frontiers | Frontiers in Marine Science

TYPE General Commentary
PUBLISHED 01 April 2025
DOI 10.3389/fmars.2025.1576990

OPEN ACCESS

EDITED BY
Di Jin,
Woods Hole Oceanographic Institution, United States

REVIEWED BY
Ciara Willis,
Woods Hole Oceanographic Institution, United States

*CORRESPONDENCE
Mauricio Castrejón
hugo.castrejon@udla.edu.ec

RECEIVED 14 February 2025
ACCEPTED 21 March 2025
PUBLISHED 01 April 2025
CORRECTED 02 September 2025

CITATION
Castrejón M and Defeo O (2025) Commentary: Addressing illegal longlining and ghost fishing in the Galapagos Marine Reserve—a response to Hearn and Bucaram (2025). *Front. Mar. Sci.* 12:1576990. doi: 10.3389/fmars.2025.1576990

Commentary: Addressing illegal longlining and ghost fishing in the Galapagos Marine Reserve—a response to Hearn and Bucaram (2025)

Mauricio Castrejón[1]* and Omar Defeo[2]

[1]Grupo de Investigación en Biodiversidad, Medio Ambiente y Salud, Universidad de Las Américas, Quito, Ecuador, [2]Laboratorio de Ciencias del Mar, Facultad de Ciencias, Montevideo, Uruguay

KEYWORDS

Galapagos, marine protected areas, illegal fishing, longline, bycatch, small-scale fisheries, ghost fishing, IUU fishing

A Commentary on

Addressing illegal longlining and ghost fishing in the Galapagos marine reserve: an overview of challenges and potential solutions

By Hearn AR and Bucaram S (2025). *Front. Mar. Sci.* 12:1484989. doi: 10.3389/fmars.2025.1484989

1 Introduction

Castrejón and Defeo (2024) analyzed the challenges of illegal longlining and ghost fishing in the Galapagos Marine Reserve (GMR) and proposed strategies to develop a local small-scale tuna fishery within an ecosystem-based fisheries management framework, as a sustainable alternative to overexploited coastal fisheries. Their approach aims to harmonize conservation goals with the socioeconomic needs of local communities, while presenting innovative solutions to address the ongoing debate on small-scale longlining in the GMR.

In this context, Hearn and Bucaram (2025) advocated for strict conservation measures in the GMR, including maintaining the longline ban and transitioning fishers into non-extractive livelihoods. While their focus on conservation is commendable, their analysis overlooks the socioeconomic realities of Galapagos artisanal fishers, the unintended consequences of rigid policies, and the potential of adaptive fisheries co-management to improve marine conservation.

This response aims to clarify misconceptions, provide a more comprehensive perspective on longlining, and highlight the importance of pragmatic, science-based conservation strategies that balance ecological and socioeconomic priorities for the sustainable management of small-scale fisheries in the GMR, ensuring marine biodiversity conservation while improving the livelihoods of fishing communities.

2 The Galapagos tuna fishery: an unfulfilled promise

Hearn and Bucaram (2025) argue that developing an offshore tuna fishery would reactivate latent fishing capacity, but this oversimplifies the issue. Our proposal focuses on redistributing, rather than expanding, fishing effort through strict regulations, monitoring, research, and adaptive co-management. The redistribution began in the mid-2000s when fishers began to transition from illegal shark fishing to longline tuna fishing, a more stable and less risky alternative (Castrejón et al., 2021). This transition may have contributed to the stabilization of blacktip shark (*Carcharhinus limbatus*) populations, which declined by approximately 25% from the 1980s to the 2010s but later showed signs of recovery (Peñaherrera-Palma et al., 2018). In contrast, hammerhead sharks (*Sphyrna lewini*) experienced a 50% decline with no clear signs of recovery (Peñaherrera-Palma et al., 2018), likely due to continued fishing pressure outside the GMR from national and foreign fleets (Hearn et al., 2021).

Contrary to Hearn and Bucaram's assertion, the offshore tuna fishery has operated for decades. When the GMR was established in 1998, fishers supported its creation with the expectation of gaining exclusive access to seamounts within Galapagos waters, where tunas are abundant. The first GMR management plan prioritized developing a sustainable tuna fishery as a strategy to reinforce conservation commitments and reduce fishing pressure on coastal zone (DPNG, 1999) — the archipelago's most biodiverse and ecologically valuable areas, where ecosystem-based adaptation measures should be a priority (Escobar-Camacho et al., 2021). Despite the support of the 2003 fishing regulations for this objective, restrictive policies and a persistent lack of political will have hindered progress, fueling frustration and a growing sense of betrayal among fishers.

The Palau National Marine Sanctuary (PNMS) exemplifies a well-managed transition from nearshore reef fishing to offshore tuna fisheries, redirecting fishing effort to benefit both conservation and livelihoods (Dacks et al., 2020; Filous et al., 2020). This transition was driven by policies that reduced reef fishing pressure while supporting fishers through investments in Fish Aggregating Devices (FADs), alongside regulations requiring all tuna caught within Palau's Exclusive Economic Zone (EEZ) to be landed and processed domestically (MNRET, 2019; Filous et al., 2020). However, challenges such as limited local fishing capacity, high operational costs, and competition with foreign fleets, have hindered the full realization of these benefits (Dacks et al., 2020). Palau promotes selective methods like pole-and-line, handline, and trolling as alternatives to FAD-based purse seine or longline operations. However, small-scale longlining is allowed in the Domestic Fishing Zone of the PNMS (20% of the EEZ) under strict regulations, prohibiting shark targeting, wire leaders, and FAD use, and requiring onboard observers or electronic monitoring (MNRET, 2019). Compliance is enforced through Vessel Monitoring Systems (VMS) and patrols. Thus, longlining in Palau is tightly controlled to balance domestic food security and economic benefits with conservation goals. The cases of the PNMS and GMR highlight the need to strengthen the capacity of local small-scale fishers to sustainably access offshore tuna resources as an alternative to nearshore fishing.

3 The illusion of a longline-free Galapagos

Hearn and Bucaram criticize longlining for its bycatch risks, but the ban has not eradicated the practice—it has merely driven it underground, making it unregulated and harder to control (Castrejón et al., 2021; Montaño, 2022). Legal, institutional, and socioeconomic factors prevent the ban from fully eliminating illegal longlining and ghost-fishing (Castrejón and Defeo, 2024). Scientific advancements in bycatch mitigation techniques, such as circle hooks, non-wire leaders, and mid-water longlining, have reduced bycatch of protected species from a maximum of 77.5% (Murillo et al., 2004) to a minimum of 6% (CTI, 2018) within the GMR. Yet, these improvements are often overlooked in policy discussions. A rigid ban that disregards scientific and technological progress undermines conservation goals.

We propose an ecosystem approach to fisheries to enhance the sustainability of longlining by integrating bycatch mitigation techniques, dynamic spatial management, and market incentives through a decision-support tool designed for the holistic management of bycatch. A regulated tuna fishery, rather than an ineffective total ban, would improve monitoring and reduce environmental impacts through gear modifications, electronic surveillance, and traceability. Conservation policies should prioritize science-based solutions over maintaining the illusion of a longline-free Galapagos, which has failed to address illegal fishing, probably exacerbating threats like ghost fishing.

4 Misusing the precautionary principle to justify ineffective policies

Hearn and Bucaram (2025) invoke the precautionary principle to justify the longline ban. However, its application must be proportional to the risk of irreversible harm to vulnerable and endangered species while also allowing for adaptive co-management. They dismiss longlining without conducting an ecological risk assessment, as we have recommended, or acknowledging advancements in bycatch mitigation techniques. A growing body of research demonstrates that circle hooks, weighted lines, operational adjustments, bycatch limits, emerging technologies, and time-area restrictions significantly reduce bycatch (Gillett, 2011; Clarke et al., 2014; Hall et al., 2017; Swimmer et al., 2020; Doherty et al., 2022; Shea et al., 2023). Rather than outright rejection, pilot programs should be implemented to assess whether a small-scale, well-regulated longline fishery could operate sustainably within the GMR.

The precautionary principle should not be used to justify indefinite bans in the absence of updated ecological risk assessments. Instead, it should be applied dynamically, fostering

innovation and adaptive co-management. A rigid, permanent prohibition disregards scientific advancements and overlooks the potential for sustainable longlining under strict regulatory oversight.

5 Suppression of research on longlining: conservation dogmatism over science

A concerning issue is the suppression of research on longlining, often justified by the claim that this fishing gear is inherently incompatible with multiple-use MPAs or shark sanctuaries. This perspective is not supported by scientific literature or global fisheries management practices (Simpfendorfer and Dulvy, 2017; Filous et al., 2020; Shea et al., 2023). However, more than 80% of Galapagos residents share the perception that longlining is destructive, while 26% oppose it even if bycatch were reduced to zero (Castrejón and Defeo, 2023). These misconceptions prevent an objective evaluation of controlled longlining's sustainability. Scientific transparency should take precedence over ideological biases or public perception. Authorities and NGOs should support pilot programs to rigorously assess the environmental, economic, and social impacts of longlining under strict, continuous monitoring, in collaboration with fishers. Conservation efforts should be driven by robust, evidence-based research rather than political narratives or branding.

6 Rethinking the "Blue vision": lessons from past failures

Hearn and Bucaram's "Blue Vision" proposes shifting fishers to non-extractive roles, such as plastic collectors, research service providers, and marine educators. While this approach aligns with conservation goals, it overlooks the cultural significance of fishing and the deep social and economic ties that sustain small-scale fishing communities (El-Shayeb et al., 2025). Research on the human dimensions of MPAs shows that alternative livelihoods often fail when they do not align with local values, economic realities, and social capital (Pollnac et al., 2001; Charles and Wilson, 2009; Christie et al., 2017). Displacing fishers into unfamiliar livelihoods without considering their existing adaptive strategies, social networks, and economic realities can undermine their resilience, increasing vulnerability, loss of identity, and distrust in conservation initiatives (Allison and Ellis, 2001). The failure of recreational fishing (pesca artesanal vivencial) highlights these risks. Promoted since 2005 as a sustainable alternative, it has primarily benefited tourism agencies and non-fishers, sidelining local full-time fishers, while sport fishing has become more prevalent, failing to provide a sustainable livelihood alternative for the fishing sector (Schuhbauer and Koch, 2013). Likewise, the proposal to ban fish imports and reorient Galapagos fisheries away from exports fails to account for market dynamics, food security risks, and conservation challenges. Restricting exports would limit economic opportunities for fishers (Berman et al., 2018; Anastacio-Solis and Velasco-Plaza, 2023), while banning imports would not guarantee a stable seafood supply. Seasonal fishing patterns and inadequate infrastructure could result in shortages and rising prices. Moreover, increased fishing pressure on already overexploited coastal species may emerge to satisfy local demand, further undermining conservation efforts.

Conservation initiatives in Galapagos have historically failed because NGOs and researchers often operate under the mindset of "We will help you with what we think you need, not with what you are actually asking for". As a result, projects often fail to align with fishers' real needs while integrating sustainability principles, leading to frustration and mistrust as conservation efforts continue to fall short of improving their livelihoods. Instead of prescribing one-size-fits-all solutions, co-management strategies that enhance social capital, strengthen governance, and build local leadership can improve adaptive capacity and facilitate sustainable livelihood transitions while maintaining fishers' identity and trust in conservation efforts (Cinner et al., 2015, 2018).

7 Conclusion

The future of conservation in the GMR should focus on integrating sustainable fisheries rather than eliminating them. Fishers play a vital role in the food security and economy of Galapagos residents and must be recognized as key conservation partners. Science-based solutions, including research on controlled longlining, should be explored rather than dismissed due to ideological opposition. Economic policies that restrict supply, such as fish import bans, must be carefully evaluated to prevent rising seafood prices and food insecurity.

We call for a debate grounded in scientific evidence and equity, recognizing fishers as key ocean stewards. True conservation is not about sustaining illusions of sustainability to achieve symbolic victories at the expense of practical, evidence-based solutions. Instead, it requires implementing tangible actions that benefit both people and nature, even if that means challenging conventional narratives and reassessing long-standing policies in light of new scientific evidence and socioeconomic realities. Ultimately, this is the responsibility that science—and the institutions and individuals serving as scientific advisors to the Ecuadorian government—must embrace.

Author contributions

MC: Conceptualization, Writing – original draft, Writing – review & editing. OD: Conceptualization, Writing – original draft, Writing – review & editing.

Funding

The author(s) declare that financial support was received for the research and/or publication of this article. We acknowledge the

support of Universidad de las Américas–Ecuador for funding the publication of this research (Grant BIO.HCM.22.06).

Conflict of interest

Mauricio Castrejón is a co-founder and general manager of INNOVAPESCA CIA. LTDA. Mauricio Castrejón declares that no funding, salaries, or grants from INNOVAPESCA were involved in the research or publication of the article in question.

The remaining author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Correction note

A correction has been made to this article. Details can be found at: 10.3389/fmars.2025.1692759.

Generative AI statement

The author(s) declare that Generative AI was used in the creation of this manuscript. During the preparation of this work, the author used ChatGPT 4o to improve the readability and language of the manuscript. After using this tool/service, the author reviewed and edited the content as needed, and he takes full responsibility for the content of the published article.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

References

Allison, E. H., and Ellis, F. (2001). The livelihood approach and management of small-scale fisheries. *Mar. Policy* 25, 377–388. doi: 10.1016/S0308-597X(01)00023-9

Anastacio-Solis, J., and Velasco-Plaza, M. (2023). *Estudio de mercado de la pesquería responsable de atún de aleta amarilla (Thunnus albacares) de Galápagos para identificar mercados con preferencia por un producto pesquero de calidad, legal y sostenible que contribuyan a la mejora de ingresos de los pescadores artesanales de la Reserva Marina de Galapagos* (Puerto Ayora, Galapagos: WildAid).

Berman, K., Kobylko, G., Kuratomi, T., Daniel, O., and Oswald, K. (2018). *Value chain analysis for artisanal fisheries in Galapagos, Ecuador* (USA: UCLA Anderson School of Management and Conservation International).

Castrejón, M., Astrálaga, J., Montoya, G., and Villegas, T. (2021). *Delitos contra la vida silvestre en Galapagos: caracterización, causas, y potenciales soluciones* (Puerto Ayora, Galapagos: World Wildlife Fund).

Castrejón, M., and Defeo, O. (2023). Perceptions and attitudes of residents toward small-scale longline tuna fishing in the Galapagos Marine Reserve: conservation and management implications. *Front. Mar. Sci.* 10. doi: 10.3389/fmars.2023.1235926

Castrejón, M., and Defeo, O. (2024). Addressing illegal longlining and ghost fishing in the Galapagos Marine Reserve: an overview of challenges and potential solutions. *Front. Mar. Sci.* 11. doi: 10.3389/fmars.2024.1400737

Charles, A., and Wilson, L. (2009). Human dimensions of marine protected areas. *ICES J. Mar. Sci.* 66, 6–15. doi: 10.1093/icesjms/fsn182

Christie, P., Bennett, N., Gray, N., Wilhelm, T., Lewis, N., Parks, J., et al. (2017). Why people matter in ocean governance: incorporating human dimensions into large-scale marine protected areas. *Mar. Policy* 84, 273–284. doi: 10.1016/j.marpol.2017.08.002

Cinner, J. E., Adger, W. N., Allison, E. H., Barnes, M. L., Brown, K., Cohen, P. J., et al. (2018). Building adaptive capacity to climate change in tropical coastal communities. *Nat. Clim Chang* 8, 117–123. doi: 10.1038/s41558-017-0065-x

Cinner, J. E., Huchery, C., Hicks, C. C., Daw, T. M., Marshall, N., Wamukota, A., et al. (2015). Changes in adaptive capacity of Kenyan fishing communities. *Nat. Clim Chang* 5, 872–876. doi: 10.1038/nclimate2690

Clarke, S., Sato, M., Small, C., Sullivan, B., Inoue, Y., and Ochi, D. (2014). Bycatch in longline fisheries for tuna and tuna-like species: a global review of status and mitigation measures (Rome: FAO Fisheries and Aquaculture Technical Paper No. 588).

CTI (2018). Evaluación de artes de pesca experimentales para la captura sostenible de peces pelágicos grandes en la Reserva Marina de Galapagos, Fase *1* (Galapagos, Ecuador: DPNG, CGREG, INP, MAP, y sector pesquero artesanal de Galápagos).

Dacks, R., Lewis, S. A., James, P. A. S., Marino, L. L., and Oleson, K. L. L. (2020). Documenting baseline value chains of Palau's nearshore and offshore fisheries prior to implementing a large-scale marine protected area. *Mar. Policy* 117, 103754. doi: 10.1016/j.marpol.2019.103754

Doherty, P., Enever, R., Omeyer, L., Tivenan, L., Course, G., Pasco, G., et al. (2022). Assessing the efficacy of a novel shark bycatch mitigation device in a tuna longline fishery. *Curr. Biol.* 32, R1245–R1261. doi: 10.1016/j.cub.2022.09.003

DPNG (1999). *Plan de manejo de conservación y uso sustentable de la Reserva Marina de Galápagos* (Puerto Ayora, Galapagos: Dirección del Parque Nacional Galápagos).

El-Shayeb, F., Pittman, J., Jorge-Romero, G., Gianelli, I., and Defeo, O. (2025). The role of family in shaping adaptation and adaptive capacity in small-scale fishing communities: the yellow clam fishers in Uruguay. *J. Rural Stud.* 116, 103601. doi: 10.1016/j.jrurstud.2025.103601

Escobar-Camacho, D., Rosero, P., Castrejón, M., Mena, C. F., and Cuesta, F. (2021). Oceanic islands and climate: using a multi-criteria model of drivers of change to select key conservation areas in Galapagos. *Reg. Environ. Change* 21, 47. doi: 10.1007/s10113-021-01768-0

Filous, A., Friedlander, A. M., Griffin, L., Lennox, R. J., Danylchuk, A. J., Mereb, G., et al. (2020). Movements of juvenile yellowfin tuna (*Thunnus albacares*) within the coastal FAD network adjacent to the Palau National Marine Sanctuary: implications for local fisheries development. *Fish Res.* 230, 105688. doi: 10.1016/j.fishres.2020.105688

Gillett, R. (2011). *Bycatch in small-scale tuna fisheries: a global study* (Rome: FAO Fisheries and Aquaculture Technical Paper. No. 560).

Hall, M., Gilman, E., Minami, H., Mituhasi, T., and Carruthers, E. (2017). Mitigating bycatch in tuna fisheries. Rev. *Fish. Biol. Fish.* 27, 881–908. doi: 10.1007/s11160-017-9478-x

Hearn, A. R., and Bucaram, S. (2025). Commentary: Addressing illegal longlining and ghost fishing in the Galapagos marine reserve: an overview of challenges and potential solutions. *Front. Mar. Sci.* 12. doi: 10.3389/fmars.2025.1484989

Hearn, A., Cárdenas, S., Allen, H., Castrejón, M., Cruz, S., Espinoza, E., et al. (2021). *Propuesta de ordenamiento espacial de la Zona Económica Exclusiva Insular de Ecuador* (Quito, Ecuador: Universidad San Francisco de Quito).

MNRET (2019). *Palau National Marine Sanctuary Fishing Regulations* (Republic of Palau: Ministry of Natural Resources, Environment and Tourism).

Montaño, D. (2022). *El arte de pesca prohibido que todos usan* (GK). Available online at: https://gk.city/2022/01/24/el-palangre-galapagos-uso/ (Accessed January 28, 2025).

Murillo, J. C., Reyes, H., Zárate, P., Banks, S., and Danulat, E. (2004). *Evaluación de la captura incidental durante el plan piloto de pesca de altura con palangre en la Reserva Marina de Galápagos* (Galapagos, Ecuador: Dirección del Parque Nacional Galapagos and Fundación Charles Darwin).

Peñaherrera-Palma, C., van Putten, I., Karpievitch, Y. V., Frusher, S., Llerena-Martillo, Y., Hearn, A. R., et al. (2018). Evaluating abundance trends of iconic

species using local ecological knowledge. *Biol. Conserv.* 225, 197–207. doi: 10.1016/j.biocon.2018.07.004

Pollnac, R. B., Crawford, B. R., and Gorospe, M. L. G. (2001). Discovering factors that influence the success of community-based marine protected areas in the Visayas, Philippines. *Ocean Coast. Manag* 44, 683–710. doi: 10.1016/S0964-5691(01)00075-8

Schuhbauer, A., and Koch, V. (2013). Assessment of recreational fishery in the Galapagos Marine Reserve: failures and opportunities. *Fish. Res.* 144, 103–110. doi: 10.1016/j.fishres.2013.01.012

Shea, B. D., Gallagher, A. J., Bomgardner, L. K., and Ferretti, F. (2023). Quantifying longline bycatch mortality for pelagic sharks in western Pacific shark sanctuaries. *Sci. Adv.* 9, eadg3527. doi: 10.1126/sciadv.adg3527

Simpfendorfer, C. A., and Dulvy, N. K. (2017). Bright spots of sustainable shark fishing. *Curr. Biol.* 27, R97–R98. doi: 10.1016/j.cub.2016.12.017

Swimmer, Y., Zollett, E. A., and Gutierrez, A. (2020). Bycatch mitigation of protected and threatened species in tuna purse seine and longline fisheries. *Endanger. Species Res.* 43, 517–542. doi: 10.3354/ESR01069