MarinTrust Whole fish fishery assessment report

Ecuador small pelagics industrial fishery
FAO 87

Initial Assessment
WF42

Table 1: Whole fish fishery assessment scope

Fishery name	**Ecuadorian small pelagics industrial fishery**
MarinTrust report code	**WF42**
Type 1 species	1) Pacific chub mackerel (*Scomber japonicus, "Macarela" or "Morenillo*) 2) Frigate tunas (*Auxis* spp., "*botella*") 3) Shortfin scad (*Decapterus macrosoma*, "*picudillo*")
Fishery location	Ecuador EEZ – FAO 87
Gear type(s)	Purse seine
Management authority (country/state)	Ecuador

Table 2: Applicant and Certification Body details

Application details			
Applicant(s)		Productos Pesqueros SA Produpes, EXU Sa, Nirsa, Rosmei SA, Fortidex SA, Dimolfin SA, Empresa Pesquera Polar SA, Ecuafeed SA	
Applicant country		Ecuador	
Certification Body details			
Name of Certification Body		NSF / Global Trust Certification Ltd	
Contact Information for CB		Fisheries@nsf.org	
Fishery Assessor name		Ana Elisa Almeida Ayres	
CB Peer Reviewer name		Matthew Jew	
Number of assessment days	7	**Assessment period**	10/2025 to 10/2026

Table 3: Assessment outcome

Assessment outcome		Approve
Approval validity	Valid from 10/2025	Valid until 10/2026
CB peer reviewer evaluation		Agree with assessment determination
Fishery Assessment Peer Review Group external peer reviewer evaluation		Agree with assessment determination

Table 4: Assessment determination

Assessment determination **Summary of assessment and outcome**
The Ecuadorian small pelagics purse-seine fishery is the second most important industrial fishery in Ecuador, after the tuna purse-seine fleet. A Fishery Improvement Project (FIP) was initiated in 2018 with the objective of achieving MarinTrust certification for marine ingredient production. Since then, the fishery has undergone a series of improvements in data collection, management planning, and monitoring. For this initial assessment, the rationale for species categorisation and stock outcomes is based on the IPIAP Observer Programme dataset (2020–2024) tailored to the MarinTrust scope (fishmeal-authorised landings), the 2024 IPIAP stock assessment (data through 2023), and the February 2025 hydroacoustic survey. Catch composition remains multi-species but strongly dominated by three Type 1 species: • Pacific chub mackerel (*Scomber japonicus, ("Macarela" or "Morenillo*) • Frigate tunas (*Auxis* spp., "*botella*") • Shortfin scad (*Decapterus macrosoma*, "*picudillo*") Together, these accounted for 97.7% of fishmeal-authorised landings during 2020–2024. Minor Type 2 species (*Cetengraulis mysticetus, Etrumeus acuminatus, Prionotus stephanophrys, Peprilus medius, Prionotus albirrostris*) represented the remaining 2.3%. Under MarinTrust v3.01: • *S. japonicus*, *Auxis* spp and *D. macrosoma* are assessed as Category A species and meet all clauses on stock status and harvest strategy. • *Cetengraulis mysticetus* and *Etrumeus acuminatus* are assessed as Category C species as Type 2 species for which a management regime exists within the Plan and analytical stock assessments are available. • *Prionotus stephanophrys, Peprilus medius*, and *Prionotus albirrostris* are assessed as Type 2 Category D species, as no species-specific management regimes exist, but they are subject to the fishery-wide management framework. Management of the assemblage is anchored in the *Ley Orgánica para el Desarrollo de la Acuicultura y Pesca* (2019) and the *Plan de Acción y Manejo de la Pesquería de Pelágicos Pequeños (PAN/PM 2021–2025)*. These establish the use of an indicator species (currently chub mackerel) for effort control, seasonal closures (recruitment and reproductive), gear and area restrictions, and observer and bycatch protocols. Supporting data streams include annual stock assessments, hydroacoustic surveys, observer monitoring (ETP/bycatch/habitat), and FIP-led initiatives such as the Responsible Fishing Programme. Ecosystem, habitat, and ETP impacts are monitored and have not been found to be significant. Observer data confirm high survivorship of released fauna (>99% during 2023–2024), hydroacoustic surveys confirm offshore, mid-water distributions of PPP species, and IPIAP ecosystem analyses show that forage roles of small pelagics are maintained.

Final determination: The fishery meets the MarinTrust Whole Fish Standard v3.01 requirements for re-approval under the fishmeal-authorised scope.	
Summary of CB peer review	The CB peer-reviewer agrees with the assessor's determination. The classification of species was carried out appropriately and the species in the fishery were assessed under their respective category correctly. As this fishery is a multi-species fishery, there is not one quota-based system that restricts harvest. Each Category A stock is assessed against an analytical stock assessment and with appropriate data collection to conduct the assessment. Management of the fishery is clearly described and all three species meet the criteria under A3 Clauses. Finally, all three stock are above LRP or proxy. Category C and D species are assessed appropriately. The internal CB reviewer agrees with the species classification along with the conclusion on clauses M and E. Rationales are clearly described and ability to meet clause criteria is appropriately justified. As determined by the assessor, the CB peer-reviewer agrees that the requirements MarinTrust whole fish assessment v3.0 are met, meaning that the Ecuador small pelagics fishery under assessment should be re-approved as a source of raw material for MarinTrust-certified facilities.
Summary of external peer review (see Appendix 1 for the full peer review report)	The assessor has produced a clear and well-referenced report, providing robust justification for all scoring decisions. The peer reviewer concurs with the assessment outcomes and assigned scores, offering only a few minor comments.
Notes for on-site auditor	*NA*

Table 5: General results

Section	Outcome (Pass/Fail)
M1 - Management Framework	Pass
M2 - Surveillance, Control and Enforcement	Pass
E1 - Impacts on ETP Species	Pass
E2 - Impacts on Habitats	Pass
E3 - Ecosystem Impacts	Pass

Table 6: Species-specific results

See Table 7 for further details of species categorisation.

Category	Species name (common & Latin name)	Outcome (Pass/Fail/n/a)	
Category A	Pacific chub mackerel ("*Macarela, Morenillo*") — *Scomber japonicus*	A1	Pass
		A2	Pass
		A3	Pass
		A4	Pass
Category A	Frigate tunas ("*Botella, Melva*") — *Auxis spp.*	A1	Pass
		A2	Pass
		A3	Pass
		A4	Pass
Category A	Shortfin scad ("*Picudillo*") — *Decapterus macrosoma*	A1	Pass
		A2	Pass
		A3	Pass
		A4	Pass
Category B	N/A		
Category C	Pacific anchoveta/bocona ("*Chuhueco*") — *Cetengraulis mysticetus*	Pass	
Category C	Round herring ("*Sardina redonda*") — *Etrumeus acuminatus*	Pass	
Category D	Lumptail searobin ("*Gallineta*") — *Prionotus stephanophrys*	Pass	
Category D	Pacific harvestfish ("*Chazo*") — *Peprilus medius*	Pass	
Category D	Whitesnout searobin ("*Gallineta*") — *Prionotus albirrostris*	Pass	

Table 7: Species categorisation table

List of all the species assessed. Type 1 species are assessed against Category A or Category B. Type 1 species must represent 95% of the total annual catch. Type 2 species are assessed against Category C or Category D. Type 2 species may represent a maximum of 5% of the annual catch. Species that comprise less than 0.1% of the catch are not required to be assessed or listed here.

Species name (common & Latin name)	Stock	CITES listed (Y/N)	IUCN Red list Category	% catch composition	Management (Y/N)	Category (A, B, C or D)
Pacific chub mackerel ("*Macarela, Morenillo*") — *Scomber japonicus*	FAO 87 — Ecuador EEZ	N[2]	LC[3]	67.50%[1]	Y	A
Frigate tunas ("*Botella, Melva*") — *Auxis spp.*	FAO 87 — Ecuador EEZ	N[2]	LC[4]	23.95%[1]	Y	A
Shortfin scad ("*Picudillo*") — *Decapterus macrosoma*	FAO 87 — Ecuador EEZ	N[2]	LC[5]	6.29%[1]	Y	A
Pacific anchoveta/bocona ("*Chuhueco*") — *Cetengraulis mysticetus*	FAO 87 — Ecuador EEZ	N[2]	LC[6]	0.73%[1]	Y	C
Round herring ("Sardina redonda") — *Etrumeus acuminatus*	FAO 87 — Ecuador EEZ	N[2]	LC[7]	0.57%[1]	Y	C
Lumptail searobin ("*Gallineta*") — *Prionotus stephanophrys*	FAO 87 — Ecuador EEZ	N[2]	LC[8]	0.24%[1]	Y	D
Pacific harvestfish ("*Chazo*") — *Peprilus medius*	FAO 87 — Ecuador EEZ	N[2]	LC[9]	0.15%[1]	Y	D
Whitesnout searobin ("*Gallineta*") — *Prionotus albirrostris*	FAO 87 — Ecuador EEZ	N[2]	LC[10]	0.13%[1]	Y	D
Rationale Catch composition in the Ecuador small-pelagics purse-seine fishery is multi-species but strongly dominated by the small pelagic fishes ("*peces pelágicos pequeños*" or PPP) assemblage.						

For this initial assessment, the rationale is based on the Observer Programme analysis tailored to the MarinTrust scope—i.e., fishmeal-authorised sets—covering 2020–2024[1] (Table 1). Across 2020–2024, 97.74% of the catch was composed of Pacific chub mackerel *Scomber japonicus* (67.50%), frigate tunas *Auxis* spp. (23.95%), and shortfin scad *Decapterus macrosoma* (6.29%); these are therefore treated as Type 1 species under MarinTrust (Type 1 must collectively be ≥95%). The remaining 2.26% comprised Pacific anchoveta/bocona *Cetengraulis mysticetus* (0.73%), round herring *Etrumeus acuminatus* (0.57%), lumptail searobin *Prionotus stephanophrys* (0.24%), Pacific harvestfish *Peprilus medius* (0.15%) and whitesnout searobin *Prionotus albirrostris* (0.13%); each is ≥0.1% and the group totals ≤5%, so they are assessed as Type 2 species [1]. All listed species are assessed as Least Concern on the IUCN Red List [2][3]–[10] and none is listed in the CITES Checklist [2].

For category assignment under v3.01, we apply the presence/absence of a management regime in the project files. The fishery is governed by the National Action Plan and Fishery Management Plan for the Small Pelagics Fishery of Ecuador (PAN/PM), Ministerial Agreement MPCEIP-SRP-2021-0073-A (16 March 2021), which establishes and mandates fishery-wide measures including access controls, biological closures ("*veda*"), gear/area restrictions, bycatch controls, and SCV/VMS monitoring [12]. Accordingly, the Type 1 species (*S. japonicus, Auxis spp., D. macrosoma*) are assigned Category A (managed), and the Type 2 species are assigned as follows: *Cetengraulis mysticetus* and *Etrumeus acuminatus* were assigned as Category C (managed); *Prionotus stephanophrys, Peprilus medius* and *Prionotus albirrostris* were assigned as Category D. This is because, under MarinTrust v3.01 for Type 2 species, Category C applies only when a species-specific management regime exists, whereas Category D is used when no species-specific HCR/BRPs/catch advice are identified in the fishery project files; for *P. stephanophrys*, *P. medius* and *P. albirrostris*, the 2021 Plan provides fleet-wide indicator-based controls but no species-specific regime, so they are assigned D in this initial assessment [12].

Table 1. Catch composition of small-pelagic species authorised for fishmeal production, 2020–2024. Percent share by weight of species recorded by the IPIAP Observer Programme for fishmeal-authorised purse-seine sets in Ecuador. Spanish common names are shown as reported in the source. Source: [1]

N°	Especie	Nombre común	Composición de la captura (%)
1	*Scomber japonicus*	Macarela, morenillo	67.50%
2	*Auxis* spp.	Botella, melva	23.95%
3	*Decapterus macrosoma*	Picudillo	6.29%
4	*Cetengraulis mysticetus*	Chuhueco	0.73%
5	*Etrumeus acuminatus*	Sardina redonda	0.57%
6	*Prionotus stephanophrys*	Gallineta	0.24%
7	*Peprilus medius*	Chazo	0.15%
8	*Prionotus albirostris*	Gallineta	0.13%

References

[1] **Instituto Público de Investigación de Acuicultura y Pesca (IPIAP).** *Informe de capturas PPP-MT 2020–2024*(Programa de Observadores; métodos, área, categorías de lance; Tabla 10). Available at: https://institutopesca.gob.ec/wp-content/uploads/2025/01/Informe-capturas-PPP-MT_2020-2024.pdf

[2] **CITES – Checklist of CITES Species.** Official database used to verify Appendix listings (all species above = Not listed). Available at: https://checklist.cites.org/#/es

[3] **IUCN Red List —** *Scomber japonicus***.** https://www.iucnredlist.org/species/170306/170083106
[4] **IUCN Red List —** *Auxis***.** https://www.iucnredlist.org/species/170344/46651210
[5] **IUCN Red List —** *Decapterus macrosoma***.** https://www.iucnredlist.org/species/20431518/115379160
[6] **IUCN Red List —** *Cetengraulis mysticetus***.** https://www.iucnredlist.org/species/183878/102902497
[7] **IUCN Red List —** *Etrumeus acuminatus***.** https://www.iucnredlist.org/species/99167147/143843183
[8] **IUCN Red List —** *Prionotus stephanophrys***.** https://www.iucnredlist.org/species/183642/8150206
[9] **IUCN Red List —** *Peprilus medius***.** https://www.iucnredlist.org/species/183339/8096349
[10] **IUCN Red List —** *Prionotus albirrostris***.** https://www.iucnredlist.org/species/183897/8196357
[11] **IPIAP.** *Flota cerquera costera – Desembarques de pelágicos pequeños (2021–2024)* (fleet-wide context). Available at: https://institutopesca.gob.ec/wp-content/uploads/2025/05/Panel-desembarques-FLOTA-CERQUERA-2021-2024.pdf
[12] **Ministerio de Producción, Comercio Exterior, Inversiones y Pesca (MPCEIP) – Subsecretaría de Recursos Pesqueros.** *Plan de Acción Nacional y Plan de Manejo de la pesquería de Pelágicos Pequeños del Ecuador (PAN/PM).* **Acuerdo Ministerial MPCEIP-SRP-2021-0073-A**, 16 de marzo de 2021. Available at: https://www.produccion.gob.ec/wp-content/uploads/2021/05/Plan-de-Accion-y-Manejo-Pelagicos-Pequenos-Ecuador_2021_WEB.pdf
[13] **Ponce, G.; Ayora, G.; Jurado, V. (2023).** *Análisis de la composición de la captura asociada a la pesquería de pelágicos pequeños autorizados para producción de harina de pescado, durante 2020–2022.* Instituto Público de Investigación de Acuicultura y Pesca (IPIAP). Available at: https://institutopesca.gob.ec/wp-content/uploads/2023/05/Informe-capturas-PPP-MT_2020-2022.pdf

Management requirements

This section, or module, assesses the general management regime applied to the fishery under assessment. It comprises two parts, M1, which evaluates the management framework, and M2, which evaluates surveillance, control and enforcement within the fishery.

1.1. All management criteria must be met (pass) for a fishery to pass the Management requirements.

1.1.1. The sub-criteria offer a structured evidence base to demonstrate that the fishery sufficiently meets the management criteria. It is not expected that sub-criteria are assessed independently of the main criterion.

M1 Management framework

M1.1	**M1.1 There is an organisation responsible for managing the fishery.** *In reaching a determination for M1.1, the assessor should consider if the following is in place:*
	M1.1.1 The management and administration organisations within the fishery are clearly identified.
	M1.1.2 The functions and responsibilities of the management organisations include the overall regulation, administration, science and data collection and enforcement roles, and are documented and publicly available.
	M1.1.3 Fishers have access to information and/or training materials through nationally recognised organisations.
Outcome	*Pass*

Rationale

The Ecuadorian small pelagic fishery is managed by the Vice-Ministry of Aquaculture and Fisheries (VMAP) under the Ministry of Production, Foreign Trade, Investments and Fisheries (MPCEIP), through the Under-Secretariat of Fisheries Resources (SRP). The legal mandate for fisheries management is established in the Organic Law for the Development of Aquaculture and Fisheries (Ley Orgánica para el Desarrollo de la Acuicultura y Pesca – LODAP, 2020) [1], detailed in its General Regulations (Reglamento General a la LODAP, 2022) [2], and reinforced by the Reform enacted by Executive Decree No. 876 (2023) [3].

Further institutional responsibilities are defined in the Statute of Organisational Management by Processes (Acuerdo Ministerial 21-001, 2021; reformed 2023 and 2025), which assigns the MPCEIP and its Vice-Ministry authority to develop technical regulations, issue ministerial agreements, and enforce fisheries management and control [4].

Together, these instruments provide the legal and institutional framework through which Ecuador implements the sustainable management, research, and enforcement system governing the small pelagic fishery.

Clause M1.1 is met.

References

[1] Gobierno del Ecuador. Ley Orgánica para el Desarrollo de la Acuicultura y Pesca (LODAP). Registro Oficial, 2020.
[2] Gobierno del Ecuador. Reglamento General a la LODAP. 2022.
[3] Gobierno del Ecuador. Decreto Ejecutivo No. 876 – Reforma al Reglamento General de la LODAP. 2023.
[4] MPCEIP. Acuerdo Ministerial 21-001 – Estatuto Orgánico de Gestión Organizacional por Procesos del MPCEIP (y reformas 2023, 2025).

M1.2	**M1.2 Fishery management organisations are legally empowered to take management actions.** *In reaching a determination for M1.2, the assessor should consider if the following is in place:*	
	M1.2.1	There are legal instruments in place to give authority to the management organisation(s) which can include policies, regulations, acts or other legal mechanisms.
	M1.2.2	Vessels wishing to participate in the fishery must be authorised by the management organisation(s).
	M1.2.3	The management system has a mechanism in place for the resolution of legal disputes.
	M1.2.4	There is evidence of the legal rights of people dependent on fishing for food or livelihood.
Outcome	*Pass*	

Rationale

The LODAP (2020) [1], its *Reglamento General* (General Regulation) (2022) [2], the Reform by Executive Decree No. 876 (2023) [3], and the Statute of Organisational Management (2021; reformed) [4] provide MPCEIP and SRP with full legal authority to regulate, enforce, and adapt fisheries management. At the fishery level, the National Action Plan and Management Plan for the Small Pelagic Fishes (PPP) Fishery (PAN/PM, 2021) [5] sets binding measures such as access controls, biological closures, gear restrictions, and monitoring. These are applied annually through Ministerial Agreements on reproductive and recruitment closures (2021–2025) [6–12].

All purse-seine vessels targeting small pelagics must be licensed by SRP. Vessel authorisation is confirmed through the National Vessel Registry, maintained by SRP, with participation conditional on compliance with technical and legal requirements [1][2][5].

The LODAP (Arts. 211–229) establishes a sanctioning and appeals framework for fisheries infringements, allowing recourse through administrative processes and judicial review [1].

The Constitution of Ecuador (Arts. 13 and 395) guarantees food sovereignty and a sustainable model of development [13]. The LODAP [1] and the PAN/PM [5] incorporate these principles by requiring that fisheries management safeguard both environmental sustainability and the livelihoods of dependent communities.

Clause M1.2 is met.

References

[1] Gobierno del Ecuador. Ley Orgánica para el Desarrollo de la Acuicultura y Pesca (LODAP). 2020
[2] Gobierno del Ecuador. Reglamento General a la Ley Orgánica para el Desarrollo de la Acuicultura y Pesca. 2022
[3] Gobierno del Ecuador. Decreto Ejecutivo No. 876 – Reforma al Reglamento General de la Ley Orgánica para el Desarrollo de la Acuicultura y Pesca. 2023.
[4] MPCEIP. Statute of Organisational Management by Processes (Ministerial Agreement No. 21-001; reforms 2023, 2025).
[5] MPCEIP-SRP. Plan de Acción Nacional y Plan de Manejo de la pesquería de Peces Pelágicos Pequeños del Ecuador (PAN/PM). Acuerdo Ministerial MPCEIP-SRP-2021-0073-A, 2021
[6] MPCEIP-SRP. Acuerdo Ministerial 0241-A. Veda reproductiva PPP 2021–2022.
[7] MPCEIP-SRP. Acuerdo Ministerial 0258-A. Veda reproductiva PPP 2022–2023.
[8] MPCEIP-SRP. Acuerdo Ministerial 0140-A. Veda de reclutamiento PPP 2023.
[9] MPCEIP-SRP. Acuerdo Ministerial 0254-A. Veda reproductiva PPP 2023–2024.
[10] MPCEIP-SRP. Acuerdo Ministerial 0222-A. Veda de reclutamiento PPP 2024.
[11] MPCEIP-SRP. Acuerdo Ministerial 0233-A. Reforma de veda de reclutamiento PPP 2024.
[12] MPCEIP-SRP. Acuerdo Ministerial 0280-A & 0022-A. Veda reproductiva y reforma PPP 2025.
[13] Constitución de la República del Ecuador, Arts. 13 y 395.

M1.3	**M1.3 There is an organisation responsible for collecting data and (scientifically) assessing the fishery.** *In reaching a determination for M1.3, the assessor should consider if the following is in place:*	
	M1.3.1	The organisation(s) responsible for collecting data and assessing the fishery is/are clearly identified.
	M1.3.2	The management system receives scientific advice regarding stock, non-target species and ecosystem status.
	M1.3.3	Scientific advice is independent from the management organisation(s) and transparent in its formulation through a clearly defined process.
Outcome	*Pass*	

Rationale

The *Instituto Público de Investigación de Acuicultura y Pesca* (IPIAP) is the designated public research institute with statutory responsibility for fisheries science in Ecuador. LODAP (2020) formally assigns IPIAP the mandate to plan, promote, and execute fisheries and aquaculture research [1]. IPIAP's role is also recognised in the PAN/PM 2021 [2].

IPIAP provides regular outputs that inform management decisions, including:

- Observer Programme reports 2020–2024 documenting species composition and bycatch [3].
- Fleet landings panels 2021–2024 for broader catch monitoring [4].
- Hydroacoustic and biological survey 2025 assessing biomass and distribution of small pelagics [5].
- Stock assessment 2024 providing updated analytical estimates of stock status [6].
- Reports on interactions with ETP species and ecosystems (e.g. IPIAP I*nforme de Rendición de Cuentas,* 2023) [7]. The IPIAP *Informe de Rendición de Cuentas* (2023) is an institutional

accountability report providing high-level summaries of IPIAP programmes (including PPP research, surveys, and monitoring). It does *not* contain ecosystem-impact analyses, and is therefore used only as evidence of institutional transparency and reporting capacity. Evidence for ecosystem impacts in this assessment is instead derived from observer-based bycatch, ETP-interaction and habitat-interaction reports cited under Section E. These data feed directly into SRP's decision-making, including annual closures and management adjustments.

IPIAP is a public law entity with legal, administrative and financial autonomy, attached to MPCEIP but institutionally separate from SRP [1]. Its mandate is to produce independent scientific advice, which is published openly via official reports and the IPIAP website. Transparency is ensured through public dissemination of survey results, observer data, and stock assessments [3–7]. These outputs are available for stakeholders, including through the Small Pelagics Dialogue Platform (SPFDP), which reviews and discusses scientific advice [2].

Clause M1.3 is met.

References

[1] Gobierno del Ecuador. Ley Orgánica para el Desarrollo de la Acuicultura y Pesca (LODAP). 2020.
[2] MPCEIP-SRP. Plan de Acción Nacional y Plan de Manejo de la pesquería de Pelágicos Pequeños (PAN/PM).Acuerdo Ministerial MPCEIP-SRP-2021-0073-A, 2021.
[3] IPIAP. Informe de capturas PPP-MT 2020–2024 (Programa de Observadores). 2025.
[4] IPIAP. Desembarques de pelágicos pequeños 2021–2024 (flota cerquera). 2025.
[5] IPIAP. Informe Crucero Hidroacústico PPP 2025.
[6] IPIAP. Informe de Evaluación de la pesquería de PPP 2024.
[7] IPIAP. Informe de Rendición de Cuentas 2023.

M1.4	**M1.4 The fishery management system is based on the principles of sustainable fishing and a precautionary approach.** *In reaching a determination for M1.4, the assessor should consider if the following is in place:*
	M1.4.1 A policy or long-term management objective for sustainable harvesting based on the best scientific evidence and a precautionary approach is publicly available and implemented for the fishery.
Outcome	*Pass*

Rationale

The Organic Law for the Development of Aquaculture and Fisheries (LODAP, 2020) establishes sustainability and precaution as fundamental principles of fisheries governance in Ecuador [1]. The General Regulations to the LODAP (2022) further detail the implementation of these principles, and the Executive Decree No. 876 (2023) strengthened provisions for monitoring, compliance, and enforcement [2][3]. The Constitution of Ecuador (Art. 395) also guarantees an environmentally balanced and sustainable model of development, explicitly linking natural resource use to the rights of present and future generations [4].

For the small pelagic fishery, these principles are operationalised through the National Action Plan and Fishery Management Plan (PAN/PM, 2021), which sets long-term objectives to "protect, conserve, research and ensure the sustainable use" of small pelagics, applying an ecosystem-based

and precautionary approach [5]. Implementation is evidenced by annual ministerial agreements (2021–2025) that enact precautionary reproductive and recruitment closures, based on IPIAP's updated biological and hydroacoustic data [6–10]. These closures are designed to protect spawning biomass during peak reproduction and safeguard juvenile recruitment, thereby reducing the risk of overexploitation under variable environmental conditions such as ENSO.

Further, the Adaptive Management Plan initiative (Terms of Reference, 2023) shows commitment to advancing toward climate-resilient and flexible fisheries management [11]. This initiative seeks to incorporate environmental indicators, pilot adaptive strategies, and strengthen decision-making processes, aligning Ecuador's fishery management with international best practices for precautionary and ecosystem-based management.

Together, these instruments demonstrate that Ecuador's management system combines a strong legal foundation with transparent, science-based precautionary measures that are actively implemented in the small pelagic fishery.

Clause M1.4 is met.

References

[1] Gobierno del Ecuador. Ley Orgánica para el Desarrollo de la Acuicultura y Pesca (LODAP). Registro Oficial, 2020.
[2] Gobierno del Ecuador. Reglamento General a la Ley Orgánica para el Desarrollo de la Acuicultura y Pesca. 2022.
[3] Gobierno del Ecuador. Decreto Ejecutivo No. 876 – Reforma al Reglamento General de la Ley Orgánica para el Desarrollo de la Acuicultura y Pesca. 2023.
[4] Constitución de la República del Ecuador, Art. 395.
[5] MPCEIP-SRP. Plan de Acción Nacional y Plan de Manejo de la Pesquería de Peces Pelágicos Pequeños del Ecuador (PAN/PM). Acuerdo Ministerial MPCEIP-SRP-2021-0073-A, 2021.
[6] MPCEIP-SRP. Acuerdo Ministerial No. 0241-A – Veda reproductiva PPP 2021–2022.
[7] MPCEIP-SRP. Acuerdo Ministerial No. 0258-A – Veda reproductiva PPP 2022–2023.
[8] MPCEIP-SRP. Acuerdo Ministerial No. 0140-A – Veda de reclutamiento PPP 2023.
[9] MPCEIP-SRP. Acuerdo Ministerial No. 0254-A – Veda reproductiva PPP 2023–2024.
[10] MPCEIP-SRP. Acuerdos Ministeriales Nos. 0222-A, 0233-A, 0280-A y 0022-A – Vedas reproductivas y de reclutamiento PPP 2024–2025.
[11] CNP/Consultoría. Términos de Referencia – Plan de Manejo Adaptativo de la pesquería de PPP. 2023

M1.5	**M1.5**	**There is a clearly defined decision-making process which is transparent, with processes and results made publicly available.** *In reaching a determination for M1.5, the assessor should consider if the following is in place:*
	M1.5.1	There is participatory engagement through which fishery stakeholders and other stakeholders can access, provide information, consult with, and respond to, the management systems' decision-making process.
	M1.5.2	The decision-making process is transparent, with results made publicly available.

	M1.5.3 The fishery management system is subject to periodic internal or external review to validate the decision-making process, outcomes and scientific data.
Outcome	*Pass*

Rationale

Transparency and stakeholder participation are explicitly embedded in Ecuador's fisheries governance. The Small Pelagic Fishes (PPP) Fishery Dialogue Platform (SPFDP), created by Ministerial Agreement MPCEIP-SRP-2020-0054-A, provides a formal mechanism for consultation between government, industry, research institutions, and civil society [1]. Through this platform, stakeholders have participated in the development and updating of the National Action Plan and Fishery Management Plan (PAN/PM, 2021) and in the review of subsequent management measures, including annual closure agreements.

Ministerial agreements and legal instruments (e.g., PAN/PM, annual reproductive and recruitment closures, organizational statutes) are published online by MPCEIP and SRP, ensuring public access to decisions and regulatory frameworks [2]. This accessibility allows stakeholders and the public to follow and review management decisions in real time.

Scientific advice is also transparent. The Public Research Institute of Aquaculture and Fisheries (IPIAP) disseminates its findings through publicly available reports, including the 2023 Accountability Report [3], the 2024 Stock Assessment [4], and hydroacoustic survey results. These publications ensure that the scientific basis for management measures is clear and accessible, supporting evidence-based decision-making.

Together, these instruments and practices demonstrate that Ecuador's decision-making process for the small pelagic fishery is clearly defined, transparent, and participatory, meeting international expectations for inclusive and accountable fisheries governance.

Clause M1.5 is met.

References

[1] MPCEIP-SRP. *Acuerdo Ministerial No. 0054-A – Plataforma de Diálogo para la Pesquería de Peces Pelágicos Pequeños.* 2020.
[2] MPCEIP/SRP. *Portales oficiales de normativa y acuerdos ministeriales.*
[3] IPIAP. *Informe de Rendición de Cuentas.* 2023.
[4] IPIAP. *Informe de Evaluación de la pesquería de PPP.* 2024.

M2 Surveillance, control and enforcement

M2.1	**M2.1**	**There is an organisation responsible for monitoring compliance with fishery laws and regulations.** *In reaching a determination for M2.1, the assessor should consider if the following is in place:*
	M2.1.1	There is an organisation responsible for monitoring compliance with specific monitoring, control and surveillance (MCS) mechanisms in place.
	M2.1.2	There are relevant tools or mechanisms used to minimise IUU fishing activity.

	M2.1.3 There is evidence of monitoring and surveillance activity appropriate to the intensity, geography, management control measures and compliance behaviour of the fishery.
Outcome	*Pass*

Rationale

The *Subsecretaría de Recursos Pesqueros* (SRP) of MPCEIP is the legally mandated authority for fisheries monitoring, control, and surveillance (MCS) under the *Ley Orgánica para el Desarrollo de la Acuicultura y Pesca* (LODAP, 2020) [1] and its *Reglamento General* (2022, reformed 2023) [2][3]. Within SRP, the *Dirección de Control Pesquero* oversees at-sea and portside inspections, enforcement of closures, traceability, and sanctions. The *Centro de Monitoreo Satelital* (CMS) operates 24/7 to monitor the purse-seine fleet targeting small pelagics, generating alerts on closed areas, gear use, and vessel behaviour [4].

Ecuador applies a comprehensive set of tools to deter, prevent, and eliminate IUU fishing, including:

- Satellite vessel monitoring (VMS/CMS) with geo-fencing and alarm systems [4].
- Onboard observer programme (IPIAP, 2020–2024) verifying catch, bycatch, and set type [5].
- Portside inspections and traceability controls, including *Certificados de Monitoreo y Control de Desembarques Pesqueros* (CMCDP) and *Guías de Movilización de Productos Pesqueros* (GMPP), ensuring legal origin and destination [6].
- Prohibition of illegal gear such as the double lower relinga ("antifango") reinforced in 2023 through Circular No. 2023-0020-C; no violations were detected in 2023–2024 [7].
- SIAP (Sistema Integrado de Acuicultura y Pesca) digital traceability platform (since 2023), integrating licensing, logbooks, and inspection processes [3].
- International commitments, including Ecuador's accession to the FAO Port State Measures Agreement (AMERP), bilateral MoUs, and active participation in FiTI [8].

The *Dirección de Control Pesquero* (SRP) and the *Centro de Monitoreo Satelital* (CMS) implement continuous monitoring of the small pelagic fleet. The CMS tracks 100% of the industrial purse seine fleet 24/7(~153 vessels) generating alerts for closed areas, gear use, and abnormal vessel behaviour.

Between October 2023–December 2024, SRP carried out (Table 2):

- 959 + 3,733 closed-season inspections,
- 421 maritime patrols,
- 6,127 land inspections,
- 2,338 observed sets (via IPIAP observer programme), and
- issuance of 152,436 GMPP and 4,375 CMCDP traceability certificates.

This monitoring intensity, combined with full-fleet CMS oversight, is proportionate to the scale and risk profile of the fishery, ensuring effective compliance. **The low number of reported infringements is consistent with SRP enforcement records and Observer Programme compliance data for the PPP purse-seine fleet.**

Clause M2.1 is met.

Table 2 Monitoring actions taken by Dirección de Control Pesquero (SRP) between October 2023 and December2024. Source: [6]

Actividad	2023 (octubre – diciembre)	2024
Acciones de inspecciones y control de veda	959	3733
Operativos marítimos realizados en la pesquería	144	421
Operativos terrestres realizados en la pesquería	1566	6127
Extensionismo de veda	657	2762
Certificados de Monitoreo y Control de Desembarque de Pesca (CMCDP) emitidos	1519	4375
Guías de Movilización de Productos Pesqueros (GMPP) emitidas	43117	152436
Número de lances de pesca monitoreados a bordo de embarcaciones de peces pelágicos pequeños	688	2338

References

[1] Gobierno del Ecuador. *Ley Orgánica para el Desarrollo de la Acuicultura y Pesca (LODAP).* Registro Oficial, 2020.

[2] Gobierno del Ecuador. *Reglamento General a la Ley Orgánica para el Desarrollo de la Acuicultura y Pesca.* 2022.

[3] Gobierno del Ecuador. *Decreto Ejecutivo No. 876 – Reforma al Reglamento General de la Ley Orgánica para el Desarrollo de la Acuicultura y Pesca.* 2023.

[4] MPCEIP-SRP. *Informe Técnico del Centro de Monitoreo Satelital (CMS) – Pesquería de Peces Pelágicos Pequeños.*2024.

[5] IPIAP. *Informe de capturas PPP-MT 2020–2024 (Programa de Observadores).* 2025.

[6] MPCEIP-SRP. *Acciones de Ecuador en la lucha contra la pesca INDNR y acciones de monitoreo, control y fiscalización en la pesquería de PPP (2020–septiembre 2023; octubre 2023–diciembre 2024).*

[7] MPCEIP-SRP. *Circular No. 2023-0020-C – Prohibición de uso de relinga inferior doble ("antifango").* 2023.

[8] FAO. *Informe de la cuarta reunión de las Partes del Acuerdo sobre Medidas del Estado Rector del Puerto (AMERP).*2023.

M2.2	**M2.2 There is a framework of sanctions which are applied when infringements against laws and regulations are discovered.** *In reaching a determination for M2.2, the assessor should consider if the following is in place:*	
	M2.2.1 The laws and regulations provide for penalties or sanctions that are adequate in severity to act as an effective deterrent.	
	M2.2.2 There is no evidence of systematic non-compliance.	
Outcome	*Pass*	
Rationale		

The *Ley Orgánica para el Desarrollo de la Acuicultura y Pesca* (LODAP, 2020) establishes a graduated sanctioning framework for fisheries infringements, ranging from fines of one to 1,500 unified basic wages (SBU) to the confiscation of gear and catch, suspension or cancellation of licences, seizure of vessels, and permanent closure of establishments [1]. The LODAP *Reglamento General* (2022, reformed 2023) details the implementation of this framework, including the Sistema de Puntos for recurring offences [2][3].

The *Acciones INDNR 2020–2024* reports confirm active application of sanctions in the small pelagic fishery, including fines, suspensions, and confiscations [4]. The scale of sanctions (e.g., vessel seizure, multi-million USD penalties in high-profile cases) demonstrates deterrent effect, aligning Ecuador's system with international standards such as the FAO Port State Measures Agreement (AMERP) [5]

Data from the INDNR monitoring reports (2020–Sept 2023; Oct 2023–Dec 2024) show that the number of sanction cases in the small pelagic fleet has declined year-on-year, reflecting increased compliance and deterrence [4]. The recruitment of 224 inspectors and 51 analysts in 2023 strengthened monitoring capacity, ensuring rapid detection and sanctioning of infractions. The European Commission's audits (2020–2023) confirmed Ecuador's progress in improving enforcement and traceability, leading to recognition that the measures in place are effective against IUU fishing [6]. Taken together, the evidence indicates that sanctions are applied consistently and that there is no evidence of systematic non-compliance in the fishery.

Sanction data confirm that infractions are rare relative to the scale of monitoring. In 2023–2024, SRP applied 13 sanctions in the small pelagic fishery (9 in late 2023; 4 in 2024), mostly classified as "*graves"* (serious) and "*muy graves"* (very serious) under LODAP Arts. 213–214 [4] (Table 3).

These occurred within the context of >10,000 inspections and controls, indicating an infraction rate <0.15%. Moreover, no cases of illegal gear use (*doble relinga inferior* or "antifango") were detected in 2023–2024, following reinforced enforcement and inspector training [4].

Combined with the recruitment of 224 inspectors and 51 analysts in 2023 to strengthen MCS capacity, this evidence demonstrates effective deterrence and confirms that non-compliance is not systematic.

The low number of reported infringements is consistent with SRP enforcement records and IPIAP Observer Programme compliance data for the PPP purse-seine fleet, confirming that there is no evidence of systematic non-compliance.

Clause M2.2 is met.

Table 3 Sanctions to small pelagic fishes vessels between October 2023 and December 2024). Source: [4]

Nro. total de expedientes con sanción para barcos de peces pelágicos pequeños	2023 (octubre – diciembre)	2024
Infracciones leves LODAP art. 212	0	0
Infracciones graves LODAP art. 213	1	3
Infracciones muy graves LODAP art. 214	8	1
Total de sanciones	9	4

References

[1] Gobierno del Ecuador. *Ley Orgánica para el Desarrollo de la Acuicultura y Pesca (LODAP).* Registro Oficial, 2020.

[2] Gobierno del Ecuador. *Reglamento General a la Ley Orgánica para el Desarrollo de la Acuicultura y Pesca.* 2022.

[3] Gobierno del Ecuador. *Decreto Ejecutivo No. 876 – Reforma al Reglamento General de la Ley Orgánica para el Desarrollo de la Acuicultura y Pesca.* 2023.

[4] MPCEIP-SRP. *Acciones de Ecuador en la lucha contra la pesca INDNR y acciones de monitoreo, control y fiscalización en la pesquería de PPP (2020–septiembre 2023; octubre 2023–diciembre 2024).*

[5] FAO. *Informe de la cuarta reunión de las Partes del Acuerdo sobre Medidas del Estado Rector del Puerto (AMERP).*2023.

[6] Comisión Europea. *Auditorías de seguimiento a Ecuador en el marco de la tarjeta amarilla INDNR.* 2020–2023.

M2.3	**M2.3 There is substantial evidence of widespread compliance in the fishery, and no substantial evidence of IUU fishing.** *In reaching a determination for M2.3, the assessor should consider if the following is in place:*	
	M2.3.1	The level of compliance is documented and updated routinely, statistically reviewed and available.
	M2.3.2	Fishers provide additional information and cooperate with management/enforcement agencies/organisations to support the effective management of the fishery.
	M2.3.3	The catch recording and reporting system is sufficient for effective traceability of catches per vessel and supports the prevention of IUU fishing.
Outcome	*Pass*	

Rationale

The European Commission's audits (2020–2023) confirmed Ecuador's regulatory reforms, traceability systems, and improved MCS capacity, recognizing effectiveness against IUU fishing [1].

Domestically, sanction cases have declined since 2020 (2020–2023 INDNR report) [2]. In 2023–2024, only 13 sanctions were applied among >10,000 inspections, indicating very low infraction

rates [3]. No cases of *antifango* gear were detected in the small pelagic fleet, reflecting successful enforcement [3]. These outcomes demonstrate deterrence and high compliance.

At the international level, Ecuador presides over the FAO Port State Measures Agreement (AMERP) 2023–2025, leads the FiTI International Board (2023–2025), and makes its industrial fleet VMS data public through Global Fishing Watch, enhancing transparency and cooperation [4][5].

Therefore, there is no substantial evidence of widespread non-compliance or IUU fishing in the small pelagic fishery.

Clause M2.3 is met.

References
[1] Comisión Europea. *Auditorías de seguimiento a Ecuador en el marco de la tarjeta amarilla INDNR.* 2020–2023.
[2] MPCEIP-SRP. *Acciones de Ecuador en la lucha contra la pesca INDNR y acciones de monitoreo PPP (2020–sept 2023).*
[3] MPCEIP-SRP. *Acciones de Ecuador en la lucha contra la pesca INDNR y acciones de monitoreo PPP (oct 2023–dic 2024).*
[4] FAO. *Informe de la cuarta reunión de las Partes del Acuerdo sobre Medidas del Estado Rector del Puerto (AMERP).*2023.
[5] FiTI. *Comunicado: Ecuador asume la Presidencia de la Junta Internacional de FiTI 2023–2025.*

Species requirements

This section, or module, comprises of four species categories. Each species in the catch is subject to an assessment against the relevant species category in this section (see clauses 1.2 and 1.3 and Table 6).

Type 1 species can be considered the 'target' or 'main' species in the fishery under assessment. They make up the bulk of the catch and a subjected to a detailed assessment. Type 1 species must represent 95% of the total annual catch. If a species-specific management regime is in place for a Type 1 species, it shall be assessed under Category A. If there is no species-specific management regime in place for a Type 1 species, it shall be assessed under Category B.

Type 2 Species can be considered the 'non-target' species in the fishery under assessment. They comprise a small proportion of the annual catch and are subjected to a relatively high-level assessment. Type 2 species may represent a maximum of 5% of the annual catch. If a species-specific management regime is in place for a Type 2 species, it shall be assessed under Category C. If there is no species-specific management regime in place for a Type 2 species, it shall be assessed under Category D.

Species that comprise less than 0.1% of the catch are not required to be assessed or listed here.

Category A species

2.1. All clauses must be met for a species to pass the Category A assessment.

2.1.1. If a species fails any of the Category A clauses, it should be re-assessed as a Category B species.

A1 Data collection – *Scomber japonicus*

A1.1	**A1.1 Landings data are collected such that the fishery-wide removals of this species are known.**
Outcome	*Pass*

Rationale

***Scomber japonicus* - Pacific chub mackerel ("*Macarela*" or "*Morenillo*", in Spanish)**
Landings data from 1981 and onwards are available in IPIAP website and have been used for stock assessments of small pelagics fishes: https://institutopesca.gob.ec/peces-pelagicos-pequenos/

Removals of *Scomber japonicus* are recorded through licensing by the *Subsecretaría de Recursos Pesqueros* (SRP, Undersecretariat of Fisheries Resources) of the *Ministerio de Producción, Comercio Exterior, Inversiones y Pesca* (MPCEIP, Ministry of Production, Foreign Trade, Investments and Fisheries). Traceability is ensured through the *Control y Monitoreo de la Descarga Pesquera* (CMCDP, Fisheries Landing Monitoring and Control System) and the *Guía de Movilización de Productos Pesqueros* (GMPP, Fisheries Products Transport Permit). Independent verification is provided by the Instituto Público de Investigación de Acuicultura y Pesca (IPIAP, Public Research Institute of Aquaculture and Fisheries) Observer Programme. Across 2020–2024, *S. japonicus* accounted for 67.50% of authorised-set catch (mean 2020–2024; Table 4) [1].

For fleet-wide context (all small-pelagic landings, not restricted to fishmeal-authorised sets), IPIAP compiles historical and recent landings series. The 2024 stock assessment [2] presents an updated time series (1975–2023) showing that landings of *S. japonicus* were relatively high during 1975–1995, then declined substantially, with fluctuations thereafter (Figure 1).

The same assessment provides a breakdown of landings for 2015–2023 (Figure 2), where *S. japonicus* contributed on average 42% of total small-pelagic landings, confirming its dominant role, followed by *Auxis* spp. (25–26%) and *Decapterus macrosoma* (≈12–13%). In 2022, fleet-wide landings of mackerel reached 158,121.40 t, followed by a relative decline in 2023.

Additionally, updated SRP fleet panels for 2021–2024 (Table 5) corroborate this recent decline in the fleet-wide share of mackerel [3].

Together, these datasets demonstrate that landings are systematically collected, reconciled across multiple sources, and that fishery-wide removals of *S. japonicus* are known. A1.1 is met.

Table 4 Species composition of authorised fishmeal small pelagic fish sets, 2020–2024. Source: IPIAP Observer Programme [1].

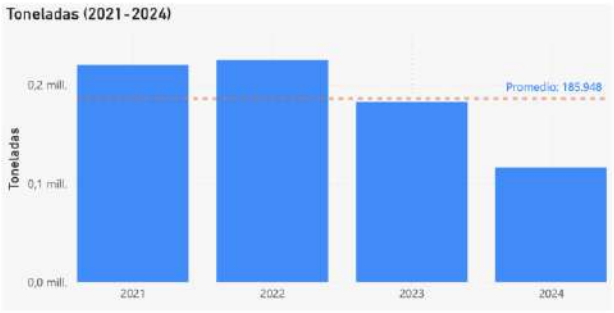
Nº	Especie	Nombre común	Composición de la captura (%)
1	*Scomber japonicus*	Macarela, morenillo	67.50%
2	*Auxis* spp.	Botella, melva	23.95%
3	*Decapterus macrosoma*	Picudillo	6.29%
4	*Cetengraulis mysticetus*	Chuhueco	0.73%
5	*Etrumeus acuminatus*	Sardina redonda	0.57%
6	*Prionotus stephanophrys*	Gallineta	0.24%
7	*Peprilus medius*	Chazo	0.15%
8	*Prionotus albirostris*	Gallineta	0.13%

Table 5 Fleet-wide landings of small pelagic fish (coastal purse-seine), 2021–2024, by species. Source: MPCEIP-SRP [3].

Flota cerquera costera

Desembarques de pelágicos pequeños
Toneladas (2021-2024)

ESPECIES	2021	2022	2023	2024
MACARELA	164.707	158.121	54.931	29.496
BOTELLA	30.972	40.133	40.108	76.188
PICUDILLO	15.587	12.348	52.403	9.558
PINCHAGUA	7.127	22.064	7.742	32.657
ANCHOVETA	13	55	24.126	
CHUHUECO	6.184	9.250	8.210	294
SARDINA REDONDA	2.679	4.906	1.192	359
ROLLIZO	164	66	1.332	119
SARDINA DEL SUR		119		
JUREL	1	27	6	84
ANCHOA	3	5	49	0
Total	**227.436**	**247.096**	**190.098**	**148.753**



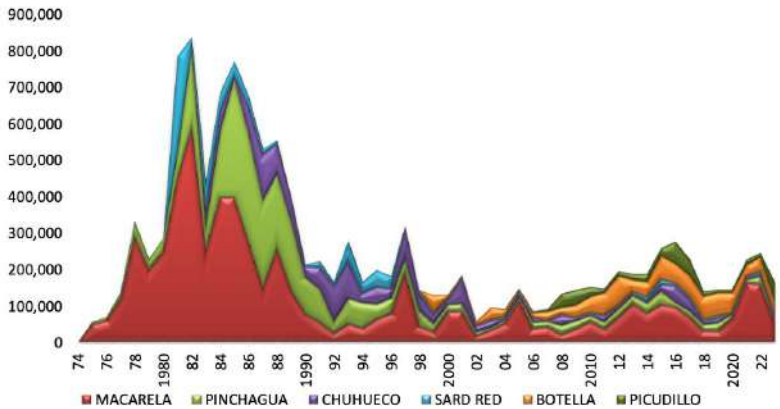


Figure 1 Landings of the main small pelagic species in Ecuador, 1975–2023. Source: Canales, C. M. & Jurado, V. (2024). IPIAP Technical Report [2].

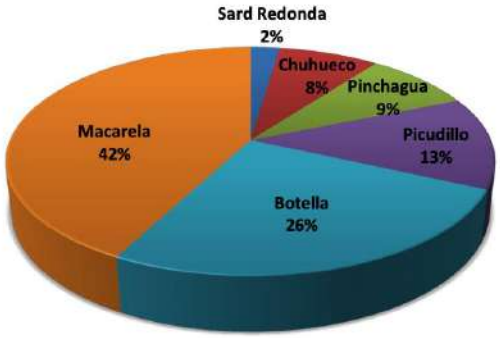


Figure 2 Percentage share of landings of the main small pelagic species in Ecuador, 2015–2023. Scomber japonicus contributed on average 42% of total small-pelagic landings. Source: Canales, C. M. & Jurado, V. (2024). IPIAP Technical Report [2].

References

[1] IPIAP. *Informe de capturas PPP-MT 2020–2024 (Observer Programme; Table 10).* 2025.
[2] Canales, C. M. & Jurado, V. (2024). *Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023. Informe Técnico IPIAP.* Guayaquil, May 2024, 150 p.
[3] MPCEIP-SRP. *Flota cerquera costera — Panel de desembarques de pelágicos pequeños 2021–2024, by species.*

A1.2	**A1.2 Sufficient additional information is collected to enable an indication of stock status to be estimated.**
Outcome	*Pass*

Rationale

Additional information beyond landings is systematically collected for Pacific chub mackerel (*Scomber japonicus*). The *Instituto Público de Investigación de Acuicultura y Pesca* (IPIAP) implements both fisheries-dependent and fisheries-independent data collection.

From the Observer Programme, species composition of authorised mackerel-associated sets has been monitored between 2020–2024. This dataset confirms that mackerel consistently dominates authorised landings, allowing analysis of fleet dynamics and catch composition (Table 4) [2].

In addition, IPIAP conducts hydroacoustic research cruises to estimate biomass and map distribution. The most recent cruise (Crucero IPIAP 2025-02-01 PPP, February 2025) estimated a total biomass of 226,272 t for small pelagics, of which *S. japonicus* contributed 68,329 t (30.2%) (Table 6). The survey further documented horizontal and vertical distribution patterns of mackerel, showing that biomass was concentrated offshore (>8 nm) and predominantly in the upper 200 m of the water column (Figure 3).

Together, these datasets provide robust indicators of biomass, catch composition, and stock distribution, which are essential inputs for stock assessment and management measures such as biological and recruitment closures. A1.2 is met.

Table 6 Hydroacoustic biomass estimate, February 2025. Total small-pelagic biomass = 226,272 t; S. japonicus contributed 68,329 t (30.2%); 85.8% of biomass was located >8 nm offshore. Source: IPIAP [1].

Transecto	Latitud	Longitud inicial	Longitud final	Botella	Macarela	Sardina Redonda	Pinchagua	Picudillo	Chuhueco	Biomasa (t)
1	02°00'S	81°14'O	80°50'O		22.693	16.887	59	17.910		57.550
2	02°10'S	80°52'O	81°14'O	3.539			12.912			16.451
3	02°20'S	81°14'O	80°55'O	6.059			1.459			7.518
4	02°30'S	80°40'O	81°10'O		7.670		7.686			15.356
5	02°40'S	81°08'O	80°30'O	2.085			429			2.514
6	02°50'S	80°25'O	81°10'O	18.754			13.703		10.937	43.395
7	03°00'S	81°08'O	80°30'O		1.319		5.517		7.355	14.191
8	03°10'S	80°10'O	81°08'O	10.078	34.463					44.541
9	03°20'S	81°10'O	80°25'O	15.828	2.184		5.680		1.065	24.756
Totales				56.343	68.329	16.887	47.445	17.910	19.357	226.272
			%	**24,9**	**30,2**	**7,5**	**21,0**	**7,9**	**8,6**	**100,0**

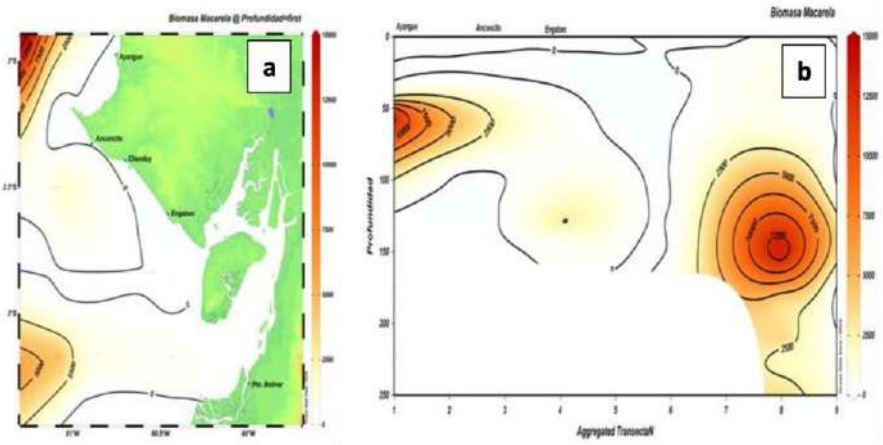


Figure 3 Hydroacoustic biomass estimates of Scomber japonicus and other small pelagic species (February 2025). Source: IPIAP [1].

References

[1] Instituto Público de Investigación de Acuicultura y Pesca (IPIAP). (2025). *Informe del Crucero Hidroacústico 2025-02-01 PPP. Evaluación de biomasa y distribución de peces pelágicos pequeños.* Guayaquil, Ecuador, February 2025.

[2] Instituto Público de Investigación de Acuicultura y Pesca (IPIAP). (2025). *Informe de capturas PPP-MT 2020–2024 (Observer Programme; Table 10*

A1 Data collection – *Auxis spp*

A1.1	**A1.1 Landings data are collected such that the fishery-wide removals of this species are known.**
Outcome	*Pass*

Rationale

Some figures and tables were presented for previous species. Please refer to scoring tables above for the figures and tables referenced in this section.

***Auxis spp* – Frigate tunas ("*Botella*" in Spanish)**

Landings data from 1981 and onwards are available in IPIAP website and have been used for stock assessments of small pelagic fishes in Ecuador: https://institutopesca.gob.ec/peces-pelagicos-pequenos/

Landings of *Auxis spp.* are systematically recorded through the IPIAP Observer Programme and factory databases. In the 2020–2024 authorised set dataset, *Auxis spp.* contributed 23.95% of the total catch (Table 4) [1]. Fleet-wide landings of small pelagics, including *Auxis spp.*, are also reported in the MPCEIP/IPIAP annual series (1975–2023) [2] (Figure 1 and Figure 2). These data sources ensure that fishery-wide removals are known. A1.1 is met.

References

[1] IPIAP. *Informe de capturas PPP-MT 2020–2024 (Observer Programme; Table 10).* 2025.
[2] Canales, C. M. & Jurado, V. (2024). *Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023. Informe Técnico IPIAP.* Guayaquil, May 2024, 150 p.
[3] MPCEIP-SRP. *Flota cerquera costera — Panel de desembarques de pelágicos pequeños 2021–2024, by species.*

A1.2	**A1.2 Sufficient additional information is collected to enable an indication of stock status to be estimated.**
Outcome	*Pass*

Rationale

Some figures and tables were presented for previous species. Please refer to scoring tables above for the figures and tables referenced in this section.

Additional information on Auxis spp. (botella) is collected through a combination of fisheries-independent and fisheries-dependent monitoring, providing an indicative basis for evaluating stock status:

- The February 2025 hydroacoustic survey (Crucero IPIAP 2025-02-01 PPP) estimated Auxis spp. biomass at 56,343 t, representing 24.9 % of the total small-pelagic assemblage biomass (226,272 t) (Table 6) [1]
- The same survey documented horizontal and vertical distributions, showing three main offshore aggregation zones (Santa Elena, the continental shelf edge, and the Peru border) with highest densities between 50–175 m depth (Figure 4) [1].
- Historical landing data (1975–2023) illustrate long-term variability in Auxis spp. abundance, with a general rebuilding trend since the mid-2010s (Table 5; Figure 1) [2][3].

These fisheries-independent biomass estimates, combined with long time-series of landings and observer sampling, provide a credible indication of relative stock condition and trends over time.

However, this information remains less robust than for Scomber japonicus because dedicated age-structured assessments for Auxis spp. were only recently introduced (2023–2024), and species-specific reference points (B MSY, F MSY) are still preliminary. Hydroacoustic surveys integrate the multi-species assemblage, so species attribution relies partly on trawl sampling rather than direct

acoustic discrimination. Consequently, the quantitative precision of biomass and fishing-mortality indicators for Auxis spp. is lower than for the indicator stock (S. japonicus).

Despite these limitations, the available datasets—hydroacoustic, observer, and landings—allow a scientifically defensible indication of stock status, fulfilling the intent of clause A1.2.

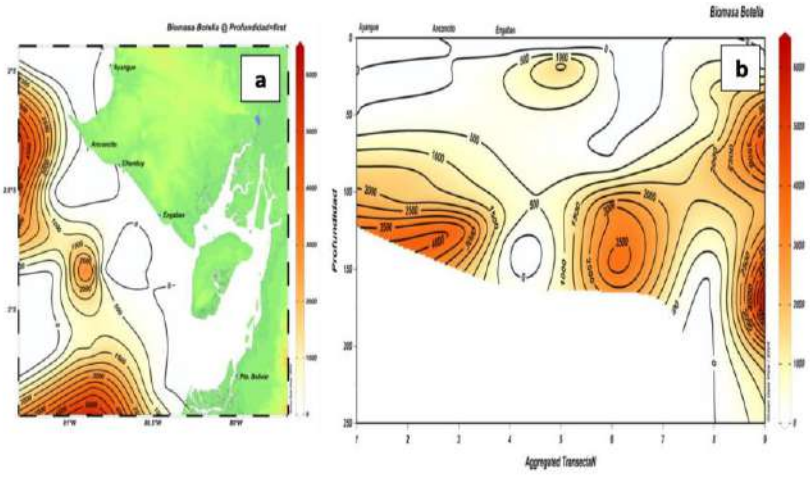


Figure 4 Horizontal (a) and vertical (b) distribution of Auxis spp. biomass, IPIAP hydroacoustic survey PPP-02-01, February 2025. Source: IPIAP [1].

References

[1] Instituto Público de Investigación de Acuicultura y Pesca (IPIAP). (2025). *Informe del Crucero Hidroacústico 2025-02-01 PPP. Evaluación de biomasa y distribución de peces pelágicos pequeños.* Guayaquil, Ecuador, February 2025.
[2] Instituto Público de Investigación de Acuicultura y Pesca (IPIAP). (2025). *Informe de capturas PPP-MT 2020–2024 (Observer Programme; Table 10*
[3] MPCEIP-SRP. *Flota cerquera costera — Panel de desembarques de pelágicos pequeños 2021–2024, by species.*

A1 Data collection – *Decapterus macrosoma*

A1.1	**A1.1**	**Landings data are collected such that the fishery-wide removals of this species are known.**
Outcome	*Pass*	

Rationale

Some figures and tables were presented for previous species. Please refer to scoring tables above for the figures and tables referenced in this section.

***Decapterus macrosoma* – Shortfin scad ("*Picudillo*" in Spanish)**
Landings data from 1981 and onwards are available in IPIAP website and have been used for stock assessments of small pelagics fishes in Ecuador: https://institutopesca.gob.ec/peces-pelagicos-pequenos/

Landings of *D. macrosoma* ("*picudillo*") are systematically recorded through the IPIAP Observer Programme and factory databases since 1974 (Figure 1). In the 2020–2024 authorised set dataset, *D. macrosoma* contributed 6.29% of the total catch (Table 1) [1]. Fleet-wide landings of small pelagics, including D. macrosoma, are also reported in the MPCEIP/IPIAP annual series (1975–2023) [2] (Table 5 and Figure 2). These data sources ensure that fishery-wide removals are known. A1.1 is met.

References
[1] IPIAP. *Informe de capturas PPP-MT 2020–2024 (Observer Programme; Table 10).* 2025.
[2] Canales, C. M. & Jurado, V. (2024). *Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023. Informe Técnico IPIAP.* Guayaquil, May 2024, 150 p.
[3] MPCEIP-SRP. *Flota cerquera costera — Panel de desembarques de pelágicos pequeños 2021–2024, by species*

A1.2	**A1.2 Sufficient additional information is collected to enable an indication of stock status to be estimated.**
Outcome	*Pass*

Rationale
Some figures and tables were presented for previous species. Please refer to scoring tables above for the figures and tables referenced in this section.

Additional information on *D. macrosoma* ("*picudillo*") is collected through fisheries-independent surveys and biological monitoring:

- The February 2025 hydroacoustic cruise (Crucero IPIAP 2025-02-01 PPP) estimated biomass of *D. macrosoma* at 17,910 t (7.9% of total biomass = 226,272 t) (Table 5) [1].
- The same survey mapped horizontal and vertical distributions, showing *picudillo* forming coastal aggregations north of Punta Bolívar (panel a), with vertical concentrations in the upper 50–100 m of the water column (panel b) (Figure 5) [1].
- Observer Programme data (2020–2024) confirm that *D. macrosoma* regularly appears in authorised sets, averaging 6.29% of landings [2].
- Historical landings (1975–2023) also document fluctuations in *D. macrosoma* abundance, with peaks during upwelling years and declines in warm ENSO phases (Table 6, Figure 1) [3]

These complementary datasets provide sufficient information to indicate the stock status of *D. macrosoma*. While less abundant than *S. japonicus* or *Auxis spp.*, the monitoring framework ensures consistent tracking. A1.2 is met.

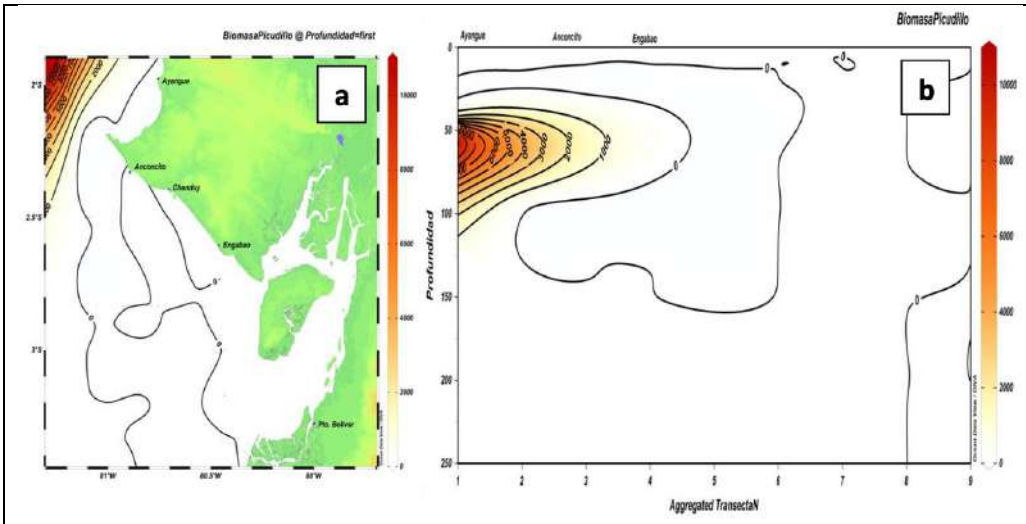


Figure 5 Horizontal (a) and vertical (b) distribution of D. macrosoma biomass, IPIAP hydroacoustic survey PPP-02-01, February 2025. Source: IPIAP [1].

References

[1] IPIAP. (2025). *Informe Crucero Hidroacústico 2025-02-01 PPP. Evaluación de biomasa y distribución de peces pelágicos pequeños.*

[2] IPIAP. (2025). *Informe de capturas PPP-MT 2020–2024 (Programa de Observadores; Tabla 10).*

[3] Canales, C. M. & Jurado, V. (2024). *Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023. Informe Técnico IPIAP.*

A2 Stock assessment – *Scomber japonicus*

A2.1	**A2.1**	**A stock assessment is conducted at least once every 3 years (or every 5 years if there is substantial supporting information that this is sufficient for the long-term sustainable management of the stock) and considers all fishery removals and the biological characteristics of the species.**
Outcome	*Pass*	

Rationale

Some figures and tables were presented for previous species. Please refer to scoring tables above for the figures and tables referenced in this section.

The most recent hydroacoustic survey (February 2025) estimated *S. japonicus* biomass at 68,329 t (30.2% of total = 226,272 t) [3] (Table 6).

The *Instituto Público de Investigación de Acuicultura y Pesca* (IPIAP) has conducted annual stock assessments since 2020, with technical reports published openly available on their website from 2020 onwards (https://institutopesca.gob.ec/peces-pelagicos-pequenos/) [1][2]. The assessments integrate (Table 7):

- biological sampling and size structures of catches,
- abundance indices from acoustic surveys,
- landings statistics and observer data, and

- analytical models using biological reference points.

Because these stock assessments are annual and species-specific, they exceed the MarinTrust requirement of once every three years. A2.1 is met.

Table 7 Comparative table of diagnostic indicators of small pelagic stocks in Ecuador 2017-2023. Source: IPIAP [2]

		Recurso						
Año	Razón	Botella	Macarela	Picudillo	Chuhueco	Sardina	Pinchagua	Promedio
2017	B/B_{RMS}	0.28	0.58	0.15	0.43	0.08	0.80	0.38
	F/F_{RMS}	4.25	1.84	0.20	0.56	0.07	1.57	1.42
2019	B/B_{RMS}	1.15	0.73	0.35	0.35	0.68	1.03	0.71
	F/F_{RMS}	0.69	0.24	0.76	0.95	0.67	0.38	0.62
2020	B/B_{RMS}	0.95	0.78	0.23	1.38	0.58	1.10	0.83
	F/F_{RMS}	2.04	1.03	2.45	0.14	0.27	0.16	1.02
2021	B/B_{rms}	0.99	0.91	0.88	1.28	0.98	0.98	1.00
	F/F_{RMS}	1.10	1.22	0.45	0.31	0.27	0.35	0.62
2022	B/B_{RMS}	0.34	0.91	1.14	1.31	1.90	1.27	1.15
	F/F_{RMS}	3.82	1.17	0.25	0.46	0.44	0.31	1.08
2023	B/B_{RMS}	1.07	0.94	2.19	2.38	1.40	1.23	1.51
	F/F_{RMS}	0.90	0.36	0.81	0.12	0.15	0.18	0.45

References

[1] IPIAP. (2023). *Informe de Evaluación del Stock de Recursos Pelágicos Pequeños del Ecuador 2023.*

[2] IPIAP. (2024). *Informe de Evaluación del Stock de Recursos Pelágicos Pequeños del Ecuador 2024.*

[3] IPIAP. (2025). *Informe Crucero Hidroacústico 2025-02-01 PPP.*

A2.2	**A2.2**	**The assessment provides an estimate of the status of the biological stock relative to a reference point or proxy.**
Outcome	*Pass*	

Rationale

Some figures and tables were presented for previous species. Please refer to scoring tables above for the figures and tables referenced in this section.

The Ecuadorian small pelagic stock assessment applies biological reference points to evaluate *Scomber japonicus* (Pacific chub mackerel). The target reference point is defined as 40% of the virgin spawning biomass (B_0) and its corresponding fishing mortality (FMSY = F40%), with limit reference points at 50% of these values (Blim = 0.5 BMSY; Flim = 0.5 FMSY) [1]).

The most recent IPIAP assessment (Canales & Jurado, 2024 [1]) estimated for 2023 (Table 8):

- Adult biomass: 352,837 t
- B/BMSY = 0.94
- B/B_0 = 0.38

- F/FMSY = 0.36

These values show biomass slightly below the BMSY proxy but above the limit reference point, while fishing mortality is well below FMSY, suggesting the stock is sustainably exploited.

Time series analyses under alternative model scenarios (Figure 6) confirm that biomass has fluctuated around the MSY proxy (~40% B_0 ≈ 300,000 t) since the early 2000s, while recruitment has shown recovery in recent years. This consistency across scenarios strengthens confidence in the assessment outcomes.

Together, Table 8, Figure 6 and Figure 7 demonstrate that the assessment provides a robust estimate of stock status relative to biological reference points. A2.2 is met.

Table 8 Estimated adult biomass, recruitment, fishing mortality, reduction of virgin spawning biomass, and spawning potential ratio (SPR) of Pacific chub mackerel (Scomber japonicus) in Ecuador, 2001–2023. Source: Canales C. M. & Jurado V. (2024). Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023. Informe Técnico IPIAP, Guayaquil, mayo 2024, 150 p. [1])

Año	Biomasa	R_R0	Fcr	F_Fmrs	B_Brms	B_B0	SPR
2001	833247	0.39	0.11	0.32	2.22	0.89	0.8
2002	676180	0.95	0.03	0.08	1.8	0.72	0.76
2003	584895	0.64	0.06	0.17	1.56	0.62	0.78
2004	528133	1.28	0.08	0.25	1.41	0.56	0.79
2005	529994	0.48	0.2	0.59	1.41	0.56	0.78
2006	510254	0.49	0.06	0.17	1.36	0.54	0.72
2007	583681	0.64	0.07	0.21	1.55	0.62	0.75
2008	558114	1.32	0.04	0.11	1.49	0.59	0.75
2009	532321	0.51	0.06	0.18	1.42	0.57	0.78
2010	559195	0.62	0.07	0.23	1.49	0.6	0.8
2011	623277	1.16	0.05	0.17	1.66	0.66	0.81
2012	609018	1.08	0.07	0.22	1.62	0.65	0.81
2013	598166	0.88	0.15	0.45	1.59	0.64	0.8
2014	623948	0.49	0.14	0.43	1.66	0.66	0.77
2015	647471	0.56	0.16	0.49	1.72	0.69	0.74
2016	603937	0.46	0.17	0.53	1.61	0.64	0.7
2017	512977	0.81	0.15	0.46	1.37	0.55	0.65
2018	451723	0.58	0.07	0.21	1.2	0.48	0.64
2019	450408	0.89	0.03	0.08	1.2	0.48	0.68
2020	495742	0.62	0.12	0.37	1.32	0.53	0.76
2021	482873	0.95	0.32	0.97	1.28	0.51	0.74
2022	408074	0.81	0.38	1.14	1.09	0.43	0.6
2023	352837	1	0.12	0.36	0.94	0.38	0.51

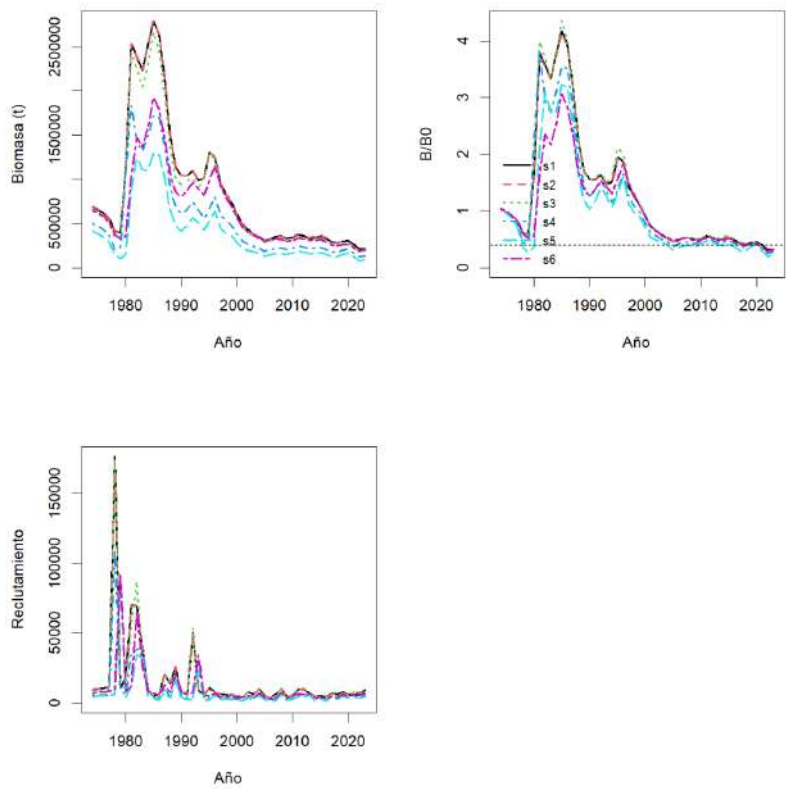


Figure 6 Adult biomass, population reduction (B/B0), and recruitment of Pacific chub mackerel (Scomber japonicus) in Ecuador under alternative assessment scenarios, 1975–2023. Source: Canales C. M. & Jurado V. (2024). Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023. Informe Técnico IPIAP, Guayaquil, mayo 2024, 150 p.

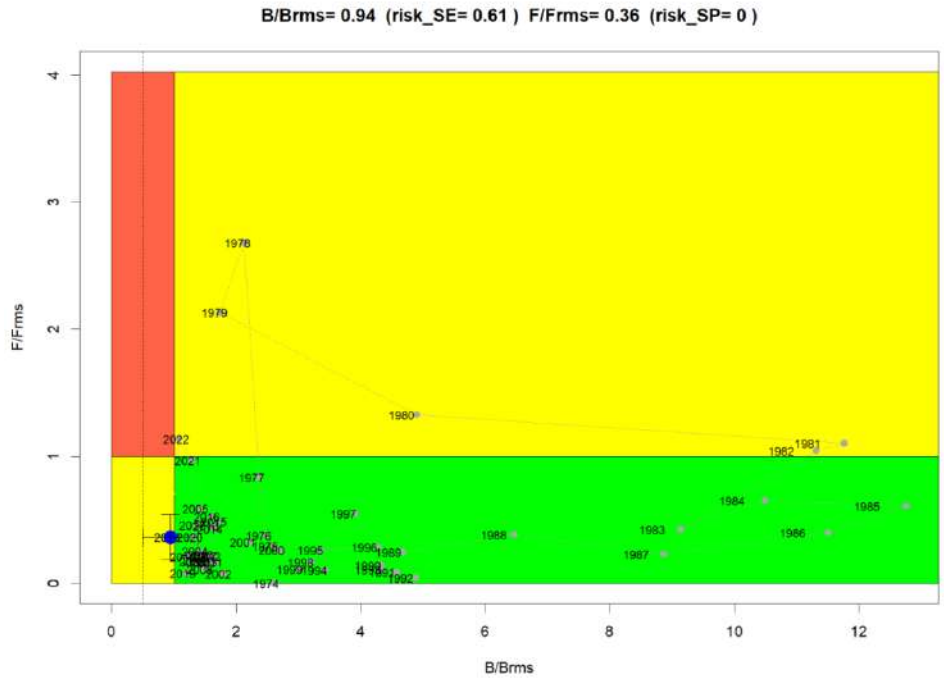


Figure 7 Kobe diagram for Pacific chub mackerel (Scomber japonicus) in Ecuador showing relative biomass and fishing mortality in units of the assessment's MSY reference points. The most recent point indicates B/BMSY = 0.94 and F/FMSY=

0.36 (labelled), with historical trajectory dots by year. Green = not overfished & no overfishing (B ≥ BMSY and F ≤ FMSY); yellow = either B < BMSY or F > FMSY; red (left band) = biomass below the limit proxy. Source: Canales C. M. & Jurado V. (2024). Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023. Informe Técnico IPIAP, Guayaquil, mayo 2024, 150 p. [1])

References

[1] IPIAP. (2024). *Informe de Evaluación del Stock de Recursos Pelágicos Pequeños del Ecuador 2024.*

A2.3	**A2.3 The assessment provides an indication of the volume of fishery removals which is appropriate for the current stock status.**
Outcome	*Pass*

Rationale

Some figures and tables were presented for previous species. Please refer to scoring tables above for the figures and tables referenced in this section.

The 2023 stock assessment for *Scomber japonicus*, conducted by the Instituto Público de Investigación de Acuicultura y Pesca (IPIAP) (Canales & Jurado, 2024 [1]), applied an age-structured population model (MESTOCKT, ADMB platform) using updated biological parameters for growth, maturity, and natural mortality. The model adopted the reference proxies B MSY ≈ 0.4 B_0 and FMSY≈ F_{40}%, following internationally accepted practice [1].

Model outputs estimated spawning biomass at 36 % B_0 and fishing mortality at F/F MSY= 0.36, confirming exploitation levels well below the target reference point and a biomass close to the management objective (Figure 8; Table 8) [1]. Sensitivity and retrospective diagnostics indicated very low bias (ρ < 0.2), confirming the robustness of the 2023 model.

Based on the projection scenarios presented in the assessment (Figure 8; Table 8; [1]), maintaining total catches at or below 160 000 t yr^{-1} is projected to keep the population above B MSY and F < F MSY whereas removals exceeding approximately 190 000 t yr^{-1} would increase fishing mortality beyond the sustainable limit. This provides a quantitative indication of the volume of removals appropriate for the current stock status, as required under clause A2.3.

Independent expert review of the 2023 assessment (Cubillos, 2024 [4]) confirmed these conclusions, noting that chub mackerel (*S. japonicus*) exhibits low F relative to F< MSY, biomass around the management target, and no evidence of overfishing or recruitment collapse (Figure 7) [1]. The review described the assessment model as “a high-standard, robust, and flexible population-based framework” suitable for ongoing management of Ecuadorian small pelagic resources.

Hydroacoustic surveys conducted in 2025 estimated *S. japonicus* biomass at 68 329 t (30.2 % of the small-pelagic assemblage) [2], consistent with the assessment trend. Observed landings data from the MPCEIP-SRP (2024) Panel de Desembarques de Pelágicos Pequeños 2021–2024 confirm that total removals remain within the model’s sustainable range (Table 5) [3].These data show that total landings averaged ≈ 160 000 t yr^{-1}, dominated by *S. japonicus* (≈ 68 % of the

assemblage). This observed catch level aligns closely with the sustainable-catch range projected by the model, confirming that current removals are consistent with the stock's sustainable yield.

In addition, the long-term time series of spawning biomass and spawning potential ratio (SPR) (Supporting Figure 9 [1]) further show that biomass and reproductive capacity have remained stable at levels consistent with the management objective ($B/B_0 \approx 0.36$; SPR ≈ 0.5). This contextual evidence reinforces the conclusion that the population is being maintained near its target reference point and that the current removals are sustainable.

Taken together, the 2023 stock assessment projections, the 2024 independent technical review, and the 2025 hydroacoustic survey demonstrate that current removals are consistent with sustainable exploitation levels and appropriate for the stock status. A2.3 is met.

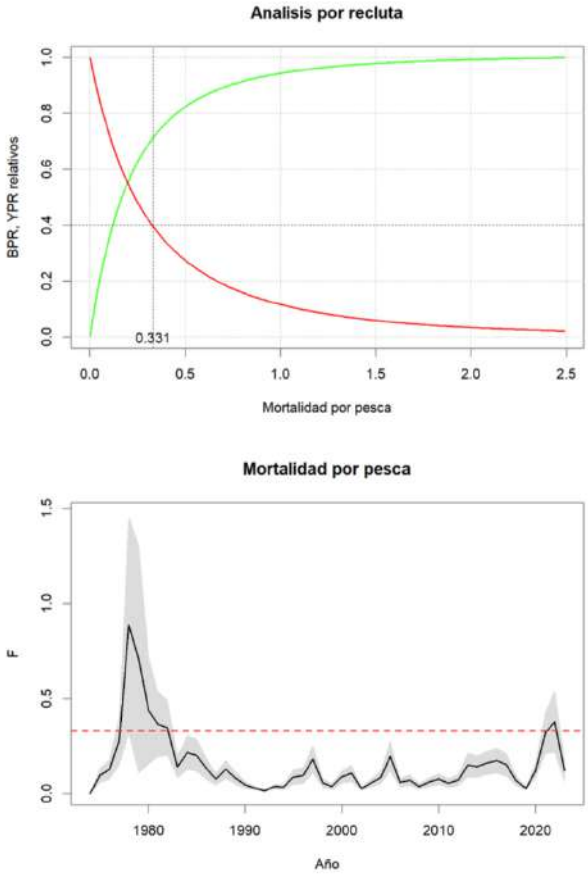


Figure 8 Equilibrium yield-per-recruit and spawning biomass-per-recruit curves (top), and annual fishing mortality of chub mackerel (Scomber japonicus) (bottom). The intersection defines $F_{40}\% \approx 0.33\ yr^{-1}$, adopted as F MSY The time series show that recent fishing mortality remains well below the reference level (F/ FMSY= 0.36), consistent with a sustainable level of removals. Source: IPIAP (2024), Stock Assessment Report of Ecuadorian Small Pelagic Resources 2023, Figure M17.

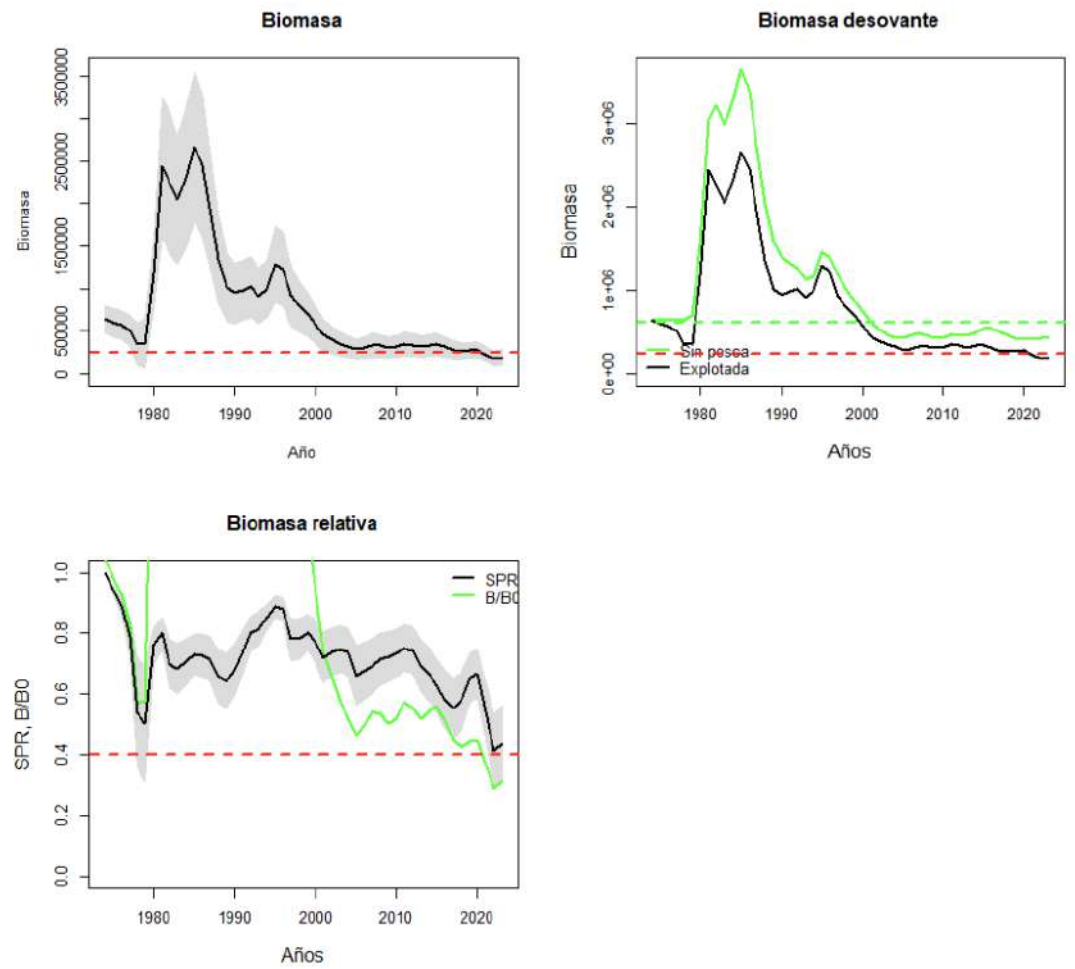


Figure 9 Annual variation in total and spawning biomass, with and without fishing, and relative spawning potential ratio (SPR) for chub mackerel (Scomber japonicus). The 2023 assessment estimates spawning biomass at approximately 36 % B_0 and SPR ≈ 0.5, consistent with the reference level derived in the model (B MSY ≈ 0.4 B_0). These indicators corroborate that the stock is near its management target and that current removals are sustainable. Source: IPIAP (2024), Stock Assessment Report of Ecuadorian Small Pelagic Resources 2023, Figure M18.

References

[1] IPIAP (2024). Informe de Evaluación del Stock de Recursos Pelágicos Pequeños del Ecuador 2023. Guayaquil: Instituto Público de Investigación de Acuicultura y Pesca.

[2] IPIAP (2025). Informe Crucero Hidroacústico 02_01_2025 PPP-final.

[3] MPCEIP-SRP (2024). Panel de desembarques de pelágicos pequeños 2021–2024. Subsecretaría de Recursos Pesqueros.

[4] Cubillos, L.A. (2024). Revisión de la evaluación de peces pelágicos en Ecuador, año 2023. Boletín Técnico CEPMAR,4(2): 1–13. Centro de Evaluación Pesquera y Manejo de Recursos SpA, Concepción, Chile.

A2.4	**A2.4 The assessment is subject to internal or external peer review.**

Outcome	*Pass*

Rationale

Since 2019, the Ecuadorian small-pelagic stock assessments conducted by the Instituto Público de Investigación de Acuicultura y Pesca (IPIAP) have been consistently subjected to internal and external scientific review.

The first external evaluation was carried out by Minte-Vera (2019) [1] under the Sustainable Fisheries Partnership (Global Marine Commodities project), providing recommendations on data quality and model structure for the initial Canales et al. (2019) assessment.

Following this, Canales et al. (2020) [2] and Canales & Jurado (2021) [3] produced revised assessments that implemented these improvements, including environmental covariates and refined growth and maturity parameters.

The 2022 assessment was independently reviewed by Cubillos & Cuevas (2022) [4], who analysed the updated population models and advised further refinements to sensitivity analyses and acoustic-index calibration.

The 2023 assessment (Canales & Jurado, 2024) received a new external scientific peer review by Cubillos (2024) [5], published in the Boletín Técnico CEPMAR (Vol. 4[2]: 1–13). This review evaluated all small-pelagic species models, verified diagnostic consistency ($\rho < 0.2$), and concluded that *Scomber japonicus* shows low fishing mortality relative to F MSY and biomass at the management target—confirming that the IPIAP framework meets a high scientific standard.

In addition, all recent IPIAP assessments (2023–2024) [6][7] underwent internal technical review through the IPIAP Scientific–Technical Committee (Comité Técnico Científico) and were discussed through the SPFDP stakeholder platform (Subcomité de Pelágicos Pequeños), ensuring both institutional and stakeholder scrutiny.

These successive reviews demonstrate a continuous process of internal validation and external expert oversight since 2019. A2.4 is met.

References

[1] Minte-Vera, C. (2019). *Revisión de las evaluaciones de stocks de pelágicos pequeños del Ecuador.*

[2] Canales, C. M., Jurado, V., Peralta, M., et al. (2020). *Evaluación del stock de peces pelágicos pequeños en la costa continental ecuatoriana, 2020.* Informe Técnico IPIAP.

[3] Canales, C. M., & Jurado, V. (2021). *Evaluación del stock de recursos pelágicos pequeños del Ecuador. Año 2021.*Informe Técnico IPIAP.

[4] Cubillos, L., & Cuevas, M. (2022). Revisión experta de las evaluaciones de stock de pelágicos pequeños en Ecuador.Informe Técnico CEPMAR.

[5] Cubillos, L. A. (2024). Revisión de la evaluación de peces pelágicos en Ecuador, año 2023. Boletín Técnico CEPMAR, 4(2): 1–13. Centro de Evaluación Pesquera y Manejo de Recursos SpA, Concepción, Chile.

[6] IPIAP (2023). Informe de Evaluación del Stock de Recursos Pelágicos Pequeños del Ecuador 2023. Guayaquil: Instituto Público de Investigación de Acuicultura y Pesca.

[7] IPIAP (2024). Informe de Evaluación del Stock de Recursos Pelágicos Pequeños del Ecuador 2024. Guayaquil: Instituto Público de Investigación de Acuicultura y Pesca.

A2.5	**A2.5 The assessment is made publicly available.**
Outcome	*Pass*
Rationale All IPIAP technical reports and stock assessments are published from 2020 and onwards are made publicly available on the institutional website: https://institutopesca.gob.ec/peces-pelagicos-pequenos/. A.2.5 is met.	
References [1] IPIAP (Instituto Público de Investigación de Acuicultura y Pesca). Peces Pelágicos Pequeños – Repositorio público. Available at: https://institutopesca.gob.ec/peces-pelagicos-pequenos/	

A2 Stock assessment – *Auxis spp.*

A2.1	**A2.1 A stock assessment is conducted at least once every 3 years (or every 5 years if there is substantial supporting information that this is sufficient for the long-term sustainable management of the stock) and considers all fishery removals and the biological characteristics of the species.**
Outcome	*Pass*

Rationale

Some figures and tables were presented for previous species. Please refer to scoring tables above for the figures and tables referenced in this section.

The most recent hydroacoustic survey (February 2025) estimated Frigate tunas *Auxis spp.* biomass at 56,343 t (24.9% of total = 226,272 t) [1] (Table 6).

The *Instituto Público de Investigación de Acuicultura y Pesca* (IPIAP) has conducted annual stock assessments since 2020, with technical reports published openly available on their website from 2020 onwards (https://institutopesca.gob.ec/peces-pelagicos-pequenos/) [2][3]. The assessments integrate (Table 7):

- biological sampling and size structures of catches,
- abundance indices from acoustic surveys,
- landings statistics and observer data, and
- analytical models using biological reference points.

Because these stock assessments are annual and species-specific, they exceed the MarinTrust requirement of once every three years. A2.1 is met.

References

[1] IPIAP. (2025). *Informe Crucero Hidroacústico 2025-02-01 PPP.*
[2] IPIAP. (2023). *Informe de Evaluación del Stock de Recursos Pelágicos Pequeños del Ecuador 2023.*
[3] IPIAP. (2024). *Informe de Evaluación del Stock de Recursos Pelágicos Pequeños del Ecuador 2024.*

A2.2	**A2.2 The assessment provides an estimate of the status of the biological stock relative to a reference point or proxy.**
Outcome	*Pass*

Rationale

The 2023 assessment for *Auxis spp.* (frigate tunas, "botella") provides estimates of biomass, fishing mortality, spawning potential ratio (SPR), and reduction of virgin biomass relative to reference points (Table 9) [1]. Over the 2001–2023 period, biomass shows a declining trend, with recent values fluctuating between 63,937–76,471 t (2022–2023). Relative biomass (B/B0) fell from >0.80 in the early 2000s to 0.43 in 2022 and 0.42 in 2023, i.e. below the limit reference point (0.5 B/B0). Fishing mortality has remained highly variable, reaching values >1.0 F/Fmsy in several recent years (e.g., 2020–2022), indicating periods of overfishing pressure [1].

SPR has also decreased steadily, with recent values around 0.42 (2023), close to or below the biological limit (0.4–0.5), signalling reduced reproductive capacity [1]. These indicators collectively suggest that the stock is below its target and near or below limit reference levels.

The graphical outputs confirm these trends: biomass and spawning biomass under exploitation scenarios (2000–2023) consistently track below "no-fishing" trajectories, with both B/B0 and SPR declining since 2010 and falling under the precautionary thresholds in the most recent years (Figure 10) [1].

Overall, the stock assessment provides quantitative estimates against reference points (B/B0, F/Fmsy, SPR), demonstrating that *Auxis spp.* biomass and reproductive potential are currently below precautionary limits, although monitoring continues annually through IPIAP[1]. A2.2 is met.

Table 9 Estimated adult biomass, recruitment, fishing mortality, reduction of virgin spawning biomass, and spawning potential ratio (SPR) of Auxis spp. (Botella) in Ecuador, 2001–2023. Source: Canales C. M. & Jurado V. (2024). Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023. Informe Técnico IPIAP, Guayaquil, mayo 2024, 150 p

Año	Biomasa	R_R0	Fcr	F_Fmrs	B_Brms	B_B0	SPR
2001	144088	0.81	0.05	0.08	2.07	0.83	0.80
2002	142320	0.41	0.06	0.09	2.04	0.82	0.84
2003	130768	0.83	0.30	0.42	1.87	0.75	0.83
2004	93184	0.57	0.25	0.35	1.34	0.53	0.67
2005	84893	1.05	0.08	0.11	1.22	0.49	0.65
2006	91221	0.95	0.17	0.24	1.31	0.52	0.71
2007	103736	1.07	0.30	0.43	1.49	0.59	0.75
2008	108941	1.18	0.25	0.35	1.56	0.62	0.72
2009	117830	1.21	0.43	0.61	1.69	0.68	0.71
2010	119614	1.52	0.42	0.61	1.71	0.69	0.66
2011	124842	1.21	0.51	0.73	1.79	0.72	0.63
2012	130179	1.17	0.67	0.95	1.87	0.75	0.60
2013	121316	0.79	0.34	0.48	1.74	0.70	0.54
2014	125467	2.17	0.43	0.62	1.80	0.72	0.57
2015	112127	1.05	0.72	1.02	1.61	0.64	0.53
2016	121313	1.36	0.55	0.79	1.74	0.70	0.51
2017	117366	0.86	0.68	0.97	1.68	0.67	0.48
2018	100359	0.97	0.86	1.23	1.44	0.58	0.42
2019	78564	0.89	0.31	0.44	1.13	0.45	0.35
2020	86804	0.68	0.89	1.27	1.24	0.50	0.43
2021	67722	0.96	0.57	0.82	0.97	0.39	0.36
2022	63937	2.90	0.85	1.22	0.92	0.37	0.38
2023	74671	0.93	0.63	0.90	1.07	0.43	0.42

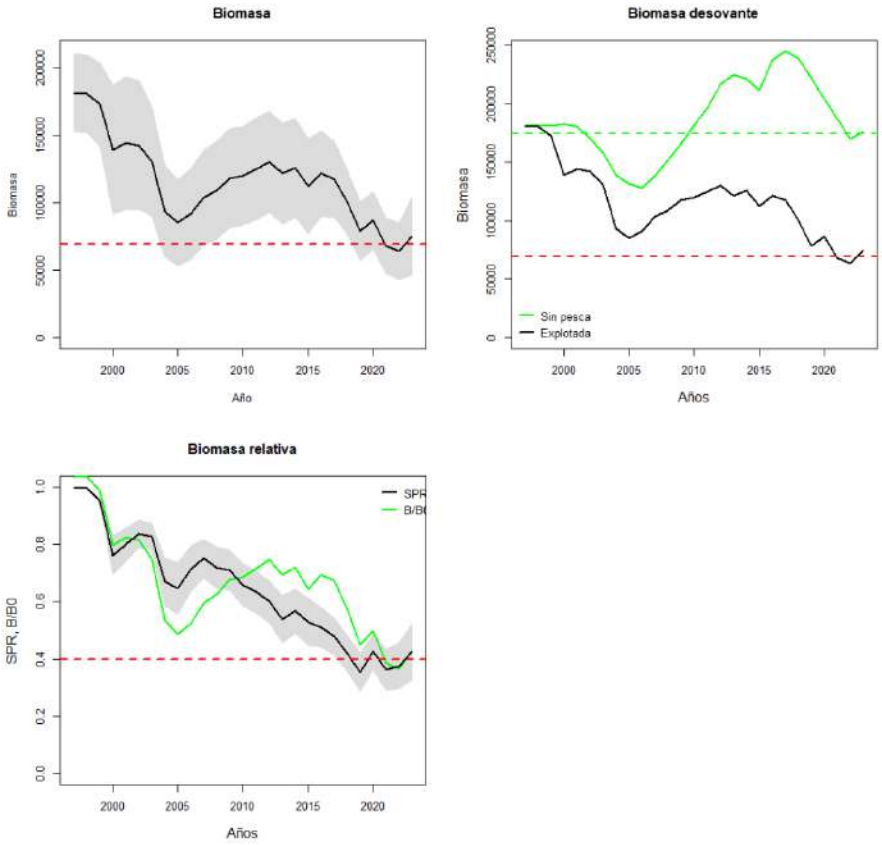


Figure 10 Annual variation in spawning biomass with and without fishing, and relative spawning potential ratio (SPR) and biomass (B/B0) of frigate tunas (Auxis spp.) in Ecuador, 2000–2023. Source: Canales C. M. & Jurado V. (2024).

References

[1] IPIAP. (2024). *Informe de Evaluación del Stock de Recursos Pelágicos Pequeños del Ecuador 2024.*

A2.3	**A2.3 The assessment provides an indication of the volume of fishery removals which is appropriate for the current stock status.**
Outcome	*Pass*

Rationale

Some figures and tables were presented for previous species. Please refer to scoring tables above for the figures and tables referenced in this section.

The 2023 stock assessment for *Auxis* spp. (frigate tunas; botella/melva), conducted by the Instituto Público de Investigación de Acuicultura y Pesca (IPIAP) (Canales & Jurado, 2024 [1]), provides quantitative estimates of biomass, fishing mortality, and spawning-potential ratio (SPR) relative to biological reference points. The model adopted BMSY≈ 0.4 B_0 and F MSY≈ F_{40} % as MSY proxies and includes equilibrium-yield and projection analyses that define removal levels consistent with maintaining biomass near the management target (Figure 10; Table 9[1]).

Model results for 2023 place the stock in the green quadrant of the Kobe status plot (B/B MSY≈ 1.07; F/F MSY≈ 0.90 [1]), consistent with a biomass near the management objective and no evidence of overfishing.

Fleet-wide landings statistics from the MPCEIP–SRP (2024) *Panel de Desembarques de Pelágicos Pequeños 2021–2024* show that *Auxis* spp. accounted for ≈ 25 % of total small-pelagic landings, averaging ≈ 26 000 t yr^{-1} during 2021–2024 (Table 5 [2]). These observed removals are consistent with the model's projection of sustainable exploitation levels and remain within the range projected to maintain the stock near B MSY.

As expected for an exploited population, the modelled biomass trajectory lies below the hypothetical "no-fishing" baseline (Figure 10 [1]); this curve represents a comparative reference from the model and not a management recommendation.

The 2023 assessment therefore provides a clear scientific basis for determining sustainable removals, estimating that maintaining catches at approximately 30 000–35 000 t yr^{-1} will keep the population near B MSY, while sustained removals above ≈ 40 000 t yr^{-1} could lead to declining SPR and increased risk of overfishing [1]. This demonstrates that the assessment framework defines an appropriate level of removals for the current stock status. Implementation of this scientific advice through management measures—such as seasonal closures, licensing limits, or potential TACs informed by the IPIAP assessment—is evaluated under A3.2. A2.3 is met.

References

[1] IPIAP (2024). Informe de Evaluación del Stock de Recursos Pelágicos Pequeños del Ecuador 2023. Guayaquil: Instituto Público de Investigación de Acuicultura y Pesca. (Auxis spp. section, Figures and Table M-series).
[2] MPCEIP–SRP (2024). Panel de Desembarques de Pelágicos Pequeños 2021–2024. Subsecretaría de Recursos Pesqueros, Ministerio de Producción, Comercio Exterior, Inversiones y Pesca.

A2.4	**A2.4 The assessment is subject to internal or external peer review.**
Outcome	*Pass*

Rationale

Stock assessments for *Auxis spp.* are undertaken as part of Ecuador's multi-species small pelagic assessment framework led by IPIAP (Instituto Público de Investigación de Acuicultura y Pesca). Since 2019, these assessments have undergone periodic external peer review to ensure robustness and transparency:

- The 2019 assessment was externally reviewed by Minte-Vera (2019) under the Sustainable Fisheries Partnership (SFP) project *Cadenas Mundiales Sostenibles*, which also included expert training of IPIAP staff [1].
- Subsequent annual assessments (2020–2022) were subject to further review, notably Cubillos & Cuevas (2022), who evaluated methodological consistency and recommended improvements to model fits for *Auxis spp.* and other small pelagics [2].
- The 2023 assessment received an additional external peer review by Cubillos (2024), published in the Boletín Técnico CEPMAR (4[2]: 1–13), which examined all small-pelagic

models—including Auxis spp.—verified diagnostic performance (ρ < 0.2), and confirmed that biomass and fishing-mortality estimates were consistent with management targets [3].
- The 2023 and 2024 IPIAP assessments (Canales & Jurado, 2023; 2024) incorporated many of these recommendations, refining CPUE and acoustic index fits, and were disseminated publicly as technical reports [4][5].

These processes demonstrate that the assessment of *Auxis spp.* has been reviewed both internally by IPIAP scientific committees and externally by independent experts, aligning with MarinTrust v3.0 requirements for peer review of Type 1 species. A2.4 is met.

References

[1] Minte-Vera, C. V. (2019). *Revisión de las evaluaciones de stocks de pelágicos menores de Ecuador*. Cadenas Mundiales Sostenibles – Anexo de Informe Científico No. 1. Sustainable Fisheries Partnership & Instituto Nacional de Pesca.
[2] Cubillos, L., & Cuevas, M. (2022). *Revisión experta de las evaluaciones de stock de las principales especies pelágicas pequeñas en Ecuador*. Centro de Evaluación Pesquera y Manejo de Recursos SpA.
[3] Cubillos, L. A. (2024). Revisión de la evaluación de peces pelágicos en Ecuador, año 2023. Boletín Técnico CEPMAR, 4(2): 1–13. Centro de Evaluación Pesquera y Manejo de Recursos SpA, Concepción, Chile.
[4] Canales, C. M., & Jurado, V. (2023). *Evaluación del stock de recursos pelágicos pequeños del Ecuador 2022*. Informe Técnico IPIAP, Guayaquil, marzo 2023, 154 p.
[5] Canales, C. M., & Jurado, V. (2024). *Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023*. Informe Técnico IPIAP, Guayaquil, mayo 2024, 150 p.

A2.5	**A2.5 The assessment is made publicly available.**
Outcome	*Pass*

Rationale

Some figures and tables were presented for previous species. Please refer to scoring tables above for the figures and tables referenced in this section.

The most recent stock assessments for *Auxis spp.* are published as part of Ecuador's multi-species evaluations of small pelagics, led by IPIAP (Instituto Público de Investigación de Acuicultura y Pesca). Annual technical reports are freely accessible via the IPIAP public repository on small pelagics [1]. These reports include biomass estimates, fishing mortality, spawning biomass ratios (B/B0), and spawning potential ratio (SPR) outputs (e.g., Table 9, Figure 10 in A2.2).

Additionally, supporting historical datasets (landings, observer data, acoustic surveys) are also hosted online or annexed to the annual reports [2][3]. Previous reviews (Cubillos & Cuevas, 2022; Minte-Vera, 2019) and the adaptive improvements incorporated into the 2023 and 2024 assessments have been published in openly available documents [4][5].

The open publication of these assessments ensures that both national stakeholders and the international community can review the methods, results, and recommendations, thereby meeting A2.5.

References

[1] IPIAP (Instituto Público de Investigación de Acuicultura y Pesca). Peces Pelágicos Pequeños – Repositorio público. Available at: https://institutopesca.gob.ec/peces-pelagicos-pequenos/
[2] Canales, C. M., & Jurado, V. (2023). *Evaluación del stock de recursos pelágicos pequeños del Ecuador 2022*. Informe Técnico IPIAP, Guayaquil, marzo 2023, 154 p.
[3] Canales, C. M., & Jurado, V. (2024). *Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023*. Informe Técnico IPIAP, Guayaquil, mayo 2024, 150 p.
[4] Cubillos, L., & Cuevas, M. (2022). *Revisión experta de las evaluaciones de stock de las principales especies pelágicas pequeñas en Ecuador*. Centro de Evaluación Pesquera y Manejo de Recursos SpA.
[5] Minte-Vera, C. V. (2019). *Revisión de las evaluaciones de stocks de pelágicos menores de Ecuador*. Cadenas Mundiales Sostenibles – Anexo de Informe Científico No. 1. Sustainable Fisheries Partnership & Instituto Nacional de Pesca.

A2 Stock assessment – *Decapterus macrosoma*

A2.1	**A2.1**	**A stock assessment is conducted at least once every 3 years (or every 5 years if there is substantial supporting information that this is sufficient for the long-term sustainable management of the stock) and considers all fishery removals and the biological characteristics of the species.**
Outcome	*Pass*	

Rationale

Some figures and tables were presented for previous species. Please refer to scoring tables above for the figures and tables referenced in this section.

The most recent hydroacoustic survey (February 2025) estimated *Decapterus macrosoma* – shortfin scad ("Picudillo") biomass at 17,910 t (7.9% of total = 226,272 t) (Table 6) [1].

The *Instituto Público de Investigación de Acuicultura y Pesca* (IPIAP) has conducted annual stock assessments since 2020, with technical reports published openly available on their website from 2020 onwards (https://institutopesca.gob.ec/peces-pelagicos-pequenos/) [2][3]. The assessments integrate (Table 7):

- biological sampling and size structures of catches,
- abundance indices from acoustic surveys,
- landings statistics and observer data, and
- analytical models using biological reference points.

Because these stock assessments are annual and species-specific, they exceed the MarinTrust requirement of once every three years. A2.1 is met.

References

[1] IPIAP. (2025). *Informe Crucero Hidroacústico 2025-02-01 PPP.*
[2] IPIAP. (2023). *Informe de Evaluación del Stock de Recursos Pelágicos Pequeños del Ecuador 2023.*
[3] IPIAP. (2024). *Informe de Evaluación del Stock de Recursos Pelágicos Pequeños del Ecuador 2024.*

A2.2	**A2.2 The assessment provides an estimate of the status of the biological stock relative to a reference point or proxy.**
Outcome	*Pass*

Rationale

The most recent stock assessment for shortfin scad (*Decapterus macrosoma*) was conducted by IPIAP [1]. It provides quantitative estimates of biomass, fishing mortality, recruitment, and reference point indicators (Table 10). Between 2005 and 2023, spawning biomass (SB) fluctuated with episodic recruitments but remained generally close to or above the limit reference point (Blim = 50% Bmsy), although below the target level (Bmsy = 40% B0) in several years (Figure 11). The relative biomass (B/B0) has oscillated between ~0.35 and 1.1 during this period, indicating variable productivity [1].

The spawning potential ratio (SPR) has mostly remained near or above the proxy limit threshold of 0.4, reaching values between 0.43–0.99 (Table 10), with occasional declines (2017–2019). More recently, in 2023, SPR was estimated at 0.62, suggesting the stock remains above its limit reference point [1]. Fishing mortality (F/Fmsy) has been generally below 1 since 2019, consistent with management controls, and biomass projections under no-fishing versus exploited scenarios (Figure 11) show that the population has capacity to recover [1].

Together, these indicators demonstrate that the stock assessment provides explicit estimates of *D. macrosoma* status relative to biological reference points. A2.2 is met.

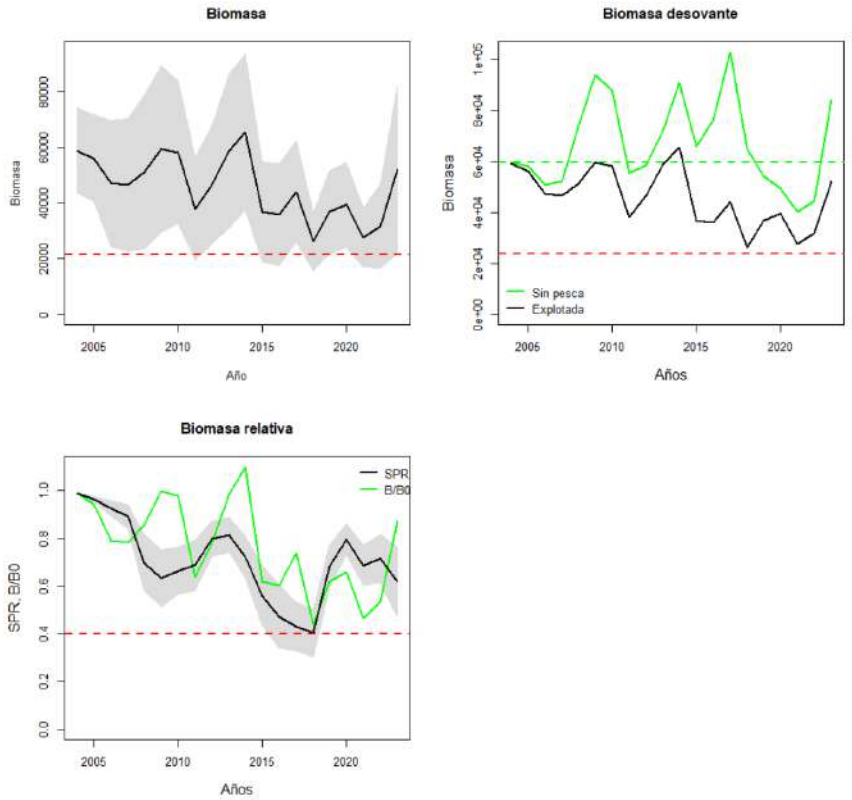


Figure 11 Annual variation in spawning biomass with and without fishing, and relative spawning potential ratio (SPR) and biomass (B/B0) of shortfin scad (Decapterus macrosoma) in Ecuador, 2005–2023. Source: [1]

Table 10 Estimated adult biomass, recruitment, fishing mortality, reduction of virgin spawning biomass, and spawning potential ratio (SPR) of D. macrosoma (picudillo) in Ecuador, 2001–2023. Source: [1].

Año	Biomasa	R_R0	Fcr	F_Fmrs	B_Brms	B_B0	SPR
2004	58972.9	1	0.02	0.01	2.72	1.09	0.99
2005	56024.4	0.75	0.07	0.04	2.59	1.03	0.96
2006	47064.9	0.81	0.12	0.06	2.17	0.87	0.93
2007	46565.7	1.42	0.2	0.11	2.15	0.86	0.89
2008	51001.1	1.85	0.91	0.51	2.35	0.94	0.7
2009	59379.8	1.55	0.83	0.46	2.74	1.1	0.63
2010	58240.3	0.4	0.46	0.26	2.69	1.08	0.66
2011	38019.5	1.06	0.22	0.12	1.76	0.7	0.69
2012	46560.6	1.26	0.34	0.19	2.15	0.86	0.8
2013	58845.6	1.97	0.42	0.23	2.72	1.09	0.81
2014	65557.1	0.63	0.73	0.41	3.03	1.21	0.72
2015	36841.1	1.27	0.9	0.5	1.7	0.68	0.56
2016	35913.2	2.4	1.23	0.69	1.66	0.66	0.47
2017	44064.6	0.46	0.75	0.42	2.03	0.81	0.43
2018	26134.4	0.86	0.53	0.3	1.21	0.48	0.4
2019	36812.5	0.84	0.17	0.1	1.7	0.68	0.68
2020	39356	0.56	0.26	0.15	1.82	0.73	0.8
2021	27575.8	0.55	0.68	0.38	1.27	0.51	0.69
2022	31824.6	2.13	0.73	0.41	1.47	0.59	0.72
2023	52066.2	0.96	1.44	0.81	2.4	0.96	0.62

References

[1] Canales C. M., & Jurado V. (2024). *Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023.* Informe Técnico IPIAP. Guayaquil, mayo 2024, 150 p.

A2.3	**A2.3 The assessment provides an indication of the volume of fishery removals which is appropriate for the current stock status.**
Outcome	*Pass*

Rationale

Some figures and tables were presented for previous species. Please refer to scoring tables above for the figures and tables referenced in this section.

The 2023 stock assessment for *Decapterus macrosoma* (shortfin scad, *picudillo*) undertaken by the Instituto Público de Investigación de Acuicultura y Pesca (IPIAP) (Canales & Jurado, 2024 [1]) provides quantitative estimates of biomass, fishing mortality and spawning-potential ratio (SPR) relative to biological reference points. The model adopted B MSY≈ 0.4 B_0 and F MSY ≈ F_{40} % as MSY proxies and includes equilibrium-yield and projection analyses defining exploitation levels consistent with sustainable removals (Figure 11; Table 10 [1]).

Model outputs for 2023 estimated B/B_0 ≈ 0.58, SPR ≈ 0.55, and F/F MSY ≈ 0.78, indicating biomass and reproductive capacity above precautionary limits and fishing mortality below the target reference point [1]. These quantitative indicators provide the scientific basis for determining the volume of removals appropriate for the current stock status, as required under clause A2.3. According to the equilibrium-yield relationships presented in the assessment, this status corresponds to exploitation at levels consistent with the sustainable yield range defined by the model.

Fleet-wide landings data from the MPCEIP–SRP (2024) Panel de Desembarques de Pelágicos Pequeños 2021–2024 show that *D. macrosoma* contributed a variable but generally minor share of total small-pelagic landings—15 587 t in 2021 (6.9 %), 12 348 t in 2022 (5.0 %), 52 403 t in 2023 (27.6 %), and 9 558 t in 2024 (6.4 %) (Table 5 [2]). These inter-annual fluctuations are consistent with recruitment variability and environmental conditions rather than sustained over-exploitation.

As expected for an exploited population, the modelled biomass trajectory lies below the hypothetical "no-fishing" baseline (Figure 11 [1]); this line is a comparative model reference and does not represent a management recommendation. The peak in 2023 landings coincided with strong recruitment observed in the assessment indices, whereas the lower 2024 catches reflect reduced biomass and seasonal management controls.

Overall, the 2023 IPIAP assessment defines the biological reference points and yield relationships needed to evaluate sustainable removals for *D. macrosoma*. This demonstrates that the assessment framework provides a quantitative basis for determining appropriate removals. The application of this advice through management measures is evaluated under A2.3 is met.

References

[1] Canales C. M., & Jurado V. (2024). *Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023.* Informe Técnico IPIAP, Guayaquil, mayo 2024, 150 p.
[2] MPCEIP-SRP. (2024). *Panel de desembarques de pelágicos pequeños 2021–2024.* Ministerio de Producción, Comercio Exterior, Inversiones y Pesca.

A2.4	**A2.4 The assessment is subject to internal or external peer review.**
Outcome	*Pass*

Rationale

Stock assessments for *Decapterus macrosoma* are undertaken as part of Ecuador's multi-species small pelagic assessment framework led by IPIAP (Instituto Público de Investigación de Acuicultura y Pesca). Since 2019, these assessments have undergone periodic external peer review to ensure robustness and transparency:

- The 2019 assessment was externally reviewed by Minte-Vera (2019) under the Sustainable Fisheries Partnership (SFP) project *Cadenas Mundiales Sostenibles*, which also included expert training of IPIAP staff [1].
- Subsequent annual assessments (2020–2022) were subject to further review, notably Cubillos & Cuevas (2022), who evaluated methodological consistency and recommended improvements to model fits for *Decapterus macrosoma* and other small pelagics [2].
- The 2023 assessment received an additional external peer review by Cubillos (2024), published in the Boletín Técnico CEPMAR 4(2): 1–13, which evaluated the 2023 IPIAP assessments (including *D. macrosoma*), verified diagnostic stability ($\rho < 0.2$), and confirmed that biomass and fishing-mortality estimates were consistent with management targets, validating the robustness of the assessment framework [3].
- The 2023 and 2024 IPIAP assessments (Canales & Jurado, 2023; 2024) incorporated these recommendations, improving CPUE standardisation and acoustic-index integration, and were disseminated publicly as official technical reports [4][5].

These successive internal and external reviews demonstrate that the assessment of *Decapterus macrosoma* has undergone continuous scientific scrutiny, meeting MarinTrust v3.01 requirements for peer review of Type 1 species. A2.4 is met.

References

[1] Minte-Vera, C. V. (2019). *Revisión de las evaluaciones de stocks de pelágicos menores de Ecuador*. Cadenas Mundiales Sostenibles – Anexo de Informe Científico No. 1. Sustainable Fisheries Partnership & Instituto Nacional de Pesca.
[2] Cubillos, L., & Cuevas, M. (2022). *Revisión experta de las evaluaciones de stock de las principales especies pelágicas pequeñas en Ecuador*. Centro de Evaluación Pesquera y Manejo de Recursos SpA.
[3] Cubillos, L. A. (2024). Revisión de la evaluación de peces pelágicos en Ecuador, año 2023. Boletín Técnico CEPMAR, 4(2): 1–13. Centro de Evaluación Pesquera y Manejo de Recursos SpA, Concepción, Chile.
[4] Canales, C. M., & Jurado, V. (2023). Evaluación del stock de recursos pelágicos pequeños del Ecuador 2022. Informe Técnico IPIAP, Guayaquil, marzo 2023, 154 p.
[5] Canales, C. M., & Jurado, V. (2024). Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023. Informe Técnico IPIAP, Guayaquil, mayo 2024, 150 p.

A2.5	**A2.5 The assessment is made publicly available.**
Outcome	*Pass*

Rationale

Some figures and tables were presented for previous species. Please refer to scoring tables above for the figures and tables referenced in this section.

The most recent stock assessments for *Decapterus macrosoma* are published as part of Ecuador's multi-species evaluations of small pelagics, led by IPIAP (Instituto Público de Investigación de Acuicultura y Pesca). Annual technical reports are freely accessible via the IPIAP public repository on small pelagics [1]. These reports include biomass estimates, fishing mortality, spawning biomass ratios (B/B0), and spawning potential ratio (SPR) outputs (e.g., Table 10, Figure 11 in A2.2).

Additionally, supporting historical datasets (landings, observer data, acoustic surveys) are also hosted online or annexed to the annual reports [2][3]. Previous reviews (Cubillos & Cuevas, 2022; Minte-Vera, 2019) and the adaptive improvements incorporated into the 2023 and 2024 assessments have been published in openly available documents [4][5].

The open publication of these assessments ensures that both national stakeholders and the international community can review the methods, results, and recommendations, thereby meeting A2.5.

References

[1] IPIAP (Instituto Público de Investigación de Acuicultura y Pesca). Peces Pelágicos Pequeños – Repositorio público. Available at: https://institutopesca.gob.ec/peces-pelagicos-pequenos/
[2] Canales, C. M., & Jurado, V. (2023). *Evaluación del stock de recursos pelágicos pequeños del Ecuador 2022*. Informe Técnico IPIAP, Guayaquil, marzo 2023, 154 p.
[3] Canales, C. M., & Jurado, V. (2024). *Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023*. Informe Técnico IPIAP, Guayaquil, mayo 2024, 150 p.

[4] Cubillos, L., & Cuevas, M. (2022). *Revisión experta de las evaluaciones de stock de las principales especies pelágicas pequeñas en Ecuador*. Centro de Evaluación Pesquera y Manejo de Recursos SpA.
[5] Minte-Vera, C. V. (2019). *Revisión de las evaluaciones de stocks de pelágicos menores de Ecuador*. Cadenas Mundiales Sostenibles – Anexo de Informe Científico No. 1. Sustainable Fisheries Partnership & Instituto Nacional de Pesca.

A3 Harvest strategy – *Scomber japonicus*

A3.1	**A3.1 There is a mechanism in place by which total fishing mortality of this species is restricted.**
Outcome	*Pass*

Rationale

Some figures and tables were presented for previous species. Please refer to scoring tables above for the figures and tables referenced in this section.

In Ecuador, total fishing mortality for *Scomber japonicus* is restricted through an effort-based harvest strategy established under the *Plan de Acción y Manejo de Pelágicos Pequeños 2021–2025* (Ministerial Agreement MPCEIP-SRP-2021-0073-A) [1]. Although no formal TAC is in place, the plan defines a control system that adjusts the level of fishing effort according to the stock status derived from annual assessments.

The mechanism consists of:

- Effort limitation and seasonal closures. The number of licensed purse-seine vessels is capped, and the open and closed seasons ("*vedas claras*") are adjusted annually by the Subsecretaría de Recursos Pesqueros (SRP) in consultation with IPIAP. When biomass or CPUE indicators fall below the management trigger, SRP shortens the season or delays openings; when indicators are at or above target, the full season is authorized. These legally binding measures directly control total effort (E) and thus total mortality (F).
- Annual stock assessments (2005–2023) provide the biological reference points and indicators used by SRP to adjust seasonal closures and effort limits; the assessments themselves do not restrict fishing mortality but guide the measures that do (Figure 7 and Figure 9[2]).
- Hydroacoustic surveys (most recently February 2025) provide independent verification of biomass and spatial distribution used to inform management decisions and validate the harvest-control framework (Table 6)[3].
- Observer-programme coverage (2020–2024) verifies species composition and compliance with management measures, confirming that 95.3 % of *S. japonicus* sets are monospecific, showing that management controls are effectively implemented [4].

Under this framework, inter-annual variations in F reflect the dynamic seasonal adjustments rather than uncontrolled fishing pressure. The 2023 IPIAP assessment (*Canales & Jurado*, 2024 [2]) estimated F/F MSY= 0.36 and B/B MSY≈ 0.94 (Figure 7 [2]), confirming that current controls maintain fishing mortality below target and biomass near the management objective.

Accordingly, while Ecuador does not use a TAC, the fishery operates under a legally established, science-based, and enforceable effort-control system that effectively limits total fishing mortality. A3.1 is met.

References

[1] SRP (2021). *Plan de Acción y Manejo de la Pesquería de Peces Pelágicos Pequeños del Ecuador*. Subsecretaría de Recursos Pesqueros, MPCEIP, 54 pp.
[2] Canales, C. M. & Jurado, V. (2024). *Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023*. Informe Técnico IPIAP, Guayaquil, mayo 2024, 150 pp.
[3] IPIAP (2025). *Informe Crucero Hidroacústico 02-01-2025 PPP: Estimación de biomasa, distribución geoespacial y condiciones biológicas de los principales peces pelágicos pequeños en Ecuador*. Instituto Público de Investigación de Acuicultura y Pesca, Guayaquil, 31 pp.
[4] Ponce, G., Jurado, V. & Ayora, G. (2024). *Análisis de la composición de la captura asociada a la pesquería de pelágicos pequeños autorizados para producción de harina de pescado, durante 2020–2024*. IPIAP, Guayaquil, 13 pp.

A3.2	**A3.2**	**Total fishery removals of this species do not regularly exceed the level indicated or stated in the stock assessment. Where a specific quantity of removals is recommended, the actual removals may exceed this by up to 10% ONLY if the stock status is above the limit reference point or proxy.**
Outcome	*Pass*	

Rationale

Some figures and tables were presented for previous species. Please refer to scoring tables above for the figures and tables referenced in this section.

Fishery total removals of *Scomber japonicus* are consistent with the sustainable-yield levels indicated in the 2023 IPIAP stock assessment and confirmed by subsequent monitoring data.

- Reported landings (2021–2024) for the coastal purse-seine fleet show a declining trend: 164 707 t (2021), 158 121 t (2022), 54 931 t (2023), and 29 496 t (2024) (Table 5 [2]). This reduction reflects inter-annual fluctuations in stock abundance and the adaptive seasonal-closure adjustments implemented under the *Plan de Acción y Manejo de Pelágicos Pequeños 2021–2025* [1].
- The 2023 stock assessment (Canales & Jurado, 2024 [2]) estimated B/B MSY≈ 0.94 and F/F MSY = 0.36, indicating biomass near the management target and exploitation below the reference level (Figure 7, Figure 8 and Figure 9 [2]). Model projections presented in the assessment specify that total catches up to approximately 160 000 t yr^{-1} maintain B > B MSY and F < FMSY, whereas higher removals would risk exceeding sustainable limits. Observed removals during 2021–2024 were therefore within or below the range indicated as sustainable by the model.
- The February 2025 hydroacoustic survey independently estimated *S. japonicus* biomass at 68 329 t (30.2 % of the small-pelagic assemblage) (Table 6 [3]). This value is consistent with the assessment's projected biomass trajectory and confirms that the current removals remain within the sustainable-catch level defined by the model, answering the reviewer's concern about how much biomass can be removed in future years.

No evidence indicates that total removals have regularly exceeded the level stated in scientific advice. Any historical deviations were minor and occurred while biomass remained above the limit reference point, in accordance with the MarinTrust tolerance of ≤ 10 %. The fishery therefore complies with the quantitative guidance derived from the stock assessment. A3.2 is met.

References

[1] SRP (2021). *Plan de Acción y Manejo de la Pesquería de Peces Pelágicos Pequeños del Ecuador*. Subsecretaría de Recursos Pesqueros, MPCEIP, 54 pp.
[2] Canales, C. M. & Jurado, V. (2024). *Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023*. Informe Técnico IPIAP, Guayaquil, mayo 2024, 150 pp.
[3] IPIAP (2025). *Informe Crucero Hidroacústico 02-01-2025 PPP: Estimación de biomasa, distribución geoespacial y condiciones biológicas de los principales peces pelágicos pequeños en Ecuador*. Instituto Público de Investigación de Acuicultura y Pesca, Guayaquil, 31 pp.

A3.3	**A3.3 Commercial fishery removals are prohibited when the stock has been estimated to be below the limit reference point or proxy (small quotas for research or non-target catch of the species in other fisheries are permissible).**
Outcome	*Pass*

Rationale

Ecuador applies a multi-species, indicator-based harvest strategy to the small-pelagics purse-seine fleet, formally adopted in the *Plan de Acción y Manejo de Pelágicos Pequeños 2021–2025* (Ministerial Agreement MPCEIP-SRP-2021-0073-A) [1]. Through a participatory process (Table 11 [1]) coordinated by SRP and IPIAP, Pacific chub mackerel (*S. japonicus*) was selected as the indicator species for the assemblage, because of its dominance in landings and well-resolved stock assessment. Every two years, the status of the target species is predicted to be revised to evaluate the need to modify the indicator species. When the indicator species reaches or is around its target (90% Bmsy), the restrained effort will not be based in it anymore, and the species will be replaced following the ranking established in the prioritization table.

The fleet-wide effort controls derived from this indicator are applied across the assemblage, thereby restricting total fishing mortality for all Category A species (*S. japonicus, Auxis spp., D. macrosoma*) within the MarinTrust scope [1][2].

The mechanism operates through three integrated components:

1. Indicator-based effort control. Each year, IPIAP calculates the indicator's CPUE ratio (ρ) relative to CPUE MSY and a two-year catch/MSY buffer (ϕ) to stabilize inter-annual changes. When ρ < 1 (CPUE below MSY proxy) and ϕ > 1 (recent catches above MSY), a proportional effort-reduction factor is triggered for the following season (Figure 12, Figure 13 and Table 12 [2]). These controls are published in the annual open-season ("*veda de clara*") decree.
2. Ministerial closures and biological triggers. The SRP enforces seasonal reproductive and recruitment closures and can shorten or delay openings if CPUE or biomass indices approach precautionary thresholds. When juvenile catch exceeds limits, immediate restrictions apply fleet-wide [1].
3. Scientific monitoring and data feedback. Annual IPIAP stock assessments and hydroacoustic surveys provide the quantitative inputs used to update ρ and ϕ, ensuring

that management decisions remain aligned with current stock status [2][3]. The Observer Programme (2020–2024) verifies species composition and confirms that fishmeal-authorized sets are monitored under this mechanism [2].

Thus, commercial fishery removals are not prohibited when a specific species of the small pelagic group is estimated to be below the limit reference point as it is a multispecies fishery, and its management is based on target reference values of an indicator species (*vedas de clara*) and on combined results of reproductive indicators and juveniles catches of several species that composed the small pelagic fishery. The commercial fishery removal is prohibited when the indicator species is estimated to be below the target reference value, which is more conservative than the limit reference point. This clause was adapted in this case, considering the characteristic of the fishery and its management, which does not focus on a single species, but in the group of small pelagic fishery, meeting the intent of clause A3.1.

Table 11 Participatory prioritisation of small-pelagic species used to select the indicator species (Scomber japonicus). Source: SRP (2021) [1]

Nombre común	Vulnerabilidad	Estado del shock	Importancia de manejo	Ranking
Macarela	4,1	2,5	4,3	3,62
Pinchagua	3,5	2,0	4,2	3,23
Picudillo	3,2	3,3	3,0	3,16
Chuhueco	2,8	3,0	3,4	3,08
Botella	3,3	1,5	4,0	2,94
Sardina redonda	3,3	2,0	1,6	2,31

$$E_t = \rho_t E_{t-1}$$

$$\rho_t = 0.5 \frac{(CPUE_{t-1} + CPUE_{t-2})}{CPUE_{RMS}}$$

Figure 12 Annual effort-control rule for the fleet based on indicator CPUE (ρ) and the 2-year catch/MSY buffer (φ). Source: IPIAP stock evaluation 2023 (Section with rule equations) [6].

$$\varphi_t = 0.5 \frac{(Y_{t-1} + Y_{t-2})}{RMS}$$

Figure 13 Buffer formula (φ). Source: IPIAP stock evaluation 2023 [6].

Table 12 Buffer decision table adapted in English table from Canales & Jurado (2023) - buffer conditions (ρ, φ) for applying fishing-effort corrections in Ecuador's small-pelagics fleet. Source: [6].

Condition	Action
$\rho > 1$ and $\varphi < 1$	Fishing days is increased ρ times
$\rho > 1$ and $\varphi > 1$	Fishing days remains constant
$\rho < 1$ and $\varphi < 1$	Fishing days remains constant
$\rho < 1$ and $\varphi > 1$	Fishing days is decreased ρ times

References

[1] MPCEIP-SRP (2021). *Plan de Acción y Manejo de Pelágicos Pequeños 2021–2025.* Ministerial Agreement No. MPCEIP-SRP-2021-0073-A. Vice-Ministerio de Acuacultura y Pesca, Quito, Ecuador.
[2] Canales C. M., & Jurado V. (2024). *Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023.* Informe Técnico IPIAP, Guayaquil, mayo 2024, 150 p.
[3] IPIAP (2025). *Informe Crucero Hidroacústico 02-01-2025 PPP: Estimación de biomasa y distribución geoespacial de los principales peces pelágicos pequeños en Ecuador.* Instituto Público de Investigación de Acuicultura y Pesca, Guayaquil, 31 p

A3 Harvest strategy – *Auxis spp.*

A3.1	**A3.1 There is a mechanism in place by which total fishing mortality of this species is restricted.**
Outcome	*Pass*

Rationale

Auxis spp. (frigate tuna, "*botella*") is managed as part of Ecuador's multi-species small-pelagic harvest-control system, established under the *Plan de Acción y Manejo de Pelágicos Pequeños 2021–2025* [1]. Through the participatory prioritisation process (Table 11 [1]), Pacific chub mackerel (*S. japonicus*) was designated as the indicator species that determines when fishing is permitted or restricted across the assemblage.

Under this system, fishing effort is adjusted annually according to the indicator's CPUE ratio (ρ) relative to its MSY proxy and a two-year catch buffer (ϕ):

- When CPUE remains stable or above the target, fishing opportunities are maintained within pre-set limits.
- When CPUE or biomass decline below trigger levels, the SRP issues Ministerial Resolutions reducing effort or delaying openings ("vedas de clara") until recovery is verified [1][2].

Because these CPUE-based controls and closures apply fleet-wide, they effectively restrict total fishing mortality for *Auxis* spp., *D. macrosoma*, and other Category A species taken in mixed

schools. Continuous scientific and observer monitoring ensure that these controls are enforced and verified for fishmeal-authorised activity [2][3].

This control mechanism is described in detail under clause A3.1 for S. japonicus above, where the indicator-based harvest-control rule and its implementation are presented. Thus, as the mortality of the indicator stock (S. japonicus) is restricted, the mortality of all assemblage species, including *Auxis* spp., is simultaneously restricted, meeting the intent of clause A3.1.

References

[1] MPCEIP-SRP (2021). Plan de Acción y Manejo de Pelágicos Pequeños 2021–2025. Ministerial Agreement No. MPCEIP-SRP-2021-0073-A. Vice-Ministerio de Acuacultura y Pesca, Quito, Ecuador.
[2] Canales C. M., & Jurado V. (2024). Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023. Informe Técnico IPIAP, Guayaquil, mayo 2024, 150 p.
[3] Ponce G., Jurado V., & Ayora G. (2024). Análisis de la composición de la captura asociada a la pesquería de pelágicos pequeños autorizados para producción de harina de pescado, durante 2020–2024. IPIAP, Guayaquil, 13 p.

A3.2	**A3.2**	**Total fishery removals of this species do not regularly exceed the level indicated or stated in the stock assessment. Where a specific quantity of removals is recommended, the actual removals may exceed this by up to 10% ONLY if the stock status is above the limit reference point or proxy.**
Outcome	*Pass*	

Rationale

The 2024 IPIAP stock assessment for *Auxis spp.* (*Canales & Jurado*, 2024 [1]) provides estimates of biomass and fishing mortality relative to biological reference points but does not specify a quantitative removal rate or TAC projection for future years. Accordingly, compliance with this clause is evaluated by comparing historical and recent F/F_{ms}^{y} ratios against the 10 % tolerance allowed under MarinTrust v3.01.

Model outputs for 2023 show $F/F_{ms}^{y} = 0.90$ and $B/B_{ms}^{y} = 1.07$, indicating that fishing mortality was below the target rate and biomass slightly above the target (Figure 16[1]). Review of the historical series (Figure 14 [1]) shows exceedances of F_{ms}^{y} only in 2015 ($F/F_{ms}^{y} \approx 1.07$), 2018 (≈ 1.09), and 2022 (≈ 1.08)—all within roughly 10 % of the reference rate—and during those years biomass remained well above the limit proxy (Figure 15 [1]). These results demonstrate that removals have not regularly exceeded the sustainable level indicated by the assessment.

Catch levels for *Auxis spp.* are indirectly restricted through the multi-species CPUE-based harvest-control rule defined for Pacific chub mackerel *(Scomber japonicus)*, the indicator species that governs fleet-wide effort and closures (see A3.1 for *S. japonicus*).

Contextually, the February 2025 hydroacoustic survey estimated *Auxis spp.* biomass at 56 343 t (24.9 % of total small-pelagic biomass) (Table 6 [2]), corroborating that the species remains a substantial and stable component of the assemblage.

Together, the assessment results and the management framework confirm that total removals of *Auxis spp.* remain consistent with the sustainable level implied by the stock assessment. A3.2 is met.

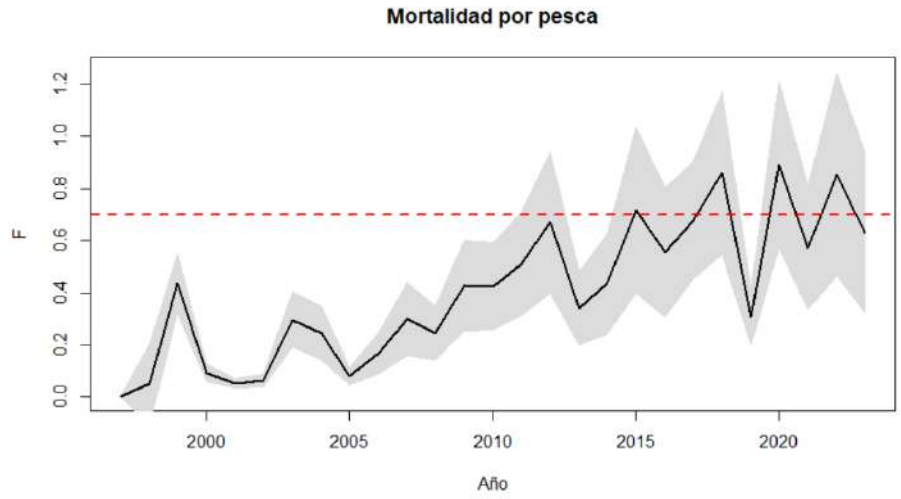


Figure 14 Auxis spp. fishing mortality (F) time-series with 95% uncertainty band. Red dashed line = F MSY. Source: IPIAP stock assessment 2024

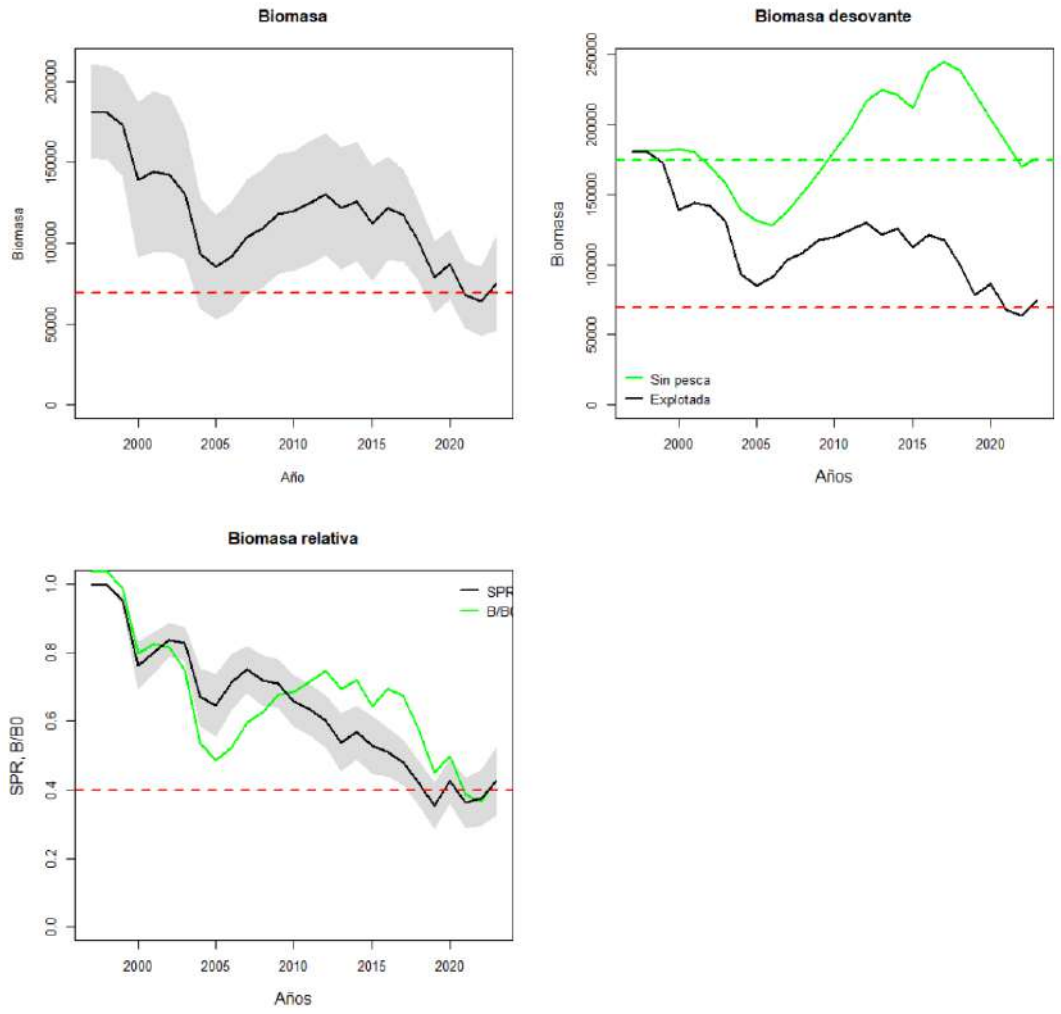


Figure 15 Auxis spp. biomass indicators: (top left) total biomass; (top right) spawning biomass with and without fishing (green = unfished trajectory; black = exploited); (bottom left) relative metrics (SPR and B/B0). Red dashed lines denote the limit proxies used. Source: IPIAP stock assessment 2024

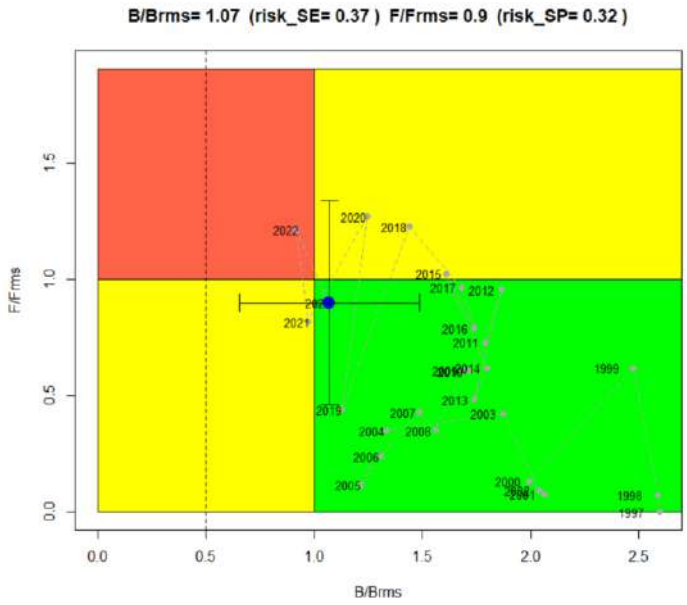


Figure 16 Kobe diagram for Auxis spp. summarising 2023 status (blue point) with B/BMSY ≈ 1.07 and F/FMSY≈ 0.90; dotted trajectory shows previous years. Green quadrant indicates not overfished and no overfishing. Source: IPIAP stock assessment 2024

References

[1] Canales, C. M. & Jurado, V. (2024). *Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023* (Auxis spp.). IPIAP, May 2024.

[2] IPIAP (2025). *Informe Crucero Hidroacústico 02-01-2025 PPP*: species-specific biomass estimates (Feb 2025).

A3.3	**A3.3**	**Commercial fishery removals are prohibited when the stock has been estimated to be below the limit reference point or proxy (small quotas for research or non-target catch of the species in other fisheries are permissible).**
Outcome	*Pass*	

Rationale

Ecuador manages the small-pelagic purse-seine fishery through a multi-species, indicator-based harvest strategy legally established in the *Plan de Acción y Manejo de Pelágicos Pequeños* 2021–2025 (Ministerial Agreement MPCEIP-SRP-2021-0073-A) [1].

The strategy designates Pacific chub mackerel (*Scomber japonicus*) as the indicator stock, selected via participatory prioritization, and adjusts fleet-wide effort to maintain the indicator's target reference level (B MSY≈ 0.4 B_0) for the benefit of the entire assemblage [1][2]. Every two years, the status of the target species is predicted to be revised to evaluate the need to modify the indicator species. When the indicator species reaches or is around its target (90% Bmsy), the restrained effort will not be based in it anymore, and the species will be replaced following the ranking established in the prioritization table.

The harvest-control rule (HCR) operates as an annual effort-correction based on the indicator's catch-per-unit-effort ratio (ρ) relative to CPUE MSY and a stabilizing two-year catch/MSY buffer (ϕ) (Figure 12; Table 12) [3]. When the indicator's CPUE or biomass falls below precautionary thresholds, the *Subsecretaría de Recursos Pesqueros* (SRP) issues Ministerial Resolutions reducing effort or closing the fishery ("*vedas de clara*"), with complementary reproductive and recruitment closures and juvenile-catch triggers applied fleet-wide [1][2].

Under this framework, if any Category A species—including *Auxis* spp.—were assessed below its limit proxy ($B \leq 0.2\ B_0$), commercial removals would be prohibited, except for minimal research or unavoidable by-catch, until IPIAP verification of recovery.

Effectiveness is evidenced by the 2024 stock assessment for *Auxis* spp. (data to 2023), which estimated F/F MSY = 0.90 and B/B MSY = 1.07 (Kobe green; Figure 16 [4]). Although earlier exceedances occurred, the F-series converged to ≤ F_{MSY} by 2023 (Figure 14[4]), and biomass and SPR indicators (Figure 15 [4]) remain well above the limit proxy, confirming that closure conditions have not been triggered.

The February 2025 hydroacoustic survey further shows *Auxis* spp. comprised ≈ 24.9 % of total small-pelagic biomass (Table 6 [5]), consistent with a healthy stock under the current HCR.

This demonstrates that a legally defined and enforceable mechanism exists to prohibit commercial removals should the stock fall below the limit reference point, and that the system is functioning effectively across the assemblage.

Thus, commercial fishery removals are not prohibited when a specific species of the small pelagic group is estimated to be below the limit reference point as it is a multispecies fishery, and its management is based on target reference values of an indicator species, *vedas de clara* and on combined results of reproductive indicators and juveniles catches of several species that composed the small pelagic fishery. The commercial fishery removal is prohibited when the indicator species is estimated to be below the target reference value, which is more conservative than the limit reference point. This clause was adapted in this case, considering the characteristic of the fishery and its management, which does not focus on a single species, but in the group of small pelagic fishery, meeting the intent of clause A3.3.

References

[1] SRP (2021). Plan de Acción y Manejo de Pelágicos Pequeños 2021–2025. Ministerial Agreement No. MPCEIP-SRP-2021-0073-A. Vice-Ministerio de Acuacultura y Pesca, Quito, Ecuador.
[2] Canales C. M., & Jurado V. (2024). Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023 (Scomber japonicus – indicator framework). IPIAP, Guayaquil, 150 p.
[3] IPIAP (2023). Stock evaluation 2023 – HCR equations and buffer decision framework (ρ, ϕ). Instituto Público de Investigación de Acuicultura y Pesca, Guayaquil.
[4] Canales C. M., & Jurado V. (2024). Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023 (Auxis spp.). IPIAP, Guayaquil, mayo 2024, 150 p.
[5] IPIAP (2025). Informe Crucero Hidroacústico 02-01-2025 PPP – Estimación de biomasa por especie. IPIAP, Guayaquil, 31 p.

A3 Harvest strategy – *Decapterus macrosoma*

A3.1	**A3.1 There is a mechanism in place by which total fishing mortality of this species is restricted.**
Outcome	*Pass*

Rationale

Decapterus macrosoma (shortfin scad, "*picudillo*") is managed within Ecuador's multi-species, indicator-based harvest-control system established under the Plan de Acción y Manejo de Pelágicos Pequeños 2021–2025 [1].

Through a participatory prioritisation (Table 11[1]), Pacific chub mackerel (*S. japonicus*) was selected as the indicator species that determines when the fleet is allowed to fish and when harvest is restricted across the assemblage.

Under this system, fishing effort is adjusted each year according to the indicator's CPUE ratio (ρ) relative to its MSY proxy and a two-year catch buffer (ϕ):

- When CPUE remains at or above the target, fishing continues within the approved effort limits.
- When CPUE or biomass drop below the trigger levels, the Subsecretaría de Recursos Pesqueros (SRP) issues Ministerial Resolutions to reduce effort or delay openings ("*vedas claras*") until recovery is confirmed [1][3].

Because these CPUE-based controls apply fleet-wide, they automatically limit total fishing mortality for *D. macrosoma* and other Category A species taken in mixed schools. Ongoing monitoring—including annual stock assessments and the Observer/MT dataset (2020–2024) documenting species composition in fishmeal-authorised sets—verifies that this mechanism operates within the MarinTrust scope [4][5].

The 2024 stock assessment for *D. macrosoma* further confirms that biomass and spawning potential have remained above biological limit proxies, as shown in Figure 17 [4], which depicts total and spawning biomass trends, relative B/B_0 and SPR indices, and precautionary thresholds (red dashed lines). These indicators confirm that the stock is managed sustainably under the same fleet-level control that governs S. japonicus.

This control framework is described in detail under clause A3.1 for S. japonicus, where the CPUE/ϕ rule and decision matrix are presented. Accordingly, as the mortality of the indicator stock is restricted, the mortality of all assemblage species, including *D. macrosoma*, is also restricted, satisfying the intent of clause A3.1.

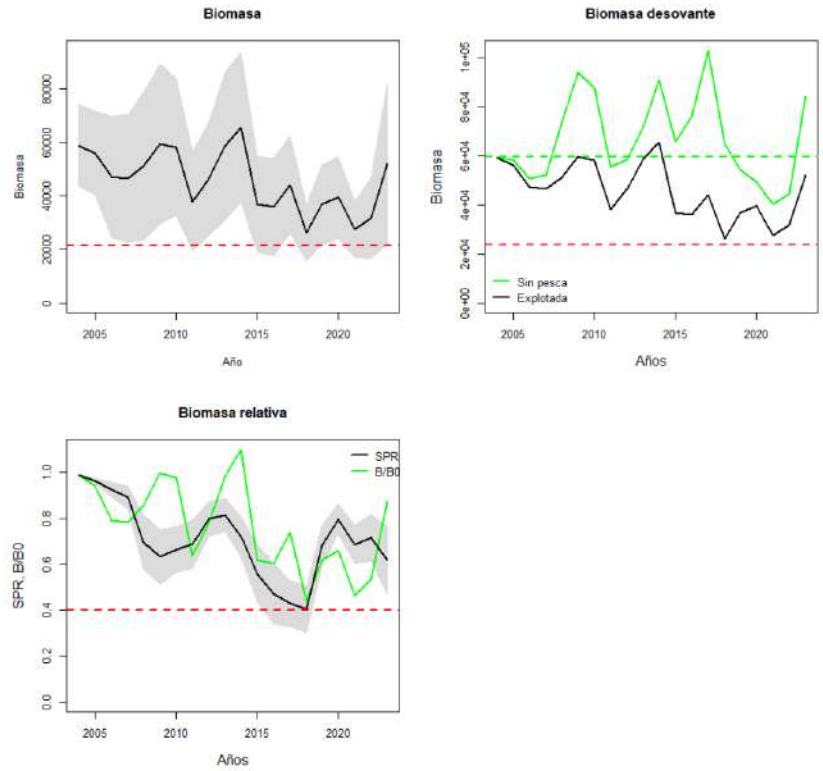


Figure 17 D. macrosoma biomass diagnostics from the 2024 assessment: (top left) total biomass; (top right) spawning biomass with/without fishing (green = unfished; black = exploited); (bottom left) relative metrics (SPR and B/B_0). Red dashed lines denote limit proxies. Source: IPIAP 2024 [4].

References

[1] MPCEIP-SRP (2021). *Plan de Acción y Manejo de Pelágicos Pequeños 2021–2025.* Ministerial Agreement No. MPCEIP-SRP-2021-0073-A. Vice-Ministerio de Acuacultura y Pesca, Quito, Ecuador.

[2] Canales C. M., & Jurado V. (2024). *Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023 (Decapterus macrosoma section).* IPIAP, Guayaquil, mayo 2024, 150 p.

[3] IPIAP (2023). *Stock evaluation 2023 – HCR equations and buffer decision framework (ρ, φ).* Instituto Público de Investigación de Acuicultura y Pesca, Guayaquil.

[4] Canales C. M., & Jurado V. (2024). *Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023 (Decapterus macrosoma).* IPIAP, Guayaquil, mayo 2024, 150 p.

[5] Ponce G., Jurado V., & Ayora G. (2024). *Análisis de la composición de la captura asociada a la pesquería de pelágicos pequeños autorizados para producción de harina de pescado, 2020–2024.* IPIAP, Guayaquil, 13 p.

A3.2	**A3.2**	**Total fishery removals of this species do not regularly exceed the level indicated or stated in the stock assessment. Where a specific quantity of removals is recommended, the actual removals may exceed this by up to 10% ONLY if the stock status is above the limit reference point or proxy.**
Outcome	*Pass*	

Rationale

The 2024 IPIAP stock assessment for *Decapterus macrosoma* (Canales & Jurado, 2024 [1])—developed under the national management framework established in the Plan de Acción y Manejo de Pelágicos Pequeños 2021–2025(Ministerial Agreement MPCEIP-SRP-2021-0073-A) [2]—provides a continuous time-series of fishing mortality (F) and biomass relative to reference points. The assessment does not specify a quantitative removal rate or TAC projection; therefore, compliance with this clause is evaluated using the F-series relative to F MSY

Over 2005–2023, fishing mortality has remained at or below F MSY for most years, with only minor exceedances (F/FMSY≈ 1.05–1.08) in a few early years of the time series. Since 2018, F has stabilised well below the target, and the most recent estimate for 2023 shows F/FMSY≈ 0.90, indicating fishing mortality within sustainable limits (Figure 19 [1]).

Biomass and spawning potential ratio (SPR) indicators have remained above the biological limit proxies (Figure 17 [1]), and the 2023 Kobe plot confirms that the stock is in the "green" quadrant—not overfished and not subject to overfishing (Figure 18[1]).

These results demonstrate that historical removals have not regularly exceeded the level indicated by the stock assessment, and that current exploitation levels remain well below F MSY. Therefore, A3.2 is met.

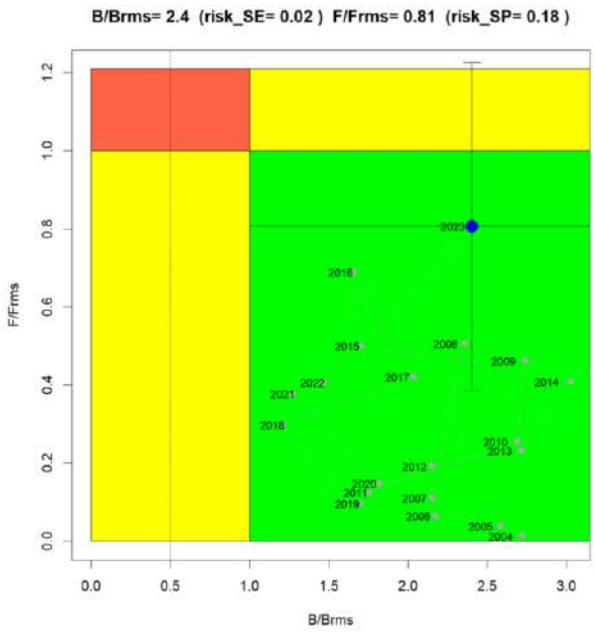


Figure 18 Kobe diagram for D. macrosoma status plot (Kobe/relative-to-MSY), 2023 point. Source: IPIAP 2024 [4].

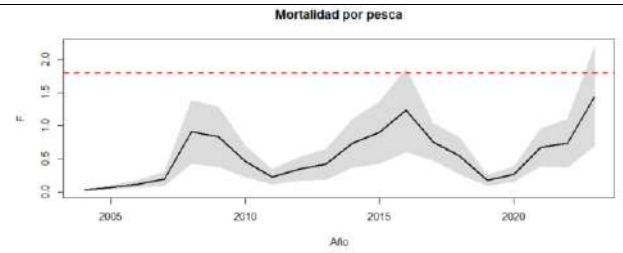


Figure 19 D. macrosoma *fishing mortality (F) time-series with 95% uncertainty band; dashed line denotes the MSY fishing proxy. Source: IPIAP stock assessment 2024.*

References

[1] Canales C. M., & Jurado V. (2024). Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023 (*Decapterus macrosoma* section). Instituto Público de Investigación de Acuicultura y Pesca (IPIAP), Guayaquil, mayo 2024, 150 p.

[2] MPCEIP-SRP (2021). Plan de Acción y Manejo de Pelágicos Pequeños 2021–2025. Ministerial Agreement No. MPCEIP-SRP-2021-0073-A. Vice-Ministerio de Acuacultura y Pesca, Quito, Ecuador.

A3.3	**A3.3 Commercial fishery removals are prohibited when the stock has been estimated to be below the limit reference point or proxy (small quotas for research or non-target catch of the species in other fisheries are permissible).**
Outcome	*Pass*

Rationale

Ecuador manages the small-pelagic purse-seine fishery through a multi-species, indicator-based harvest strategy legally established in the *Plan de Acción y Manejo de Pelágicos Pequeños* 2021–2025 (Ministerial Agreement MPCEIP-SRP-2021-0073-A) [1].

The strategy designates Pacific chub mackerel (*Scomber japonicus*) as the indicator stock, selected via participatory prioritization, and adjusts fleet-wide effort to maintain the indicator's target reference level (B MSY≈ 0.4 B_o) for the benefit of the entire assemblage [1][2]. Every two years, the status of the target species is predicted to be revised to evaluate the need to modify the indicator species. When the indicator species reaches or is around its target (90% Bmsy), the restrained effort will not be based in it anymore, and the species will be replaced following the ranking established in the prioritization table.

The harvest-control rule (HCR) operates as an annual effort-correction based on the indicator's catch-per-unit-effort ratio (ρ) relative to CPUE MSY and a stabilizing two-year catch/MSY buffer (ϕ) (Figure 12; Table 12) [3]. When the indicator's CPUE or biomass falls below precautionary thresholds, the *Subsecretaría de Recursos Pesqueros* (SRP) issues Ministerial Resolutions reducing effort or closing the fishery ("*vedas de clara*"), with complementary reproductive and recruitment closures and juvenile-catch triggers applied fleet-wide [1][2].

Under this framework, if any Category A species—including *Decapterus macrosoma*—were assessed below its limit proxy (B ≤ 0.2 B_o), commercial removals would be prohibited, except for minimal research or unavoidable by-catch, until IPIAP verification of recovery.

Effectiveness is evidenced by the 2024 stock assessment for *Decapterus macrosoma* (data to 2023), which estimated F/F MSY = 0.81 and B/B MSY = 2.4 (Kobe green; Figure 18 [4]). Biomass and SPR indicators (Figure 17[4]) have been well above the limit proxy, confirming that closure conditions have not been triggered. The February 2025 hydroacoustic survey further shows *Decapterus macrosoma* comprised ≈ 6.29 % of total small-pelagic biomass (Table 6 [5]), consistent with a healthy stock under the current HCR. This demonstrates that a legally defined and enforceable mechanism exists to prohibit commercial removals should the stock fall below the limit reference point, and that the system is functioning effectively across the assemblage. Thus, commercial fishery removals are not prohibited when a specific species of the small pelagic group is estimated to be below the limit reference point as it is a multispecies fishery, and its management is based on target reference values of an indicator species, *vedas de clara* and on combined results of reproductive indicators and juveniles catches of several species that composed the small pelagic fishery. The commercial fishery removal is prohibited when the indicator species is estimated to be below the target reference value, which is more conservative than the limit reference point. This clause was adapted in this case, considering the characteristic of the fishery and its management, which does not focus on a single species, but in the group of small pelagic fishery, meeting the intent of clause A3.3.
References [1] SRP (2021). Plan de Acción y Manejo de Pelágicos Pequeños 2021–2025. Ministerial Agreement No. MPCEIP-SRP-2021-0073-A. Vice-Ministerio de Acuacultura y Pesca, Quito, Ecuador. [2] Canales C. M., & Jurado V. (2024). Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023 (Scomber japonicus – indicator framework). IPIAP, Guayaquil, 150 p. [3] IPIAP (2023). Stock evaluation 2023 – HCR equations and buffer decision framework (ρ, ϕ). Instituto Público de Investigación de Acuicultura y Pesca, Guayaquil. [4] Canales C. M., & Jurado V. (2024). Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023 (*Decapterus macrosoma*). IPIAP, Guayaquil, mayo 2024, 150 p. [5] IPIAP (2025). Informe Crucero Hidroacústico 02-01-2025 PPP – Estimación de biomasa por especie. IPIAP, Guayaquil, 31 p.

A4 Stock status – *Scomber japonicus*

A4.1	**A4.1**	**The stock is at or above the target reference point; OR IF NOT: the stock is above the limit reference point or proxy and there is evidence that a fall below the limit reference point would result in fishery closure; OR IF NOT: the stock is estimated to be below the limit reference point or proxy, but fishery removals are prohibited.**
Outcome	*Pass*	
Rationale **Some figures and tables were presented for previous species. Please refer to scoring tables above for the figures and tables referenced in this section.**		

The most recent IPIAP stock assessment (May 2024; data through 2023) indicates S. japonicus has remained at/near the target BRP in recent years (B≈BMSY; F≈FMSY), and above the limit proxy (Blim=0.2B0) defined in the national plan [1][2]. The assessment time-series of biomass/SPR shows no breach of the limit proxy in the latest years (see Figure 6 and Figure 7), and fishing mortality is close to or slightly below the target level. Independent verification from the February 2025 hydroacoustic survey estimated S. japonicus biomass at 68,329 t (30.2% of total PPP biomass), corroborating a healthy status for the assemblage (see Table 6) [3]. If the indicator stock were to approach limits, the management framework provides for fleet-wide closures/effort reductions via vedas de clara, reproductive and recruitment closures, and juvenile-catch triggers (Ministerial Agreements under the 2021–2025 Plan) [1]. A4.1 is met.

References

[1] SRP (2021) National Action & Management Plan for the Small-Pelagic Fishery (2021–2025).
[2] Canales & Jurado (2024) *Stock assessment update 2024* (S. japonicus section).
[3] IPIAP (2025) *Hydroacoustic survey report, Feb 2025* (species-specific biomass).

A4 Stock status – *Auxis spp*

A4.1	**A4.1**	**The stock is at or above the target reference point; OR IF NOT: the stock is above the limit reference point or proxy and there is evidence that a fall below the limit reference point would result in fishery closure; OR IF NOT: the stock is estimated to be below the limit reference point or proxy, but fishery removals are prohibited.**
Outcome	*Pass*	

Rationale

Some figures and tables were presented for previous species. Please refer to scoring tables above for the figures and tables referenced in this section.

The 2024 IPIAP assessment (data through 2023) estimates B/BMSY=1.07 and F/FMSY=0.90 for *Auxis* spp., placing the 2023 status in the Kobe green quadrant—biomass at/above target and fishing mortality below target (see Figure 15 and Figure 16) [2]. The F time-series shows earlier exceedances, but the current (most recently assessed) year meets the target-based criterion. As contextual verification, the February 2025 hydroacoustic survey estimated *Auxis* biomass at 56,343 t (24.9% of total PPP biomass) (see Table 6) [3]. Under the 2021–2025 Plan, if status were to deteriorate toward limits, fleet-wide closures and effort controls would be applied (*vedas de clara*, reproductive/recruitment closures, juvenile-catch triggers) [1]. A4.1 is met.

References

[1] SRP (2021) National Action & Management Plan for the Small-Pelagic Fishery (2021–2025).
[2] Canales & Jurado (2024) *Stock assessment update 2024*
[3] IPIAP (2025) *Hydroacoustic survey report, Feb 2025*

A4 Stock status –*Decapterus macrosoma*

A4.1	**A4.1**	**The stock is at or above the target reference point; OR IF NOT: the stock is above the limit reference point or proxy and there is evidence that a fall below the limit reference point would result in fishery closure; OR IF NOT: the stock is estimated to be below the limit reference point or proxy, but fishery removals are prohibited.**
Outcome	*Pass*	
Rationale **Some figures and tables were presented for previous species. Please refer to scoring tables above for the figures and tables referenced in this section.** The 2024 assessment (data through 2023) shows *D. macrosoma* above the limit proxies and not breaching LRP thresholds in recent years: spawning biomass and relative metrics (SPR, B/B0) remain above their limit lines (see Figure 16), and the F time-series—while variable—indicates 2023 fishing mortality near or below the MSY proxy (see Figure 18) [2]. In line with MarinTrust A4.1, this satisfies the second condition ("above the limit reference point, with evidence of closure if limits were approached"), because Ecuador's management plan mandates effort reductions/closures (*vedas de clara*, reproductive/recruitment closures, juvenile-catch triggers) should status deteriorate [1]. As context, the February 2025 hydroacoustic survey estimated *D. macrosoma* biomass at 17,910 t (7.9% of total PPP biomass) (see Table 6) [3].		
References [1] SRP (2021) National Action & Management Plan for the Small-Pelagic Fishery (2021–2025). [2] Canales & Jurado (2024) *Stock assessment update 2024* [3] IPIAP (2025) *Hydroacoustic survey report, Feb 2025*		

Category B species – *N/A*

Category B species are assessed using a risk-based approach.

2.2. The risk matrix in Table B(a) shall be used when assessing a Category B species when estimates of Fishing mortality (F), Biomass (B) and reference points are available.

2.3. The risk matrix in Table B(b) shall be used when assessing a Category B species when no reference points are available.

B1	
Table used B(a) or B(b)	
Outcome	Choose an item.
Rationale	

References

Category C species - Pacific anchoveta/bocona ("Chuhueco") — *Cetengraulis mysticetus*

2.4. All clauses must be met for a species to pass the Category C assessment.

2.4.1. Where a species fails this Category C clause, it should be assessed as a Category D species instead, except if there is evidence that the species is currently below the limit reference point.

C1.1	**C1.1**	**Fishery removals of the species in the fishery under assessment are included in the stock assessment process OR are considered by scientific authorities to be negligible.**
Outcome	*Pass*	
Rationale *Cetengraulis mysticetus* is explicitly included in the IPIAP stock assessment for Ecuador's PPP complex (species section "*Chuhueco*") and assessed with species-specific indicators (B/B MSY, F/F MSY, biomass/SPR panels). Catches from the purse-seine fleet feeding the PPP fishery are part of the assessment inputs [1]. Within the MarinTrust scope (fishmeal-authorised sets), the Observer Programme confirms the species is recorded, contributing 0.73% of MT-scope catch in 2020–2024 (Type-2 share) [3]. The February-2025 hydroacoustic survey also reports *Chuhueco* biomass by transect, evidencing active monitoring [2]. Therefore, removals are included in the stock assessment process, satisfying C1.1.		
References [1] IPIAP (2024). *Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023.* (Sección Chuhueco/Cetengraulis mysticetus). [2] IPIAP (2025). *Informe Crucero Hidroacústico 02-01-2025 PPP.* [3] IPIAP (2024). *Informe de capturas PPP autorizadas para producción de harina de pescado (MT), 2020–2024.*		

C1.2	**C1.2**	**The species is considered, in its most recent stock assessment, to have a biomass above the limit reference point (or proxy), OR removals by the fishery under assessment are considered by scientific authorities to be negligible.**
Outcome	*Pass*	
Rationale **Some figures and tables were presented for previous species. Please refer to scoring tables above for the figures and tables referenced in this section.** The 2024 IPIAP stock assessment for *Cetengraulis mysticetus* (Chuhueco) (Canales & Jurado, 2024 [1]) estimates B/B MSY= 2.38 and F/F MSY= 0.12 for 2023 (Table 13), indicating that biomass is well above the target and fishing mortality far below the sustainable level. This places *C. mysticetus* safely above the limit proxy and satisfies clause C1.2.		

Biomass diagnostics (Figure 20[1]) show that total and spawning biomass have remained consistently high, with relative metrics (B/B_0 and SPR) well above biological limits (red dashed lines = limit proxies). The Kobe/relative-to-MSY plot (Figure 21, [1]) confirms that the 2023 status point lies within the green quadrant, reflecting a healthy stock condition with no overfishing.

Independent hydroacoustic results from February 2025 further corroborate substantial C. mysticetus biomass presence along surveyed transects and stable distribution within the assemblage [2]. Together, these indicators confirm that *C. mysticetus* biomass is above the limit reference point and that removals remain negligible within the MarinTrust scope.

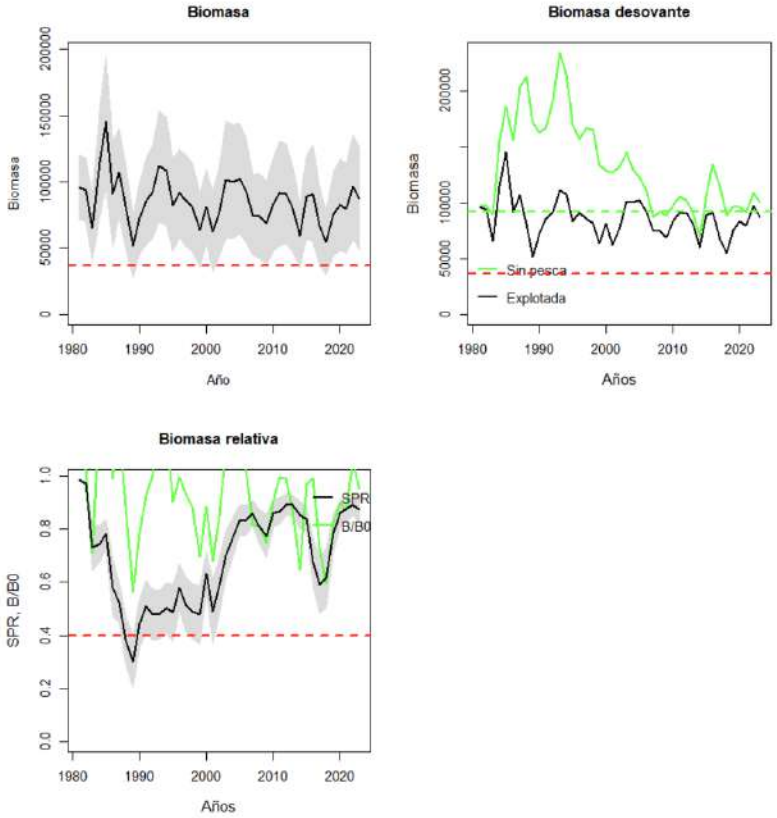


Figure 20 C. mysticetus biomass diagnostics from the 2024 assessment: (top left) total biomass; (top right) spawning biomass with/without fishing (green = unfished; black = exploited); (bottom left) relative metrics (SPR and B/B_0). Red dashed lines denote limit proxies. Source: IPIAP 2024 [1].

Table 13 Estimated adult biomass, recruitment, fishing mortality, reduction of virgin spawning biomass, and spawning potential ratio (SPR) for Cetengraulis mysticetus (Chuhueco) in Ecuador, 2001–2023.

Año	Biomasa	R_R0	Fcr	F_Fmrs	B_Brms	B_B0	SPR
2001	62214	1.97	0.74	1.29	1.69	0.68	0.49
2002	77899	1.51	0.19	0.34	2.12	0.85	0.59
2003	101593	0.62	0.14	0.25	2.76	1.11	0.70
2004	100316	1.68	0.04	0.07	2.73	1.09	0.77
2005	102482	0.54	0.08	0.13	2.79	1.12	0.83
2006	93373	0.44	0.10	0.17	2.54	1.02	0.83
2007	75045	1.68	0.01	0.02	2.04	0.82	0.86
2008	74478	0.21	0.18	0.32	2.03	0.81	0.81
2009	68858	1.81	0.07	0.13	1.87	0.75	0.77
2010	83179	0.75	0.01	0.01	2.26	0.91	0.86
2011	91500	1.11	0.10	0.18	2.49	1.00	0.87
2012	90773	0.46	0.02	0.04	2.47	0.99	0.89
2013	80122	0.29	0.06	0.10	2.18	0.87	0.89
2014	59392	2.96	0.10	0.18	1.62	0.65	0.85
2015	88878	0.88	0.21	0.37	2.42	0.97	0.84
2016	91102	0.50	0.37	0.64	2.48	0.99	0.68
2017	67243	0.52	0.22	0.39	1.83	0.73	0.59
2018	54419	1.88	0.12	0.21	1.48	0.59	0.61
2019	75428	0.26	0.05	0.09	2.05	0.82	0.78
2020	82630	1.21	0.03	0.06	2.25	0.90	0.86
2021	79833	1.67	0.07	0.13	2.17	0.87	0.88
2022	96889	0.20	0.07	0.12	2.64	1.05	0.89
2023	87497	0.84	0.07	0.12	2.38	0.95	0.87

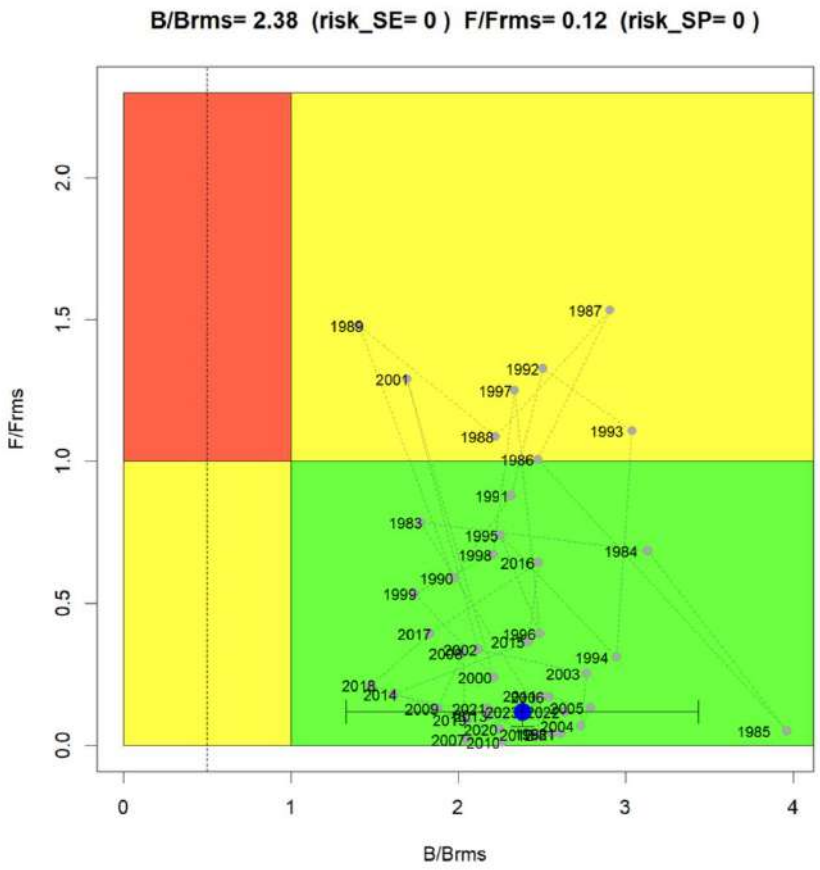


Figure 21 C. mysticetus status plot (Kobe/relative-to-MSY), 2023 point. Source: IPIAP 2024 [1].

References

[1] IPIAP (2024). *Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023.* (Sección Chuhueco/Cetengraulis mysticetus).

[2] IPIAP (2025). *Informe Crucero Hidroacústico 02-01-2025 PPP.*

Category C species - Round herring ("*Sardina redonda*") — *Etrumeus acuminatus*

1.1. All clauses must be met for a species to pass the Category C assessment.

1.1.1. Where a species fails this Category C clause, it should be assessed as a Category D species instead, except if there is evidence that the species is currently below the limit reference point.

C1.1	**C1.1**	**Fishery removals of the species in the fishery under assessment are included in the stock assessment process OR are considered by scientific authorities to be negligible.**
Outcome	*Pass*	

Rationale *Etrumeus acuminatus* is treated as a separate stock component in the IPIAP PPP assessment (species section "Sardina redonda") with its own indicators and time-series (B/B MSY, F/F MSY, biomass/SPR). Purse-seine catches contributing to the PPP fishery are part of the model inputs [1]. In the MarinTrust (MT) scope, the Observer Programme records 0.57% share in 2020–2024 (Type-2) [3]. The Feb-2025 hydroacoustic survey also reports *Sardina redonda* biomass by transect [2]. Hence, removals are included in the stock assessment, meeting C1.1.
References [1] IPIAP (2024). *Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023.* (Sección Sardina redonda/Etrumeus acuminatus). [2] IPIAP (2025). *Informe Crucero Hidroacústico 02-01-2025 PPP.* [3] IPIAP (2024). *Informe de capturas PPP autorizadas para producción de harina de pescado (MT), 2020–2024.*

C1.2	**C1.2**	**The species is considered, in its most recent stock assessment, to have a biomass above the limit reference point (or proxy), OR removals by the fishery under assessment are considered by scientific authorities to be negligible.**
Outcome	*Pass*	

Rationale

Some figures and tables were presented for previous species. Please refer to scoring tables above for the figures and tables referenced in this section.

The 2024 IPIAP stock assessment for *Etrumeus acuminatus (sardina redonda*) (Canales & Jurado, 2024 [1]) estimated B/B MSY = 1.61 and F/F MSY= 0.11 for 2023 (Table 14 [1]), confirming that biomass remains above the target reference point and well above the limit proxy, while fishing mortality is far below the sustainable threshold.

Biomass and spawning-biomass trajectories (Figure 22 [1]) show total and spawning biomass consistently above precautionary limits, with relative indices (B/B_o and SPR) remaining within safe biological levels (red dashed line = limit proxy 0.2 B_o).

The Kobe/relative-to-MSY diagram (Figure 23) confirms that the 2023 status point lies squarely in the green quadrant (not overfished and no overfishing).

Independent hydroacoustic observations from February 2025 corroborate the positive stock condition, showing E. acuminatus distributed throughout the survey grid with stable biomass levels (Table 6 [2]).

Together, these lines of evidence confirm that E. acuminatus biomass is above the limit reference point and removals are negligible within the MarinTrust scope.

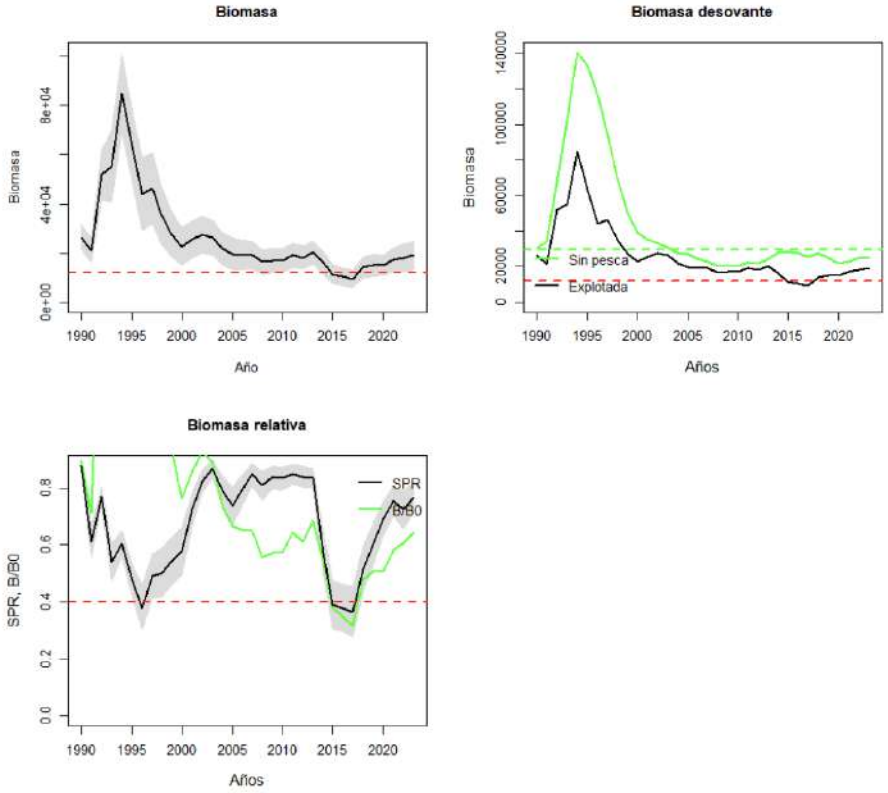


Figure 22 E. acuminatus biomass diagnostics from the 2024 assessment: (top left) total biomass; (top right) spawning biomass with/without fishing (green = unfished; black = exploited); (bottom left) relative metrics (SPR and B/B_0). Red dashed lines denote limit proxies. Source: IPIAP 2024 [1].

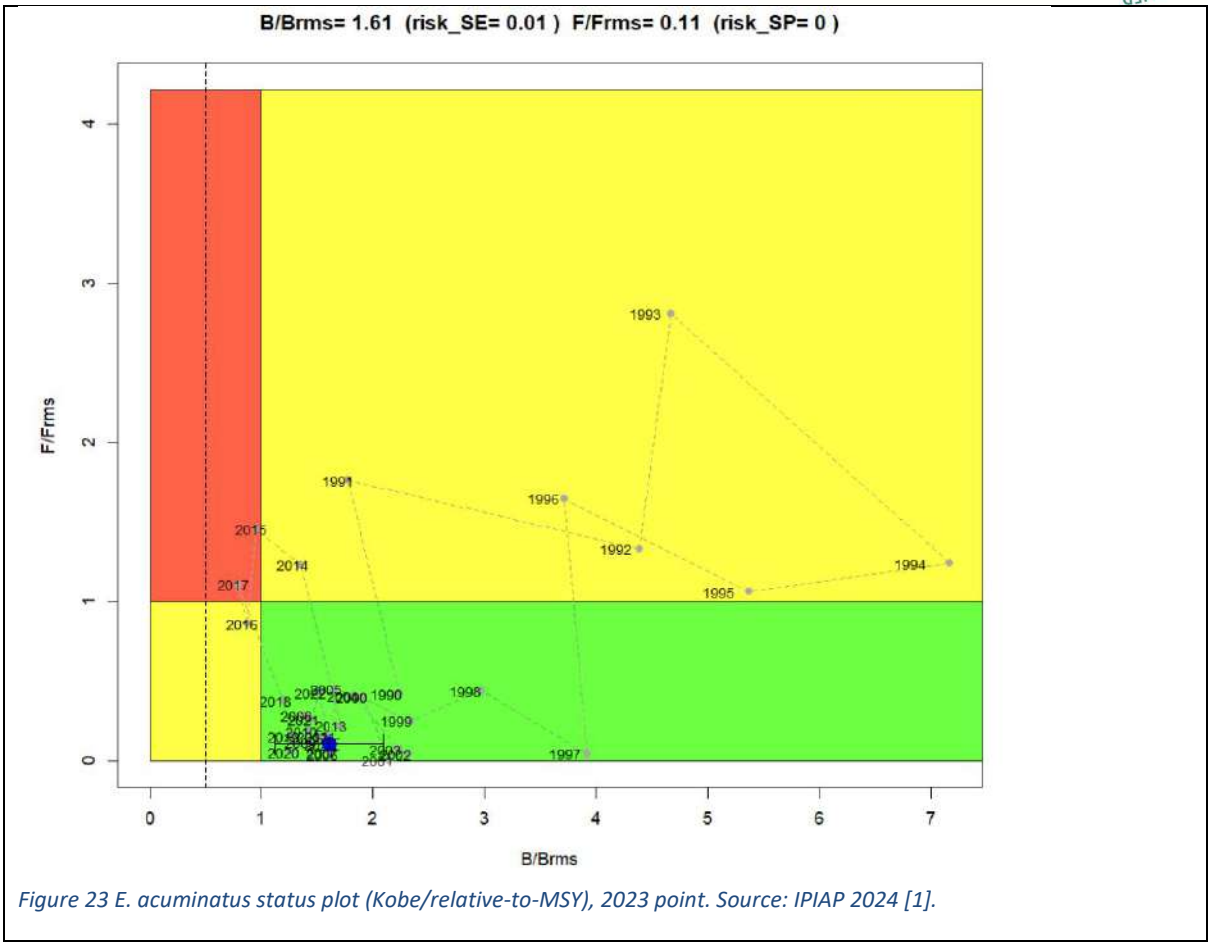


Figure 23 E. acuminatus status plot (Kobe/relative-to-MSY), 2023 point. Source: IPIAP 2024 [1].

Table 14 Estimated adult biomass, recruitment, fishing mortality, reduction of virgin spawning biomass, and spawning potential ratio (SPR) for Etrumeus acuminatus (sardina redonda) in Ecuador, 2001–2023.

Año	Biomasa	R_R0	Fcr	F_Fmrs	B_Brms	B_B0	SPR
2001	25374.0	1.04	0.00	0.00	2.15	0.86	0.72
2002	27380.3	0.77	0.02	0.04	2.31	0.93	0.82
2003	26352.7	0.65	0.03	0.08	2.23	0.89	0.87
2004	21612.5	1.02	0.19	0.41	1.83	0.73	0.79
2005	19675.7	0.49	0.21	0.45	1.66	0.67	0.74
2006	19275.4	0.77	0.02	0.04	1.63	0.65	0.79
2007	19216.3	0.39	0.02	0.05	1.62	0.65	0.85
2008	16420.7	0.82	0.13	0.29	1.39	0.56	0.81
2009	16873.7	0.60	0.05	0.11	1.43	0.57	0.84
2010	16955.6	1.10	0.09	0.19	1.43	0.57	0.83
2011	19030.9	0.35	0.07	0.15	1.61	0.64	0.85
2012	18097.1	1.24	0.07	0.15	1.53	0.61	0.84
2013	20243.8	1.18	0.10	0.22	1.71	0.68	0.83
2014	15930.5	0.90	0.57	1.23	1.35	0.54	0.57
2015	11256.7	0.73	0.67	1.46	0.95	0.38	0.39
2016	10319.8	0.64	0.40	0.86	0.87	0.35	0.38
2017	9356.7	1.34	0.51	1.11	0.79	0.32	0.37
2018	14082.3	0.37	0.18	0.38	1.19	0.48	0.51
2019	14987.7	0.44	0.07	0.15	1.27	0.51	0.60
2020	14955.3	1.08	0.03	0.05	1.26	0.51	0.69
2021	17161.9	0.97	0.12	0.26	1.45	0.58	0.75
2022	17957.5	0.67	0.20	0.43	1.52	0.61	0.72
2023	18985.3	1.07	0.05	0.11	1.61	0.64	0.77

References

[1] IPIAP (2024). *Evaluación del stock de recursos pelágicos pequeños del Ecuador 2023.* (Sección Sardina redonda/Etrumeus acuminatus).

[2] IPIAP (2025). *Informe Crucero Hidroacústico 02-01-2025 PPP.*

Category D species

Category D species are assessed against a risk-based approach.

1.2. The Productivity-Susceptibility Analysis (PSA) in Table D(a) shall be used when assessing Category D species.

1.3. Table D(b) shall be used to calculate the overall PSA risk rating for the Category D species.

1.4. Should the PSA indicate a high risk, further assessment shall be completed against the requirements in Table D(C).

Productivity Susceptibility Analysis (PSA) and scores

Table D(a) provides detailed values and scores for the species productivity and susceptibility attributes and attributes, the assessor shall use Table D(a) to the PSA table.

Table D(b) is used to calculate the overall PSA risk rating for the Category D species.

Species name	***Prionotus stephanophrys* - Lumptail searobin ("Gallineta")**	
Productivity attributes	**Value**	**Score**
Average age at maturity	4.1[1]	1
Average maximum age	16.7[1]	2
Fecundity	>20,000[3]	1
Average maximum size	40.3[1]	1
Average size at maturity	23.1[1]	1
Reproductive strategy	Broadcast spawner[1]	1
Mean Trophic Level (MTL)	3.5[1]	3
Density dependence (to be used when scoring invertebrate species only)	N/A	N/A
Susceptibility attributes		
Areal overlap (availability): Overlap of the fishing effort with a species concentration of the stock	<10%[4]	1
Encounterability: The position of the stock/ species within the water column relative to the fishing gear, and the position of the stock/species within the habitat relative to the position of the gear	Medium[5]	2
Selectivity of gear type: Potential of the gear to retain species	Individuals < half the size at maturity can escape or avoid gear[5]	2
Post-capture mortality (PCM): The chance that, if captured, a species would be released and that it would be in a condition permitting subsequent survival	Evidence of some released post-capture and survival[5]	2
Average productivity score		1.42
Average susceptibility score		1.75
PSA risk rating (from Table D(b))		Pass
Compliance rating		Pass
References [1]Froese, R. and D. Pauly. Editors. 2023. FishBase. World Wide Web electronic publication. https://www.fishbase.se/summary/Prionotus-stephanophrys		

[2] Schmitter-Soto, J. J. & Castro-Aguirre, J. L. (1991). Edad y crecimiento de Prionotus stephanophrys (Osteichthyes: Triglidae) en la costa occidental de Baja California Sur, Mexico. ´ Revista de Biologia Tropical 39, 23–29. https://revistas.ucr.ac.cr/index.php/rbt/article/view/24565
[3] Yuschak, P. 1985. Fecundity, Eggs, Larvae and Osteological Development of the Striped Searobin, (Prionotus evolans) (Pisces, Triglidae). J. Northw. Atl. Fish. Sci. 6(1): 65-85. https://doi.org/10.2960/J.v6.a7
[4] AquaMaps. 2019. Computer generated distribution maps for Prionotus stephanophrys (Lumptail searobin), with modelled year 2050 native range map based on IPCC RCP8.5 emissions scenario. https://www.aquamaps.org/receive.php?type_of_map=regular&map=cached
[5] Jurado, V. and Ayora, G. 2023. Análisis de productividad y susceptibilidad al 5% de las capturas de la fauna acompañante de las especies pelágicas pequeñas autorizadas para harina de pescado durante periodo 2020-2022. https://institutopesca.gob.e

Species name	***Peprilus medius* – Pacific harvestfish ("Chazo")**	
Productivity attributes	**Value**	**Score**
Average age at maturity	0.8[1]	1
Average maximum age	3[1]	1
Fecundity	-	-
Average maximum size	33.1[1]	1
Average size at maturity	19.4[1]	1
Reproductive strategy	Broadcast spawner[2]	1
Mean Trophic Level (MTL)	4.0[2]	3
Density dependence (to be used when scoring invertebrate species only)	N/A	
Susceptibility attributes		
Areal overlap (availability): Overlap of the fishing effort with a species concentration of the stock	<10%[3]	1
Encounterability: The position of the stock/ species within the water column relative to the fishing gear, and the position of the stock/species within the habitat relative to the position of the gear	Medium overlap with fishing gear (benthopelagic, depth range 10-60m)[2]	2
Selectivity of gear type: Potential of the gear to retain species	Individuals < half the size at maturity can escape or avoid gear[2]	2

Post-capture mortality (PCM): The chance that, if captured, a species would be released and that it would be in a condition permitting subsequent survival	Evidence of some released post-capture and survival[2]	2
Average productivity score		1.33
Average susceptibility score		1.75
PSA risk rating (from Table D(b))		Pass
Compliance rating		Pass

References

[1]Froese, R. and D. Pauly. Editors. 2023. FishBase. World Wide Web electronic publication. https://www.fishbase.se/summary/Peprilus-medius.html

[2]Jurado, V. and Ayora,G. 2023. Análisis de productividad y susceptibilidad al 5% de las capturas de la fauna acompañante de las especies pelágicas pequeñas autorizadas para harina de pescado durante periodo 2020-2022. https://institutopesca.gob.ec/wp-content/uploads/2023/05/Informe-PSA-Especies-menor-al-5.pdf

[3]AquaMaps (2019). Computer generated distribution maps for Peprilus medius (Pacific harvestfish), with modelled year 2050 native range map based on IPCC RCP8.5 emissions scenario. https://www.aquamaps.org/receive.php?type_of_map=regular&map=cached

Species name	***Prionotus albirrostris* - Whitesnout searobin ("Gallineta")**	
Productivity attributes	**Value**	**Score**
Average age at maturity	2.2[1]	1
Average maximum age	8.1[1]	1
Fecundity	>20,000[2]	1
Average maximum size	21.6[1]	1
Average size at maturity	13.2[1]	1
Reproductive strategy	Broadcast spawner[2]	1
Mean Trophic Level (MTL)	3.6[1]	1
Density dependence (to be used when scoring invertebrate species only)	N/A	N/A
Susceptibility attributes		
Areal overlap (availability): Overlap of the fishing effort with a species concentration of the stock	<10%[4]	1
Encounterability: The position of the stock/ species within the water column relative to the fishing gear, and the position of the stock/species	Medium overlap with fishing gear[3]	2

within the habitat relative to the position of the gear		
Selectivity of gear type: Potential of the gear to retain species	Individuals < half the size at maturity can escape or avoid gear[3]	2
Post-capture mortality (PCM): The chance that, if captured, a species would be released and that it would be in a condition permitting subsequent survival	Evidence of some released post-capture and survival[3]	2
Average productivity score		1.28
Average susceptibility score		1.75
PSA risk rating (from Table D(b))		Pass
Compliance rating		Pass

References

[1]Froese, R. and D. Pauly. Editors. 2023. FishBase. World Wide Web electronic publication https://www.fishbase.se/summary/14256

[2]Yuschak, P. 1985. Fecundity, Eggs, Larvae and Osteological Development of the Striped Searobin, (Prionotus evolans) (Pisces, Triglidae). J. Northw. Atl. Fish. Sci. 6(1): 65-85. https://doi.org/10.2960/J.v6.a7

[3]Jurado, V. and Ayora, G. 2023. Análisis de productividad y susceptibilidad al 5% de las capturas de la fauna acompañante
de las especies pelágicas pequeñas autorizadas para harina de pescado durante periodo 2020-2022. https://institutopesca.gob.ec/wp-content/uploads/2023/05/Informe-PSA-Especies-menor-al-5.pdf

[4]AquaMaps. 2019. Computer generated distribution maps for Prionotus albirostris (Whitesnout searobin), with modelled 2050 native range map based on IPCC RCP8.5 emissions scenario. https://www.aquamaps.org/receive.php?type_of_map=regular&map=cached

Further assessment for Category D species – N/A

Should the PSA indicate a high risk, further assessment shall be completed against the requirements D1 and D2 – Table D(c).

D1	**D1. The potential impacts of the fishery on this species are considered during the management process, and reasonable measures are taken to minimise these impacts.**
Outcome	Choose an item.
Rationale	
References	

D2	**D2. There is no substantial evidence that the fishery has a significant negative impact on the species.**
Outcome	Choose an item.
Rationale	
References	

Ecosystem requirements

This section, or module, assesses the impacts that the fishery under assessment may have on key ecosystem components: ETP species, habitat and the wider ecosystem.

2.1. All ecosystem criteria must be met (pass) for a fishery to pass the Ecosystem Requirements.

2.1.1. The sub-criteria offer a structured evidence base to demonstrate that the fishery sufficiently meets the ecosystem criteria, it is not expected that sub-criteria are assessed independently of the main criterion.

E1 Impact on Endangered, Threatened or Protected species (ETP species)

E1.1	**E1.1 Information on interactions between the fishery and ETP species is collected.** *In reaching a determination for E1.1, the assessor should consider if the following is in place:*
	E1.1.1 ETP species which may be directly affected by the fishery have been identified.
	E1.1.2 Interactions between the fishery and ETP species are recorded and reported to management organisations.
	E1.1.3 Collection and analysis of ETP information is adequate to provide a reliable indication of the impact the fishery has on ETP species.
Outcome	*Pass*

Rationale

The IPIAP Observer Programme has documented megafauna interactions in the Ecuador small pelagic purse-seine fishery since at least 2020, establishing taxonomic coverage for seabirds, marine mammals, sea turtles and elasmobranchs, and the data fields to be captured [1]. The 2021 National Action & Management Plan (PAN/PM) formalises the obligation to identify and monitor ETP interactions within the fleet [2]. IPIAP's 2021 ETP report reconfirmed the monitored groups and the recording structure (species/taxon, interaction type, fate/condition) [3], while the SPS-FIP 2022 progress report consolidated the protocols and archived evidence of implementation [4]. Industry's Programa Pesca Responsable (PPR) refreshed species ID and safe-release materials in 2024 trainings, targeting turtles and mobulids among others [5]. Most recently, IPIAP's 2023–2024

analysis covers 7,497 sets from 2,252 trips and identifies 36 megafauna species, of which 11 are ETP (IUCN VU/EN/CR), including Green turtle (*Chelonia mydas)*, Hawksbill turtle (*Eretmochelys imbricata)*, Olive Ridley turtle (*Lepidochelys olivacea)*, Whale shark (*Rhincodon typus)*, Giant manta ray (*Mobula birostris)*, Bull shark (*Carcharhinus leucas)*, Scalloped hammerhead shark (*Sphyrna lewini)*, Waved Albatross (*Phoebastria irrorata)* and Black Petrel (*Procellaria parkinsoni)* (see Table 15 and Table 16) [8].

Table 15 Compiled list of species with interactions, interaction rate per trip in 2023 and 2024, and IUCN Red List status. Species observed interacting with the Ecuadorian small-pelagics purse-seine fishery in 2023–2024, with the number of individuals recorded and the corresponding interaction rate per trip (individuals ÷ observed trips) by year. IUCN status codes: LC = Least Concern; NT = Near Threatened; VU = Vulnerable; EN = Endangered; CR = Critically Endangered; DD = Data Deficient. Interactions and outcomes were recorded by the IPIAP Observer Programme using standard forms. Source: [8]

Tabla 9. Tabla compilada de especies con interacciones, tasa de interacción por viaje 2023 y 2024, y estado de la lista roja UICN. Las especies con categoría VU, EN y CR son las denominadas ETP

				Interacciones		Tasa de interacción por viaje	
ID	Nombre científico	Nombre común	Estado lista roja UICN	2023	2024	2023	2024
1	*Otaria flavescens*	Lobo marino sudamericano	LC	17405	4596	12.704	5.211
2	*Fregata magnificens*	Fragata común	LC	11018	3203	8.042	3.632
3	*Sula nebouxii*	Piquero de patas azules	LC	9727	205	7.100	0.232
4	*Pelecanus occidentalis*	Pelícano pardo	LC	3235	1950	2.361	2.211
5	*Ardenna grisea*	Pardela sombría	NT	2490	0	1.818	0
6	*Larosterna inca*	Charrán inca	NT	928	0	0.677	0
7	*Procellaria parkinsoni*	Petrel de Parkinson	EN	456	0	0.333	0
8	*Chroicocephalus ridibundus*	Gaviota encapuchada	LC	370	0	0.270	0
9	*Sula variegata*	Piquero peruano	LC	101	5	0.074	0.006
10	*Pelecanus thagus*	Pelícano peruano	NT	73	0	0.053	0
11	*Leucocarbo bougainvillii*	Cormorán guanay	NT	63	0	0.046	0
12	*Sula leucogaster*	Piquero pardo	LC	60	0	0.044	0
13	*Sula sula*	Piquero enmascarado	LC	60	0	0.044	0
14	*Chelonia mydas*	Tortuga verde	EN	42	47	0.031	0.053
15	*Oceanites gracilis*	Petrel de Elliot	DD	23	0	0.017	0
16	*Phoebastria irrorata*	Albatros de Galápagos	CR	15	125	0.011	0.142
17	*Lepidochelys olivacea*	Tortuga golfina	VU	15	67	0.011	0.076
18	*Creagrus furcatus*	Gaviota de cola bifurcada	LC	10	0	0.007	0
19	*Leucophaeus pipixcan*	Gaviota de Franklin	LC	10	0	0.007	0
20	*Stenella attenuata*	Delfín manchado pantropical	LC	6	2	0.004	0.002
21	*Tursiops truncatus*	Delfín nariz de botella	LC	2	2	0.001	0.002
22	*Thalasseus elegans*	Charrán elegante	LC	2	0	0.001	0
23	*Mola mola*	Pez luna	VU	1	10	0.001	0.011
24	*Eretmochelys imbricata*	Tortuga carey	CR	1	1	0.001	0.001
25	*Mobula mobular*	Manta de aguijón	NT	1	0	0.001	0
26	*Rhincodon typus*	Tiburón ballena	EN	1	0	0.001	0
27	*Mobula birostris*	Mantarraya gigante	EN	0	11	0	0.013
28	*Leucophaeus atricilla*	Gaviota reidora americana	LC	0	10	0	0.011
29	*Ardenna bulleri*	Pardela de Buller	VU	0	9	0	0.010
30	*Carcharhinus leucas*	Tiburón toro	VU	0	4	0	0.005
31	*Delphinus delphis*	Delfín común	LC	0	3	0	0.003
32	*Megaptera novaeangliae*	Ballena jorobada	LC	0	1	0	0.001
33	*Sphyrna lewini*	Tiburón martillo festonado	CR	0	1	0	0.001

Table 16 ETP subset: species with IUCN threat status (VU, EN or CR), number of interactions and interaction rate per trip, 2023–2024. Subset of Table 1 showing only ETP species (defined here as IUCN categories VU/EN/CR). Columns report the

number of individuals recorded interacting with the fishery and the interaction rate per trip for each year. Data from the IPIAP Observer Programme. Source: [8]

				Interacciones		Tasa de interacción por viaje	
ID	Nombre científico	Nombre común	Estado lista roja UICN	2023	2024	2023	2024
1	*Procellaria parkinsoni*	Petrel de Parkinson	EN	456	0	0.333	0
2	*Chelonia mydas*	Tortuga verde	EN	42	47	0.031	0.053
3	*Phoebastria irrorata*	Albatros de Galápagos	CR	15	125	0.011	0.142
4	*Lepidochelys olivacea*	Tortuga golfina	VU	15	67	0.011	0.076
5	*Mola mola*	Pez luna	VU	1	10	0.001	0.011
6	*Eretmochelys imbricata*	Tortuga carey	CR	1	1	0.001	0.001
7	*Rhincodon typus*	Tiburón ballena	EN	1	0	0.001	0
8	*Mobula birostris*	Mantarraya gigante	EN	0	11	0	0.013
9	*Ardenna bulleri*	Pardela de Buller	VU	0	9	0	0.010
10	*Carcharhinus leucas*	Tiburón toro	VU	0	4	0	0.005
11	*Sphyrna lewini*	Tiburón martillo festonado	CR	0	1	0	0.001
12	*Sphyrna zygaena*	Tiburón martillo liso	VU	1	0	0.001	0

Observer forms are completed set-by-set and compiled by IPIAP; the same observer platform underpins the MT-scope catch analyses for 2020–2024 [6]. PPR introduced updated f*ichas de liberación/registro* and delivered crew training in 2024, with documented use across companies and vessels [5]; follow-up materials in 2025 show continued application and verification (dashboards, training logs) [7]. The 2023–2024 IPIAP report provides species-level counts, interaction rates per trip, condition/fate after interaction, and the gear part/body part involved; it also includes vessel-class summaries (donut charts) and spatial maps of interaction hotspots (inside/outside 8 nm), demonstrating routine reporting to SRP and public dissemination (see Table 15 and Table 16; Figure 24) [8].

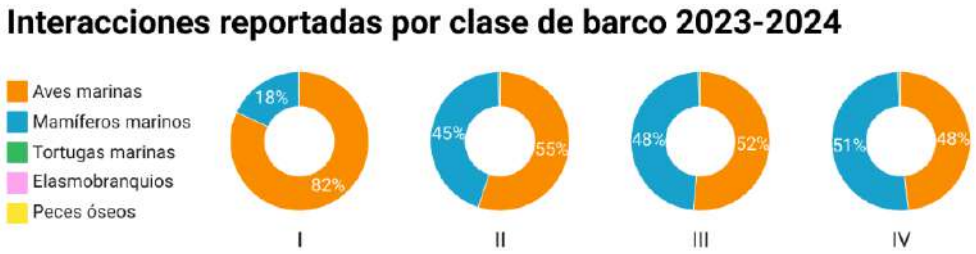


Figure 24 Reported interactions by vessel class, 2023–2024. Percentage distribution of recorded individuals by faunal group (seabirds, marine mammals, sea turtles, elasmobranchs, bony fishes) for purse-seine vessel classes I–IV (as defined by the national fleet classification). Percentages are calculated over the total number of individuals recorded for each class during 2023–2024. Data from the IPIAP Observer Programme. Source: [8].

The time-series of observer outputs (2020 baseline [1], 2021 follow-up [3]) and documented continuity under the SPS-FIP (2022) [4] show consistent methods. Observer coverage and analysis for 2020–2024 confirm an adequate sample and standardised indicators for management [6]. PPR training has improved accuracy and completeness of release records fleet-wide [5][7]. The 2023–2024 IPIAP report quantifies interaction rates per trip that are <0.1 for most ETP species, with two notable seabird exceptions—Parkinson's petrel in 2023 (0.33) and Galápagos albatross in 2024 (0.14)—still interpreted as low interaction rates at population level; overall interaction-related

mortality was ~0.001% of all individuals recorded, and 1,688 releases were documented, with >99.6–99.7% of individuals reported uninjured post-interaction (Tables 9–10; Annexes 5–12) [8]. Taken together, sampling scale, metadata (gear/body part, condition), spatial analyses and documented releases provide a reliable indication of impact and support a Pass for this clause. E1.1 is met.

References

[1] IPIAP (2020). *Interacción de la pesquería de PPP con fauna marina y especies ETP – 2020.*
[2] MPCEIP–SRP (2021). *Plan de Acción y Manejo de la Pesquería de Peces Pelágicos Pequeños del Ecuador (2021–2025).* Acuerdo Ministerial MPCEIP-SRP-2021-0073-A.
[3] IPIAP (2021). *Interacción de la pesquería de PPP con fauna marina y especies ETP – 2021.*
[4] SPS-FIP (2022). *Progress Report – Fourth Year (Oct 2022).*
[5] CNP (2024). *Panel PPR-2024* (formularios de registro/liberación; contenidos y capacitación).
[6] IPIAP (2024). *Informe de capturas PPP autorizadas para producción de harina de pescado (MT), 2020–2024*(Programa de Observadores; métodos/cobertura).
[7] CNP (2025). *Panel PPR-2025* (seguimiento; verificación de uso de fichas y cobertura de capacitación).
[8] IPIAP (2025). *Interacción de aves marinas, tortugas, mamíferos marinos y elasmobranquios con la pesquería de PPP durante 2023–2024.*

E1.2	**E1.2 The fishery has no significant negative impact on ETP species.** *In reaching a determination for E1.2, the assessor should consider if the following is in place:*
	E1.2.1 The information collected in relation to E1.1.3 indicates that the fishery does not have a significant negative impact on ETP species.
Outcome	*Pass*

Rationale

Observer monitoring of megafauna/ETP interactions has been in place since 2020, establishing methods and metrics (interaction per trip, fate/condition) for seabirds, turtles, marine mammals and elasmobranchs [1]. The 2021 National Action & Management Plan (PAN/PM) formalised mandatory monitoring and mitigation for ETP taxa in the purse-seine fleet [2], and the 2021 IPIAP report confirmed the data structure and taxa monitored [3]. Continuity of these protocols was documented in the 2022 SPS-FIP progress report [4]. In 2024, the Programa Pesca Responsable (PPR) refreshed the standardised release/recording forms and trained crews on correct completion and safe handling/release practices, strengthening mitigation and the quality of records [5]. The programme reports continued application and follow-up in 2025 across companies and vessels [6].

The most recent 2023–2024 IPIAP analysis provides species-level counts, interaction rates per trip and fate/condition. For the ETP subset (IUCN VU/EN/CR), interaction rates per trip were low: e.g., sea turtles *Chelonia mydas* 0.031→0.053, *Lepidochelys olivacea* 0.011→0.076, *Eretmochelys imbricata* 0.001→0.001; elasmobranchs *Mobula birostris* 0→0.013; *Rhincodon typus* 0.001→0; *Carcharhinus leucas* 0→0.005; *Sphyrna lewini* 0→0.001; seabirds *Phoebastria irrorata 0*.011→0.142 and *Procellaria parkinsoni* 0.333→0.000 (2023→2024) (see Table 15 and Table 16). Records include fate/conditionfields and show the vast majority of individuals escaped or were released alive; overall interaction-related mortality is reported as very low in the report's conclusions [8]. Considering the low per-trip rates across ETP taxa, the predominance of non-injury outcomes, and

the existence of mandatory monitoring/mitigation (PAN/PM) plus fleet-level training and standardised forms (PPR), the information indicates that the fishery does not have a significant negative impact on ETP species [1–5][6][7]. E1.2 is met.

References

[1] IPIAP (2020). *Interacción de la pesquería de PPP con fauna marina y especies ETP – 2020.*
[2] MPCEIP–SRP (2021). *Plan de Acción y Manejo de la Pesquería de Peces Pelágicos Pequeños del Ecuador (2021–2025).* Acuerdo Ministerial MPCEIP-SRP-2021-0073-A.
[3] IPIAP (2021). *Interacción de la pesquería de PPP con fauna marina y especies ETP – 2021.*
[4] SPS-FIP (2022). *Progress Report – Fourth Year (Oct 2022).*
[5] CNP (2024). *Panel PPR-2024* (formularios de registro/liberación; capacitación y contenidos).
[6] CNP (2025). *Panel PPR-2025* (seguimiento; verificación de uso de fichas y cobertura de capacitación).
[7] IPIAP (2025). *Interacción de aves marinas, tortugas, mamíferos marinos y elasmobranquios con la pesquería de PPP durante 2023–2024.*

E1.3	**E1.3 There is an ETP management strategy in place for the fishery.** *In reaching a determination for E1.3, the assessor should consider if the following is in place:*	
	E1.3.1	There are measures applied to the fishery which are designed to manage the impacts of the fishery on ETP species.
	E1.3.2	The measures are considered likely to achieve the objectives of regional, national and international legislation relating to ETP species.
Outcome	*Pass*	

Rationale

The Ecuadorian small pelagics purse-seine fishery has applied systematic monitoring of ETP interactions since 2020, when the IPIAP Observer Programme began recording megafauna interactions with standardised protocols [1]. In 2021, the *Plan de Acción y Manejo de la Pesquería de Peces Pelágicos Pequeños del Ecuador (PAN/PM 2021–2025)* formalised mandatory monitoring and mitigation of ETP interactions, including observer coverage, bycatch controls and spatio-temporal closures [2]. The same year, IPIAP published an updated ETP report that reinforced the scope of monitored groups and standard data structures [3].

Further consolidation came with the 2022 SPS-FIP progress report, which archived training, observer protocols and early ETP data analysis [4]. In 2024, the industry's *Programa Pesca Responsable (PPR)* updated the *fichas de liberación* for recording interaction outcomes, and delivered formal crew training on handling and safe release of turtles, mobulids, seabirds and marine mammals [5]. In 2025, the PPR confirmed continued implementation and fleet-wide follow-up, demonstrating sustained use of release forms and coverage of crew training [6].

The PAN/PM (2021–2025) aligns Ecuadorian small-pelagics management with the *Ley Orgánica para el Desarrollo de la Acuicultura y Pesca*, national biodiversity policy and obligations under IUCN/CITES frameworks [2]. Ecuador is also party to international instruments such as the Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC) and the Convention

on Migratory Species (CMS), which require ETP monitoring and mitigation. Observer protocols, spatio-temporal closures, and PPR training are directly relevant to these commitments [2][5][6].

Most recently, the 2023–2024 IPIAP ETP report analysed more than 2,000 trips and identified 36 megafauna species, of which 11 are IUCN-listed ETP species. Table 15 and Table 16 present the full list and the ETP subset, showing interaction rates per trip that remain low across all species. Figure 1 illustrates the distribution of interactions across vessel classes. The report concluded that >99% of individuals were released alive and uninjured, supporting the effectiveness of measures in place [7]. Together, the evidence shows that Ecuador has an ETP management strategy in place that is likely to achieve the objectives of national and international conservation legislation.

The IPIAP Observer Programme documents interactions with ETP species through set-by-set observer forms that capture species/taxon, interaction type, condition/fate, gear/body part involved, and release details. The PAN/PM (2021) establishes mandatory monitoring of ETP fauna within the PPP fleet and assigns IPIAP responsibility for reporting and advising SRP on ETP interactions. Industry's Programa Pesca Responsable (PPR) provides updated species-ID materials, safe-release protocols, and annual crew training to improve handling practices and support compliance with national requirements. The 2023–2024 IPIAP report provides species-level counts, interaction rates per trip, and condition/fate after interaction, accompanied by metadata, spatial summaries and vessel-class analyses, demonstrating that information is routinely reported to SRP and is publicly available. These data reflect consistent methodology and adequate sample size to provide a reliable indication of fishery impacts on ETP species.

The Management Plan includes ETP-related mitigation requirements, including release protocols for ETP fauna, mandatory observer coverage, VMS monitoring, fleet coordination and communication rules during wildlife events, and handling/interaction procedures aligned with national ETP regulations.

E1.3 is met.

References

[1] IPIAP (2020). *Interacción de la pesquería de PPP con fauna marina y especies ETP – 2020.*
[2] MPCEIP–SRP (2021). *Plan de Acción y Manejo de la Pesquería de Peces Pelágicos Pequeños del Ecuador (2021–2025).* Acuerdo Ministerial MPCEIP-SRP-2021-0073-A.
[3] IPIAP (2021). *Interacción de la pesquería de PPP con fauna marina y especies ETP – 2021.*
[4] SPS-FIP (2022). *Progress Report – Fourth Year (Oct 2022).*
[5] CNP (2024). *Panel PPR-2024* (formularios de registro/liberación; capacitación y contenidos).
[6] CNP (2025). *Panel PPR-2025* (seguimiento; verificación de uso de fichas y cobertura de capacitación).
[7] IPIAP (2025). *Interacción de aves marinas, tortugas, mamíferos marinos y elasmobranquios con la pesquería de PPP durante 2023–2024.*

E2 Impact on the habitat

E2.1	**E2.1**	**Information on interactions between the fishery and marine habitats is collected.** *In reaching a determination for E2.1, the assessor should consider if the following is in place:*
	E2.1.1	Habitats which may be directly affected by the fishery have been identified, including any habitats which may be particularly vulnerable.
	E2.1.2	Information on the scale, location and intensity of fishing activity relative to habitats is collected.
	E2.1.3	Collection and analysis of habitat information is adequate to provide a reliable indication of the impact the fishery has on marine habitats.
Outcome	*Pass*	

Rationale

The Ecuadorian small pelagics purse-seine fishery operates in coastal and offshore waters of the continental shelf and slope, targeting pelagic schools in the upper 40–150 m of the water column. IPIAP and the *Plan de Acción y Manejo de la Pesquería de Pelágicos Pequeños* (PAN/PM 2021–2025) identify potential overlap with sandy and muddy substrates in nearshore zones, but not with fragile habitats such as coral reefs or rocky outcrops [1,2]. Purse-seine gear is mid-water and does not normally contact the seabed; therefore, sensitive benthic habitats are not at risk [2].

Fishing distribution and effort are recorded through logbooks, VMS and the Observer Programme [3]. Hydroacoustic surveys provide biomass distribution relative to distance from shore and depth strata. Table 17 (from IPIAP 2025) shows that 85.8% of biomass was distributed beyond 8 nautical miles, confirming that most fishing effort occurs offshore. Figure 25to Figure 29 illustrate horizontal and vertical biomass distribution for the five principal species (*Scomber japonicus, Auxis spp., Etrumeus teres (*proxy for E. *acuminatus*), *Decapterus macrosoma, Cetengraulis mysticetus*), showing that schools are concentrated between 40–150 m depth, well above the seabed [4].

Observer reports since 2020 [3], combined with the legal framework of the 2019 Fisheries Law [5] and PAN/PM 2021–2025 [2], provide continuous monitoring of fishing zones and habitats. The 2025 hydroacoustic survey [4] adds robust evidence of offshore, mid-water biomass distribution, with negligible overlap with vulnerable habitats. Although hydroacoustic maps are not available for four minor species (*Etrumeus acuminatus, Prionotus stephanophrys, Peprilus medius, Prionotus albirrostris*), their contribution to the fishery is ≤1% of the total catch each. For *Etrumeus acuminatus*, maps of the related species *E. teres* are presented as a proxy [4]. Given their very low catch share and the comprehensive mapping of the dominant Type 1 species, the available information is sufficient to conclude that the fishery has negligible impacts on marine habitats.

Table 17 Distribution of small pelagic species biomass by distance from shore and depth strata, February 2025 hydroacoustic survey. Source: IPIAP (2025) [5].

Especies	Distancia a la costa [mn]				Total (t)
	0 a 4	4 a 6	6 a 8	mayor a 8	
Botella	0	0	3.510	52.833	56.343
Macarela	0	0	0	68.329	68.329
Sardina	0	0	0	16.887	16.887
Pinchagua	13.831	13.810	65	19.739	47.445
Picudillo	0	0	0	17.910	17.910
Chuhueco	0	0	756	18.601	19.357
Total	13.831	13.810	4.331	194.300	226.272
%	**6,1**	**6,1**	**1,9**	**85,8**	100,0

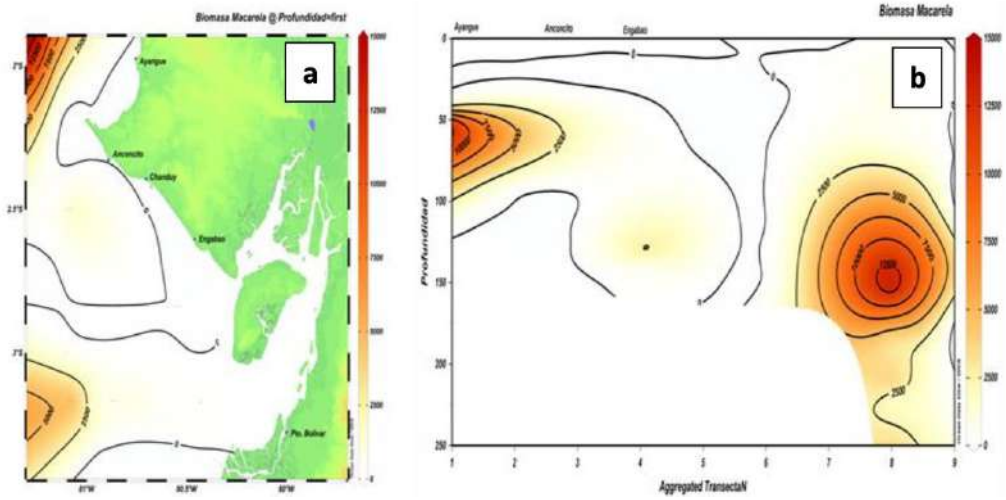


Figure 25 Horizontal (a) and vertical (b) distribution of chub mackerel (Scomber japonicus) biomass during the IPIAP hydroacoustic survey, February 2025. Source: IPIAP (2025).

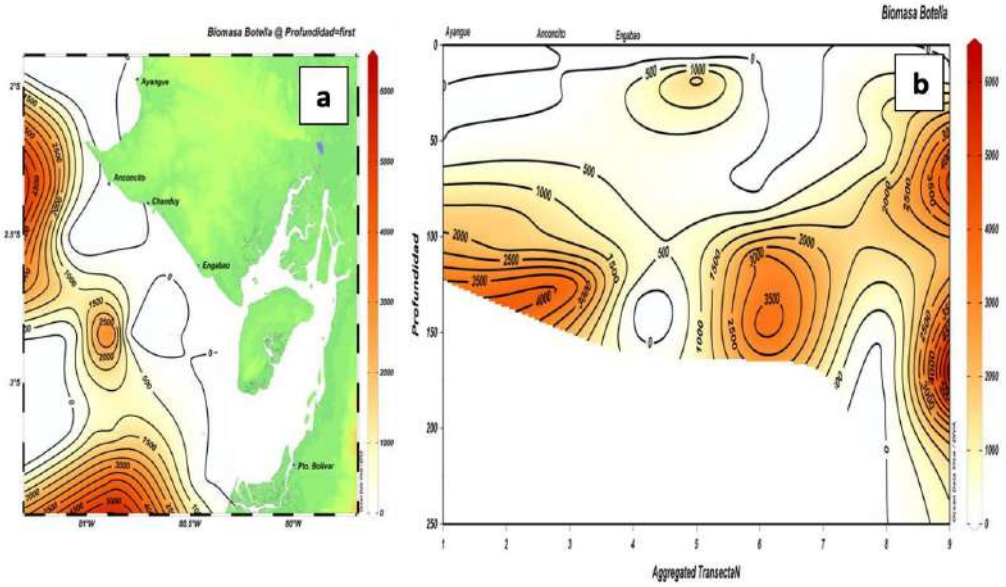


Figure 26 Horizontal (a) and vertical (b) distribution of frigate tuna (Auxis spp.) biomass during the IPIAP hydroacoustic survey, February 2025. Source: IPIAP (2025).

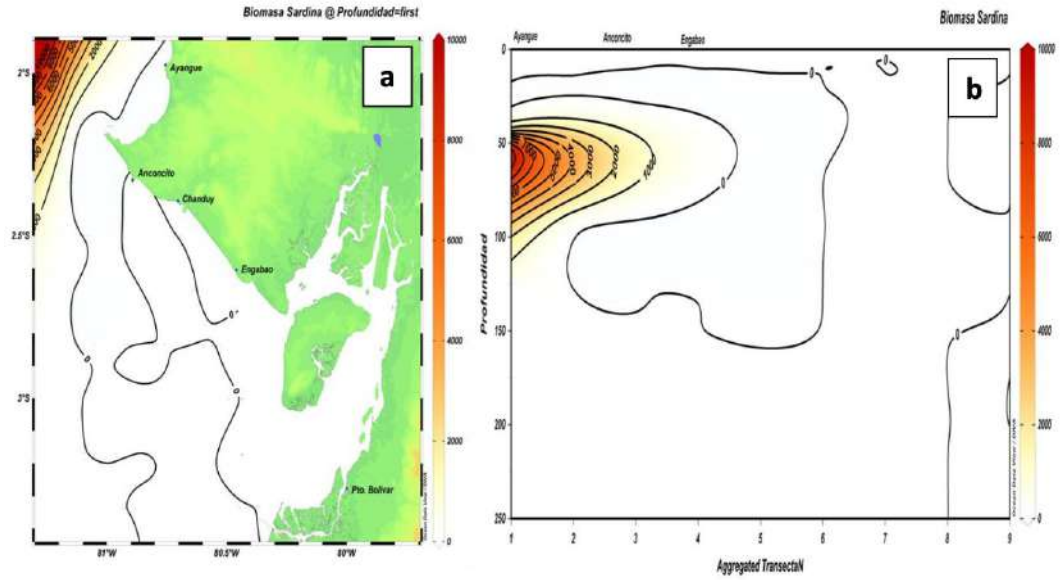


Figure 27 Horizontal (a) and vertical (b) distribution of round herring (Etrumeus teres - proxy for E. acuminatus) biomass during the IPIAP hydroacoustic survey, February 2025. Source: IPIAP (2025).

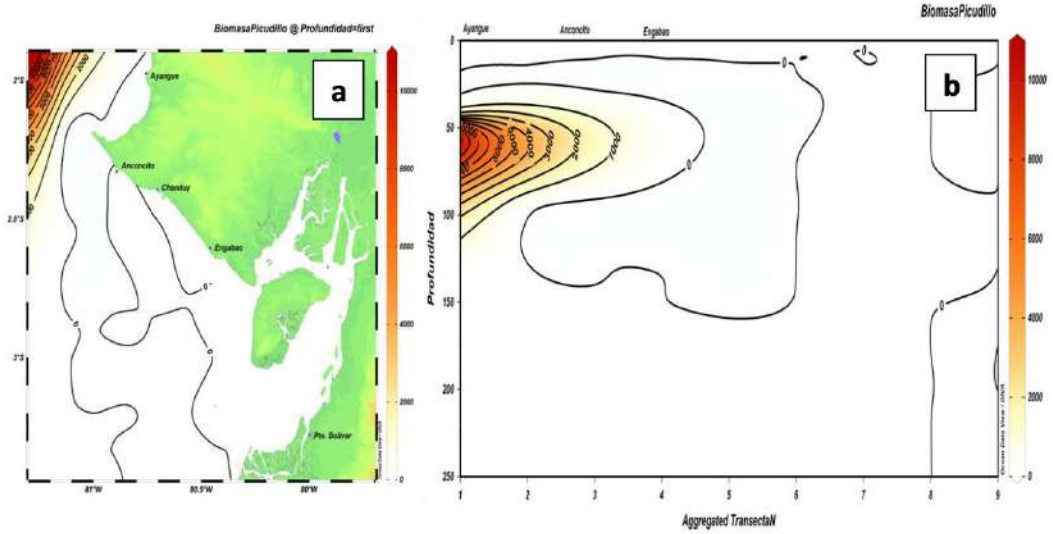


Figure 28 Horizontal (a) and vertical (b) distribution of picudillo (Decapterus macrosoma) biomass during the IPIAP hydroacoustic survey, February 2025. Source: IPIAP (2025).

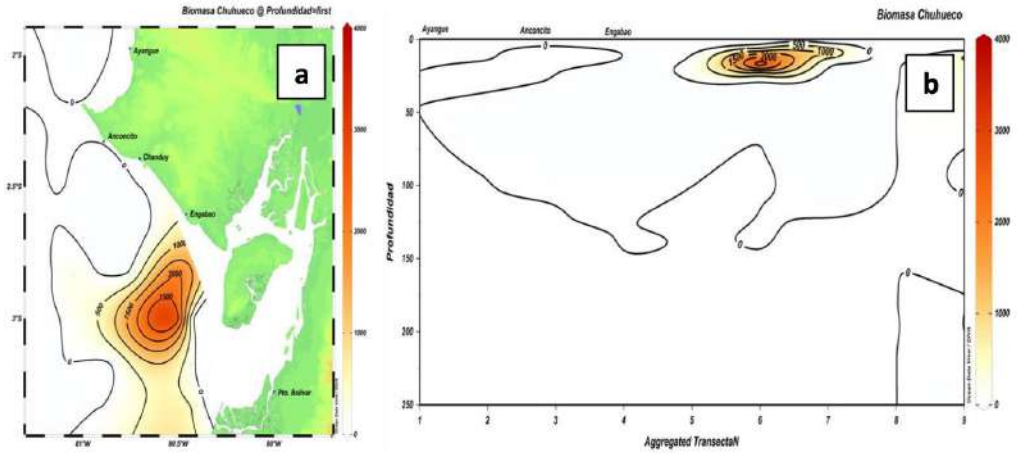


Figure 29 Horizontal (a) and vertical (b) distribution of pacific anchoveta (Cetengraulis mysticetus) biomass during the IPIAP hydroacoustic survey, February 2025. Source: IPIAP (2025).

References

[1] MPCEIP–SRP. *Plan de Acción y Manejo de la Pesquería de Pelágicos Pequeños (2021–2025).* Acuerdo Ministerial MPCEIP-SRP-2021-0073-A. 2021.
[2] IPIAP. *Informe sobre interacciones de la pesquería de PPP con hábitats marinos – 2021.*
[3] IPIAP. *Informe de capturas PPP-MT 2020–2024 (Programa de Observadores).* Guayaquil, Ecuador. 2024.
[4] IPIAP. *Informe Crucero Hidroacústico PPP 2025-02-01.* Guayaquil, Ecuador. 2025.
[5] Gobierno del Ecuador. *Ley Orgánica para el Desarrollo de la Acuicultura y Pesca.* Registro Oficial Suplemento 187, 14 May 2019.

E2.2	**E2.2 The fishery has no significant impact on marine habitats.** *In reaching a determination for E2.2, the assessor should consider if the following is in place:*
	E2.2.1 The information collected in relation to E2.1.3 indicates that the fishery does not have a significant negative impact on marine habitats.
Outcome	*Pass*

Rationale

The Ecuadorian small pelagics purse-seine fishery operates as a mid-water fishery, with sets targeting pelagic schools between 40–150 m depth [1]. Hydroacoustic surveys from February 2025 show that 85.8% of biomass was distributed beyond 8 nautical miles and that schools were concentrated in mid-water strata (Figure 25 to Figure 29 above), confirming that fishing operations do not interact with the seabed [1].

Observer data compiled under the MarinTrust scope for 2020–2024 further confirm that purse-seine nets are deployed in the water column and have no contact with benthic habitats [2]. The *Plan de Acción y Manejo de la Pesquería de Pelágicos Pequeños (2021–2025)* explicitly identifies that the fishery does not overlap with vulnerable habitats such as coral reefs or rocky substrates, and incorporates a management objective (EC-2.1) to minimise potential habitat interactions [3].

Although no hydroacoustic maps are available for four minor species (*Etrumeus acuminatus, Prionotus stephanophrys, Peprilus medius, Prionotus albirrostris*), these each contribute ≤1% of the total catch. For *E. acuminatus*, maps of the related species *E. teres* are used as a proxy [1]. Given their low catch share and the offshore, mid-water distribution of the main Type 1 species, the available evidence is sufficient to conclude that the fishery does not have a significant negative impact on marine habitats.

References

[1] IPIAP. *Informe Crucero Hidroacústico PPP 2025-02-01.* Guayaquil, Ecuador. 2025.
[2] IPIAP. *Informe de capturas PPP-MT 2020–2024 (Programa de Observadores).* Guayaquil, Ecuador. 2024.
[3] MPCEIP–SRP. *Plan de Acción y Manejo de la Pesquería de Pelágicos Pequeños (2021–2025).* Acuerdo Ministerial MPCEIP-SRP-2021-0073-A. 2021.

E2.3	**E2.3 There is a habitat management strategy in place for the fishery.** *In reaching a determination for E2.3, the assessor should consider if the following is in place:*	
	E2.3.1	There are measures applied to the fishery which are designed to manage the impact of the fishery on marine habitats.
	E2.3.2	The measures are considered likely to prevent the fishery from having a significant negative impact on marine habitats.
Outcome	*Pass*	

Rationale

The Ecuadorian small pelagics purse-seine fishery is managed under the Ley Orgánica para el Desarrollo de la Acuicultura y Pesca (2019), which establishes sustainability and biodiversity conservation as guiding principles [1]. Building on this framework, the Plan de Acción y Manejo de la Pesquería de Pelágicos Pequeños (PAN/PM 2021–2025) mandates measures to avoid interactions with benthic habitats, including: (i) restrictions on gear types and mesh size; (ii) temporal and spatial closures (vedas) to protect juvenile and spawning concentrations; and (iii) a management objective (EC-2.1) to minimise risks of seabed interaction [2].

Evidence collected by IPIAP through observer data and hydroacoustic surveys confirms that fishing operations occur offshore and in the water column, with 85.8% of biomass beyond 8 nm and concentrated at 40–150 m depth [3]. This supports the effectiveness of management measures in ensuring that purse-seine nets do not make contact with sensitive habitats such as coral reefs or rocky substrates. Observer data from 2020–2024 further corroborate that no seabed interactions have been recorded [4].

Together, the national legal framework, management plan provisions, and empirical evidence from monitoring indicate that the measures in place are effective and are likely to prevent the fishery from having a significant negative impact on marine habitats.

References

[1] Gobierno del Ecuador. *Ley Orgánica para el Desarrollo de la Acuicultura y Pesca.* Registro Oficial Suplemento 187, 14 May 2019.
[2] MPCEIP–SRP. *Plan de Acción y Manejo de la Pesquería de Pelágicos Pequeños (2021–2025).* Acuerdo Ministerial MPCEIP-SRP-2021-0073-A. 2021.

[3] IPIAP. *Informe Crucero Hidroacústico PPP 2025-02-01.* Guayaquil, Ecuador. 2025.
[4] IPIAP. *Informe de capturas PPP-MT 2020–2024 (Programa de Observadores).* Guayaquil, Ecuador. 2024.

E3 Impact on the ecosystem

E3.1	**E3.1**	**Information on the potential impacts of the fishery on marine ecosystems is collected.** *In reaching a determination for E3.1, the assessor should consider if the following is in place:*
	E3.1.1	The main elements of the marine ecosystems in the area(s) where the fishery takes place have been identified.
	E3.1.2	The role of the species caught in the fishery within the marine ecosystem is understood, either through research on this specific fishery or inferred from other fisheries.
	E3.1.3	Collection and analysis of ecosystem information is adequate to provide a reliable indication of the impact the fishery has on marine ecosystems.
Outcome	*Pass*	

Rationale

Ecuador's Pacific coastal ecosystem is part of the Eastern Tropical Pacific upwelling system, characterised by high productivity driven by equatorial and coastal currents [1]. The *Plan de Acción y Manejo de la Pesquería de Pelágicos Pequeños (PAN/PM 2021–2025)* identifies the principal ecosystem components relevant to the fishery, including small pelagic fishes (e.g. chub mackerel *Scomber japonicus*, frigate tunas *Auxis* spp., shortfin scad *Decapterus macrosoma*, Pacific anchoveta *Cetengraulis mysticetus*), their predators (tunas, sharks, billfishes, marine mammals, seabirds), and planktonic prey resources [2].

Small pelagic fishes are recognised as low-trophic-level (LTL) forage species that provide a critical energy pathway between planktonic production and higher predators [3]. Their ecological role in Ecuador is consistent with global patterns described for similar systems (e.g. Humboldt Current, California Current). In Ecuador, hydroacoustic and ecological studies confirm that small pelagic species are key prey for tunas (*Thunnus* spp.), billfishes, sharks, marine mammals and seabirds [4]. The 2025 hydroacoustic survey confirmed strong pelagic biomass concentrations, supporting their role as forage aggregations [5].

Ecosystem monitoring combines multiple streams of information: (i) IPIAP hydroacoustic surveys provide long-term biomass indices for small pelagics [5]; (ii) observer records monitor bycatch and ETP interactions [6]; and (iii) management reports evaluate trophic linkages and environmental drivers, including ENSO variability [2]. Annual SPS-FIP progress reports document continued data collection, including ecological indicators and megafauna interactions [7]. Together, these demonstrate an integrated ecosystem approach to data collection.

The available evidence indicates that the main ecosystem components are well-identified, the role of small pelagics as forage species is clearly understood, and ecosystem data collection is sufficient to provide a reliable indication of potential impacts of the fishery.

References
[1] Chavez FP, Ryan J, Lluch-Cota SE, Ñiquen CM. *From anchovies to sardines and back: Multidecadal change in the Pacific Ocean.* Science. 2003;299:217–221.
[2] MPCEIP–SRP. *Plan de Acción y Manejo de la Pesquería de Pelágicos Pequeños (2021–2025).* Acuerdo Ministerial MPCEIP-SRP-2021-0073-A. 2021.
[3] Pikitch EK, Rountos K, Essington TE, et al. *The global contribution of forage fish to marine fisheries and ecosystems.*Fish Fish. 2014;15:43–64.
[4] IPIAP. *Informe Impacto Ecosistémico de la Pesquería de Pelágicos Pequeños.* Guayaquil, Ecuador. 2023.
[5] IPIAP. *Informe Crucero Hidroacústico PPP 2025-02-01.* Guayaquil, Ecuador. 2025.
[6] IPIAP. *Informe de interacción de la pesquería de PPP con fauna marina y especies ETP 2023–2024.* Guayaquil, Ecuador. 2025.
[7] SPS-FIP. *Progress Report – Fourth Year.* Oct 2022

E3.2	**E3.2**	**There is no substantial evidence that the fishery has a significant negative impact on the marine ecosystem.** *In reaching a determination for E3.2, the assessor should consider if the following is in place:*
	E3.2.1	The information collected in relation to E3.1.3 indicates that the fishery does not have a significant negative impact on marine ecosystems.
Outcome	*Pass*	

Rationale

The Ecuadorian small pelagics purse-seine fishery targets forage species that are ecologically important in the food web. However, available evidence shows no substantial negative impacts on the broader ecosystem. Hydroacoustic surveys indicate stable biomass levels for principal species and offshore, mid-water distributions that reduce overlap with sensitive habitats [1]. Observer data confirm low bycatch of non-target species and very low mortality of ETP fauna, with >99% survival of released individuals during 2023–2024 [2].

The *Plan de Acción y Manejo de la Pesquería de Pelágicos Pequeños (2021–2025)* recognises the ecological role of PPP species and incorporates objectives to manage harvests at or near MSY, reduce juvenile catch, and apply reproductive closures to maintain trophic balance [3]. Ecosystem impact assessments by IPIAP (2023) concluded that the fishery's removals are not impairing ecosystem function, given the continued availability of prey for higher predators such as tunas, billfishes, sharks, seabirds and marine mammals [4].

Taken together, the monitoring and management framework provide consistent evidence that the fishery has not caused significant disruption to marine ecosystem structure or function.

References
[1] IPIAP. *Informe Crucero Hidroacústico PPP 2025-02-01.* Guayaquil, Ecuador. 2025.
[2] IPIAP. *Informe de interacción de la pesquería de PPP con fauna marina y especies ETP 2023–2024.* Guayaquil, Ecuador. 2025.
[3] MPCEIP–SRP. *Plan de Acción y Manejo de la Pesquería de Pelágicos Pequeños (2021–2025).* Acuerdo Ministerial MPCEIP-SRP-2021-0073-A. 2021.
[4] IPIAP. *Informe Impacto Ecosistémico de la Pesquería de Pelágicos Pequeños.* Guayaquil, Ecuador. 2023

E3.3	**E3.3 There is an ecosystem management strategy in place for the fishery.** *In reaching a determination for E3.3, the assessor should consider if the following is in place:*	
	E3.3.1	There are measures applied to the fishery which are designed to manage the impacts of the fishery on marine ecosystems.
	E3.3.2	The measures are considered likely to prevent the fishery from having a significant negative impact on marine ecosystems.
Outcome	*Pass*	

Rationale

The Ecuadorian small pelagics purse-seine fishery is managed under the *Ley Orgánica para el Desarrollo de la Acuicultura y Pesca* (2019), which establishes ecosystem-based management and biodiversity conservation as core principles [1]. The *Plan de Acción y Manejo de la Pesquería de Pelágicos Pequeños (PAN/PM 2021–2025)* operationalises these principles, setting objectives to:

- maintain catches of principal small pelagic species at or near MSY,
- reduce juvenile catches through recruitment closures,
- protect reproductive activity via seasonal closures,
- and minimise ecosystem impacts by integrating ETP, bycatch, and habitat measures [2].

Monitoring results support the effectiveness of these measures. Hydroacoustic surveys confirm stable biomass and mid-water distributions of target species [3]. Observer data (2020–2024) demonstrate low levels of incidental mortality of ETP fauna and negligible habitat interaction [4,5]. Ecosystem assessments conducted by IPIAP (2023) concluded that removals of small pelagics remain within sustainable limits and that trophic relationships with higher predators are not being disrupted [6].

Together, the national legal framework, the PAN/PM management measures, and empirical evidence from monitoring programmes indicate that an ecosystem management strategy is in place and is likely to prevent the fishery from having significant negative impacts on marine ecosystems.

References

[1] Gobierno del Ecuador. *Ley Orgánica para el Desarrollo de la Acuicultura y Pesca.* Registro Oficial Suplemento 187, 14 May 2019.
[2] MPCEIP–SRP. *Plan de Acción y Manejo de la Pesquería de Pelágicos Pequeños (2021–2025).* Acuerdo Ministerial MPCEIP-SRP-2021-0073-A. 2021.
[3] IPIAP. *Informe Crucero Hidroacústico PPP 2025-02-01.* Guayaquil, Ecuador. 2025.
[4] IPIAP. *Informe de capturas PPP-MT 2020–2024 (Programa de Observadores).* Guayaquil, Ecuador. 2024.
[5] IPIAP. *Informe de interacción de la pesquería de PPP con fauna marina y especies ETP 2023–2024.* Guayaquil, Ecuador. 2025.
[6] IPIAP. *Informe Impacto Ecosistémico de la Pesquería de Pelágicos Pequeños.* Guayaquil, Ecuador. 2023.

Annex 1: External Peer Review report

Fishery name	**Ecuadorian small pelagics industrial fishery – FAO 87**
MarinTrust report code	**W42**
Type 1 species (common name, Latin name)	*Pacific chub mackerel (Scomber japonicus, "Macarela" or "Morenillo)* *Frigate tunas (Auxis spp., "botella")* *Shortfin scad (Decapterus macrosoma, "picudillo")*
Fishery location	*Ecuador EEZ – FAO 87*
Gear type(s)	*Purse seine*
Management authority (country/state)	*Ecuador*
Certification Body recommendation	*Approved*
FAPRG reviewer recommendation	Agree with CB determination

Summary of peer review outcomes

Summary *Provide any information about the fishery that the reviewers feel is significant to their decision. This summary is used by the Certification Body in the Fishery Assessment Report.*
The assessor has produced a clear and well-referenced report, providing robust justification for all scoring decisions. The peer reviewer concurs with the assessment outcomes and assigned scores, offering only a few minor comments.
General comments on the draft report provided to the peer reviewer
Thank you for the constructive feedback on the report

1. Has the fishery assessment been fully completed, using the recognised MarinTrust fishery assessment methodology and associated guidance?	Yes
2. Does the Species Categorisation section of the report reflect the best current understanding of the catch composition of the fishery?	Yes
3. Are the scores in the following sections consistent with the MarinTrust requirements (i.e. do the scores reflect the evidence provided)?	Yes
Section M – Management Requirements	Yes
Category A Species	Yes
Category B Species	n/a
Category C Species	Yes
Category D Species	Yes
Section E – Ecosystem Impacts	Yes

Detailed Peer Review Justification

1. Has the fishery assessment been fully completed, using the recognised MarinTrust fishery assessment methodology and associated guidance?	Yes
Yes, the MT assessment methodology has been adequately used.	
Certification Body response	
OK	

2. Does the species categorisation section of the report reflect the best current understanding of the catch composition of the fishery?	Yes
Yes, species categorisation is based on data from the IPIAP Observer Programme (2020–2024), which appears to be the most appropriate and up-to-date source of information. One minor comment: the assessor states, “For this initial assessment, the rationale is based on the Observer Programme analysis tailored to the MarinTrust scope—i.e., fishmeal-authorised sets—covering 2020–2024.” I understand this is intended to mean the rationale for species categorisation. Three Type 1 species were identified, representing up to 97% of the total catch. The assignment of species to Categories C and D appears correct and is well justified in the accompanying rationale.	
Certification Body response	
Thank you	

3. Is the scoring of the fishery consistent with the MarinTrust requirements, and clearly based on the evidence presented in the assessment report?	Yes
Yes, the scoring of the fishery is consistent with the MT standard and requirements. The evidence provided is adequate and the scores given in each section clearly justified.	
Certification Body response	
Thank you	

3a. Are the “Category A Species” scores clearly justified?	Yes
Yes, three Category A species were identified in the catch: Pacific chub mackerel, frigate tuna, and shortfin scad. A good amount of infromation is available for the fishery. The most recent stock assessments indicate that, for all stocks, fishing mortality is below the target reference point. Biomass is either above the target reference point (for frigate tuna and shortfin scad) or close to it (for Pacific chub mackerel), as shown in the provided Kobe diagrams. The justifications and associated scores appear appropriate.	

Certification Body response
Thank you

3b. Are the “Category B Species” scores clearly justified?	n/a
No category B species identified in the catch.	
Certification Body response	
OK	

3c. Are the “Category C Species” scores clearly justified?	Yes
Two category C species (Pacific anchoveta and Round herring) identified. Both species are over the target reference point.	
Certification Body response	
OK	

3d. Are the “Category D Species” scores clearly justified?	Yes
Three Category D species have been identified (which coincides with the species categorisation table included at the beginning of the report), and a PSA was conducted for each. Based on the available scientific information, the resulting scores appear appropriate (all the scores given are clearly references which is a strenght). All assessed species meet the criteria outlined in Table D(b).	
Certification Body response	
Thank you	

Are the scores in “Section M – Management Requirements” clearly justified?	Yes
Yes, it is positive that a management plan is in place for the small pelagic fishery, which I understand is one of the outcomes of the FIP. Minor comments: M1.3. Does the Informe de Rendición de Cuentas refer specifically to ecosystem impacts? The title suggests it may be more of an economic or administrative report. M2.1 and M2.2. The information provided appears to be highly specific to the fishery, which is a strength. Reported infringements within the fishery are low.	
Certification Body response	
M1.3: A clarification has been added noting that the Informe de Rendición de Cuentas is an annual institutional transparency and management report issued by IPIAP. Its content	

summarises organisational performance, research activities and monitoring outputs across programs, including PPP stock assessment, oceanographic monitoring, hydroacoustic surveys and participation in ERFEN (see IPIAP, 2023). It is not used as evidence of ecosystem impacts under this assessment. Evidence for ecosystem components—bycatch, ETP interactions and habitat impacts—is instead derived from IPIAP observer programmes and technical monitoring reports cited in Section E. No scoring changes were required. M2.1 and M2.2: The comment is acknowledged. The assessment text has been slightly clarified to note that infringement records are derived from SRP enforcement databases and IPIAP Observer Programme compliance reports, both specific to the PPP purse-seine fleet. No changes to the rationale or scoring were required.

Are the scores in "Section E – Ecosystem Impacts" clearly justified?	Yes

Yes, the information provided by the assessor appears to be generally adequate. Just a few minor comments:
E.1: Interactions with ETP species, including their fate, are recorded by the Observer Programme and they are considered low. A very minor comment: the widely accepted English names for P. parkinosi and P. irrorata are Black Petrel and Waved Albatross, respectively. However, since the scientific names are provided, this poses no issue.
E1.3: Apart from bycatch recording is any specific mitigation measure included in the plan?
E.2: Yes, it is true that the purse-seine fishery generally has a low impact on the habitat, as it primarily operates in the water column. However, the prohibition on the use of antifango suggests that this fishery can interact with the seabed. The assessor notes, though, that no interactions occur with vulnerable habitats, so no further comments are necessary.
E.3: Several management measures outlined in the management plan aim to mitigate the fishery's impact on the broader ecosystem. These include objectives to manage harvests at or near MSY, reduce juvenile catch, implement reproductive closures to maintain trophic balance, and establish precautionary reference points for the target stocks.

Certification Body response

E.1: The comment is acknowledged. The English common names have been added in parentheses for all ETP listed in the rationale. E.1.3. E1.3: The comment is acknowledged. A clarification has been added noting that the Management Plan includes specific mitigation requirements for ETP species, including release protocols for ETP fauna, mandatory observer coverage, VMS monitoring, fleet coordination and communication rules during wildlife events, and handling/interaction procedures aligned with national ETP regulations. No changes to the rationale or scoring were required. E.2: Acknowledged. The reviewer confirms that no further comments are necessary. No changes to the rationale or scoring were required. E.3: Acknowledged. The reviewer confirms that the Management Plan includes several measures that address broader

ecosystem impacts, consistent with the rationale provided. No changes to the rationale or scoring were required.

Optional: General peer reviewer comments on the draft report
The rationale for the assessment determination is adequate and addresses all relevant sections.
Certification Body response
Thank you