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IOTC ROS DATA REVIEW: OBSERVER COVERAGE AND COMPILED CATCH AND DISCARDS DATASET

IOTC Secretariat

Purpose, expectation and action intended

The purpose of this paper is to review observer coverage under the IOTC Regional Observer Scheme (ROS) and present the first consolidated dataset of catches and discards recorded by observers in longline and purse seine fisheries.

The WPDCS is invited to:

1. **NOTE** the estimates of observer coverage by fleet and fishing gear for 2025, and the limitation of aggregated coverage estimates for assessing compliance with the minimum 5% requirement.
2. **REVIEW** the compiled ROS catch and discard dataset and the associated effort and coverage information and provide feedback on any corrections or additional data required.
3. **ACKNOWLEDGE** the limitations affecting the completeness, consistency and comparability of ROS data with other IOTC statistical datasets.
4. **RECOMMEND** that CPCs collaborate with the Secretariat to recover, validate and, where necessary, resubmit historical observer data at the required operational level using the agreed IOTC ROS reporting forms, to support their integration into the ROS database and their use by the Scientific Committee and its Working Parties.

Abstract

This paper presents the first consolidated dataset of catches and discards recorded under the IOTC Regional Observer Scheme (ROS) in longline and purse seine fisheries, together with estimates of observer coverage. The compiled dataset contains approximately 75,800 records from 13 fleets, covering 289 species codes and the period 2010-2025. In 2025, aggregated observer coverage was estimated at 4.7% for longline fisheries and 15.9% for purse seine fisheries, although these overall estimates are indicative, as the minimum 5% requirement applies at the CPC fleet level. Seven of fourteen longline fleets and six of eight purse seine fleets had estimated coverage of at least 5%. Spatial analyses for 2022-2025 indicate that observed operations covered 65% of the 5°×5° cells with reported longline effort and purse seine observed sets cover 70% of the 5°x5° cells. However, differences in reporting formats, spatial and temporal resolution, and units limit the comparability of observer data with other IOTC statistical datasets. The paper highlights the need for CPCs to collaborate with the Secretariat to recover and harmonise historical submissions at the required operational level, supporting their integration into the ROS database and subsequent scientific analyses.

Keywords: observer data, observations at-sea, observer coverage

Introduction

The Resolution on the ROS requires observer coverage of at least 5% of the total number of fishing operations (sets) for vessels of 24 m length overall and above, and for smaller vessels fishing outside their Exclusive Economic Zone. CPCs are responsible for training and deploying observers and for reporting the data to the Secretariat using the IOTC reporting tools.

Last year the Secretariat presented to the WPDCS a review of the evolution of the ROS reporting tools and of the completeness of the data submitted (IOTC-2025-WPDCS21-24). That paper showed that many CPCs continue to report in alternative formats that are not compatible with the database, which makes the data difficult to use. This paper presents for the first time a compiled dataset of observer catches and discards from longline and purse seine fisheries, together with estimates of observer coverage derived from it.

The objective is to review estimated observer coverage in 2025 in relation to the minimum coverage requirement established under the ROS, and to make available to the Scientific Committee and its Working Parties a harmonised dataset of observer catches and discards compiled from historical submissions.

Materials and methods

Data available

This review combines observer data submitted by CPCs with total fishing effort reported through the mandatory statistics of the CPCs for longline (LL) and purse seine (PS) fisheries over the period 2010-2025.

Total effort by fleet and year was extracted from the IOTC database, using the effort declared by CPCs under the mandatory statistics. For the spatial and temporal analysis (Section 4) the total effort was used at monthly effort by 5°x5° grid.

Observed catch and discard records were compiled from all the files available to the Secretariat (provided that these records were complete in terms of spatial and temporal information). The records were harmonised into a single structure (fleet, fishing gear, source, year, month, 5°x5° grid, destination, species, catch and unit).

Coverage

Observer coverage was calculated as the ratio of observed effort to total reported effort, by fleet and year. Coverage was also aggregated across all fleets using the same fishing gear to provide an overall indicator of the availability of observer data. However, the minimum 5% coverage requirement established under the ROS applies at the level of individual CPC fleets, rather than to the combined effort of all fleets. Consequently, the aggregated coverage estimates and the corresponding 5% reference threshold are indicative and should not be used to assess compliance with the Resolution.

In accordance with Resolution 25/06, observer coverage should be calculated using the number of fishing operations (sets). However, as this information is not consistently available across fleets and years, alternative measures of fishing effort were used where necessary:

- Longline (LL): Number of hooks, where the number of sets was unavailable.
- Purse seine (PS): Number of sets, or fishing days where the number of sets was unavailable.

For each fishing gear, aggregated observer coverage was calculated as the ratio of total observed effort to total reported effort across fleets, using the corresponding effort units. These alternative measures are not directly equivalent to the number of fishing operations and may introduce biases in coverage estimates. Consequently, coverage calculated using hooks or fishing days should be considered indicative and cannot be used to establish compliance with the minimum 5% requirement.

Fleet-years with reported total effort but no corresponding observer data available to the Secretariat were assigned zero observed effort for the calculation of aggregated coverage. These estimates may therefore underestimate actual coverage where observer data were not submitted or could not be incorporated.

Fleet-years with observed effort but no corresponding total reported effort could not be assessed and are identified accordingly in the accompanying effort and coverage table. For each fleet-year, estimated observer coverage was classified as at least 5%, below 5%, or unavailable due to missing observer data or total effort information. These classifications describe coverage estimated from the data available to the Secretariat and do not necessarily indicate compliance with the requirements of Resolution 25/06.

Spatial coverage

The spatial distribution of observer coverage was assessed for the period 2022–2025, using data reported through the updated IOTC ROS forms, which provide information at the level of individual fishing operations.

For each fishing gear, the analysis compared the spatial distribution of observed fishing operations with that of total reported fishing effort. Three indicators were calculated: (i) the proportion of grid cells with reported fishing effort that contained at least one observed operation; (ii) the proportion of total reported fishing effort occurring in these cells; and (iii) the estimated observer coverage within each grid cell, calculated as the ratio of observed effort to total reported effort.

Grid cells were classified into three categories: no observed operations despite reported fishing effort, estimated observer coverage below 5%, and estimated observer coverage of at least 5%.

Results

Estimated observer coverage

Coverage by fleet and year, for the whole series 2010-2025, is provided in the effort table that accompanies the dataset; the following section describes the general coverage trends and the estimated coverage for 2025.

Longline

Aggregated observer coverage in IOTC longline fisheries has generally increased since the implementation of the ROS in 2010, although it has remained below the 5% reference level throughout most of the period (Figure 1). Coverage declined markedly in 2020-2021, reflecting restrictions on the deployment of onboard observers during the COVID-19 pandemic, before recovering to a peak of 6.8% in 2022. Since then, coverage has declined slightly, remaining below the 5% reference level and reaching 4.7% in 2025.

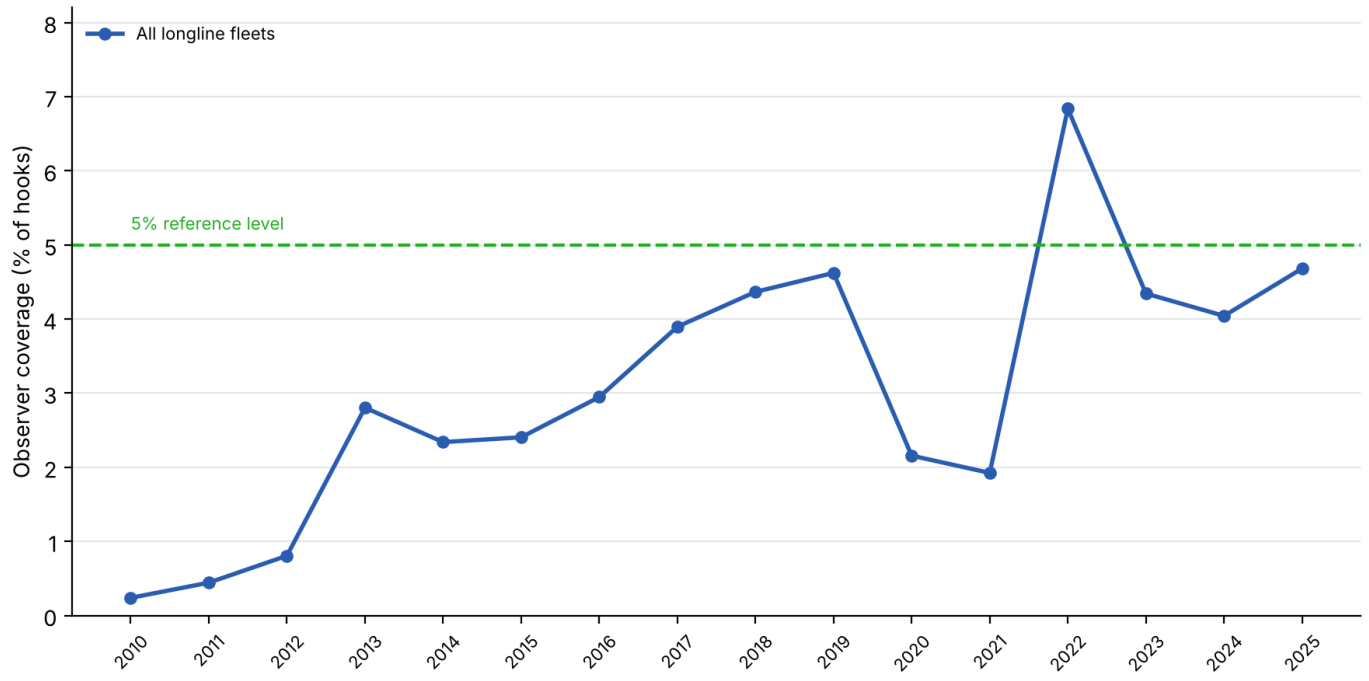

Figure 1: All-fleet longline observer coverage trend (observed / total hooks) for the period 2010-2025. Dashed line: 5% reference level.

In 2025, seven fleets had estimated observer coverage of at least 5%: Japan (18.6%), South Africa (18.5%), EU,France (17.0%), Korea (14.4%), Australia (8.7%), EU,Portugal (7.3%) and China (5.3%). Taiwan,China (4.0%) and EU,Spain (3.7%) were below 5%. Five fleets that reported effort (Seychelles, Malaysia, Oman, Mauritius and Tanzania) have no observer data reported (Figure 2).

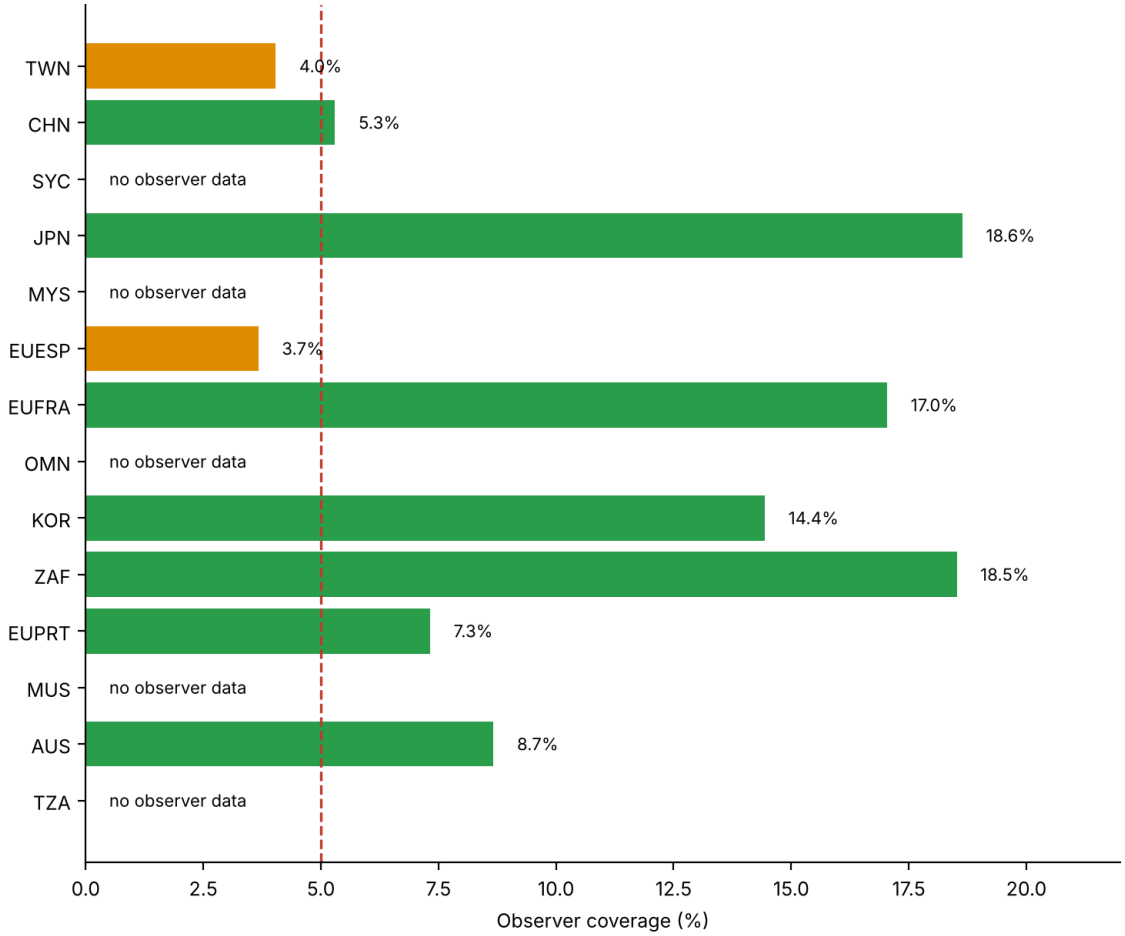

Figure 2: Longline 2025 observer coverage by fleet (hooks). Fleets ordered by total effort.

Purse seine

Aggregated observer coverage in IOTC purse seine fisheries exceeded the 5% reference level in most years during 2010-2025 (Figure 3). In 2025, aggregated coverage was estimated at 15.9%, with six of the eight fleets having estimated coverage of at least 5%: Kenya (53.9%), EU,France (51.7%), Tanzania (35.5%), EU,Italy (33.2%), EU,Spain (10.2%) and Seychelles (6.9%). Oman had estimated coverage of 2.7%, while no observer data have been reported for Mauritius since 2020 (Figure 4).

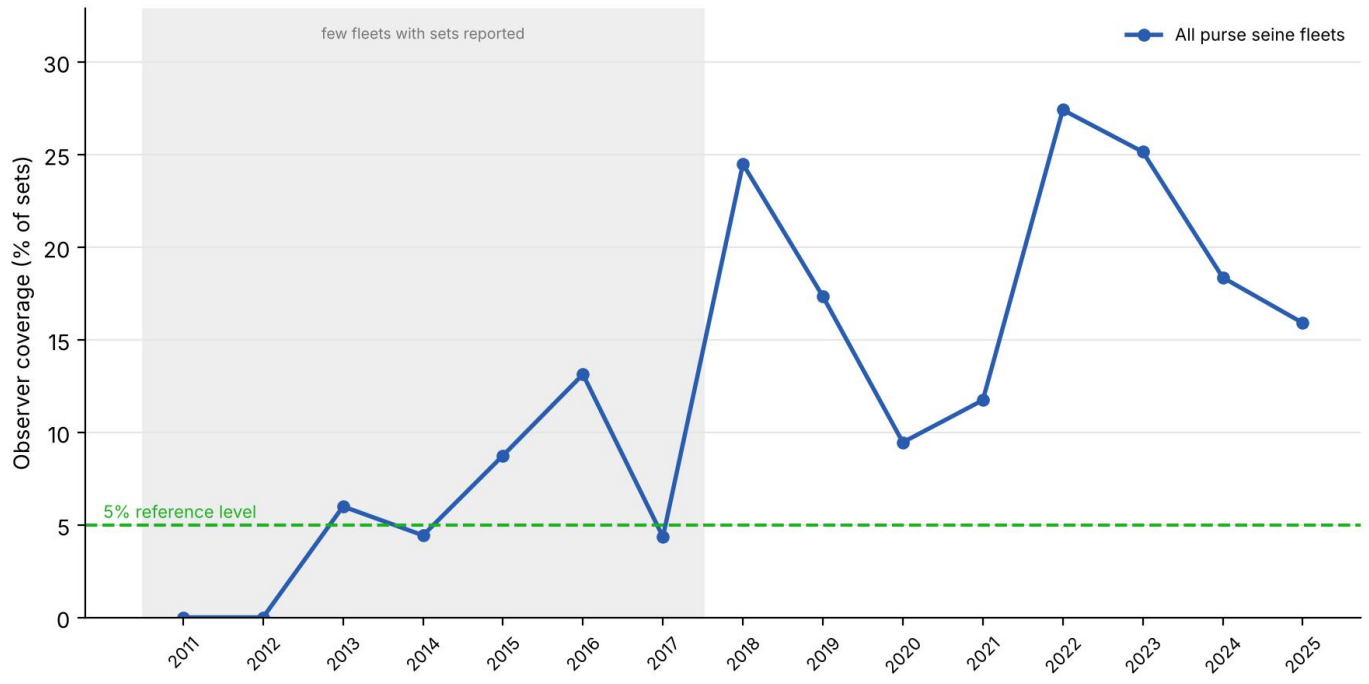

Figure 3: Purse seine: all-fleet observer coverage (observed / total sets), 2010-2025. Dashed line: 5% reference level.

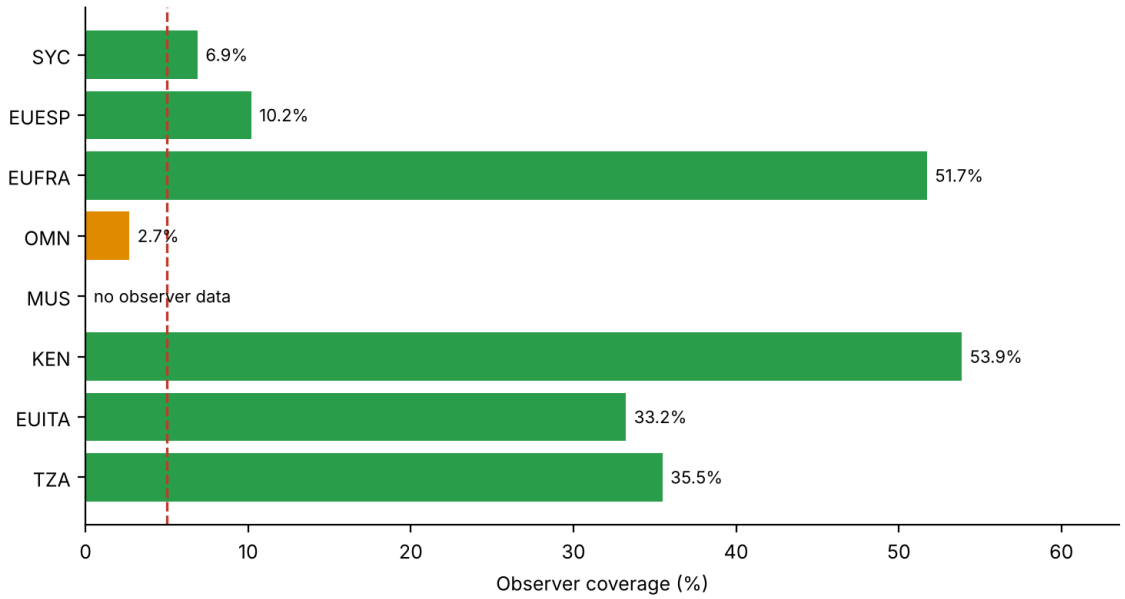

Figure 4. Purse seine 2025: observer coverage by fleet (sets). Fleets ordered by total effort.

Spatial coverage

The analysis is limited to 2022-2025 with data reported using the IOTC forms and comparable observer data reported at the level of the individual operation (position, date and effort of each set). Values in this section can differ slightly from those in Section 3.1 because here only the operation-level files are used.

For longline fleets 65% of the 5°x5° cells with reported LL effort had at least one observed set, and these cells hold 96% of the reported effort (Figure 5). However, coverage inside most of them is below 5%: 5% or more is reached mainly in cells in the south of the Indian Ocean (south of about 30°S, between 50°E and 110°E), around Madagascar and the Mozambique Channel, along the East African coast from about 5°S to 10°N, and in some cells between 15°S and 25°S, 70-95°E. Cells with effort and no observed operations are mainly in the Arabian Sea, the Bay of Bengal, off Indonesia

and north-west Australia, and on the southern and eastern edges of the fishery; together they hold 4% of the reported effort.

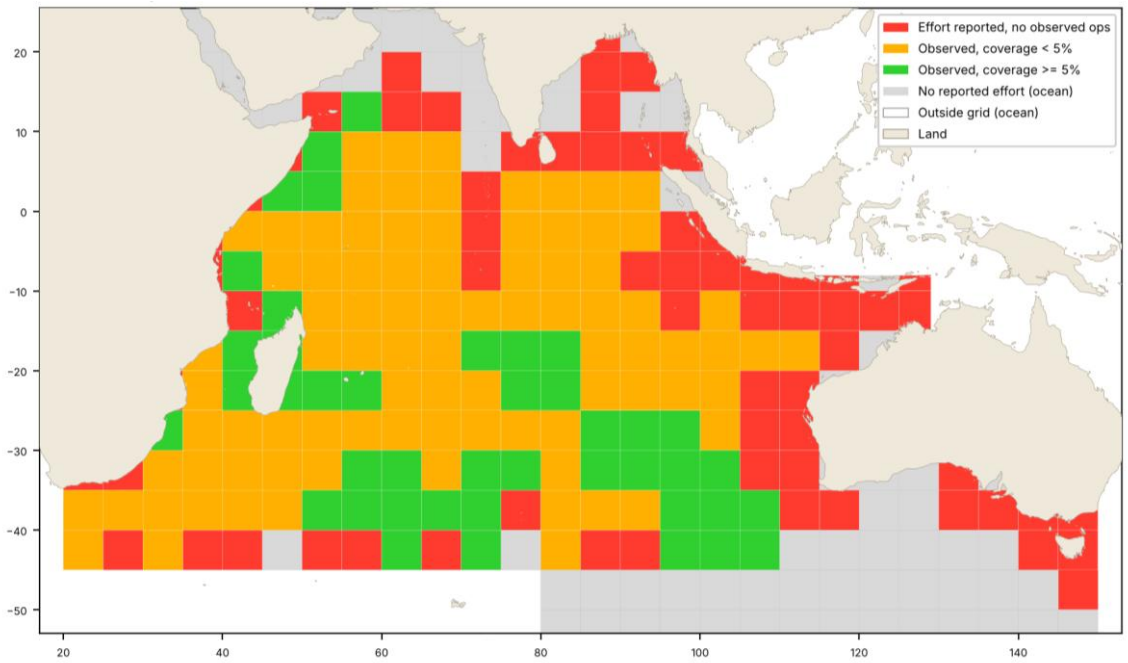

Figure 5. Longline: observer coverage by 5°x5° cell, all fleets, 2022-2025. Red: effort reported, no observed operations; orange: observed, coverage below 5%; green: observed, coverage of 5% or more.

For purse seine fisheries 70% of the 5°x5° cells with reported effort between 2022 and 2025 had observed sets (39 of 56 cells), holding over 99% of the effort (Figure 6). In contrast to LL, most observed cells reach coverage of 5% or more, mainly in the western Indian Ocean. Cells without observed operations are at the margins of the fishing grounds: the north (Arabian Sea), the south (about 15–25°S) and an eastern area (about 70–85°E, between 15°S and 5°N), where observed and unobserved cells are mixed.

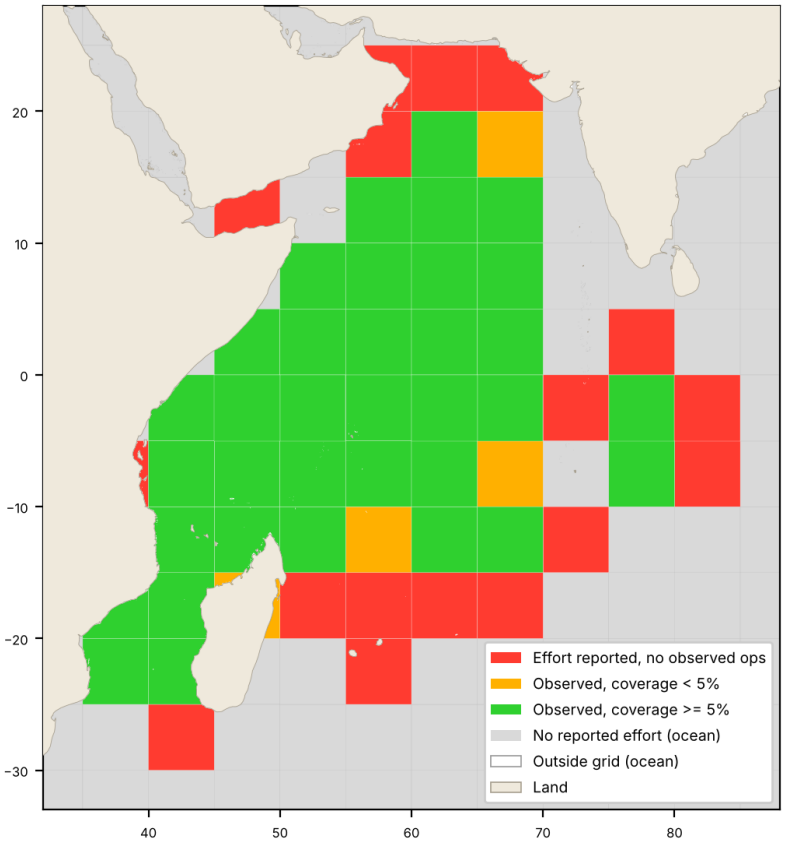

Figure 6. Purse seine observer coverage by 5°x5° cell, all fleets, 2022–2025. Red: effort reported, no observed operations; orange: observed, coverage below 5%; green: observed, coverage of 5% or more

Although the maps show the location of observed operations relative to reported effort and the 5% level, they do not indicate whether submissions are complete or contain all mandatory fields. However, they demonstrate that observer data can be used to monitor the activity of the longline and purse seine fleets across most of their fishing grounds.

Data available

The compiled dataset contains 75,836 records of observer catches and discards from 13 fleets and 16 fleet–gear combinations, covering 289 species codes and the period 2010-2025. Although originally submitted by CPCs in different formats, these data have been compiled into a single harmonised structure for use by the Scientific Committee and its Working Parties. A separate table provides the observed effort, total reported effort and estimated observer coverage described in Section 3.

ROS Catch and discard dataset

Each record is the catch of one species in one fleet, gear, source, year, month and 5°x5° grid cell, aggregated over all observed sets in that cell and month (Table 1). The dataset therefore describes the spatial and temporal distribution of observed catches and discards, not individual sets.

Field	Content
FLEET_CODE	Fleet (CPC)
GEAR_CODE	gear (LL, PS)
SOURCE	OB = Human observer, EM = electronic monitoring system
YEAR	Date (year) of the collected catch/discards records
MONTH	Date (month) of the collected catch/discards records
GRID5X5	CWP 5°x5° grid code
FATE	RE = retained; DI = discarded

Field	Content
SPECIES_CODE	Species 3 alpha code (from IOTC code list)
SPECIES_NAME	Species common name (English)
SPECIES_CATEGORY_CODE	Species category (from IOTC code list)
CATCH	Sum of the catch
CATCH_UNIT	numbers (NO) or kilograms (KG)
COVERAGE_FLEET_YEAR_PCT	Observer coverage (%) of the fleet and gear in that year
COVERAGE_UNIT	the effort unit on which it is based (hooks, sets or fishing days)
COVERAGE_GEAR_YEAR_PCT	Observer coverage (%) of all fleets of the gear in that year

Effort and coverage table

The secondary table has one row per gear, fleet and year, with the observed effort, the total reported effort, the unit (hooks for LL; sets for PS, or fishing days where the fleet does not report sets), the coverage in percent and a status: at least 5%, below 5%, no observer data reported, or no total effort reported (observed effort without a reported total, so coverage cannot be calculated). Rows with fleet "ALL" give the coverage of all fleets of a gear. The table links to the dataset through fleet, gear and year, and covers all the years available, from 2010 to 2025.

Furthermore, each observer record retained from 2010 onwards was classified according to its comparability with the catch and effort dataset for the same fleet using the compiled dataset. The following were considered: species not included in the dataset; species not reported by the fleet in that year; non-comparable units (numbers versus weight); absence of catch and effort records for the same month and 5°x5° grid cell; and comparable records (Figure 7). Of the 42,071 retained records, 27.4 per cent are comparable (32.9 per cent for longline fishing and 17.7 per cent for purse seine fishing). This percentage varies considerably between fleets, ranging from over 80 per cent in some to almost none in those where the unit of measurement differs, or where species are not included in the dataset.

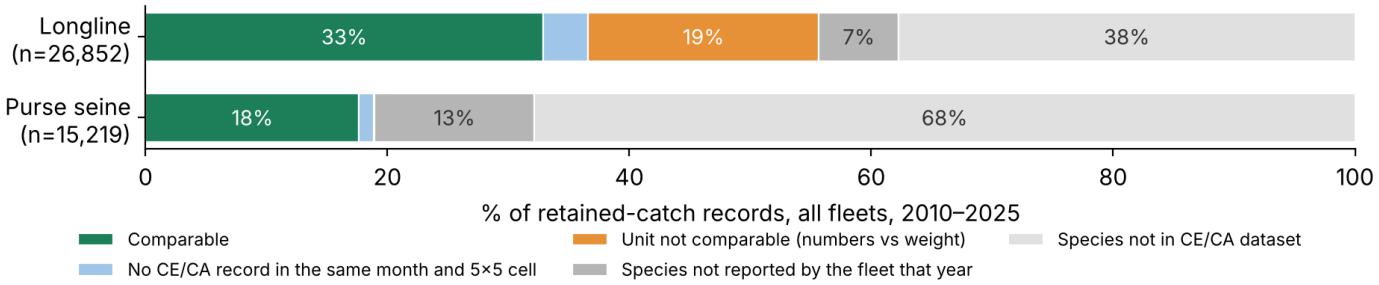

Figure 7. Share of retained observer records that can be compared with the catch and effort dataset of the same fleet, and reason when they cannot, all fleets (2010-2025). n = retained records with a 5°x5° cell.

Conclusion

The reporting of ROS data to the Secretariat has improved over time, with an increasing number of CPC fleets submitting operation-level data using the agreed IOTC reporting forms. In 2025, seven of fourteen longline fleets and six of eight purse seine fleets had estimated observer coverage of at least 5%. The spatial analysis also indicates that observed operations are distributed across much of the fishing grounds of both fisheries. However, aggregated observer coverage estimates should be interpreted as indicative, as the minimum coverage requirement applies at the CPC fleet level.

The compilation of historical observer data represents an important step towards improving their accessibility and use by the Scientific Committee and its Working Parties. Observer data provide an independent source of information on catches and discards at the level of individual fishing operations, including species that may not be adequately

represented in nominal catch or catch-and-effort datasets. Nevertheless, substantial limitations remain, including incomplete submissions, missing effort information, differences in spatial and temporal resolution, and inconsistencies in reporting units. Only 27.4% ((32.9% in longline, 17.7% in purse seine) of retained observer catch records could be directly compared with the IOTC catch-and-effort dataset, highlighting the need for greater consistency between reporting systems.

The Secretariat therefore encourages CPCs to collaborate in recovering, validating and, where necessary, resubmitting historical ROS data at the required operational level using the agreed IOTC reporting forms. Together with the development of the new ROS database and associated validation tools, these efforts will support the progressive consolidation of a more complete and consistent dataset and strengthen the use of observer information for scientific analyses and independent verification of reported catches.

References

IOTC Resolution 25/06 On a regional observer scheme.

IOTC Secretariat (2025). The evolution of the IOTC Regional Observer Scheme (ROS) reporting obligations and tools. IOTC-2025-WPDCS21-24.