 5 species of marine turtles, and 1 species of sea cucumber (Wagner et al., 2021; Gaymer et al., 2025). These species include two that are critically endangered, twelve that are endangered, 33 that are near threatened, and 35 that are vulnerable to extinction (Wagner et al., 2021).

Critical Migratory Routes and connectivity: The ridges serve as important migratory pathways for pelagic species, including sharks, bony fishes (e.g. tunas), sea turtles, seabirds and cetaceans, playing a vital role in broader oceanic ecological processes (Boteler et al. 2022; Chavez-Molina et al., 2023).

Biological productivity: Due to its seamount-associated high productivity, this region provides important foraging grounds for a high diversity and abundance of seabirds, as well as cetaceans, sea turtles and fishes (Wagner et al., 2021).

Deepest light-dependent coral and algal dominated benthic communities on earth: Water clarity allows healthy coral reefs and algal beds over 300 in depth (Gaymer et al. 2025).

Diverse habitat forming Communities (structural complexity): The seamounts support rich assemblages of deep-sea corals, gorgonians and sponges, which provide essential habitats for various marine species.

Potential New Species Discoveries: Recent expeditions have reported over 1019 species, identified approximately 170 potential new species and 420 new reports, underscoring the region's unexplored biodiversity (Easton et al. 2024; Sellanes et al. 2024; Schmidt Ocean Institute, 2024).

4. Uniqueness and rarity

The Salas y Gomez and Nazca Ridges are characterized by the uniqueness and rarity of their biodiversity, with the highest levels of marine endemism on our planet, as for many taxonomic groups, close to half of the species are endemic to the region, thus found nowhere else on earth (Friedlander et al., 2016; Gaymer et al., 2025; Wagner et al., 2021). Regional endemism estimates for fish and invertebrates range from 40% to 46.3% (Chavez-Molina et al., 2023). The dominance of endemic species is unlike any place on Earth.

5. Vulnerability, fragility, sensitivity, or slow recovery/resilience

Oceanic seamounts and coral ecosystems, found throughout ABNJ, are considered among the most fragile environments to anthropogenic activities and climate change (Friedlander et al., 2021). This is particularly true for the Salas y Gomez and Nazca Ridges, characterized by highly vulnerable ecosystems such as seamounts, which are dominated by some of the longest living species on the planet (>2000 y old), which are extremely fragile, vulnerable to disturbances and very slow to recover (Gaymer et al. 2024). Recently reported evidence of trawling in the Nazca ridge that occurred more than 20 y ago show almost no recovery.

6. Area is of special significance for threatened or important species or ecosystem properties

In particular, the Salas y Gómez and Nazca ridges are home to 93 species that are endangered, near threatened, or vulnerable to extinction, including 25 species of sharks and rays, 21 species of birds, 16 species of corals, 7 species of marine mammals, 7 species of bony fishes, 5 species of marine turtles, and 1 species of sea cucumber (Gaymer et al., 2025)

The Nazca ridge and the eastern part of the Salas y Gómez ridge has been identified as a reproductive and nursery habitat for emblematic pelagic species such as jack mackerel, sharks (i.e. *Carcharhinus galapagensis*) and swordfish (i.e., *Xiphias gladius*) (Arcos et al., 2001; Yañez et al., 2004, 2006; Vega et al., 2009; Morales, 2020), thus they have a fundamental role to support fisheries occurring in adjacent waters.

The majority of the Salas y Gómez Ridge and the southern portion of the Nazca Ridge are located near the center of the South Pacific Gyre, a large-scale oceanographic feature characterized by extremely nutrient-poor waters. This paucity of nutrients makes this region particularly susceptible to anthropogenic and climatic disturbances. For example, model climate change predictions indicate that in the next 20–40 years the seawater of this region will experience increases in temperature, decreases in dissolved oxygen, acidification, and declining export of particulate organic carbon (Gaymer et al. 2024).

7. VMEs are known to occur and/or triggering of VME indicator thresholds reported for the area proposed

Across the Salas y Gomez and Nazca Ridges, numerous VME indicator species have been identified such as antipatharians (black corals), stylasterids (hydrocorals), stony corals, anemones, and large hexactinellid sponges (Chavez-Molina et al., 2023; FAO, 2017; Georgian et al., 2021; Gaymer et al., 2025), as listed under SPRFMO CMM-03 Annex 5.

High Occurrence of VMEs: The Salas y Gomez and Nazca Ridges have been identified as hosting numerous VMEs due to their topographic and oceanographic features, which support deep-sea coral and sponge communities (Clark et al., 2014).

Coral and Sponge Density: Multiple scientific surveys indicate significant densities of cold-water corals (e.g., *Lophelia pertusa* and *Solenosmilia variabilis*) and large sponge aggregations, both of which are recognized as VME indicators under international guidelines put forward by the FAO, the body responsible for setting the guidelines for the identification and conservation of VMEs (Chavez-Molina et al., 2023; Gaymer et al., 2025).

FAO VME Criteria Met: The area meets several FAO criteria for VMEs, including uniqueness, fragility, and functional significance for ecosystem integrity, reinforcing the need for enhanced management measures (FAO, 2017; FAO, 2009).

Benthic Habitat Mapping: Predictive habitat modeling suggests that a significant portion of the ridges' seafloor is suitable for VMEs, emphasizing the need for precautionary spatial protection measures (Chavez-Molina et al., 2023).

SPRFMO Conservation Considerations: Given the presence of multiple VMEs, the SPRFMO Scientific Committee has recommended enhanced spatial management measures, including fishery closures and habitat protection zones (SPRFMO, 2022). UNGA resolution 64/72 specifically calls on RFMOs to implement appropriate protocols to protect VMEs from significant adverse impacts and implement FAO guidelines for the management of deep sea fisheries in the high seas (Chavez-Molina et al., 2023). Despite international recognition towards the need for protecting the ABNJ of the Salas y Gomez and Nazca Ridges, and its diverse benthic assemblages and endemic species, this global biodiversity hotspot remains unprotected (Gaymer et al. 2025).

8. Cultural Significance

The Salas y Gómez and Nazca ridges are a region with an exceptionally rich and long history of seafaring and cultural significance (Delgado et al., 2022). This region has served as a voyaging highway from indigenous cultures who first ventured to this remote region (~1000 years ago),

	allowing contact between Polynesians and Amerindians, to the European colonial exploration, as well as the rise of the modern global economy that have led to substantial increases in maritime traffic in the area for voyaging, fishing, and transportation of commodities across (Gaymer et al., 2025). 9. Scientific interest Deep-sea explorations from many countries along the Salas y Gómez Ridges have shown that each surveyed seamount supports a distinct community, with little species overlap across different areas of the ridge (Wagner et al., 2021). These findings suggest that protecting only a subset of these seamounts may be insufficient to preserve the full range of biodiversity. Additionally, these surveys have uncovered numerous species previously unknown to science. Over the past decade, following its designation as an Ecologically or Biologically Significant Area (EBSA) under the Convention on Biological Diversity (CBD), scientific interest in the Salas y Gómez and Nazca Ridges has grown significantly. A wealth of research highlights the ecological and cultural importance of this unique marine environment. <u>Biodiversity Hotspot</u>: Identified as a global biodiversity hotspot, the region supports a wide array of marine life, including numerous endemic species, underscoring its importance for conservation and scientific research. A high rate of new species discoveries indicates that the marine fauna of this region still contains a large number of undiscovered species, which represent an enormous opportunity for future scientific exploration and conservation. Due to oceanographic and geological barriers, the region has developed unique evolutionary pathways, giving rise to distinct marine communities with high levels of endemism, making it a natural laboratory for evolutionary studies. <u>Underexplored Habitats</u>: Despite the unprecedented recent efforts in research in the area, including mapping of 32 seamounts and more than 1000 species reported, large portions of the ridges remain underexplored, presenting opportunities for new scientific discoveries and the potential identification of new species.
Fishing Activities, Fishing History, and Planned Fisheries	Description of fisheries operating in (or that have operated and/or plan to operate) the area <u>Historical fishing</u>: There has been historical fishing targeting Jack mackerel, squid, tuna, striped bonito, marlin and swordfish on the Salas y Gómez and Nazca ridges (Gálvez-Larach, 2009; Vega et al., 2009; Morales et al., 2021). Soviet trawling occurred on seamounts of the Nazca and Salas y Gómez ridges for Jack mackerel (<i>Trachurus murphyi</i>) and redbaits (<i>Emmelichthys</i> spp.) in the 1970s and 1980s (Parin et al., 1997; Arana et al., 2009; Clark, 2009). On seamounts of the Nazca ridge and around the Juan Fernández Archipelago, there was a commercial fishery for orange roughy (<i>Hoplostethus atlanticus</i>) and alfonsino (<i>Beryx</i>

splendens) in the 90s, but it was closed in 2006 following decreasing catches (Tingley & Dunn, 2018). On the Nazca Ridge, Chilean and Russian vessels have fished for Chilean jagged lobster (*Projasus bahamondei*) and golden crab (*Chaceon chilensis*) (Parin et al., 1997; Payá et al., 2005; Clark, 2009; Gálvez-Larach, 2009; Vega et al., 2009; Yáñez et al., 2009; Arana, 2014).

Current fishing pressure: Currently, commercial fishing continues to occur in the international waters of this area, especially outside Peruvian national waters of the Nazca Ridge, where vessels from China, Spain, Japan, Taiwan, and the Republic of Korea make over 96% of the fishing effort (Chavez-Molina et al., 2023; McDonald et al., 2024). Recent detailed fishing effort data obtained from the Global Fishing Watch showed that 760 fishing vessels appeared to fish for an annual mean of 292.956 hours between 2019-2023. The most common flag used by fishing vessels in the area during this period belonged to China, with 638 vessels (83% of vessels) and an annual mean effort of 277.959 hours (94% of total effort). Eighty-nine percent of the vessels were squid jiggers (Gaymer et al. 2024).

According to data reported by SPRFMO, squid fishing is low in the Nazca and Salas y Gómez Ridges. In 2008-2015, SPRFMO catch data showed only two vessels fishing in the area, for a cumulative time of 20.5 hrs. (Wagner et al. 2021). Noteworthy, Global Fishing Watch data showed that squid jiggers were considerably more active in this region in 2012-2020 (SC10-Doc30) and higher fishing effort was observed in the Nazca ridge between 2019 and 2023 (Gaymer et al. 2024). Data from SPRFMO showed that between 2011 and 2021 catches within the area barely exceeded 10,000 tons, representing between 0,02% and 3.9% within this timeframe, except for 2016 (18%) and 2019 (14%) in which historical peaks of ~45,000 tons were observed. *D. gigas* is the only relevant fishery in the Nazca ridge, and catches in the high seas of both ridges from 2011 to 2021 corresponded to 4,3% of the total *D. gigas* catches of the high seas SPRFMO fishing zone for those years and 1.4% when considering the whole SPRFMO fishing area (SPRFMO, 2022).

For Jack Mackerel, between 2008 - 2021, catches were only recorded in 2008, 2010, 2020 and 2021, with less than 1,000 tons (SPRFMO, 2020, 2022). In 2022, the SPRFMO granted to the Cook Island a Conservation and Management Measure (CMM) to expand their exploratory potting fishery in the SPRFMO Convention Area to the Northern Seamounts, overlapping with Salas y Gómez ridge. This CMM targeted lobster (*Jasus* spp. and *Projasus* spp.) and crab (*Chaceon* spp.), allowing a combined (lobster and crab) total allowable catch (TAC) that shall not exceed the global TAC of 300 tons per fishing year (CMM 14b-2022). An increase of fishing activity was reported by GFW in 2021 in the waters surrounding the Motu Motiro Hiva Marine Park, associated with an increment of large pelagic fisheries (e.g. tuna and swordfish) (Gaymer et al. 2024).

Other non-fishing related extractive activities	To date, this region has remained free from mining and largely unimpacted by international shipping commerce (Gaymer et al. 2025). <u>Deep Sea Mining:</u> Interest in polymetallic nodules and cobalt-rich ferromanganese crusts in the region poses risks to fragile benthic ecosystems, particularly deep-sea corals and sponge communities (Wedding et al., 2015). While there are currently no mining contracts in this region, and no mining contracts have yet been leased, the potential for future mining is a permanent risk (Toro et al. 2020; Chavez-Molina et al., 2023, Gaymer et al. 2025).
Social, Cultural and Economic impacts	<u>Social and Cultural Impacts:</u> The Salas y Gomez and Nazca Ridges are of cultural significance to polynesian (i.e Rapanui) and american indigenous people. The waters surrounding these ridges hold deep cultural and historical value for the Indigenous Rapanui people, who have long-standing navigational and ecological knowledge of the region (Gaymer et al., 2025). Industrial fishery operations and increased extractive activities could undermine cultural ties between the Rapanui community and this rich ecosystem. <u>Economic Impacts:</u> The Salas y Gómez and Nazca Ridges support migratory species targeted by both commercial and artisanal fisheries, playing a vital role in local and regional economies, particularly in Peru and Chile (Wagner et al., 2021). However, the long-term sustainability of these fisheries is increasingly challenged by the high fishing pressure on key species such as squid. This depletion not only jeopardizes the economic stability of fisheries-dependent economies, like that of Peru, but also reduces fish stocks in areas beyond national jurisdiction (ABNJ), ultimately affecting their connectivity with national waters (Galvez-Larach, 2009). Protecting the Salas y Gómez and Nazca Ridges could enhance ecosystem connectivity, support climate regulation, and strengthen food security. These conservation efforts would provide critical ecosystem services not only for neighboring states like Peru and Chile but also on a global scale (Chavez-Molina et al., 2023).
Other Supporting Information (if applicable)	<u>Regional governance:</u> Human activities in the ABNJ of the Salas y Gómez and Nazca ridges are regulated by different intergovernmental bodies, including the International Seabed Authority (ISA) for mining, the International Maritime Organization (IMO) for shipping, and regional fishery management bodies (RFMOs) for fishing, specifically the Inter-American Tropical Tuna Commission (IATTC) for tuna and other highly-migratory fishery species, and the SPRFMO for non-highly migratory fishery species (Chávez-Molina et al., 2023) <u>Conservation efforts:</u> In recent years, Chile and Peru have created several large-scale protected areas within their jurisdictional waters in the Salas y Gomez and Nazca ridges (Friedlander & Gaymer, 2021, Gaymer et al. 2025). While the recent efforts by Chile and Peru provide important advances to safeguarding the unique biodiversity and cultural resources of this region, most of these ridges (over 73%) fall within ABNJ, are

unprotected and face multiple threats, such as climate change, overfishing, destructive fishing practices, plastic pollution, and potential seabed mining, among others (Wagner et al., 2021; Gaymer et al., 2025).

Similarly, in 2025, Peru submitted a Particularly Sensitive Sea Area (PSSA) proposal under the International Maritime Organization (IMO) for the Reserva Nacional de Nasca (IMO, 2025). These are part of the Nazca Ridge, itself a section of the extensive Salas, Gómez, and Nazca Ridge system that spans over 2,800 kilometers across the central and southern Pacific Ocean, underscoring the importance of connecting protected areas within national waters to those in areas beyond national jurisdiction for effective transboundary marine conservation.

Other distinctions: The Salas y Gómez and Nazca ridges have been recognized as a Hope Spot by Mission Blue given its significance for the global health of the ocean. The islands Salas y Gómez, San Félix and San Ambrosio are all considered IBA by BirdLife International [234] and these places as well as Rapa Nui are considered KBA by the KBA Partnership Program [269]. More recently, within the Salas y Gómez and Nazca ridges one important and two candidate Important Shark and Ray Areas (ISRA and cISRA, respectively) were identified by the International Union for Conservation of Nature (IUCN) Shark Specialist Group (SSG). Salas y Gómez Island was described as a reproductive (nursery) area for the Galapagos shark, given the higher abundance, year-round occurrence and philopatry of neonates, young-of-the-year, and juveniles around the island (Morales-Serrano and Gonzales-Pestana, 2024). Salas & Gómez and Nazca ridges were also identified as cISRA given the occurrence of endemic species (e.g., Juan Fernandez Dogfish *Squalus cf. fernandinus*), threatened species (e.g., shortfin mako *Isurus oxyrinchus*), their potential as aggregation area for pelagic species, and due to their importance as biological corridors to connect distant areas of the Pacific. The waters around Salas y Gómez and Desventuradas islands are both considered critical habitats by the International Finance Corporation's Performance Standard [270]. Likewise, this region has been identified as an important area by experts consulted by the Global Ocean Biodiversity Initiative (GOBI) and the Census of Marine Life on Seamounts (CENSEAM) [271,272].

Article 4 of the SPRFMO Convention states that "conservation and management measures established for the high seas and those adopted for areas under national jurisdiction shall be compatible in order to ensure conservation and management of straddling fishery resources in their entirety". As noted above, following the designation of the Salas y Gomez and Nazca Ridges as an EBSA by the CBD, Chile and Peru have legally protected the area of the ridges that lie within their national waters. These protections allow them to invoke Article 4 to ensure that conservation measures in adjacent high seas areas remain compatible with their national protections. This ensures that protections at the national level are reinforced in adjacent high seas areas (Chavez-Molina et al., 2023). Accordingly, Peru and Chile can request SPRFMO to extend their

	protected areas through fishery management measures, including spatial and temporal closures for fisheries in areas beyond national jurisdiction that border their exclusive economic zones (Chavez-Molina et al., 2023).
Risks to the Proposed Area	<u>Risks from fisheries:</u> The Salas y Gómez and Nazca Ridges form an interconnected ecosystem spanning over 2,900 km, meaning that localized fishing pressures can have far-reaching impacts across the entire ecosystem. Several fishing practices and gears are known for impacting marine ecosystems, particularly seamounts, that are known to be highly vulnerable to disturbances and very slow to recover. Pelagic fisheries disrupt the natural cycle of dead fish sinking to the seafloor, affecting carbon flux transfer from upper water layers (Smith et al., 2009). While most of the fishing activity is concentrated on the Nazca Ridge, targeting pelagic species like jumbo flying squid, the depletion of populations in one area can affect the ecosystem as a whole. Squid, in particular, play a crucial role in the food web, and their overexploitation can disrupt the balance of the ecosystem, impacting predators such as swordfish, sharks, and marine mammals. Additionally, the Salas y Gómez and Nazca Ridges are vital for vertical oceanographic processes, supporting nutrient-rich upwelling that sustains a diverse marine ecosystem, but also biogeochemical processes that supply organic matter to deep habitats (Kiljunen et al., 2020). Disruptions caused by pelagic fisheries can interfere with the vertical migration patterns of species like squid and fishes, but also on transport of sinking organic matter, which are integral to nutrient cycling. Overfishing can reduce the efficiency of nutrient transfer between surface and deeper ocean layers, potentially undermining the health of mesopelagic and rarophotic zones that serve as feeding grounds for commercial fish species. Such disruptions also affect biogeochemical cycles, which are essential for maintaining the long-term resilience of these ecosystems, including their unique biodiversity and high levels of marine endemism. <u>Bycatch and habitat destruction:</u> Industrial fisheries operating near the ridges use purse seine, longlines, bottom trawling and traps, which can result in high bycatch of sharks, sea turtles, seabirds, marine mammals, and non-target deep-sea species (Alfaro-Shigueto et al., 2011; SPRFMO, 2014; Peña-Cutimbo et al., 2024), as well as long-term destruction of habitat-structuring endemic, fragile, and long-lived species, including cold-water corals (Cañete & Häussermann, 2012; Watling & Auster, 2017; Stevens, 2021; Hamilton & Baker, 2019). Similarly, lost fishing gear can become “ghost gear”, continuing to harm marine biodiversity long after fishing operations have ended. <u>Climate Change:</u> The nutrient poor waters of the Nazca Ridge make this region extremely susceptible to climate change and anthropogenic disturbances. Under predicted climate change scenarios, the seafloor will experience an increase in temperature, pH, and dissolved oxygen, making it inhabitable to many endemic species and ultimately threatening the biodiversity and biogeochemistry of the region (Chavez-Molina et al., 2023; Dewitte et al., 2021; Gaymer et al., 2022). Similarly, warming of

	surface and deep sea water can lead to a shift in species distributions, disrupting ecological interactions, and altering primary productivity. Ocean acidification is also particularly threatening to cold water corals and carbonate dependent species, potentially degrading benthic ecosystems across the ridges (Gattuso et al., 2014). <u>Marine Pollution:</u> Due to its proximity to the center of the South Pacific Gyre, where floating litter and debris concentrate, hundreds of species of marine vertebrates including sharks, bony-fishes, turtles, seabirds, and mammals are at risk of entanglement and plastic ingestion (Thiel et al. 2018; Gaymer et al., 2025). <u>Maritime Traffic Risks:</u> Commercial shipping is relatively low (except for the northern section of the Nazca Ridge which intersects with a major international shipping route), but this region has been identified as a potential trans-shipment route for distant water fleets (Chavez-Molina et al., 2023). This could potentially threaten thousands of species via collision, light pollution, noise pollution, and biological invasions (Wagner et al., 2021). Similarly, increasing trans-Pacific shipping routes and fishing vessel activity raise the risk of oil spills, fuel leaks, and ballast water discharge, which could introduce invasive species and pollute sensitive marine habitats (Halpern et al., 2015).
Review Period	Revision of the proposed evaluation criteria should be completed prior to the second online task team meeting. See proposed task team timeline, attached as a separate document.
Outline of Monitoring and/or Research Needed	• Reviewing 2024 fishing activity (zones, fishing effort, catches and countries) in the area. • Reporting the impact of fishing practices in the area. • Monitoring and evaluation plan to assess the ecological and economic benefits of protecting the Salas y Gomez and Nazca Ridges.

Recommendation Summary

Salas y Gomez and Nazca Ridges			
Risks	Objectives	Recommendations	Review
Potential long-term harm to the unique and sensitive deep-sea ecosystems of the Salas y	Promote the establishment of a closure to fishing activities within the Salas y Gomez and Nazca Ridge EBSA in areas beyond national	Support the implementation of a closure to all fishing activities within the Salas y Gomez and Nazca Ridge EBSA to prevent ecosystem degradation.	Conduct periodic scientific reviews through the SPRFMO Scientific Committee and independent

Gomez and Nazca Ridge due to high seas fishing activities.	jurisdiction		marine science bodies
Gaps in comprehensive legal protection for the Salas y Gomez and Nazca Ridge ecosystems under the current SPRFMO framework.	Advance legal protections that encompass the full trophic web, including seamounts, deep-sea corals, pelagic species, and associated biodiversity.	Promote coordinated conservation measures through collaboration among intergovernmental bodies such as SPRFMO, the Convention on Biological Diversity (CBD), and other relevant international organizations and RFMOs.	Strengthen monitoring and compliance through enhanced use of VMS and regional observer programs to support transparency and effective management.
Rising interest in exploratory fishing	Ensure alignment with the precautionary and ecosystem-based approach to fisheries management as outlined in the SPRFMO Convention.	Do not advance new exploratory fishing proposals in the region, unless cautious preliminary measures in strict observance of the standards set in the SPRFMO Convention (article 22) have been adopted, given the potential for irreversible harm to its unique and fragile ecosystems.	Revise and update conservation measures using adaptive management principles, incorporating the best available science and stakeholder engagement.
Ongoing decline in biodiversity and the loss of essential ecosystem services that are vital to global ocean health.	Strengthen integrated and sustainable ocean governance by aligning SPRFMO initiatives with those of relevant national, regional, and international frameworks.	Enhance connectivity between high seas conservation initiatives and national marine protected areas in Chile and Peru to support coherent regional policy development.	Report progress annually to relevant international bodies (CBD, UNGA, SPRFMO, and BBNJ Implementation Body)

*These recommendations and evaluation criteria provide a comprehensive synthesis of Chile's efforts, as outlined in the SPRFMO fishery closure proposal (Appendix II) and the Terms of Reference for the Salas y Gómez and Nazca Ridges Task Team (Appendix III).

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12TH MEETING OF THE SPRFMO COMMISSION

Manta, Ecuador, 29 January to 2 February 2024

COMM 12 – Prop 20

PROPOSAL TO:

☐ Amend ☒ Create	CMM XX-2024 to protect the Salas y Gomez and Nazca ridges area	
Submitted by: Chile		
Summary of the proposal: The proposed CMM aims to protect the Salas y Gómez and Nazca Ridges ecosystem in the southeastern portion of the Convention Area through a fishing closure. Considering that the proposed area is home to a unique and vulnerable ecosystem, whose preservation is critical for the sustainability of several fisheries resources, this measure is designed to restrict fishing activities in these areas by integrating a precautionary and ecosystem-based approach, in order to reduce the impacts of fishing and climate change on this crucial ecosystem, contributing to the long-term resilience and productivity of the South Pacific.		
Objective of the proposal: The objective of this CMM is, through the application of the precautionary approach and ecosystem approach to fisheries management, to adequately safeguard the fragile, vulnerable and ecologically relevant ecosystems of the Salas y Gómez and Nazca Ridges in the southeastern portion of the Convention Area from the impacts of fishing and climate change, protect crucial nursery habitats for fishery resources thereby ensuring the viability and growth of their populations, and enhance the long-term resilience of the South Pacific to anthropogenic threats.		
Has the proposal financial impacts or influence on the Secretariat work?		☒ Yes ☐ No
Ref: COMM12-PROP20	Received on: 10 December 2023	

The Commission of the South Pacific Regional Fisheries Management Organisation;

RECALLING the mandate to apply the precautionary approach and an ecosystem approach to fisheries management according to Article 3 of the Convention to ensure long-term conservation of fishery resources and safeguard the marine ecosystem where they occur;

RECALLING the need, as set out in Article 4 of the Convention, to ensure compatibility of Conservation and Management Measures established for the high seas and those adopted for areas under national jurisdiction, and the duty of Contracting Parties to cooperate to this end;

RECOGNISING that, under Articles 8 and 20 of the Convention, a primary function of the Commission is to adopt conservation and management measures to achieve the objective of the Convention, including, as appropriate, the general or specific locations and the periods in which fishing may or may not take place, and to protect the habitats and marine ecosystems in which fishery resources and non-target and associated or dependent species occur from the impacts of fishing, including measures to prevent significant adverse impacts on vulnerable marine ecosystems;

RECOGNISING the Salas y Gómez and Nazca Ridges are global biodiversity hotspots, with one of the highest levels of marine biological endemism in the world, that connects people and marine wildlife from across the Pacific Ocean, and that its more than 110 seamounts host an exceptionally high diversity of unique, fragile and often endemic organisms, including many indicator species for Vulnerable Marine Ecosystems;

ACKNOWLEDGING the existing scientific evidence demonstrating the ridges' unique ecological value with at least 93 threatened or endangered species and their importance as a complex migratory corridor, refuge, feeding and nursery ground for protected and commercially relevant species, including a nursery zone for Chilean jack mackerel.

RECALLING decision XII/22 of 17 October 2014, adopted by the Conference of the Parties to the Convention on Biological Diversity, recognised the Salas y Gómez and Nazca Ridges as an ecologically or biologically significant marine area (EBSA), and that decision was communicated and received by SPRFMO and presented at the Third Scientific Committee Meeting held in Port Vila (Vanuatu) in 2015;

ACKNOWLEDGING that marine ecosystems of the Salas y Gómez and Nazca Ridges face multiple threats, including climate change, harmful fishing practices and potential fisheries overexploitation, and deep seabed mining;

NOTING that Decision 13-2023 on Climate Change calls for the Commission to develop a comprehensive approach to understanding and addressing the impacts of climate change on fishery resources in the Convention Area;



RECOGNISING that one of the most effective approaches to address climate change issues in fisheries management and biodiversity conservation is through nature-based solutions, including protecting and restoring marine ecosystems, increase resilience to other threats, and strengthen adaptation, such as the Salas y Gómez and Nazca Ridges;

WELCOMING the recent adoption, on 19 June 2023, of the Agreement under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction (BBNJ) and its early signature by several members of the SPRFMO Commission;

NOTING that the BBNJ Agreement gives a mandate to its future Conference of the Parties to take decisions on the establishment of area-based management tools, including marine protected areas and related measures and to promote and strengthen cooperation, including with relevant frameworks and global, regional, subregional and sectoral bodies in the achievement of the objective of such an Agreement.

NOTING that Target 3 of the Kunming-Montreal Global Biodiversity Framework (GBF) under the Convention on Biological Diversity calls for the protection of at least 30% of marine and coastal areas by 2030 and that most SPRFMO member states, as parties to the Convention on Biological Diversity, have endorsed this commitment.

ACKNOWLEDGING the value of proactively adopting measures to protect the marine ecosystems, migratory corridors and nursery habitats of the Salas y Gómez and Nazca Ridges for the long-term health and resilience of fish stocks and biodiversity in the region, which may support the establishment of future area-based management tools in the Southeast Pacific;

NOTING that the SPRFMO Scientific Committee (11th Meeting Report) raised concerns over the stock status of lobsters (*Jasus caveorum*) in an area with similar characteristics to the Salas y Gómez and Nazca Ridges, such as high biodiversity value and vulnerability, and that preliminary assessments suggest that fishing mortality is estimated to be high and that the resource biomass has declined substantially (paragraph 223 and 227).

AFFIRMING its commitment to ensuring the long-term conservation and sustainable use of fishery resources in the South Pacific and to safeguarding the marine ecosystems in the SPRFMO Convention Area where they occur;

ADOPTS the following CMM in accordance with Articles 8 and 20 of the Convention:



Definitions

For the purpose of this CMM, the Salas y Gómez and Nazca Ridges are defined as the high seas areas of the underwater ridges depicted in Fig. 1, extending within the following coordinates:

- Salas y Gómez Ridge: between 23°42' S and 29°12' S, and between 111°30' W and 86°30' W.
- Nazca Ridge: between 15°00' S and 26°09' S, and between 86°30' W and 76°06' W.



Figure 1. Area of the proposed measurement in the Salas y Gomez and Nazca ridges, the adjacent exclusive economic zones (EEZ) and the whole EBSA region in the South Pacific.

A more detailed map and significant coordinates of the proposed CMM area is provided in Annex 2.

Application

This CMM applies to the area defined in this CMM above and within the coordinates so defined.

The Salas y Gómez and Nazca Ridges, as defined in this CMM- above and within the indicated boundaries, shall be closed to fishing. This closure applies to all existing commercial, new and



exploratory fishing concerning the fishery resources under the competence of the Commission, regardless of the types of fishing gear, fishing technology, or fishing practices that may be used.

While this CMM is in force, no Member or CNCP shall authorise vessels flying their flag to engage in any fishing in the Salas y Gómez and Nazca Ridges.

Flag States shall provide the Secretariat entry and exit notifications to the Salas y Gómez and Nazca Ridges and report vessel sightings where applicable, using the reporting template in Annex 1. The Secretariat will prepare a summary report based on these notifications, VMS tracks, and vessel sightings to be presented annually for consideration at the Compliance and Technical Committee and Commission meetings.

The Scientific Committee shall advise the Commission on the conditions and requirements for undertaking specific scientific research in the Salas y Gómez and Nazca Ridges, as provided in Article 25(5) of the Convention, which shall be consistent with their status as ecologically significant areas and biodiversity hotspots, their high marine biological endemism, the extensive presence of seamounts and fragile and often endemic organisms, including many indicator species for Vulnerable Marine Ecosystems, and as nursery ground for protected and commercially relevant species.

Data collection, monitoring and review

The Commission will ensure appropriate data collection, monitoring and review of this CMM.

Scientific research undertaken under the conditions set by the Commission according to this CMM shall support appropriate data collection regarding Salas y Gómez and Nazca Ridges.

Monitoring compliance with this measure may include reports pursuant to this CMM and Annex 1, sighting of vessels operating within the Salas y Gómez and Nazca Ridges, high seas boarding and inspection, observer reports and other suitable means.

Review

This CMM shall enter into force on 30 September 2024.

Once it enters into force, the Commission shall annually assess Members' and CNCPs' compliance with this CMM under the SPRFMO Compliance Monitoring Scheme (CMM 10-2020).

A review of this CMM shall occur seven years after it entered into force. In doing so, the Commission will take appropriate action to meet the objectives of this CMM and the Convention in view of the advice and recommendations of the Scientific Committee.



Annex 1

Notification Template for Vessel Sightings and Entry/Exit of the Salas y Gómez and Nazca Ridges Area

Reporting Vessel Details

Vessel Name:

IMO Number:

Call Sign:

Flag:

Date of notification (YYYY-MON-DD):

Contact details:

Entry Details (if applicable)

Date (YYYY-MON-DD):

Time (UTC, hh:mm):

Latitude:

Longitude:

Exit Details (if applicable)

Date (YYYY-MON-DD):

Time (UTC, hh:mm):

Latitude:

Longitude:

Vessel Sighting Details (if applicable)

Date (YYYY-MON-DD):

Time (UTC, hh:mm):

If possible, additional details of sighting (e.g. Flag, IMO Number, vessel activity):



Annex 2

Map of the area of the proposed measurement

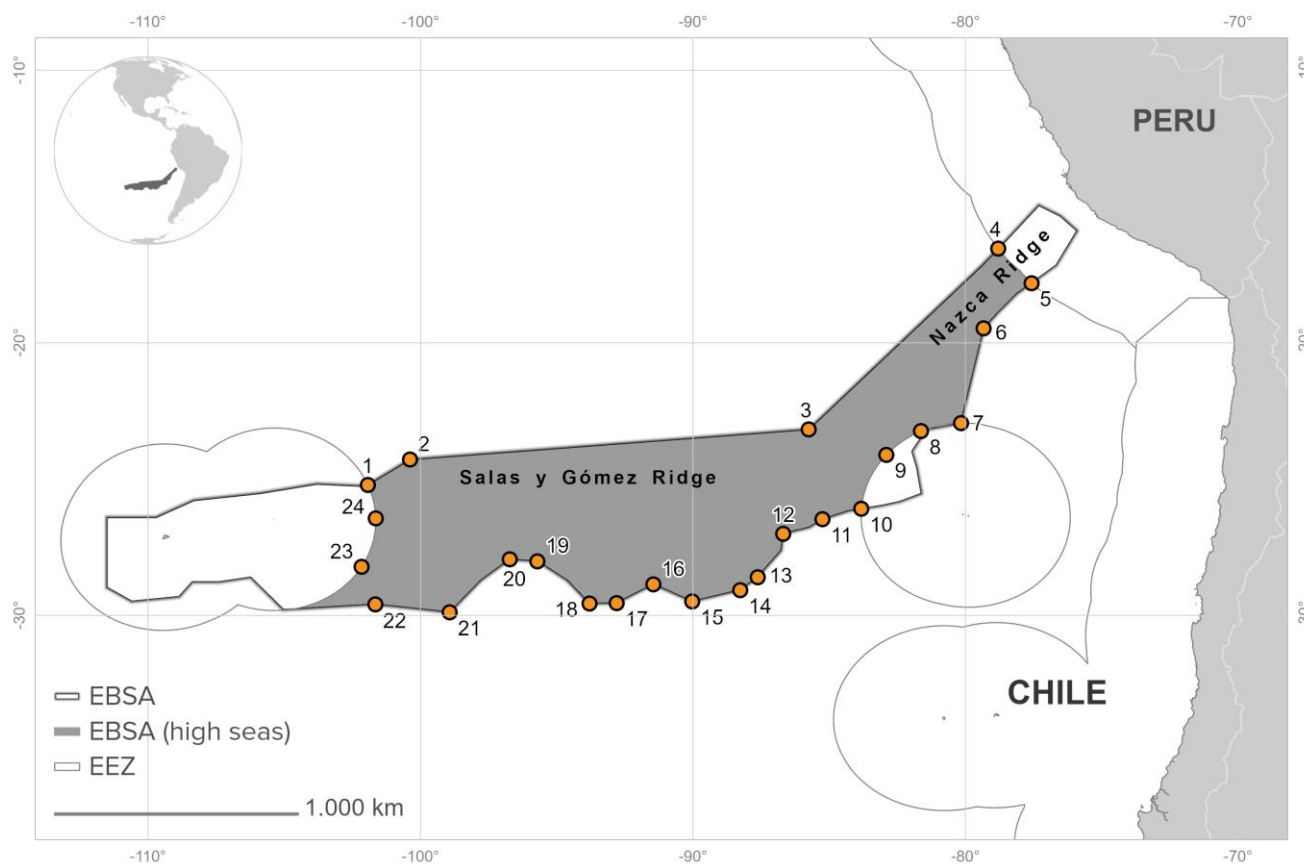




Table of significant coordinates of the area of the proposed measurement depicted in the map.

Point	Latitude	Longitude
1	-25.211512	-101.933915
2	-24.277359	-100.384911
3	-23.171855	-85.748889
4	-16.534979	-78.789679
5	-17.807870	-77.574806
6	-19.471695	-79.326597
7	-22.940783	-80.166460
8	-23.242129	-81.624576
9	-24.104733	-82.896111
10	-26.088117	-83.816938
11	-26.471023	-85.244218
12	-27.001524	-86.687409
13	-28.593028	-87.628621
14	-29.069173	-88.263112
15	-29.484802	-90.027482
16	-28.857328	-91.453560
17	-29.541845	-92.794074
18	-29.570367	-93.792329
19	-28.009486	-95.702721
20	-27.944638	-96.727198
21	-29.884104	-98.923359
22	-29.590651	-101.657308
23	-28.215516	-102.161216
24	-26.434649	-101.642708

12th MEETING OF THE SCIENTIFIC COMMITTEE

30 September to 05 October 2024, Lima, Peru

SC12 - Doc 36

Salas y Gómez and Nazca ridges: the need for protection, with a minimum
impact on fisheries

Chile

Salas y Gómez and Nazca ridges: the need for protection, with a minimum impact on fisheries

Gaymer C.F.^{1,2}, Petit I.^{1,3}, Sellanes J.¹, Easton E.^{1,4}, Canales C.⁵, Sanchez N.⁵, Tapia-Guerra J.¹, Paredes F.^{2,3}, Rodriguez H.²

¹ Center for Ecology and Sustainable Management of Oceanic Islands (ESMOI), Departamento de Biología Marina, Facultad de Ciencias del Mar, Universidad Católica del Norte, Chile

² Coral Reefs of the High Seas Coalition

³ Oceana Chile, Santiago, Chile

⁴ School of Earth, Environmental, and Marine Sciences, University of Texas Rio Grande Valley, Brownsville, TX, USA

⁵ Escuela de Ciencias del Mar, Pontificia Universidad Católica de Valparaíso, Chile

The present manuscript aims to contribute to the “COMM 12 - Decision 17-2024 to protect the Salas y Gomez and Nazca ridges area”, that tasks the Scientific Committee to compile and review all relevant scientific information and data about the Salas y Gómez and Nazca ridges and recommend possible management measures to the Commission on its following regular meeting, based on an ecosystem-based approach that aims at preserving its biodiversity and SPRFMO fishing resources. Further, this paper is a key document contributing to the 2024 Scientific Committee Multiannual Workplan.

Abstract

- Salas y Gómez and Nazca ridges are a biodiversity hotspot of over 110 seamounts, each one with a unique faunal composition and community structure, and with the highest levels of endemism known for any marine ecosystem in the planet. Due to these features, both ridges were declared “Ecologically or Biologically Significant Marine Area (EBSA)” by the Convention on Biological Diversity (CBD) in 2014.
- Marine ecosystems of the EBSA face multiple threats such as climate change, overfishing and destructive fishing practices (e.g., bottom trawling), marine debris, potential seabed mining, shipping, among others. However, only a small proportion of the Salas y Gómez and Nazca ridges is protected in the jurisdictional waters of Chile and Peru.
- There is sufficient scientific evidence for protecting the entire EBSA. There are more than 60 years of scientific expeditions, and a huge amount of research has accumulated over the last five years in a strong international collaborative effort to explore both ridges.

Considering all the different scientific efforts we estimate that ~80% of the ridges has been explored so far.

- The Nazca and Salas y Gómez EBSA represent only ~1,9% of the entire SPRFMO area. Most of the fishing in this area is primarily concentrated on ABNJ in Nazca ridge in front of Peruvian jurisdictional waters.
- Between 2019 and 2023 fishing effort in the EBSA remained low with an annual mean of only ~292.956 hours of effort observed from 760 vessels. Among them, 83% belonged to China, and 89% were squid jiggers.
- The main fisheries operating in the EBSA were the giant squid (*Dosidicus gigas*), tuna (*Katsuwonus pelamis*, *Thunnus obesus*, and *Thunnus albacares*), and the swordfish (*Xiphias gladius*), being only *D. gigas* relevant in the Nazca ridge.
- A spatial analysis of *Dosidicus gigas* catches between 2011 and 2021 reported that catches within the EBSA represented only ~1,4% of the total SPRFMO area catches.
- There is almost no fishing of jack mackerel (*Trachurus murphyi*) in the EBSA.
- Considering an eventual fishing closure in the EBSA, a modeling study shows that fishing effort after 2 years would significantly decrease in the region and would increase in the south-east of the proposed closure area.
- The water column and benthos are integrated systems linked through several biophysical and ecological processes. Disrupting these processes could have major impacts in benthic and pelagic communities, particularly in ultraoligotrophic waters like Salas y Gómez ridge.

An Ecologically or Biologically Significant Marine Area

Salas y Gómez and Nazca ridges are two seamount chains that comprise more than 110 seamounts across over 2,900 km in the southeastern Pacific. This area is surrounded by the Atacama Trench, the Humboldt current system, and oceanographic extremes like an oxygen minimum zone, which contribute to extreme isolation and the highest levels of marine endemism on Earth (Wagner et al., 2021). Most of both ridges (73%) are located in areas beyond national jurisdiction (ABNJ), with a small northeastern section of the Nazca Ridge located in Peru's jurisdictional waters, meanwhile the Salas y Gómez Ridge stretches across approximately 1,600 km between the Nazca Ridge and Rapa Nui and both ends are located in the Chilean Exclusive Economic Zone (EEZ). The majority of the Salas y Gómez Ridges and the southern portion of the Nazca Ridge are located near the center of the South Pacific Gyre, a large-scale oceanographic feature characterized by ultraoligotrophic waters (Von Dassow & Collado-Fabbri, 2014; González et al., 2019; Gaymer et al., 2022). This paucity of nutrients makes this region particularly susceptible to anthropogenic and climatic disturbances (Andrade et al., 2014). At the same time, this unusual water clarity in this region due to the ultraoligotrophic conditions, permits sunlight to reach deeper depths than in other ocean areas

worldwide, and consequently primary productivity in this region occurs around 200 m in depth, crustose coralline algae can be found down to around 300 m depth, and the deepest light-dependent coral reefs are found (Wagner et al., 2021; Gaymer et al., 2022).

These seamount chains provide relevant ecological stepping stones and a migration corridor for iconic marine fauna, including marine mammals, reptiles, sharks, seabirds and corals, with 93 species endangered, near threatened or vulnerable to extinction (Wagner et al., 2021; Gaymer et al., 2022). In addition, the Nazca ridge and the eastern part of the Salas y Gómez ridge has been pointed as a reproductive and nursery habitat for emblematic pelagic species such as Jack Mackerell (Arcos et al., 2001; Yañez et al., 2004, 2006), sharks (i.e. *Carcharhinus galapagensis*) and swordfish (i.e., *Xiphias gladius*) (Vega et al., 2009; Morales, 2020), thus they have a fundamental role to support fisheries occurring in adjacent waters.

Recent reviews by Wagner et al. (2021) and Gaymer et al. (2024a) and papers presented at SPRFMO SC 8th, 9th and 10th (Wagner et al., 2020; SC9-Doc31; Gaymer et al., 2022), have shown in detail the importance of this area as a biodiversity hotspot, with the highest levels of endemism known for any marine ecosystem in the planet (Friedlander & Gaymer, 2021; Friedlander et al., 2016, 2021; Wagner et al., 2021). Recent papers have also shown the uniqueness of the seamounts, each one with a unique faunal composition, and community structure (Mecho et al., 2019, 2021; Tapia et al., 2021), emphasizing that it is not enough to protect only some of them to protect representative biodiversity.

Due to these features, both ridges were declared “Ecologically or Biologically Significant Marine Area (EBSA)” by the Convention on Biological Diversity (CBD) in 2014, but they have also received several international recognitions, such as a Hope Spot by Mission Blue, Important Bird Areas (IBAs), as well as Key Biodiversity Areas (KBAs) (Wagner et al., 2021). Most recently, the waters around Salas y Gómez Island were identified as an Important Shark and Ray Area (ISRA), and Rapa Nui and the entire Salas y Gómez and Nazca ridges were classified as a candidate Important Shark and Ray Area (ISRAc) by IUCN given the probable occurrence of endemic species and its function as a marine corridor for migratory species (IUCN SSC Shark Specialist Group).

Cultural importance

The broader region that contains the Salas y Gómez and Nazca ridges represents the easternmost extent of the Polynesian Triangle, a region with an exceptionally rich and long history of seafaring cultures (Metraux, 1940; Anderson, 2008; Ioannidis et al., 2020; Delgado et al., 2022). Further, the human history of the waters surrounding the Salas y Gómez and Nazca ridges is rich and culturally diverse. This ranges from indigenous cultures who first ventured to this remote region close to a thousand years ago to the period of European colonial exploration, as well as the rise of the modern global economy. Voyaging, fishing, and the transportation of commodities across these remote waters left signs of the human history of exploration and exploitation (Delgado et al., 2022).

Recent evidence suggests that Polynesian voyagers traveled along the Salas y Gómez and Nazca ridges to the South American Continent long before European contact (Ioannidis et al.,

2020; Delgado et al., 2022). Wilmé et al. (2016) hypothesized that the early Austronesians used the migration routes of sea turtles to move across the Southern Pacific Ocean, suggesting the importance of these species for the Pacific communities.

Conservation efforts

As a result of the exceptional natural and cultural significance of the region, in recent years, efforts have been made by Chile and Peru to protect the portions of the ridges located in their jurisdictional waters (Paredes et al., 2019; Chávez-Molina, 2023). Several large scale marine protected areas (MPA) created by Chile cover all the waters of the Easter Island and Desventuradas ecoregions (Friedlander & Gaymer, 2021), and a recent MPA created by Peru aims to protect the easternmost portion of the Nazca Ridge, although fishing is still allowed above 1000 m (Decreto Supremo N° 008-2021-MINAM). While the recent efforts by Chile and Peru provide important advances to safeguarding the unique biodiversity and cultural resources of this region, most of these ridges (over 73%) fall within ABNJ, unprotected and facing multiple threats, such as climate change, overfishing, destructive fishing practices (e.g., bottom trawling), plastic pollution, and potential seabed mining, among others (Wagner et al., 2021; Boteler et al., 2023).

Water deeper than 200 m covers approximately 65% of the globe, making it the largest realm on earth, and simultaneously, the largest conservation gap on the planet (Drasen & Sutton, 2017; Jacquemont et al., 2024), thus protection of this vast area is crucial to achieve the 30x30 initiative established by the Global Biodiversity Framework in 2022 (Gaymer et al., 2024a).

Threats

The Salas y Gómez and Nazca ridges are threatened by climate change, overfishing and destructive fishing practices (e.g., bottom trawling), marine debris, potential seabed mining, shipping, among others (Gaymer et al., 2024a).

Climate change impacts on marine diversity of this area are still not fully clear, the nutrient-poor waters, the predicted increase in water temperature and decrease in dissolved oxygen, make the region particularly susceptible to climate change (Dewitte et al., 2021). As such, substantial changes in biochemical cycles and biodiversity, particularly shifts in species geographic distribution and population connectivity are expected (Stramma et al., 2008; Díaz & Rosenberg, 2008). Such changes could be significantly exacerbated by ENSO and other oceanographic features of the region (Conejero et al., 2020; Yañez et al., 2017; Cai et al., 2020).

Models indicate that most of the Salas y Gómez and Nazca ridges region, outside the oxygen minimum zone, will experience a marked deoxygenation trend (Gaymer et al., 2024a). The low availability of nutrients makes this region particularly susceptible to anthropogenic and climatic disturbances particularly for the benthic communities not capable of migrating over long distances. The most recent study on the impact of climate change for Rapa Nui and most of the Salas & Gómez ridge, using observational data from the last 24 years and 33 global models under the present emissions' scenario, showed that the seawater temperature will increase 0.5 °C in the next 10 years and 1°C in the next 40 years (Gaymer et al., 2024b). In

contrast, this area shows a sustained decrease in the dissolved oxygen that is projected to decrease 1,6 mol L⁻¹ by 2034, up to 3,3 mol L⁻¹ in 2064. The latter, added to the global trends in ocean acidification, implies that numerous marine species that are important both ecologically and socio-economically are at risk of changing their distribution by mid-century (Gaymer et al., 2024b). The rudderfish, the amberjack, and the yellowfin tuna have high levels of risk of changing their distribution and decreasing their abundance in the waters of the region. Further, habitat forming species such as macroalgae and coral are also at risk of decreasing their abundances (Gaymer et al., 2024b).

Fishing affects marine ecosystems by removing biomass and key species, but also through practices that can destroy vast habitats and significantly damage non-target populations. The effects are particularly strong in highly vulnerable ecosystems such as seamounts, which are dominated by some of the longest living species on the planet.

There has been historical fishing targeting Jack mackerel, squid, tuna, striped bonito, marlin and swordfish on the Salas y Gómez and Nazca ridges (Gálvez-Larach, 2009; Vega et al., 2009; Morales et al., 2021). Soviet trawling occurred on seamounts of the Nazca and Salas y Gómez ridges for Jack mackerel (*Trachurus murphyi*) and redbaits (*Emmelichthys* spp.) in the 1970s and 1980s (Parin et al., 1997; Arana et al., 2009; Clark, 2009). On seamounts of the Nazca ridge and around the Juan Fernández Archipelago, there was a commercial fishery for orange roughy (*Hoplostethus atlanticus*) and alfonsino (*Beryx splendens*) in the 90s, but it was closed in 2006 following decreasing catches (Tingley & Dunn, 2018). On the Nazca Ridge, Chilean and Russian vessels have fished for Chilean jagged lobster (*Projasus bahamondei*) and golden crab (*Chaceon chilensis*) (Parin et al., 1997; Payá et al., 2005; Clark, 2009; Gálvez-Larach, 2009; Vega et al., 2009; Yáñez et al., 2009; Arana, 2014). On the Salas y Gómez Ridge, there has been historic pelagic long-line fishing, which has impacted sharks and other pelagic species (Vega et al., 2009; Gálvez, 2012; Friedlander et al., 2013). However, today most of the fishing in this region targets pelagic species and is primarily focused on ABNJ outside Peruvian national waters of the Nazca Ridge. Catch data on Jack mackerel, squid and orange roughy in this region are available from the South Pacific Regional Fishery Management Organization (SPRFMO), whereas catch data on tuna and swordfish are available from the Inter-American Tropical Tuna Commission (IATTC). Additional fishing effort data in this region are available from Global Fishing Watch.

According to data reported by SPRFMO, squid fishing is also low in the Nazca and Salas y Gómez Ridges. In 2008-2015, SPRFMO catch data showed only two vessels fishing in the area, for a cumulative time of 20.5 hrs. (Wagner et al. 2021). Noteworthy, Global Fishing Watch data showed that squid jiggers were considerably more active in this region in 2012-2020 (SC10-Doc30). Between 2008 and 2021, jack mackerel catches were only recorded in 2008, 2010, 2020 and 2021, with less than 1,000 tons (SPRFMO, 2020, 2022). In 2022, the SPRFMO granted to the Cook Island a Conservation and Management Measure (CMM) to expand their exploratory potting fishery in the SPRFMO Convention Area to the Northern Seamounts, overlapping with Salas y Gómez ridge. This CMM targeted lobster (*Jasus* spp. and *Projasus* spp.) and crab (*Chaceon* spp.), allowing a combined (lobster and crab) total allowable

catch (TAC) that shall not exceed the global TAC of 300 tons per fishing year (CMM 14b-2022).

Marine debris is another relevant threat in the Salas y Gómez and Nazca ridges, particularly for Salas y Gómez, that is located in the center of the South Pacific Gyre, where concentrations of floating litter and marine debris are high, as they are concentrated and trapped by the surface currents of this gyre (Luna-Jorquera et al., 2019; Van Gennip et al., 2019; Wagner et al., 2021). Floating marine debris in this region mostly consists of microplastics and medium-sized plastic fragments, lines, buoys, plastic trays, plastic bags and nets (Thiel et al., 2018; Luna-Jorquera et al., 2019).

These floating pollutants primarily originate from sources on the continental coasts, including cities, beach goers, aquaculture, and fisheries (Thiel et al., 2018). Also, small fishing villages and the large artisanal fishing fleet from the Chilean and Peruvian coast contribute high loads of marine litter (Ortiz-Álvarez et al., 2022). As the transport of the floating litter from continental sources to the center of the gyre may take several years, most of it breaks down to microplastic fragments, which by far dominate the litter items found around Rapa Nui and Salas y Gomez Islands (Eriksen et al., 2013; Hidalgo-Ruz & Thiel, 2013; Ory et al., 2017; Gallardo et al., 2021). This litter affects more than 100 species of marine vertebrates, particularly sharks, fishes, turtles, birds and mammals, through entanglement and ingestion (Thiel et al., 2018). Also, incorporation of litter collected at sea into seabird nests is commonly observed and reported (Miranda Urbina et al., 2015; Garcia-Cegarra et al., 2020; Hidalgo-Ruz et al., 2021). Microplastics are ingested by a wide range of fishes (Ory et al., 2017; Chagnon et al., 2018) and also higher-level consumers (Perez-Venegas et al., 2020; Santillan et al., 2020). Microplastics are often concentrated in small- and mesoscale oceanographic features, such as local fronts (with visual slicks), which has been observed around Rapa Nui, where also zooplankton and fish larvae are often aggregated in these fronts (Gallardo et al., 2021).

Seabed mining is probably one of the greatest threats for deep offshore ecosystems. This activity will not only irreparably damage extremely fragile and slow-growing benthic communities (e.g., coral and sponges) that provide critical habitat for pelagic and benthic species, mainly by drilling the sea floor and lowering the water column quality due to the sediment plume produced (Watling & Auster, 2017; Spearman et al., 2020; Leduc et al., 2024), but also contributes to a dramatic greenhouse acceleration process for example through the exploitation of gasses 84 times more potent than CO² (Villar-Muñoz et al., 2024). Particularly, seamounts on the Salas y Gómez and Nazca ridges are known to possess cobalt-rich ferromanganese crusts on its edifice, with contents of Cu+Ni up to 0.3 %, and commercially-valuable manganese nodules are known to exist on both sides of the Nazca Ridge, which could have important concentrations of Cu and Ni (up to 1.38 % Cu+Ni) and Co (mean values up to 0.53 %) (Hein et al., 2013; Miller et al., 2018; García et al., 2020; Toro et al., 2020). Polymetallic massive sulfides are known from hydrothermal vents located to the west of the Salas y Gómez Ridge on the East Pacific Rise (EPR) (García et al., 2020), that that could have similar compositions to those samples obtained further north over the EPR: 35.8% Fe, 9.1 % Zn, 6.8 % Cu, 45.5 % S, 1.2 % SiO² (Backer et al., 1985). While there are currently no contracts

to explore or prospect deep-sea minerals in this region (Miller et al., 2018; ISA, 2024), these resources may attract mining interests in the future.

Commercial shipping is relatively low throughout the waters of this region, with the exception of the northern section of the Nazca ridge which intersects a major international shipping route connecting ports along the west coast of South America, but also waters surrounding the Salas y Gómez and Nazca ridges have been identified as a major global transshipment location for distant-water fishing fleets (Boerder et al., 2018; Miller et al., 2018; Wagner et al., 2021). The latter may have several implications for threatened fauna such as sea turtles, sea birds and whales that could be affected by collisions and light pollution (Rodríguez et al., 2017; García-Cegarra & Pacheco, 2019; Bedriñana-Romano et al., 2021).

Shipping could also be a risk of non-indigenous species introductions in the ridges, especially in the shallow seamounts, both through hull fouling or the transport of propagules in the ballast water (MacIsaac et al., 2016; Castellanos-Galindo et al., 2022).

History of science and recent findings

Research efforts targeted to these ridges started in the XIX century with the expedition by the Covadonga vessel (Vidal-Gormaz, 1875), however deeper most recent marine-focused research started 66 year ago by a US expedition to Desventuradas Islands, and was followed by several soviet trawling expeditions between 1973 and 1980 (Mironov & Detinova, 1990; Parin, 1991), National Geographic-OCEANA expeditions to Salas y Gómez, Rapa Nui and Desventuradas between 2010 and 2013 (National Geographic-OCEANA 2011, 2013, Friedlander et al. 2013, 2016), several CIMAR cruises by the Chilean Oceanographic Committee from 1999 to 2023 (CONA 2021), a JAMSTEC expedition in 2019 (Mecho et al., 2021), and 3 expeditions to both ridges by the Schmidt Ocean Institute in 2024 (Easton et al. 2024; Sellanes et al. 2024).

A huge amount of research has accumulated over the last five years in a strong international collaborative effort to explore both ridges, understand the processes that explain the observed biodiversity patterns and the major threats faced (Thiel et al., 2018; Wagner et al., 2021; Boteler et al., 2023; Delgado et al., 2022; Gaymer et al., 2024a). As mentioned above, the most recent scientific efforts deployed in the area corresponded to 3 international expeditions ran by the Schmidt Ocean Institute in January 2024 to Nazca ridge, February-March 2024 to Salas y Gómez ridge and July-August 2024 to Nazca ridge, in an unprecedented scientific effort that allowed filling gaps of knowledge in an area that has increasingly been studied in recent years. These expeditions are part of the activities coordinated by Chile of the 2024 Scientific Committee Multi Annual Workplan. The expeditions showed healthy seamount ecosystems (Fig. 1), generated the bathymetry of 32 seamounts, reported over 1019 species, 170 potential new species and 420 new reports for both ridges (Fig. 2). However, they also showed evidence of fishing impact, with vast areas destroyed by trawling, discarded fishing gear, and also evidence of marine litter (Fig. 3). These expeditions have emphasized the uniqueness of each seamount and this, added to the numerous threats they face, emphasize the need for protecting the area of these ridges that is in ABNJ. As a result of these recent research expeditions and

considering all the different scientific efforts we estimate that ~80% of the ridges has been explored so far.



Figure 1. Healthy seamount ecosystems in the Salas y Gómez and Nazca ridges. Credits: Schmidt Ocean Institute.



Figure 2. Some new species found by Falkor (too) expeditions to Salas y Gómez and Nazca ridges. Credits: Schmidt Ocean Institute.



Figure 3. Discarded fishing gear and marine litter found by Falkor (too) expeditions to Salas y Gómez and Nazca ridges. Credits: Schmidt Ocean Institute.

Regional governance

Human activities in the ABNJ of the Salas y Gómez and Nazca ridges are regulated by different intergovernmental bodies, including the International Seabed Authority (ISA) for mining, the International Maritime Organization (IMO) for shipping, and regional fishery management

bodies (RFMO) for fishing, specifically the Inter-American Tropical Tuna Commission (IATTC) for tuna and other highly-migratory fishery species, and the SPRFMO for non-highly migratory fishery species (Fig. 4) (Wagner et al., 2021; Chávez-Molina et al., 2023).

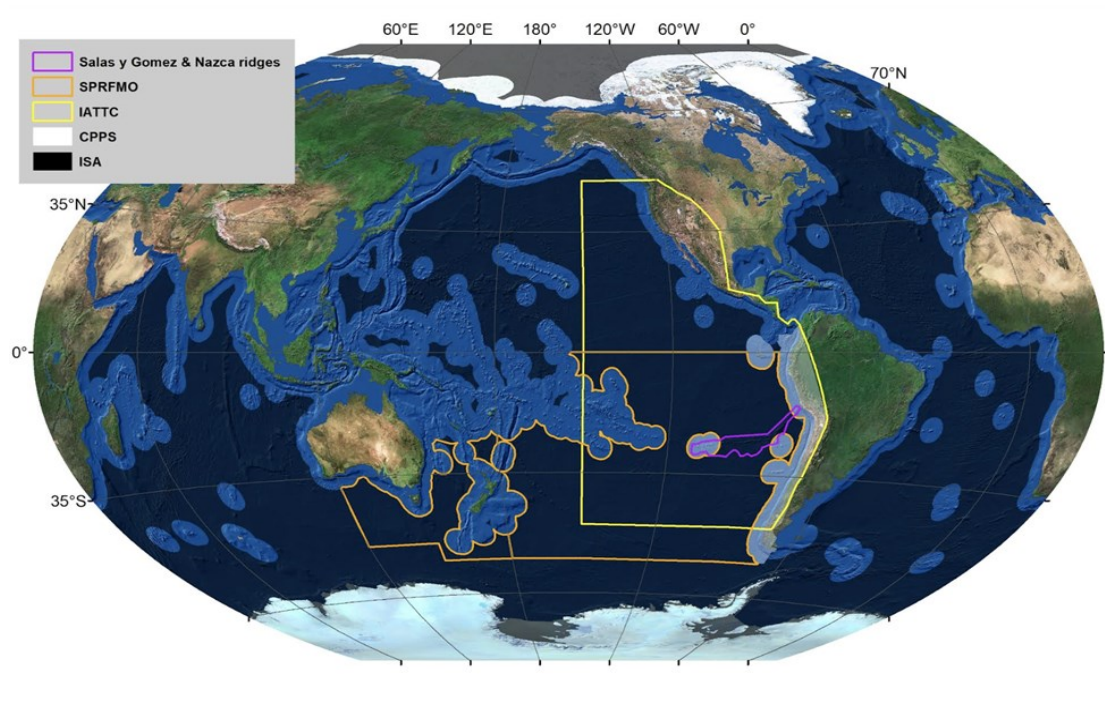


Figure 4. Map showing jurisdictional boundaries of intergovernmental bodies regulating human activities in the area of the Salas y Gómez and Nazca Ridges. (Figure taken from Chavez-Molina et al., 2023)

Environmental impacts of fishing

Several fishing practices and gears are known for impacting marine ecosystems, particularly seamounts, that are known to be highly vulnerable to disturbances and very slow to recover. Trawling destroys habitats that are normally composed of habitat-structuring (fundamental for demersal species reproduction and refuge [Fig. 5]), endemic, fragile, and long-lived species of both commercial and non-commercial interest (Cañete & Häussermann, 2012; Watling & Auster, 2017; Stevens, 2020). This process results in a significant decrease in species richness, cover, and abundance, leading to a reduction or complete loss of habitat complexity (e.g., three-dimensionality, functional role redundancy) and species functional roles (Clark et al., 2016; Watling & Auster, 2017; Hiddink et al., 2020). Furthermore, large demersal fish schools' removal has a significant ecological impact in trophic interactions, for example, by reducing predation pressure and modifying competitive interactions (OCEANA, 2015; Griffiths et al., 2017; Petit et al., 2021).

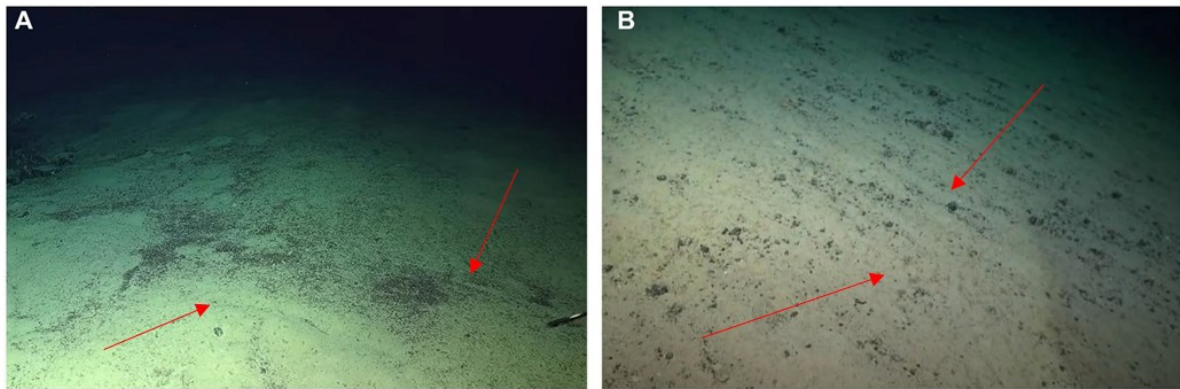


Figure 5. Bottom trawling fishing paths on Nazca ridge recorded by Falkor (too) expedition in 2024. Red arrows show trawling paths. Credits: Schmidt Ocean Institute.

Another fishing technique employed in the Salas y Gómez and Nazca ridges is trap fishing, which is commonly used for catching crustaceans. In the case of the Nazca ridge, the jagged lobster (*Projasus bahamondei*) is a relevant target for international fleets (Arana, 2014). Trap fishing affects ecosystems in different ways, for example the use of multiple traps connected by lines dragging the seafloor destroying vast areas of habitat forming species such as corals and sponges (Stevens, 2020). The loss of traps also damages the seafloor, this is particularly harmful when the lost fishing gear is moved by currents or storms, significantly increasing its negative impact in space and time (Stevens, 2020). Finally, multiple vertical trap lines might cause pelagic fauna entanglement and death (e.g. marine mammals) (Hamilton & Baker, 2019).

In addition to benthic fishing, pelagic fisheries disrupt the natural cycle of dead fish sinking to the seafloor, affecting carbon flux transfer from upper water layers. This reduction in available carbon is critical for the stability and sustenance of deep-sea ecosystems that depend on organic matter (Smith et al., 2009). Moreover, by-catch is a significant threat for various non-target species such as marine reptiles, sea birds, sharks, and marine mammals (Alfaro-Shigueto et al., 2011). In the case of the SPRFMO area, the main fishing gear used for *Trachurus murphyi* fishing is purse seine and midwater trawling, and its bycatch is composed by another pelagic species like *Scomber japonicus*, *Macruronus magellanicus*, *Thyrsites atun*, among others, as well as megafauna like dolphins, seabirds and rays as the most reported non-target catches from small scale fisheries (SPRFMO, 2014; Peña-Cutimbo et al., 2024). Meanwhile, the swordfish and tuna fisheries (purse seine and long line) in the proposed area have a permanent presence of sharks (i.e., *Sphyrna lewini*, *Sphyrna zygaena*, *Prionace glauca*, *Carcharhinus falciformis*, among others), birds (i.e., *Pterodroma externa*, *Nesofregetta fuliginosa*, *Phoebastria irrorata*, among others) and turtles (i.e. *Chelonia mydas*, *Dermochelys coriacea*, *Eretmochelys imbricata*, among others) as non-target catches (Fig. 6).

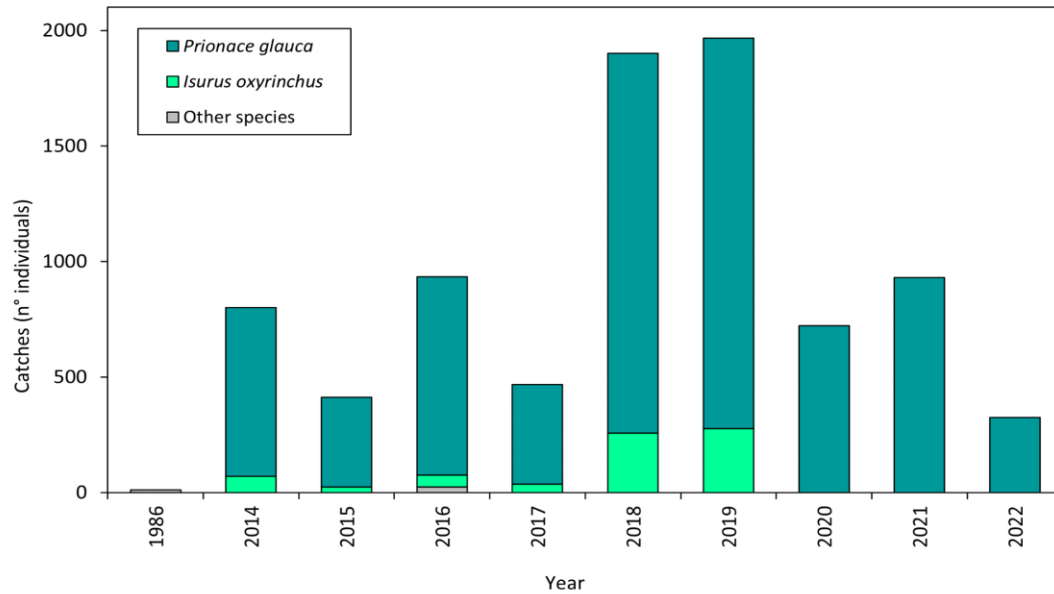


Figure 6. By-catch observed in the Salas y Gómez and Nazca ridges between 1986 and 2022 showing the major non-target species were the blue (*Prionace glauca*) and mako (*Isurus oxyrinchus*) sharks. Data source Inter-American Tropical Tuna Commission (IATTC).

Benthos and pelagos are integrated systems

The water column is considered less at risk due to the absence of fixed habitat structures that fishing gear might damage, leading to arguments that water column protection may be unnecessary given the mobility of its inhabitants (O’leary & Callum, 2018). Nevertheless, from an ecological viewpoint, the precautionary approach is essential for safeguarding the interconnected habitats of the water column and benthos, as there are no boundaries between these realms and several biogeochemical processes are proof for these habitats-interdependence (Fig. 7).

Deep habitats fundamentally differ from shallow waters in their lack of primary productivity, relying instead on the passive sinking flux of detritus or the active vertical migration of pelagic fauna (Smith et al., 2009; Kiljunen et al., 2020). A significant portion of pelagic energy settles onto the seabed as fecal material and decomposing organisms, thus providing energy to the benthic community, while this organic matter is later recycled back into the water column as nutrients, thereby promoting biomass production (Nixon, 1981; Woodland & Secor, 2013). At the same time, the vertical energy flux is also driven by active processes such as the daily vertical migration of pelagic organisms and trophic interactions, such as predation (Griffiths et al., 2017; O’leary & Callum, 2018). In this regard, most demersal fishes feed mainly on pelagic micronekton directly linking pelagic and bathyal communities, emphasizing their dependence on water quality and nutrient availability, which ultimately dictates their prey abundance (Drasen & Sutton, 2017).

One of the most iconic indications of pelagic-benthic coupling is the vertical and horizontal transport of dissolved organic carbon (DOC) (Roshan & Devries, 2017). DOC is a critical

component of marine food webs and represents one of the largest reservoirs of organic matter on Earth (Roshan & Devries, 2017; Lønborg et al., 2020). This biogeochemical process is especially important in oligotrophic subtropical regions of the ocean, such as the Salas y Gómez Ridge, where DOC would account for nearly half of the total organic carbon export, being subsidized by distant and productive waters through wind and currents (Roshan & Devries, 2017; Hansell & Orellana, 2021), enriching, as a consequence, the intermediate and deep waters with bioavailable carbon (Carlson et al., 2010; Lønborg et al., 2020; Iversen, 2023).

Interfering with the physical and biological processes of transporting organic matter, for example, by removing target species large biomasses (i.e., top predators and other abundant pelagic species) from the water column, directly reduces the amount of organic matter sinking to the seafloor disrupting in this way the stability of deep-sea ecosystems and the ecological services that underwater ridges provide, extremely relevant in low productive waters like Salas y Gómez ridge.

The fishing pressure across the Salas y Gómez and Nazca ridges has been historically low (annual mean fishing effort of ~200 hrs.) (Wagner et al., 2021). Because of that, recent expeditions have shown that the explored seamounts along the Salas y Gómez ridge and a great part of the Nazca ridge have healthy benthic ecosystems composed by a high biodiversity of fragile, community structuring engineers, and endemic species. However, some levels of destruction have been detected in the Nazca portion where fishing pressure is concentrated (Fig. 5). Even though fishing pressure has remained relatively low in the area of interest, the cumulative effect of industrial fishing would have significant effects on the trophic web, ecological interactions, as well as, in the fragile and highly vulnerable benthic ecosystems (Pauly et al., 1998).

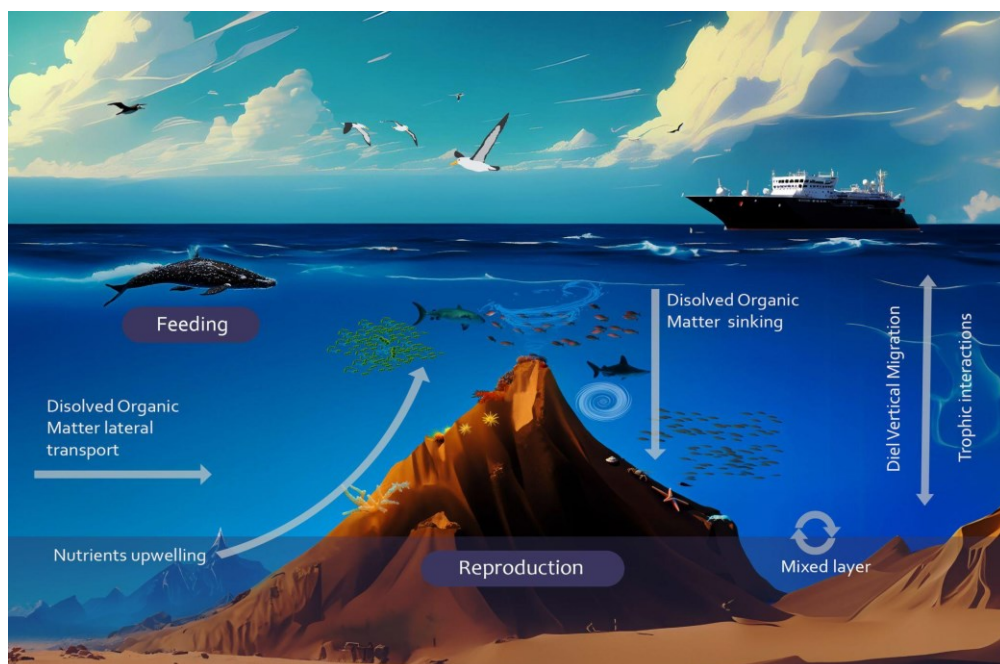


Figure 7. Benthos-pelagos integration in seamounts, illustrating some of the different biogeochemical processes which interconnect the sea floor with the water column.

Implications of a potential fishing closure area for Fisheries

The total area of the SPRFMO is ~64,010,074 km² across the Pacific Ocean. A fishing closure of the ABNJ of both ridges encompasses ~1,243,476 km², which represents only ~1.9% of the total SPRFMO area (Fig. 8). Despite its relatively small coverage, implementing a potential fishing closure in this EBSA could significantly contribute to the conservation of marine benthic and highly migratory pelagic biodiversity, to the sustainable management of international fishery resources, and to mitigate climate change (Levin et al., 2023).

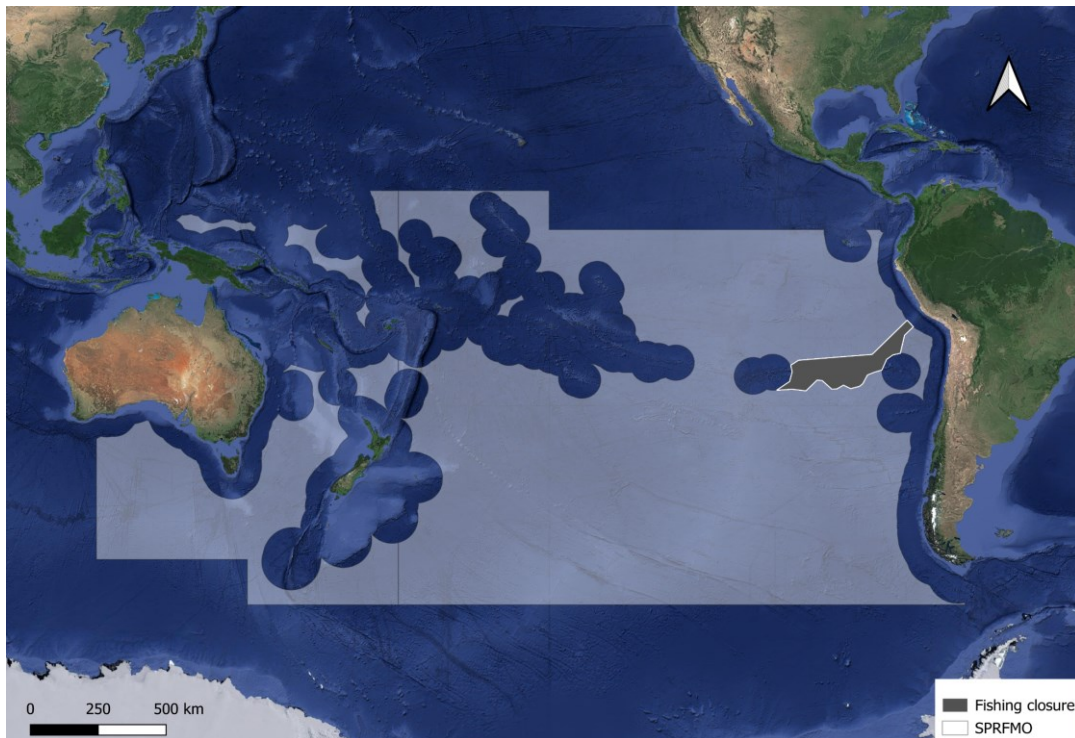


Figure 8. Map showing the entire SPRFMO area (white) and a potential fishing closure (grey) along the Salas y Gómez and Nazca ridges.

The Salas y Gómez ridge occurs in the middle of the South Pacific gyre, known by its ultraoligotrophic conditions (Dai et al., 2023). Consequently, the area has had a historical low commercial interest, which is reflected in the overall low fishing effort found in this area (Wagner et al., 2021; Fig. 9). As a consequence, a potential fishing closure in this region could result in a minimal catch loss relative to the overall catch within the entire SPRFMO area. Even so, fishing is the primary commercial activity in international waters of Salas y Gómez and Nazca ridges, with vessels from China, Spain, Japan, Taiwan, and the Republic of Korea making up over 96% of the fishing effort, most of it concentrated in Nazca ridge, in front of the Peruvian jurisdictional border (Wagner et al., 2021; McDonald et al., 2024).

Recent detailed fishing effort data obtained from the Global Fishing Watch showed that 760 fishing vessels appeared to fish for an annual mean of 292.956 hours between 2019-2023. The

most common flag used by fishing vessels in the area during this period belonged to China, with 638 vessels (83% of vessels) and an annual mean effort of 277.959 hours (94% of total effort). Eighty-nine percent of the vessels were squid jiggers.

As mentioned in the previous section, a higher fishing effort was observed in the Nazca ridge between 2019 and 2023, except in 2021 when the effort increased in the waters surrounding the Motu Motiro Hiva Marine Park probably associated to an increment of the large pelagic fisheries (e.g. tuna and swordfish) (Fig. 9). Fishing effort peaked during Austral spring and summer seasons for the 2019-2023 period.

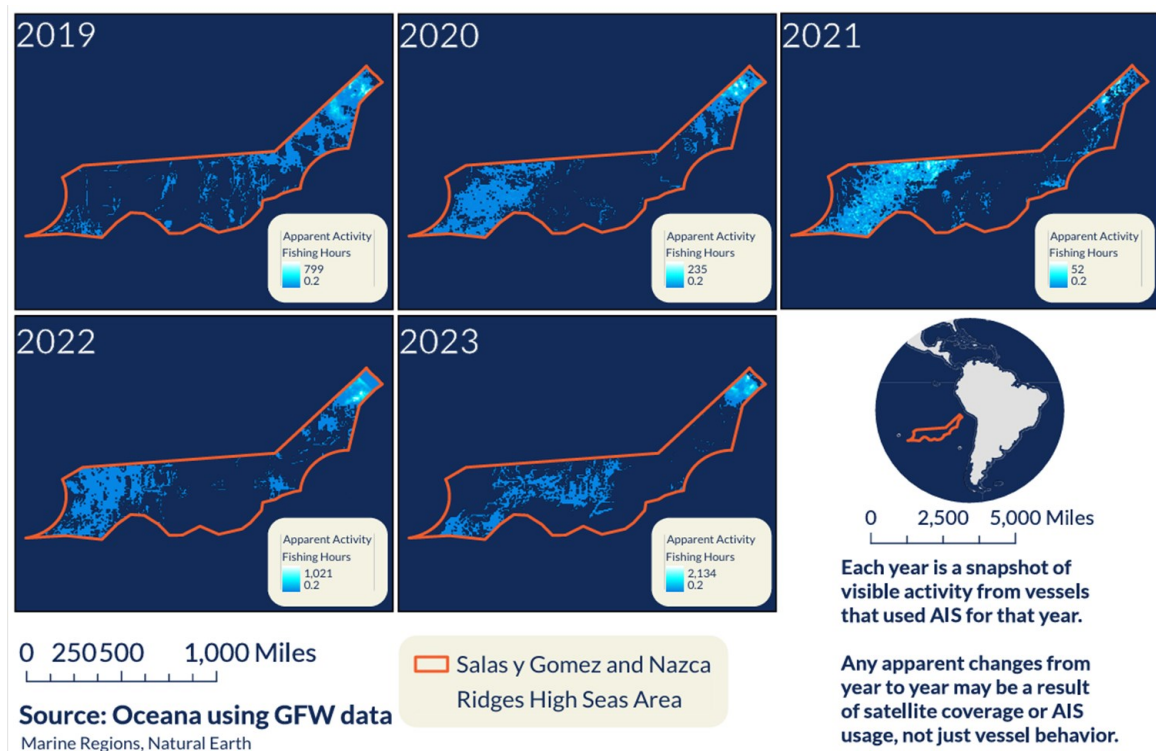


Figure 9. Apparent fishing activity within the potential fishing closure in Salas y Gómez and Nazca ridge from 2019 to 2023. Data obtained from AIS. Credits: Global Fishing Watch.

Similarly, a recent analysis by McDonald et al. (2024) forecasted the impact of global increase on ocean protection under the 30x30 scenario agreed under Target 3 of CBD's Kunming-Montreal Global Biodiversity Framework, on global patterns of fishing effort, through building a predictive machine learning model trained on a global dataset of satellite-based fishing vessel monitoring data (Global Fishing Watch from 2016 to 2021), current MPA locations, and spatiotemporal environmental, geographic, political, and economic features.

Particularly, for the Salas y Gómez and Nazca ridges proposed by Chile to close fishing activities, the study showed that in 2020 2.9% of fishing effort occurred within the proposed MPA, and 89.8% of the fishing effort occurred outside the proposed closure area. Most effort in the region is concentrated north-east of the proposed closure area, on the high seas near the Peruvian jurisdictional waters (Fig. 10). Considering an eventual closure, fishing effort would

significantly decrease in the region, particularly on the high seas near the Peruvian jurisdictional waters. Furthermore, the fishing effort after 2 years would increase in the south-east of the proposed closure area (Fig. 11).

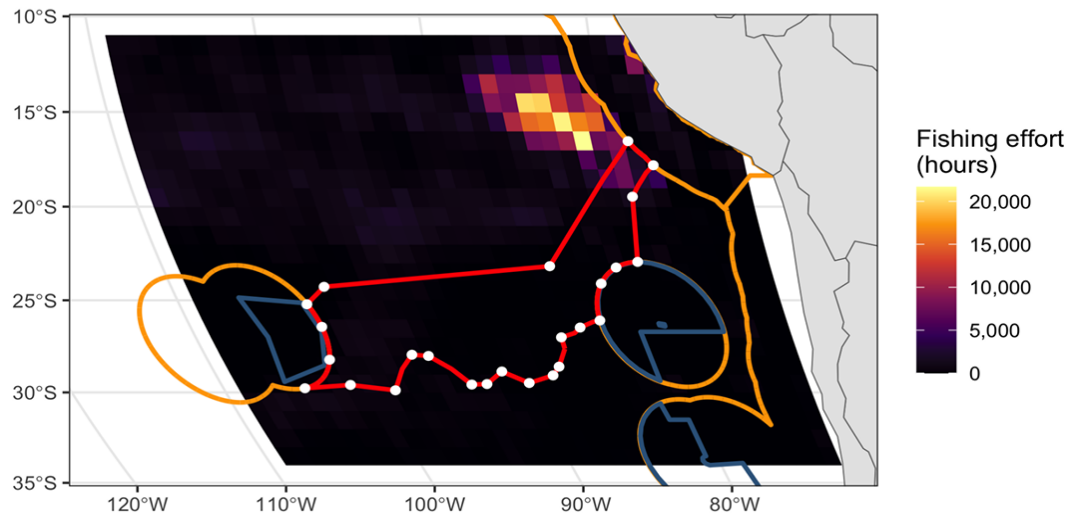


Figure 10. Observed 2020 fishing effort by all vessels according to Global Fishing Watch, in and around the Salas y Gomez and Nazca Ridges EBSA. The proposed fishing closure is shown in red, existing MPA boundaries are shown in blue (Mar de Juan Fernández in the bottom right; Nazca-Desventuradas to the right; and Motu Motiro Hiva to the left), and EEZ boundaries are shown in orange. Fishing effort is aggregated to 1x1 degree pixels, the unit of this analysis. The precise vertices proposed by Chile are shown as white dots for reference. Taken from McDonald (2024).

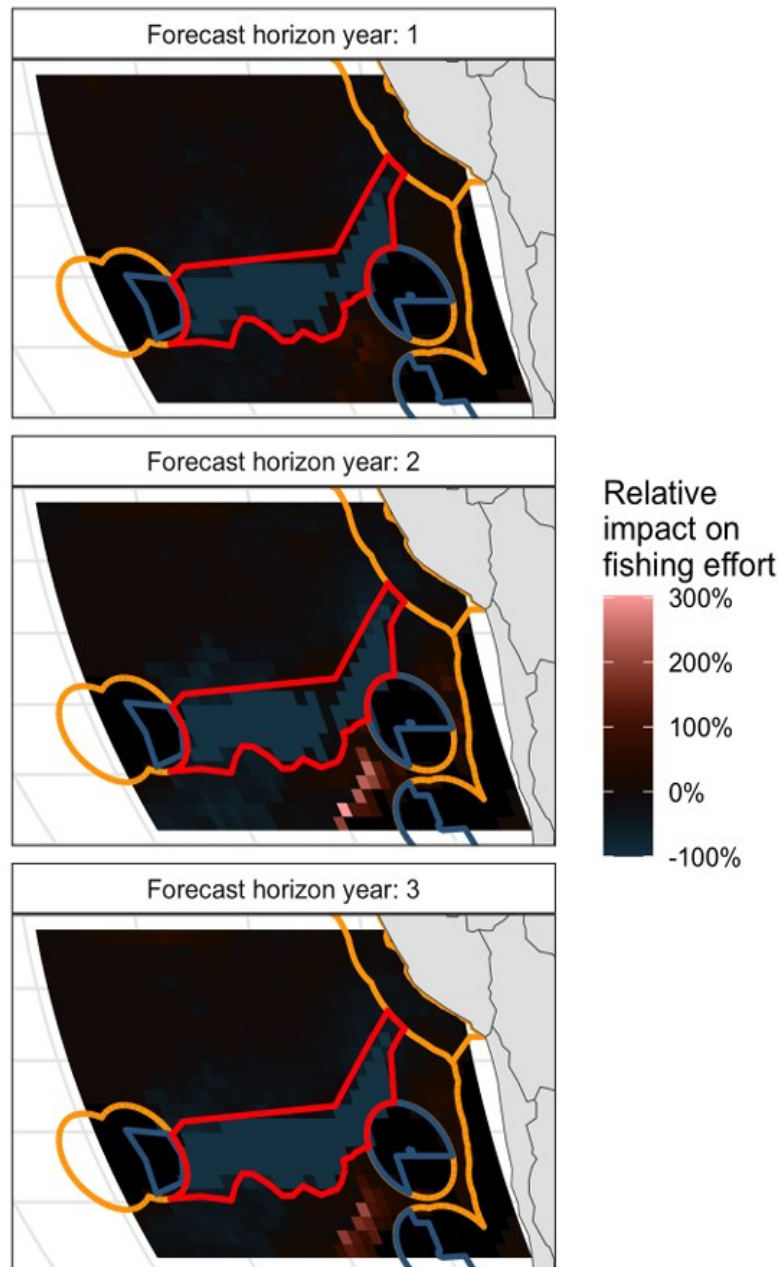


Figure 11. Relative impact on spatial fishing effort as a result from the proposed Salas y Gómez and Nazca Ridges fishing closure, in and around the proposed fishing closure. The 3 facets show the predictions for 1 year after the proposed fishing closure is implemented, 2 years after, and 3 years after. The proposed fishing closure boundary is shown in red, existing MPA boundaries are shown in blue (Mar de Juan Fernández in the bottom right; Nazca Desventuradas to the right; and Motu Motiro Hiva to the left), and EEZ boundaries are shown in orange. Changes in fishing effort are predicted for 1x1 degree pixels, the unit of this analysis. Taken from McDonald (2024).

Recent analyses about the main fisheries in the Salas y Gómez and Nazca ridges showed that the main catches in the area were for the giant squid (*Dosidicus gigas*), tuna (*Katsuwonus pelamis*, *Thunnus obesus*, and *Thunnus albacares*), and the swordfish (*Xiphias gladius*), being

D. gigas only relevant in the Nazca ridge. For the latter, the analysis made between 2011 and 2021 reported that catches within the potential fishing closure barely exceeded 10,000 tonnes (except in 2016 and 2019 with historical peaks of 45,000 tonnes), which represents approximately 1,4% of the total *D. gigas* catches relative to the entire SPRFMO fishing zone for those years (a mean of 881,755 tonnes [SPRFMO, 2022]) (Fig. 12). In the case of the jack mackerel *Tachurus murphyi*, for the same period and study area, catches were only reported for 2008, 2010, 2020 and 2021 with biomass of less than 1,000 tons, which represented less than 0.5% of the total catch regulated by SPRMFO for those years. The latter could be explained due to the main fishing area of *T. murphyi* (across the 30° and 45° of latitude [Belkin & Shen, 2023]) does not overlap with the Salas y Gómez and Nazca ridges.

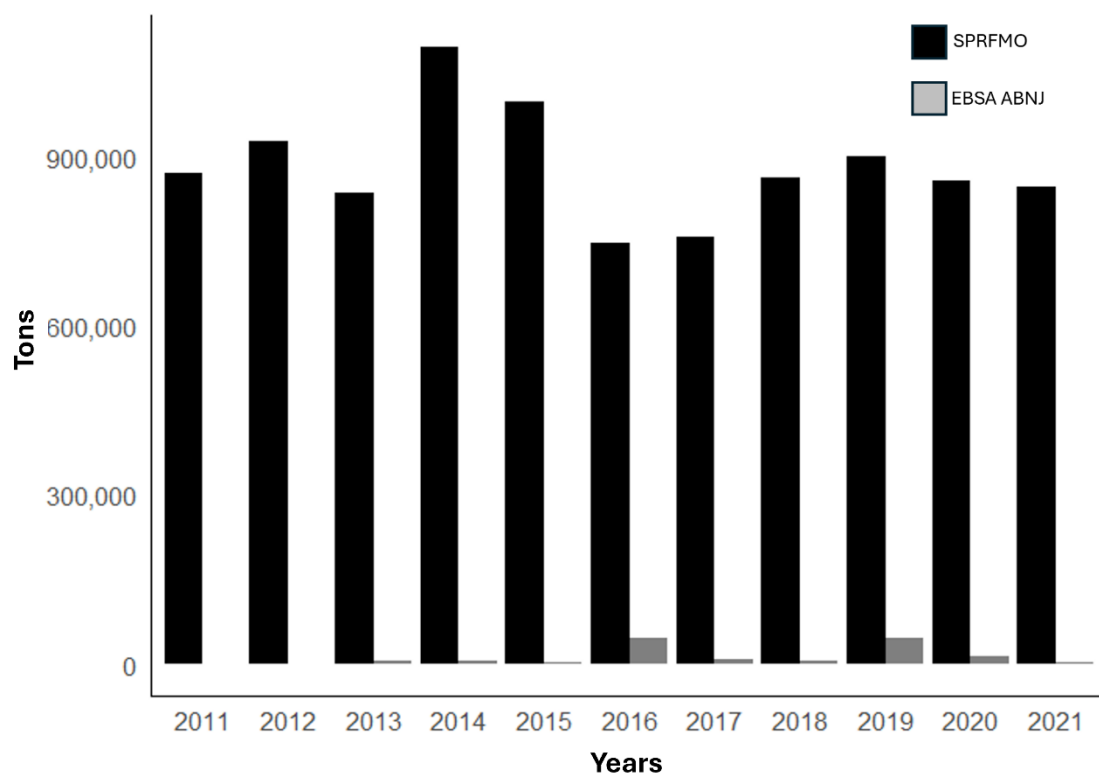


Figure 12. Comparison of historical catches (tons) for Jumbo Flying Squid (*Dosidicus gigas*) across the entire SPRFMO area (black bars) versus those from the potential fishing closure in the Salas y Gómez and Nazca ridges (grey bars) during the period from 2011 to 2021. Data source SPRFMO (2022).

Advances for the protection of ABNJ

In April 2021, Chile announced the launch of efforts to create a fully protected high seas marine protected area (MPA) in the Salas y Gómez and Nazca ridges, as a priority measure to address the climate crisis. This is the first political action carried out by a government to protect this area. After the announcement, the initiative was presented to the scientific committee of SPRFMO in September 2021 (SC9-Doc31_rev1), announced during the UN Ocean Conference

in Lisbon in June 2022, presented to the scientific committee of SPRFMO in September 2022 (SC10-Doc30), presented at the International Marine Protected Areas Congress (IMPAC5) in Canada in February 2023, and presented at the pre-UNOC meeting in Costa Rica in June 2024.

In order to promote conservation measures within the current international framework and according to SPRFMO's existing mandate (SPRFMO Convention, Article 2), the Chilean government presented a fishery closure proposal formally to the 12th SPRFMO Commission meeting in February 2024, to "restrict fishing activities in these areas by integrating a precautionary and ecosystem-based approach, in order to reduce the impacts of fishing and climate change (...) contributing to the long-term resilience and productivity of the South Pacific" (SPRFMO 2024).

As a result of this proposal, the Commission tasked the Scientific Committee at its next meeting and annually as an agenda item, to compile and review all relevant scientific information and data about the Nazca and Salas y Gómez Ridge area and recommend possible measures to the Commission on its following regular meeting, based on an ecosystem based approach that aims at preserving its biodiversity and SPRFMO fishing resources, as well a sustainable use of marine resources (SPRFMO 2024).

Advantages of protecting the Salas y Gómez and Nazca EBSA for fisheries

SPRFMO's main fisheries are dominated by *Dosidicus gigas* and *Trachurus murphyi*. Recent literature indicates that the abundance of both species in the south pacific is strongly dependent on climate variability, therefore climate change would significantly affect their population dynamics and distribution (Feng et al., 2022; Sarre et al., 2024). As previously mentioned, climate change will generate changes in distribution and abundance of numerous species, including fisheries resources. Both dominant SPRFMO's species need stable environmental conditions to live longer and grow larger, which determine their future biomass (Yu et al., 2019). Thus, the establishment of a conservation measure in the Salas y Gómez and Nazca EBSA that protects the entire ecosystem (i.e., water column and sea floor), by significantly reducing environmental threats, would provide a more stable and resilient habitat for species populations growing and reproducing, which is fundamental for conserving fisheries and food security when facing climate change's impacts.

On the other hand, protecting the Salas y Gómez and Nazca EBSA would not only contribute to the sustainability of the fisheries in a future of climate instability, but also would significantly increase surveillance and enforcement along the ridge through international collaboration, which in consequence would increase the available tools for fighting and reducing international illegal fishing in areas beyond national jurisdiction, in direct benefit of fisheries management and sustainability in waters surrounding the potential fishing closure (Ortuño, et al., 2020; Boteler et al., 2022).

Finally, the Salas y Gómez and Nazca Ridges are essential for preserving critical nursery habitats for fishery resources. These locations serve as vital reproductive and nursery grounds for numerous species. The high abundance and year-round presence of neonates, young-of-the-year, and juveniles around Salas y Gómez Island underscore its importance as a reproductive

area for the Galapagos shark (Morales et al., 2020). Likewise, waters surrounding the Rapa Nui Island have been reported as a reproductive zone for the swordfish (*Xiphias gladius*) (Yáñez et al., 2004; Vega et al., 2009). Moreover, this region is recognized as a significant recruitment zone for Chilean jack mackerel in the south pacific (NatGeo and OCEANA, 2013; Arcos et al., 2001).

Protecting the Salas y Gómez and Nazca EBSA not only would significantly contribute to preserving pelagic and benthic biodiversity and the ecosystem services provided by both ridges, but also would help to sustain and manage Latin American and international fisheries by directly protecting nursery and recruitment areas of important resources as well as promoting more stable and resilient habitats for their growth and reproduction.

Recommendations to SPRFMO

Given its exceptional natural and cultural significance, and their importance for fisheries occurring east of both ridges, the Salas y Gómez and Nazca ridges should be protected from exploitation, pollution and other anthropogenic threats using the best available conservation measures. As several intergovernmental organizations regulate human activities in the biologically and ecologically significant area of the Salas y Gómez and Nazca ridges, including SPRFMO for management of non-highly migratory fishery species, IATTC for management of tuna and other highly-migratory fishery species, ISO for shipping, ISA for mining, and CPPS for regional collaboration amongst Chile, Peru, Ecuador, and Colombia in marine policy, resource exploitation, conservation, environmental protection, and research, actions will be required within each one of these organizations to conserve the fragile and unique ecosystems of the region. Actions by SPRFMO based on its mandate will be key, thus the following recommendations emerge:

- The area located in ABNJ of the Salas y Gómez and Nazca EBSA should be permanently closed to fishing activities regulated by the SPRFMO as soon as possible. This area includes an important collection of seamounts of the southeastern Pacific Ocean and encompasses an area of approximately 1,097,846 km², that represents only 1.9% of the area regulated by SPRFMO. Legal fishing activities of species managed by SPRFMO have been minimal to nonexistent in recent years (SPRFMO 2020). Specifically, the orange roughy fishery has been closed in this region since 2006, and fishing effort for squid and Jack mackerel have been minimal (SPRFMO 2020). Even though jumbo squid has been the most relevant fishery in this area (Fig. 12), catches only represent 1.4% of the total jumbo squid catches regulated by SPRFMO. Thus, these proposed regulations would cause little impact on ongoing fishing operations, however, they would provide enormous advances in safeguarding the unique biodiversity of this region from present and future threats. Furthermore, they would showcase the global leadership of SPRFMO and its member countries. The fisheries closure should be accompanied with a monitoring program to assess the outcomes of the measure.
- SPRFMO should work closely with other intergovernmental organizations that have jurisdiction over the Salas y Gómez and Nazca ridges to ensure that the best available conservation measures are enacted. SPRFMO already has Memoranda of Understanding

and Collaborative Arrangements with IATTC and CPPS to advance cooperation and collaboration on matters of mutual interest.

- While management measures are developed, SPRFMO should not accept any proposals for exploratory fishing in the region, since this could cause irreversible harm to these extremely unique and fragile ecosystems.
- Capacity development activities should be expanded to support further understanding of the role of the Salas y Gómez and Nazca ridges for marine health, biodiversity and fisheries under a climate change scenario.
- We recommend the creation of a Task Team for SGN to compile, review and discuss the data and recommend a measure by SC13 in 2025.

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SC 12 – WP 10

SALAS Y GOMEZ AND NAZCA TASK TEAM

Terms of Reference and Workplan

SUMMARY

At its 2024 annual meeting, the Commission adopted [Decision 17-2024](#) that tasked the Scientific Committee (SC) to include Salas y Gómez and Nazca Ridges as an agenda item for its meeting in 2024 and annually thereafter. Within this agenda item, the SC — taking into consideration its priorities and available resources during its first year — will compile and review all relevant scientific information and data about the area and recommend possible measures to the Commission at its following regular meeting, based on an ecosystem-based approach that aims at preserving its biodiversity and SPRFMO fishing resources as well as a sustainable use of marine resources.

For the consideration of the SC 12 Chile presented the SC12 Doc 36: Salas y Gómez and Nazca ridges: the need for protection, with a minimum impact on fisheries, which “recommends that the area located in ABNJ of the Salas y Gómez and Nazca EBSA should be permanently closed to fishing activities regulated by the SPRFMO as soon as possible”, This recommendation was not agreed by the Scientific Committee.

Peru presented the SC12 - Doc 37 Nazca Ridge Report: Geology, Chemistry and Biophysical Coupling components, which states that the Easter-Salas y Gomez Seamount Chain (ESC) and Nazca Ridge are separate units or systems with important differences in their history, geology, oceanography, hydrodynamic features, structure and function; in that sense, the degree of dependence on matter and energy between the surface and the seabed (benthic-pelagic coupling) could be different between both systems. Finally, it recommends greater scientific research effort in order to achieve a better understanding of key processes, such as, the carbon export in relation to the pelagic fishery.

Finally, the creation of a Task Team for SGN was proposed and supported by some CNCPs. In this regard, the Salas y Gomez and Nazca Ridges Task Team will produce a report for presentation to SC13 in 2025 that

- 1) complements the information presented to the SC12 that reviews and summarizes relevant scientific information relating to the Salas y Gomez and Nazca Ridges (here after called “area”).
- 2) includes the characterisation geological, oceanographic, biogeochemical (including carbon exportation), biodiversity, ecology, cultural, connectivity, benthic-pelagic coupling and conservation information of the area.
- 3) includes the current status of SPRFMO’s benthic and pelagic resources fished within the area, as well as possible threats to those resources;
- 4) assesses the current level of fishing effort by gear including 2024 fishing activities and its possible impacts within the area;
- 5) considers the current possible level of impact of the other threats identified previously in the SC12-Doc 36;
- 6) Present to the SC possible measures based on the ecosystem approach that aims at preserving the biodiversity in the Salas y Gomez and Nazca Ridges and SPRFMO fishing resources, as well as sustainable marine resources and provide possible actions for the SC to consider; and
- 7) propose a monitoring and evaluation scheme for future work.

1. Introduction



At its 2024 annual meeting, the Commission adopted [Decision 17-2024](#) that tasked the Scientific Committee (SC) to include Salas y Gomez and Nazca Ridges as an agenda item for its meeting in 2024 and annually thereafter. ¹ Within this agenda item, the SC — taking into consideration its priorities and available resources during its first year — will compile and review all relevant scientific information and data about the area and recommend possible measures to the Commission at its following regular meeting, based on an ecosystem-based approach that aims at preserving its biodiversity and SPRFMO fishing resources as well as a sustainable use of marine resources.

In addition, the [2025 multiannual work](#) plan of the SC considers the Salas y Gomez and Nazca Ridges as a cross-cutting task, defining the following subtasks; 1) research cruises aimed to know the biooceanographic and meteorologic characteristics of Salas y Gomez ridge; as well as biodiversity, current circulation, morphology and geology of sea bottom for 2023 – 2024; 2) Climate change impacts of fisheries in Salas y Gomez and Nazca Ridges for 2024 and, 3) expedition to Salas y Gomez and Nazca aboard oceanographic research vessel for 2024-2025.

In line with that tasking and to support the effective and efficient preparation of scientific advice for the Commission, the SC agrees to create a Salas y Gómez and Nazca Ridges Task Team with these terms of reference.

2. Terms of Reference

a. Objective

The objective of the Task Team, in line with Decision 17-2024, shall be to review relevant scientific information and data about the area (including the papers in References), as well as other relevant information provided by members and observers, and to provide advice to the SC possible measures based on the ecosystem approach that aims at preserving the biodiversity in the Salas y Gomez and Nazca Ridges and SPRFMO fishing resources, as well as sustainable marine resources

All activities carried out by the Task Team will refer to the Area of Application of the Convention on the Conservation and Management of High Seas Fishery Resources in the South Pacific Ocean, as specified in its Article 5.

b. Structure

The Task Team is open to all interested Members, CNCPs and observers who may nominate one or more suitably qualified representatives to the Secretariat before 15 November 2024.

Ideally, all meetings should allow the virtual participation so as not to unfairly discriminate against small delegations with limited ability to travel. In addition, the meeting calendar of this Task team shall consider the overlap with other RFMOs meeting dates to avoid clashes with SIOFA and WCPFC meetings, or any other relevant RFMOs.

c. Responsibilities

- 1) complements the information presented to the SC12 that reviews and summarizes relevant scientific information relating to the Salas y Gomez and Nazca Ridges (here after called “area”).



- 2) includes the characterisation geological, oceanographic, biogeochemical (including carbon exportation), biodiversity, ecology, cultural, connectivity, benthic-pelagic coupling and conservation information of the area.
- 3) includes the current status of SPRFMO's benthic and pelagic resources fished within the area, as well as possible threats to those resources;
- 4) assesses the current level of fishing effort by gear including 2024 fishing activities and its possible impacts within the area;
- 5) considers the current possible level of impact of the other threats identified previously in the SC12- Doc 36;
- 6) Present to the SC possible measures based on the ecosystem approach that aims at preserving the biodiversity in the Salas y Gomez and Nazca Ridges and SPRFMO fishing resources, as well as sustainable marine resources and provide possible actions for the SC to consider; and
- 7) propose a monitoring and evaluation scheme for future work.
- Produce a report for presentation to SC13 in 2025.
- Propose a monitoring and evaluation scheme for any actions listed.
- Submits a report to the Secretariat and the SC Chair to be discussed in the 2025 SC meeting.
- Creates an open repository of the documentation reviewed for the SC members.

Workplan

The activities of the Task Team will require several meetings, but endeavours to virtually meet at least twice a year and if cost effective, also include an in-person workshop before the following 2025 SC meeting.

Activity	Date	Objective
Virtual meeting	November 2024 (last week)	Agreed the procedural aspect of the work of the Task Team and agreed the matters and topics for the workshop.
In person workshop*	TBC at the first task team meeting	Address the relevant scientific information relating to the Salas y Gomez and Nazca Ridges.
Virtual meeting	August 2025	Work on the results and recommendations.
In person meeting	Sept/Oct. 2025 (in the margins of SC-13)	Agreed the final document including the recommendations.

* Chile and the Center for Ecology and Sustainable Management of Oceanic Islands (ESMOI) are available to organize the in-person workshop and finance all arrangements including the participation of one representative from each Member. To maximise participation and reduce travel and SPRFMOs carbon footprint it is preferable for this meeting be held just prior to, or after to SPRFMO COMM13.

The dates will be confirmed at the first task team meeting.

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SC12-Doc37 NAZCA RIDGE REPORT GEOLOGY, CHEMISTRY AND BIOPHYSICAL COUPLING COMPONENTS

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