



Recommendations for the establishment of a ABMT  
to manage negative impacts from the international  
maritime navigation in the Thermal Dome:  
**an agreed path by the Maritime Authorities  
to conserve its socioeconomic value and  
marine biodiversity.**

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Recommendations for the establishment of a ABMT to manage negative impacts from the international maritime navigation in the Thermal Dome: an agreed path by the Maritime Authorities to conserve its socioeconomic value and marine biodiversity.

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**KEYWORDS**

Thermal Dome, maritime navigation, Particularly Sensitive Sea Area, COCATRAM, socioeconomic value, marine biodiversity, commercial fishing, sport fishing, marine species sighting.

**ABSTRACT**

The Thermal Dome has been recognized internationally because of its great ecological and socio-economic importance. The economic contribution of the Dome to the economies of Central American Countries and flag States from other regions in the world amounts to millions of dollars every year due to fishing and tourism related activities. Nevertheless, as of today there is no management measures that protect this unique ecosystem from the various risks that threatens it, one of them is the international maritime navigation. about 6% of the world's trade bisect the Thermal Dome, resulting in physical damages to marine habitats or organisms. This policy paper describe the agreement Central American States are pursuing to declare the Thermal Dome or part of it as a Particularly Sensitive Sea Area within the IMO regulations.

# Introduction

The Thermal Dome has been the subject of scientific and policy papers describing its dynamics, characteristics, boundaries, and biodiversity richness. Despite its importance to the Eastern Tropical Pacific, it is largely unknown to the general public. The Literature on the Thermal Dome emphasizes the importance of this permanent, naturally occurring upwelling, which is generated by a convergence of winds and currents that creates a surge of cold, nutrient-rich water that rises towards the surface of the ocean, creating a bell-shaped “dome” in front of the Central America Pacific coast. This unique oceanographic phenomenon occurs in areas beyond national jurisdiction and within the Exclusive Economic Zones of Central American countries in the Eastern Tropical Pacific.

The socio-economic value of the Thermal Dome was assessed in 2023 by the International Centre for Economic Policy for Sustainable Development (CINPE) of the National University of Costa Rica. This research demonstrated the great contribution of the Thermal Dome to the region and to other countries around the world that benefit from the resources found in this area. It was estimated that the Thermal Dome contribution, from 2017 to 2022, was of up to USD \$ 1 580 million, including commercial fishing, sport fishing and marine species watching. The significant economic contribution of the Thermal Dome to the region in the fisheries and tourism sectors, confirms the paramount importance

of establishing an adequate and sustainable management scheme to ensure the conservation of its biodiversity and maximize its economic benefits in the long term.

Due to its proximity to the Panama Canal, the biodiversity of the Thermal Dome is impacted by international shipping activities that overlap with the migration routes and aggregation areas of many of the whales, dolphins and turtles that inhabit the Dome. This overlap between ships and whales, dolphins, and turtles results in collisions with these marine animals, causing them serious injury and death. Noise from the ship activity also degrades the Dome’s ecosystem and its status as a biodiversity hotspot, an Important Marine Mammal Area (IMMA) and an Important Shark and Ray Area (ISRA).

The International Maritime Organization (IMO) is the United Nations specialized agency responsible for safe, secure, pollution-free and efficient shipping. IMO’s has developed a wide range of legal instruments to mitigate the effects of any damage that may occur because of maritime operations and accidents. Various types of Area Based Management Tools are applicable in areas recognized by their ecological, biological, socioeconomic and scientific attributes. The Particularly Sensitive Sea Area (PSSA) is one of those and it is the tool Maritime Authorities from Central American Countries have agreed to establish in the Thermal Dome.

## The socioeconomic value of the Thermal Dome

During 2023 and the beginning of 2024, with the financial support of the Overbrook Foundation and the technical support of the MarViva Foundation, the International Centre for Economic Policy for Sustainable Development (CINPE) of the National University of Costa Rica developed deep research to evaluate the economic contribution of the Thermal Dome to the national, regional, and global economy through an analysis of the fishing activities and marine touristic activities that depends on the Dome.

For the fishing activities, the main findings of the study highlight a significant decrease in the total value of the catch in the Thermal Dome area in recent years (2017-2022). The impact of the ENSO phenomenon seems strongly related to this decreasing trend. A significant vulnerability of the fishing and marine sector to the negative external impacts, such as the pandemic for the COVID-19 was also identified, which directly undermines the sustainability of the activities related to the Thermal Dome.

The research used three different data sources to analyze the commercial fishing related to the Thermal Dome. These sources were: i) Global Fishing Watch (GFW), ii) National Fisheries Institutions (NFI), and iii) Inter American Tropical Tuna Commission (IATTC).

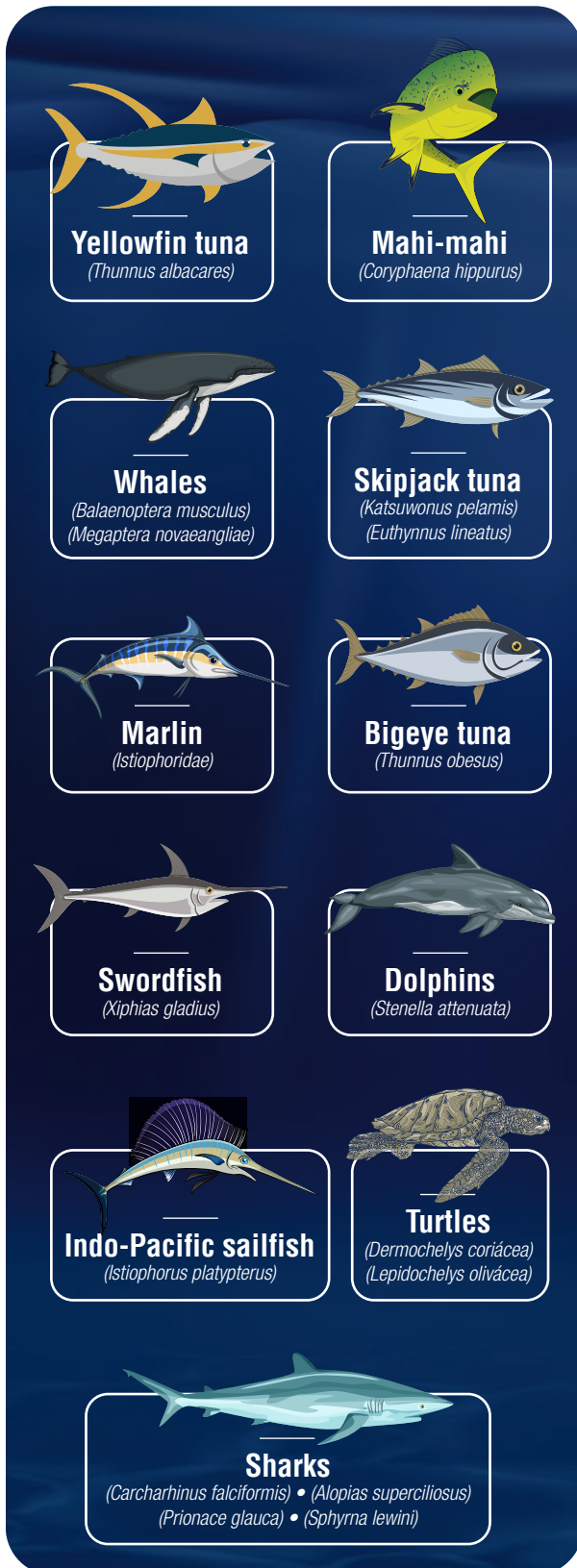
According to the Ocean Biodiversity Information Systems (OBIS), there are up to 2,078 different species in the Thermal Dome that depend on it for feeding, nesting, transit, and spawning. This illustrates the ecological importance and vitality of the Dome and the prevailing need to conserve and manage this unique ecosystem.

Only those species of commercial interest to the fishing and tourism sectors were assessed, and a reduced group of 12 flagship species were selected by CINPE (2023) in the study. The selection was based on their distinctive characteristics and ecological relevance because they provide a valuable perspective on the health and diversity of the Thermal Dome, and the fishing activities and the tourism activities based on these them:



## GRAPH 1.

Species selected for the socioeconomic analysis of the Thermal Dome



## 2.1. Commercial fishing

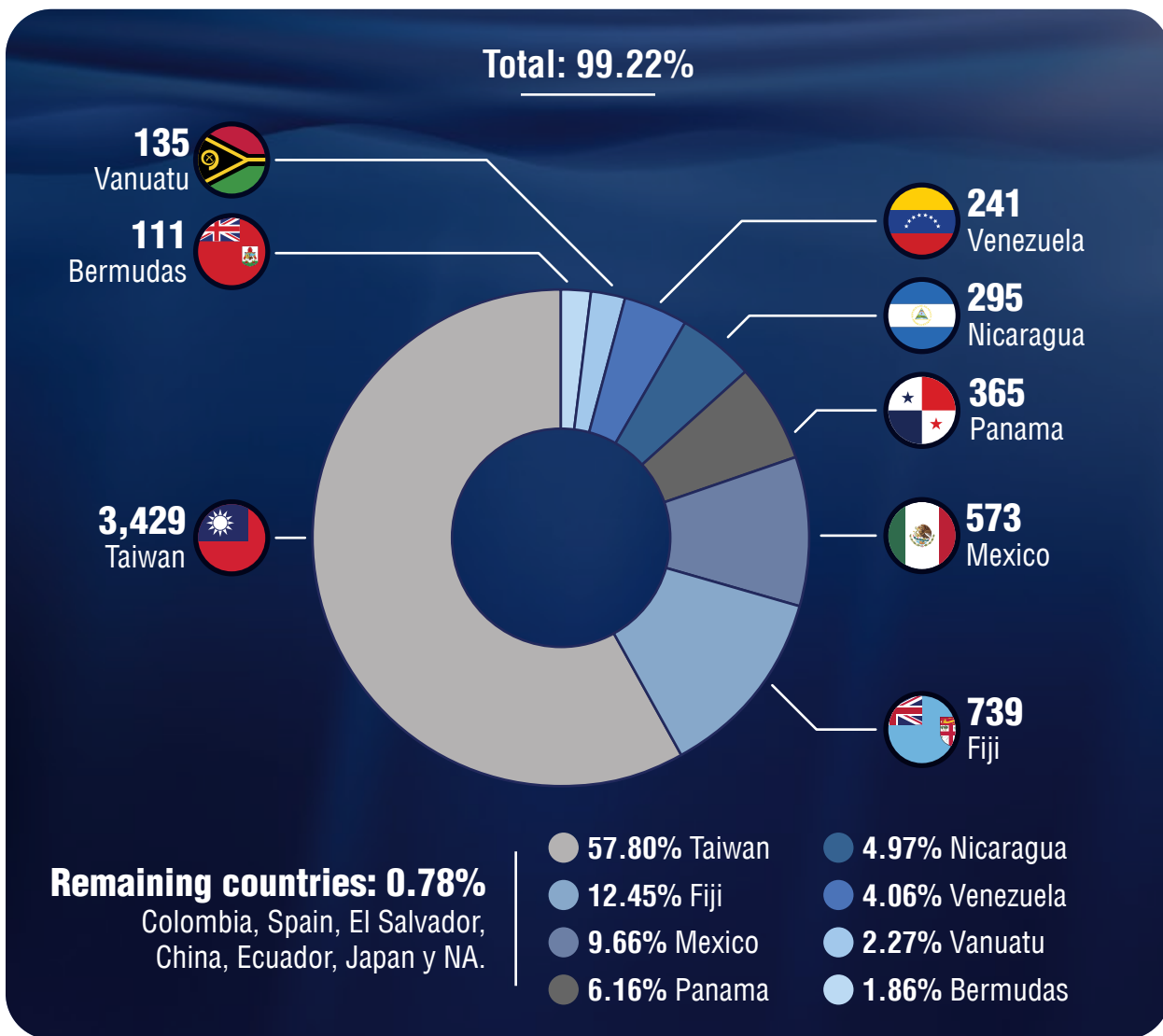
Using the IATTC data, the CINPE (2023) study found that from 2017 to 2022, a total catch of 145,859 tonnes was recorded, of which 97% was yellowfin tuna. The IATTC records 96% of the catches made by purse seiners, the majority of which come from the region (Mexico and Venezuela). The estimated value of this catch by the countries under study, using purse seine fishing, was USD 147,691,314 million. A big information gap exists on longline vessels captures. These vessels do not report to the IATTC because they are from not members countries of this regional fisheries management organization.

The Global Fishing Watch data, from 2017 to 2022, recorded a total of 5 933 days of fishing effort, meaning that fishing vessels are present in the Dome for an accumulated total of 989 days each year. Of this total fishing effort, 76% is accounted for by longliners and 24% by purse seiners. It was found that of the total number of vessels present in the Dome, 57% were from Taiwan, 12.4% from Fiji and 9.6% from Mexico (Graph 2). This shows that, in the case of longline fishing activity in the Dome, it is dominated by vessels from other regions, while purse seiners from the region generated a total of USD 499,444,007 million.

Considering the economic value of commercial fishing reported by the National Fisheries Institutions of Costa Rica, Mexico, Guatemala, Nicaragua, and El Salvador; for the same period, a total of 540,351 tones were recorded, accounting for a total of USD USD \$ 843,662,326 for these countries, of which 88% was yellowfin tuna. It was estimated that 28% of the Gross Domestic Product (GDP) of fisheries of Central America and Mexico is generated by commercial fishing activities in the Dome. Noting the case of El Salvador and Costa Rica, that between 60% and 70% of their fisheries GDP can be attributed to the Thermal Dome.

**GRAPH 2.**

Fishing effort in the Thermal Dome in days by flag, 2017-2022



Fuente: CINPE-UNA con datos de GFW, 2023.

## 2.2. Sport fishing

Sport fishing for tuna, dorado, sailfish, and marlin generates USD \$ 958,740,752 in indirect income (average tourist expenditure, boat maintenance and salaries of sport fishing service providers) and direct income (fishing permits, licences and tournaments) for the economies of Central America and Mexico.

## 2.3. Marine species watching

Whales and dolphins are the main target species of watching activities linked to the Dome. With an average of 128 days per year in watching activities, it is estimated that this activity, that relies on the biodiversity and health of the Thermal Dome ecosystem, produced a total of USD \$ 122,545,890 from 2017 to 2022, with an annual average of USD \$ 24,509,178 for 2023 in the whale watching season (January-March, and July-October).





## The threats posed by the international maritime navigation

The Thermal Dome is crossed in its core and surrounding area by ships and tankers that passes through the Panama Canal. The heavy maritime traffic that crosses the canal represents the 5% of the world’s maritime traffic, and two thirds of that traffic pass through the Thermal Dome (Castillo R. et al., 2023). This high

maritime traffic threatens habitats and marine organisms. Among those risks are collisions of vessels with cetaceans and turtles, underwater noise that interferes with communication and location patterns of cetaceans, pollution caused by accidents, collisions, ship failures, or operational discharges of ballast water.

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## Early stakeholder consultation in the Central American region

The Thermal Dome relevance in terms of biodiversity and productivity, its special importance for the biological cycle of species, representativeness, ecological connectivity, vulnerability, naturalness and uniqueness, but also its enormous economic value that benefit the region and other countries has raised awareness on its value. In 2023, two workshops held with the maritime authorities of Central America sparked a regional process to establish protective measures for maritime traffic in the Dome.

(COCATRAM), the regulatory body that encompasses all maritime traffic activities in the EEZs of Central American countries. After this workshop five interviews were conducted virtually, in Spanish, in the weeks and months following workshop with the maritime authorities from each of the five countries represented at the workshop. The following key themes and conclusions emerged from the interviews with maritime authorities, conducted by Eleanor Bent (MarViva’s intern from the Middlebury Institute of International Studies at Monterey)

In July 2023, in San José, Costa Rica a first workshop was convened with the maritime authorities of Central America, supported by the MarViva Foundation, and the Central American Commission for Maritime Transport

- | 100% of interviewees stated that the best method of protecting the Dome is through a Zona Marítima Especialmente Sensible (ZMES in Spanish) or a PSSA in English.

- | After attending the workshop, they believed that a PSSA designation made the most sense for the region, given its unique biodiversity, economic value, and high level of maritime traffic.
- | Participants also cited that they trusted the scientific and political expertise of MarViva Foundation and the SARGADOM Project and believed that through coordination with other countries, the International Maritime Organization (IMO), and COCATRAM, a PSSA designation is feasible.
- | Apart from publicly expressing their support of the PSSA, participants stated that as maritime authorities, they could engage in various activities to strengthen regulations within their EEZs. These included speed reductions (both mandatory and voluntary), regulations for vessel routes and ranges (including for fishing vessels), seasonal shifts in where vessels can travel, and regulations for contamination and speeds at ports.
- | All participants acknowledged that these regulations would only apply to their flag state ships, except for international vessels entering their ports.
- | Participants were confident that while some challenges are inevitable, resolution is possible through clear, consistent communication between regional authorities and between countries in the region with the support of COCATRAM.
- | Most participants cited the importance of regional cooperation, where individual countries take the initiative to identify the resources, research, and steps necessary to gain national support for the PSSA designation.
- | Participants also stated the importance of coalition-building across various sectors, including commercial fishing, shipping, academia, NGOs, and governments.

A clear achievement of the workshop, was the increased awareness within maritime

authorities on their role at protecting marine life in the area. They recognize their power to regulate and protect the marine ecosystems and species that make the Thermal Dome an area of significant biodiversity. Also, participants stated the importance of raising awareness of the Thermal Dome's designation as a PSSA within each country and globally.

Political will from maritime authorities was evident in this workshop and resulted in the creation of the Committee of Technical Liaisons for the process of declaring a PSSA in the Thermal Dome. COCATRAM expressed their commitment to support the efforts of this Committee to move forward with the initiative to declare a PSSA in the Thermal Dome. Through Ministerial agreements the COCATRAM 2024-2026 Strategic Plan, included as a strategic task the work on the Thermal Dome.

A second workshop was held in November 2023, in San José, Costa Rica co-organized by MarViva Foundation, the Sargasso Sea Commission, the IMO, and the World Maritime University–Sasakawa Global Ocean Institute on the designation of a PSSA in the High Seas, being the Thermal Dome and the Sargasso Sea as two pilot sites. During this workshop after technical sessions on the proposal for a PSSA, participants were divided into two groups representing each site, the Sargasso Sea, and the Thermal Dome, respectively. Each group was tasked with answering questions related to the next steps towards the establishment of a PSSA in the Thermal Dome.

After the two successful workshops, main findings of them stress the necessity to unite stakeholders not only in the shipping sector but also other sectors that should be involved in the preparation of the proposal of the PSSA for the Thermal Dome. This coordination is fundamental for ensuring comprehensive representation, inclusion in decision-making from all relevant institutions at all levels, and the effectiveness in the implementation of governance and managements measures to protect this critical marine ecosystem.



## The agreement of the Maritime Authorities to conserve the socioeconomic and marine biodiversity value for the Thermal Dome

As a result of the two workshops held in San José in 2023, the maritime authorities of the COCATRAM members agreed on a roadmap to start the process on the establishment of a PSSA in the Thermal Dome. Representatives of maritime authorities discussed on the key topics and actions that are the starting point on strategic matters that need to be defined to begin the process:

Regarding the suitable boundaries for a PSSA in the Thermal Dome, there was a consensus that the area where the PSSA will be established is in the high seas area of the Thermal Dome, considering its maximum extent.

When characterizing the traffic in the Dome and the threats posed by it, participants stated that all types of vessels navigate through the Dome generating several threats and risks, as described above. Afterwards, the maritime authorities of COCATRAM agreed on the measures that could be effective to address those threats from the international maritime navigation: speed reduction measures, areas to be avoided, reporting on ballast water discharges, sonars with warning systems of presence of cetaceans.

Considering the work that would need to be done to prepare a PSSA proposal for the Thermal Dome, who would take the lead, and which stakeholders would need to be involved in the process, the maritime

authorities of COCATRAM agreed that a priority action is developing awareness-raising and dissemination sessions in Central America with all sectors related to the PSSA proposal in the Thermal Dome. This is currently being executed with the support of COCATRAM and the SARGADOM project along the region; so far Honduras, Panama, and El Salvador have received the SARGADOM team project in a one morning session to present the Thermal Dome and the initiative of declaring a PSSA in the Dome.

Another important outcome was the commitment of the IMO to provide technical assistance and capacity building to Central American governments and COCATRAM members to develop the PSSA proposal for the Thermal Dome. The IMO requested that governments designate a national focal point to lead the process and confirm the creation of a national task force for this PSSA process. Central American governments are making significant progress in meeting these requirements and are starting the process with the support of the IMO.

Finally, a period of three years to develop and submit the PSSA of the Thermal Dome proposal to the IMO was discussed and finally agreed by COCATRAM members, considering that this timeframe is in line with the COCATRAM 2024-2026 Strategic Plan, which includes the Thermal Dome.

## Recommendations for the establishment of a PSSA as an ABMT in the Thermal Dome

Having demonstrated the environmental and socio-economic value of the Thermal Dome, and taking into account the significant threats that exist in the Thermal Dome today due to the high volume of international maritime traffic, it is recommended that a maritime traffic management system be established in the Thermal Dome as soon as possible, using the legal tools and instruments of the IMO as the appropriate area-based management tool, namely a PSSA. The available options to be established and implemented in the Dome are generally known as Associated Protective Measures (APMs), all of which have a legal basis in the IMO legal framework and are implemented by States in accordance with international law.

These associated protective measures are sectoral area-based management tools (ABMTs) that apply to a specific sectoral impact, in this case international shipping, with the specific purpose of preventing, reducing, or eliminating the threat or identified vulnerability. As the PSSA is a sectoral ABMT within the maritime sector, the IMO is the only international body with the legal mandate to consider proposals to designate areas as PSSAs and to adopt measures applicable to international shipping.

The designation of a PSSA in the Thermal Dome is the first step that will enable the proponent States to adopt a set of voluntary or mandatory measures, permanent or seasonal, depending on the persistence of the Dome and the type of risk to be addressed, or measures that are specific and proven to be effective in addressing the identified threat or vulnerability. The non-exhaustive list of IMO AMPs that may

be adopted in the thermal dome includes:

1. Traffic separation scheme.
2. Speed reduction.
3. Reporting and notification systems.
4. IMO pilotage regime.
5. Areas to be avoided.
6. No discharge prohibitions.
7. Routeing systems.
8. Other existing IMO measures with legal basis

When designating a PSSA in the Thermal Dome, States must consider that the PSSA may coincide with a Marine Protected Area (MPA) unilaterally designated by Central American States within their EEZ, or declared by the BBNJ Conference of Parties once the Treaty enters into force, which will occur when the 60th State deposits its instrument of ratification to the BBNJ Secretariat. PSSAs are a complementary tool to MPAs and contribute to their conservation goals and objectives.

Finally, it is suggested that a strong coordination among the governmental institutions of the Central American countries is needed for the proposal to be successful; but it is also strongly recommended that one or two countries among the proponents take the lead to be the champion of the proposal in the region, in order to promote regional efforts within the region, but especially before the IMO and the different committees that will evaluate and decide on the PSSA proposal and the APMs in the Thermal Dome.

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