Eastern Atlantic Ocean Tuna - Pole and Line FIP

Three-Year Audit Report

Version 1.2, September 2021

## FIP Information

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| Target species scientific name(s) and common name(s) [state target stock(s), if relevant] | Skipjack – Eastern stock (*Katsuwonus pelamis*)Yellowfin (*Thunnus albacares*)Bigeye (*Thunnus obesus*) |
| Fishery location | Atlantic Ocean |
| Gear type(s) | Pole & Line |
| Estimated FIP Landings (weight in tons) | 1,829 tons |
| Vessel type(s) and size(s) | Pole and line vessels (between 241 and 472 GRT and 16/18-20/21 crew members) |
| Number of vessels | Four vessels (Corona Del Mar, Berriz San Francisco, Iribar ZulaikaPilar Torre) |
| Management authority | Ministry of Fisheries and Maritime Economy (Senegalese fisheries management authority).International Commission for the Conservation of Atlantic Tunas (ICCAT) – Management of tuna stocks (RFMO). |
| Auditor name(s) | Jose Peiro Crespo |
| Auditor Organization/Affiliation | Naunet Fisheries Consultants |
| Date of report completion | 20/10/2022 |

## FIP Background (Optional)

The Eastern Atlantic Ocean tuna - pole and line FIP targets skipjack (*Katsuwonus pelamis*), yellowfin (*Thunnus albacares*) and bigeye tuna (*Thunnus obesus*) in the Atlantic Ocean. Fish are caught either as freely associated schools of tuna or on floating objects, for example fish aggregating devices (FADs). The fishery is currently carried out by 4 pole & line vessels and the declared total catch in 2020 was 3,240 tons. These numbers are down from 9 vessels and 10,333 tons caught in 2019 when the fishery started the FIP. The client indicated that this decreasing in the number of vessels and catch is mainly due to a number of problems that the pole and line fleet in the country has faced in recent years, including problems to catch live baitfish and the most recent issues faced by the EU fleet with the Senegalese government (the fishery operates under the EU-Senegalese fisheries partnership) which has resulted in the fishery not operating for half of the year 2022[[1]](#footnote-1).



## Stakeholder Consultation & Meetings

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| Name | Affiliation | Date and Subjects Discussed |
| Youssef Jaridi  | FIP manager | 11st July 2022Introductory call* Scope of the FIP (are of operation of the fleet, number of vessels, target species, baitfish species, catch volume, etc.)
* Main stakeholders involved in the fishery and their roles
* Scope of the audit, preparation of the stakeholder meetings, deadlines, etc.
* Main issues identified in the Fishery
* Observer data, observer training/skipper training
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| Miguel Angel Solana Torre | Vessel representative - Dakartuna | 13th October 2022Stakeholder meeting. Some specific issues were clarified with vessel representatives.* Scope of the FIP (are of operation of the fleet, number of vessels, target species, catch volumes, etc.)
* Baitfish fishery (species, volumes, areas of operation, MPAs, etc)
* Observer coverage
* ETP management strategy (observer coverage/Observer and skipper training/ETP species handling)
* FAD use/workshops
* Collaborations with other relevant FIPs and organizations (ISSF, ICCAT, etc).
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| Jose Mª Aurtenetxe Beitia | Vessel representative - Asertuna |
| Clarus Chu | Senior Policy Advisor - Food Production, WWF-UK | Contacted by email* Role of WWF in the FIP
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| Gala Moreno | ISSF | Contacted by email* Role of ISSF in the FIP: BioFAD workshop
* Updates in the use of BioFADs in the fishery.
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| Mamadou Seye | Department of Maritime Fisheries (DPM) - Senegal | Contacted by email* MSE Workshop
 |
| Fambaye NGOM SOW | Researcher Centre for Oceanographic Research (CRODT/ISRA) | Contacted by email* Live bait fishery
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## Summary of Findings and Recommendations

In regard to Principle 1, a number of engagement activities with other FIPs and the ICCAT (supporting letters) have been developed by the Eastern Atlantic Ocean Tuna - Pole and Line FIP in order to improve stock assessments, harvest strategies and harvest control rules of the target species. However, progress in this area has been slow due to two reasons: firstly, the situation created by the Covid-19 pandemic, which has postponed or cancelled some ICCAT meetings and workshops in recent years, and secondly because the inherent difficulty of getting agreements and progresses at this international RFMO level. The most relevant improvement has occurred for the bigeye tuna stock (BET). The most recent stock assessment for BET, conducted in 2021, indicated that the biomass of the species was close to the BMSY (94%) in 2019. Projections also indicated that with catches at the current TAC level (~60,000t), the biomass would reach the BMSY by 2025 (90% probability) and 2034 (98% probability). Therefore, the stock is now expected to return to the MSY level within the required timeframes. At this point, the three target stocks are likely fluctuating around the MSY level (yellowfin tuna and skipjack) or in process of reaching that point (bigeye tuna). Intersessional meetings have been conducted by the ICCAT in June 2022 and a draft proposal to potentially replace Recommendation 21-01 (which is currently the main recommendation in place for managing tuna stocks in the area) has been drafted.

In regard to Principle 2, the Eastern Atlantic Ocean Tuna - Pole and Line fishery has a relatively low impact on bycatch species, habitat and ecosystem. The main issues identified in the fishery are the impact created by the live baitfish fishery and the use of entanglement FADs. Two main activities have been conducted by the FIP to address these deficiencies.

* One has been aimed at closing data gaps in the live bait fishery (species, volumes used, status of the main species, etc) and improve management of that fishery. Data on the species and volumes caught by the fishery are now available (the main species used as a baitfish is round sardinella (*Sardinella aurita*) and the information collected from the vessels seems to indicate that the species should not be considered as a “main” species under the MSC standard); and the Bay of Hann, the main area were the live bait fishery occurred, is now closed for bait fishing (with some exceptions, please refer to the relevant section for more information). The availability of this new information about live bait and the creation of the MPA in the Bay of Hann has resulted in the increase of several score in Principle 2 (2.2.2, 2.2.3, 2.4.3, 2.5.1, 2.5.2, 2.5.3). However, some unsolved issues remain. The vessel skippers have indicated that catching live bait outside that area make the fishery unprofitable and have requested the Senegalese government (through the EU) to implement a series of spatial-temporal measures in the area, but no response has been got yet from the national authorities.
* The second activity was aimed at implementing the use of non-entangling bioFADs in the fishery in order to reduce the potential indirect impact[[2]](#footnote-2) of the fishery on ETP species. BioFADs are currently being built in Abidjan and the consultant has been told they will be implemented at some point in the fishery, but an implementation timeframe has not been specified (due to some license problems, they have not been tested yet in the fishery). ICCAT Recommendation 21-01 indicates that as of January 2021 all FADs deployed in the ICCAT area should be non-entangling and constructed from biodegradable materials but this point does not being adequately implemented (or enforced) in the area. When the use of bioFADs is implemented, scores for P.I. 2.3.1. and 2.3.2 would be raised to 80 (as the impact on the fishery on ETP species is expected to be low).

However, there is a remaining issue which has not been addressed by the FIP. The fishery has currently a 100% observer coverage[[3]](#footnote-3), and although there is an activity named: “*Reduction of impacts on the ETP species and improvement of the monitoring*” observer data does not seem to be available anywhere. That data is necessary to confirm the (low) impact of the fishery on ETP species. Therefore, the auditor considers that the score for the P.I. 2.3.3. remains below <60 until it is clarified how bycatch data is collected and it is made available.

In regard to Principle 3, if only the management of the target tuna stocks is considered, this management at the ICCAT level seems to be broadly adequate and it reaches >80 for the majority of Performance indicators under that Principle (P.I. 3.1.1 Legal and customary framework has been recently re-scored to 80). Some issues remain, related to the implementation of the ICCAT management and procedures at the national level (understanding roles and responsibilities at the national level, legislative gaps, penalties from non-compliance), etc.

Another problem identified in the Eastern Atlantic Ocean Tuna - Pole and Line fishery is the management of the batfish fishery at the national and regional level. As explained above, there are some issues which remain unclear for this particular (exceptions for the baitfish fishery in the Bay of Hann, the implementation of spatial or temporal restrictions in the area, possibilities of the fishery to get live bait fish outside that area, etc).

The auditor recommends that the FIP separates those management areas in two different actions: one intended at improving the implementation of ICCAT management and regulations at the national level, and another aimed at improving the management of straddling stocks. Until the remaining issues are not clarified (for both areas), a precautionary score has been given and no P.I. has improved its scores in Principle 3 (and some of them have been downgraded).

In general, there have been some good progresses in the FIP (new information provided by the baitfish reports have helped to raise many scores in Principle 2) but due to a number of internal and external issues (bait fishing, license problems which have resulted in the fishery not operating for more than 6 months resulting in bioFADs not being tested) progress has slowed in recent times. The number of vessels include in the FIP, and the landings of the fishery have also declined due to those problems. However, the Eastern Atlantic Ocean Tuna - Pole and Line fishery seems to be a relatively low impact fishery which could get better scores if some of the problems identified are adequately addressed.

## Summary of MSC Performance Indicator Scores

*Note: scores for all target species have been provided in the table below, firstly because information for all three species (SKJ, YFT and BET) is provided on the FisheryProgress profile of the East Atlantic Tuna Pole & Line FIP, and secondly because this information helps to track progresses for specific species, such as BET.*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Principle | Component | Performance Indicator | Previous Score 2019 | Current Score 2022 | Rationale or Key Points  |
| 1 (UoA1: SKJ) | Outcome | 1.1.1 | Stock status | 60-79 | >80 | The stock was assessed by SCRS in 2014, using data up to 2013. Regardless of the model used, the Committee was not in a position to provide a reliable estimate of the maximum sustainable yield and therefore did not provide quantitative advice on the state of the eastern stock. However, the SCRS concluded that:1. The ratio of Fcurrent/FMSY is likely below 1.0, indicating that overfishing is not occurring.2. The ratio of spawning biomass SSBcurrent/SSBMSY is likely above 1.0, indicating that the stock is not in an overfished state.3. The value of MSY is probably higher than previously estimated (143,000-170,000 t.).Therefore, the stock is above the point at which recruitment would be impaired (PRI).The results of the Bayesian surplus production models show that the values of the posterior distribution mean for the Bcur/BMSY can be in the range of 1.55 to 1.79 for the five different model scenarios and the Fcur/FMSY can be from 0.22 to 0.49. It is therefore, in the qualitative sense, very likely that the Eastern Atlantic Skipjack stock is not overfished, nor does overfishing take place. The stock assessment concluded that it can reliably be said that no indicator indicates that the stock is overfished, as all the estimates point to a lightly exploited stock. Hence, the high recent landings, even if above MSY, are unlikely to reduce the stock below BMSY for several years (ICCAT 2014). **SG80 is met.** |
| 1.1.2 | Stock rebuilding | NA | NA | NA |
| Management | 1.2.1 | Harvest Strategy | 60-79 | 60-79 | Skipjack is notably caught with juvenile yellowfin and bigeye on FADs. There are no specific regulations or controls for the species, such as a TACs. The current strategy is to limit catches to sustainable levels based on a feedback process implemented by the ICCAT and to reduce bycatch of small bigeye tunas. Because the stock status was considered above the MSY reference point, no management recommendations have been made by the Scientific Committee except catches should not be allowed to exceed the level of catch in recent years. Currently catches are estimated to be below MSY and are constrained by controls on bigeye bycatch. Recent catch levels may be unsustainable in the longer term. **SG80 is not met.** |
| 1.2.2 | Harvest control rules and tools | 60-79 | 60-79 | Recent conservation measures have been extended to Eastern Atlantic skipjack (Rec. 16-01, 19-02, 21-01). However, there are no well-defined harvest control rules for the species and therefore there is no specific plan of control if the stock size falls below the maximum sustainable yield level. The intention inferred from the scientific advice and management response is to maintain the stock at or above the MSY level by maintaining the catch rates at or below FMSY. **SG80 is not met.** |
| 1.2.3 | Information and monitoring | 60-79 | 60-79 | There is adequate information on the fleets, catches (although under-reporting can be a problem for this stock), catch and fishing effort, size composition of the catch and stock structure (tagging) but information on stock structure (the possible existence of sub-stocks) and productivity seems to be a limiting factor for this stock. On-going research is planned to improve information and therefore the stock assessment. However, it seems that the COVID-19 pandemic has not permitted progress in this point. **SG80 is not met.** |
| 1.2.4 | Assessment of stock status | 60-79 | 60-79 | Various stock assessment models have been applied to the stock, but none fitted the data sufficiently well to provide precise management advice. It ahs made that MSY reference points have not been estimated with confidence, perhaps partly because the assessment is not appropriately aligned with stock structure. Therefore, the stock assessment approach is not now appropriate for this stock, and **does not meet SG80**. |
| 1 (UoA2: YFT) | Outcome | 1.1.1 | Stock status | 60-79 | >80 | A full stock assessment was conducted by the SCRS (ICCAT Standing Committee on Research and Statistics) for yellowfin tuna in 2019, applying two production models (JABBA, MPB) and one age-structured model (Stock Synthesis) to the available catch data through 2018.For the combined results (MPB, JABBA, SS) used to develop management advice, the median estimate of B2018/BMSY is 1.17 (0.75-1.62)- and the median estimate of F2018/FMSY is 0.96 (0.56-1.5). The median MSY estimated is 121,298 t (90,428t – 267,350 t). Therefore, there is highly likely that the stock is above the PRI (using the default reference point of 0.5BMSY as proxy indicator).It is estimated that there is a 10% probability that the stock is below B2018/BMSY=0.75. Therefore, it is also considered that the stock is above or fluctuating around the MSY level. **SG80 is met.** |
| 1.1.2 | Stock rebuilding | >80 | NA | NA |
| Management | 1.2.1 | Harvest Strategy | >80 | >80 | The main binding conservation measure established by ICCAT for yellowfin is Recommendation 21-01[[4]](#footnote-4), which superseded several previous Recommendations. This multi-annual management plan for tropical tunas calls for:1. An overall TAC of 110,000 t. for YFT (unallocated by country);2. Quarterly reporting to the Secretariat of the amount of tropical tuna by species caught (monthly reporting in the case of purse seiners and large longline vessels);3. A capacity limitation consisting in each member producing an annual capacity/fishing plan that outlines how its overall longline and purse seine fleet capacity will be managed to ensure that the member can meet its obligation to limit the catch of bigeye, and its yellowfin and skipjack catches Additionally, members shall report information on their support vessels;4. The establishment of a record of vessels actively fishing for yellowfin, or supporting fishing activities5. A 72-day (January-Mid-March) prohibition in 2022 of purse seine and baitboat vessels fishing on floating objects, including their support vessels’ activities, in the high seas or EEZs. In addition, a prohibition to deploy drifting FADs during the 15 days prior to the closure;6. Observer coverage (human or electronic) of 100% for purse seine vessels and 10% for large longline vessels;7. Annual submission of FAD management plans by countries with purse seine and baitboat fisheries.8. A limit in 2022 of 300 FADs with operational buoys at any one time per vessel.The TAC adopted by ICCAT in 2016 (and maintained in Rec. 19-02) was consistent with the advice provided by SCRS in recent years. However, recent catches have been above the TAC and MSY since 2015 and the SCRS has warned that that catches above MSY levels are expected to further degrade the condition of the yellowfin stock in the future. The TAC is not allocated between CPCs, which makes it difficult to enforce.Additionally, Recommendation 17-01 establishes a ban on discards of bigeye, skipjack and yellowfin tuna by purse seine vessels.Despite the current catch being above the TAC, it is considered that there is evidence that the harvest strategy is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving stock management objectives since B2018/BMSY is 1.17 and F2018/FMSY is 0.96. **SG80 is met.** |
| 1.2.2 | Harvest control rules and tools | 60-79 | 60-79 | The TAC is not monitored, and appropriate regulations are not applied. There is no explicit allocation of yellowfin catch to ICCAT CPCs that would both reduce the likelihood of overages (by increasing accountability) and facilitate a strategy to respond in terms of subsequent catch restrictions. A full MSE has not been done for YFT, therefore well-defined HCRs are not in place. **SG80 is not met.** |
| 1.2.3 | Information and monitoring | >80 | >80 | Detailed data is available since the 1950’s. There is a comprehensive range of relevant information on stock abundance, fishery removals and environmental information. This information is used to assess the stock using up to three different stock assessment approaches as indicated in 1.2.1 and it is also considered sufficient to support the current harvest strategy. **SG80 is met.** |
| 1.2.4 | Assessment of stock status | >80 | >80 | The most recent full assessment of yellowfin tuna was carried out by SCRS in 2019. Two production models (JABBA, MPB) and one age-structured model (Stock Synthesis) to the available catch data through 2018 were used.In order to capture the uncertainty in the population dynamics of the species, the combined results of those three models were used to develop management advice.Stock assessment results were presented in a Kobe plot and the probability of the stock being in each quadrant of the Kobe plot in 2018 was estimated. The corresponding probabilities are 54% in the green (not overfished not subject to overfishing), 21% in the orange (subject to overfishing but not overfished) 2% in the yellow (overfished but not subject to overfishing) and 22% in the red (overfished and subject to overfishing). **SG80 is met.** |
| 1 (UoA3: BET) | Outcome | 1.1.1 | Stock status | 60-79 | 60-79 | A new stock assessment for the species was carried out in 2021. The 2021 assessment indicated that B2019=94%BMSY (80%CI 71%-137%). This level is above the point where recruitment would be impaired. The biomass has probably been below BMSY since the mid-1990s. Therefore, the stock is not fluctuating around the MSY level. **SG80 is not met.** |
| 1.1.2 | Stock rebuilding | 60-79 | >80 | The 2021 assessment indicated that F2019=100%FMSY (80%CI 63%-135%). Projections of the assessment indicated that catches at the current TAC level (~60000t) would have around 90% and 98% chance of achieving the Convention objectives (B>B|Z) by 2025 and 2034 (12 years) respectively. A constant catch of 62,000 t, which is the TAC established in Rec. 21-01 for 2022, will have a high probability (97%) of maintaining the stock in the green quadrant of the Kobe plot by 2034.Therefore, the stock is now expected to return to the MSY level within the required timeframes. **SG80 is met.** |
| Management | 1.2.1 | Harvest Strategy | 60-79 | 60-79 | The main binding conservation measure established by ICCAT for bigeye is Recommendation 21-01, which superseded several previous Recommendations. This multi-annual management plan for tropical tunas calls for a Total Allowable Catch (TAC) for bigeye tuna of 62,000 t. in 2022. The TAC for 2023 and future yearsshall be considered in 2022 on the basis of SCRS advice. The measure includes detailed reductions in catch (between 10 and 21%) for CPCs based on previous catch limits. Apart from TACs to control the exploitation rate, there are also other management measures implemented such as vessel capacity limits and improving fish aggregation device (FAD) management.As indicated above, the 2021 stock assessment suggested that the bigeye stock is probably below BMSY and fishing mortality is at FMSY. Projections indicated that catches at the TAC level (62,000t) have 81% probability that ICCAT Objectives have been achieved by 2022, marking a change in perception of stock status with the new stock assessment. However, evidence that the current HS is achieving its objectives is still lacking (it is not clear yet that the different elements (TAC, spatial closures, FAD controls etc.) are working together to achieve the desired objectives and it is considered that **SG80 is not met.** |
| 1.2.2 | Harvest control rules and tools | 60-79 | 60-79 | The approach to controlling the harvest is similar for YFT and BET (ICCAT Rec. 21-01\_, based on setting TAC to control the exploitation rate. There are also vessel capacity limits and improving fish aggregation device (FAD) management (including 72-day closure, limits to the number of buoyed FADs per vessel and improved information for FAD management planning). However, there are no well-defined harvest control rules and therefore there is no specific plan of control if the stock size falls below the maximum sustainable yield level. The intention inferred from the scientific advice and management response is to maintain the stock at or above the MSY level by maintaining the catch rates at or below FMSY. Therefore, the “generally understood” HCR is to set catches low enough that the stock rebuilds to BMSY, and subsequently set future catches so that the stock remains at this level. Precisely how this will be done is unclear and how TACs are set, taking into account various uncertainties, is not defined. **SG80 is not met.** |
| 1.2.3 | Information and monitoring | >80 | >80 | There is adequate information on stock structure, productivity and the fleets to allow a full stock assessment to be completed and data is adequate to propose and evaluate management measures, such as a seasonal closure to reduce catches of small bigeye. On-going research is planned to improve the information available. **SG80 is met.** |
| 1.2.4 | Assessment of stock status | >80 | >80 | The 2021 assessment was conducted using non-equilibrium production models (MPB, JABBA), and an integrated statistical model (SS3). The SS3 was the primary source of information used to evaluate this stock and showed a substantially more optimistic stock status than estimated in 2018 due to improving longline abundance indices and incorporating new mortality-at-age vectors. The assessment is appropriate for the stock and for the harvest control rule. **SG80 is met.** |
| 2 | Primary species | 2.1.1 | Outcome | >80 | >80 | Main primary species identified in the fishery are SKJ, YFT and BET. The three species are highly likely to be above the PRI. In the particular case of BET, the species is not yet around the MSY level. In the case of the bait fishery, a number of studies (Fall & Guèye 2019, Gascoigne et al., 2019 and 2020, Ngom Sow & Thiam 2020, Sieben 2020) have been conducted by the FIP to close data gaps and understand the impact of the fishery on those species (species caught, volumes, etc). With some precaution, these studies seem to confirm that the main species used as a live bait in the fishery is round sardinella (*Sardinella aurita*), which would represent 95% of the bait used (other species used are flat sardinella (*Sardinella maderensis*), sardine (Sardina pilchardus) or anchovy (*Engraulis encrasicolus*)) but that round sardinella would not be considered “main” under the MSC definition as it may represent less than 4% of the total catch. Anyway, the impact of the fishery on that species seems to be very low (0.15% of the total catch of the stock in the area). **SG80 is met** *(scored as >80 during the pre-assessment).* |
| 2.1.2 | Management strategy | >80 | >80 | There is a strategy in place for tuna species in the ICCAT area (see the relevant section in Principle 1). In regard to the baitfish fishery, the FIP has been working with CRODT (the Senegal National Institute for Oceanographic Research) to look at available data on baitfish and implement a plan for the management of bait fish at a national level. A Marine Protected Area (MPA) was created in the Bay of Hann, where the P&L vessels have traditionally fished bait in collaboration with artisanal canoes. It has had a significant impact on the P&L vessels which, with some exceptions, are no longer allowed to enter that area, significantly impacting the viability of this fishery. Currently, only four vessels under the EU partnership are working in the P&L fishery and they have required the Senegalese authorities (through the EU party) to implement some spatial-temporal measures in the area, but no progress has been made in this regard. Due to the low number of vessels currently working in the fishery, it is considered that the impact on bait species is relatively low (no main species identified). **SG80 is met** *(scored as >80 during the pre-assessment).* |
| 2.1.3 | Information | >80  | 60-79 | It is considered that information is adequate for YFT and BET but no for SKJ (see the relevant section in Principle 1).As indicated above, a number of studies (Fall & Guèye 2019, Gascoigne et al., 2019 and 2020, Ngom Sow & Thiam 2020, Sieben 2020) have been conducted by the FIP to understand the impact of the fishery on live bait species. Some quantitative information is available and adequate to assess the impact of the UoA on main secondary species (if any) with respect to status. However, it is considered that based on the lack of adequate information for SKJ, **SG80 is not met** (score downgraded from the pre-assessment). |
| Secondary species | 2.2.1 | Outcome | >80 | >80 | As indicated above, a number of studies have been undertaken during the FIP aimed to understand the impact of the fishery on live bait species. No “main” secondary bait species have been identified in the fishery. The fishery does not have any impact on other tuna species apart from the ones considered in 2.1.1. **SG80 is met.** |
| 2.2.2 | Management strategy | <60 | >80 | No main secondary species are identified in the fishery, the low impact of the fishery on bycatch species seems to be a strategy per se. **SG80 is met**.  |
| 2.2.3 | Information | 60-79 | >80 | The information provided by the reports conducted under the FIP seem to be adequate the impact of the UoA on secondary (bait) species (if any) with respect to status. Observer coverage is 100% in the fishery as all the EU vessels operating under the EU-Senegalese fisheries partnership need to have an observer aboard (see P.I. below for more information). Data collected by those observers is not available but it is understood bycatch data (tuna and non-tuna species) is registered in the logbooks and provided to the authorities. No main secondary species have been identified in the fishery. **SG80 is met.** |
| ETP species | 2.3.1 | Outcome | 60-79 | 60-79 | The EU-flagged vessels in the UoA have observers aboard (Senegalese vessels under the FIP were not required to have observers on board but no Senegalese vessel is currently included in the FIP). However, observer reports and information about the training received by those observers were not available to the experts during the pre-assessment and this P.I. was scored as 60-79.Direct interactions of pole and line fisheries with ETP species are considered very low (if any). However, some concerns were highlighted during the pre-assessment on the impact of FADs on ETP species (it refers to the risk of net entanglement as reportedly dolphins, whales and birds are commonly seen around the vessels). The FIP is currently working with ISSF, the vessel owners and FAD manufacturers to move to 100% biodegradable FADs. The FIP organized a workshop with vessel owners and captains in Bermeo Spain in 2021, and trials of 100% biodegradable FADs should have started in early 2022. However due to license issues the fishery has not been operating for several months in 2022, and bioFADs were not tested and have not been implemented yet in the fishery.Interactions with ETP species are expected to be low for the fishery (as the low number of vessels included in the FIP seems to indicate that the number of FADs used will be also low) but until observer data is available, and the use/non-use of FADs/bioFADs is confirmed, the initial **score of 60-79** is kept. |
| 2.3.2 | Management strategy | <60 | <60 | During the pre-assessment, the team of experts indicated that it was unclear whether ICCAT management measures in relation to FADs (non-entangling FADs, providing information on FAD deployment, loss, and type) had been implemented in the fishery and a <60 score was given. ICCAT recommendation 21-01 indicates that as of January 2021 all FADs deployed in the ICCAT area should be non-entangling and constructed from biodegradable materials. These bioFADs have not being implemented in the fishery. So, it seems this problem persists.The SG60 scoring guidepost indicates: “*There are measures in place that minimise the UoA-related mortality of ETP species, and are expected to be highly likely to achieve national and international requirements for the protection of ETP species*”. A ETP management strategy/measures does not seem to be necessary for the non-FAD fishery as based on other similar fisheries, interactions with ETP species are not expected. Until observer data is available and the use of bioFADs implemented, it is unclear if a management strategy is necessary for managing the impact of the fishery (FADs) on ETP species. Therefore, the initial **score of <60** is kept**.** |
| 2.3.3 | Information | <60 | <60 | As in the previous P.I., observer data on interaction with ETP species has not been provided to the consultant (and it does not seem to be regularly collected by the FIP), although a 100% observer coverage seems to be in place. The SG60 scoring guidepost indicates “*Qualitative information is adequate to estimate the UoA related mortality on ETP specie*s”. As that information is not available, the initial **score of <60** is kept. |
| Habitats | 2.4.1 | Outcome | >80 | >80 | The P&L fishery is performed in midwaters. Therefore, habitat interactions in pole-and-line fishery not likely. This P.I. was score as >80 at the time of the pre-assessment. **SG80 is met.** |
| 2.4.2 | Management strategy | >80 | >80 | The pole and line fishing technique can be considered a ‘strategy’ to reduce impact on the habitat. The gear does not contact the seabed. This P.I. was score as >80 at the time of the pre-assessment. **SG80 is met.** |
| 2.4.3 | Information | 60-79 | >80 | A Level 2 Risk Assessment (ERA) of 19 bait species potentially used by the Senegal-based tuna pole-and-line fishery on species used as live bait was conducted by a consultant in 2020 (Sieben 2020). None of the assessed species received a high PSA risk score in that assessment (resulting in MSC-PSA derived score >80). In that ERA, the footprint of the live baitfish fishery in the Bay of Hann was considered low. This Bay is now protected and the live baitfish fishery is not occurring there anymore. Therefore, it is considered that information about the habitat affected by the fishery (if any) is known. **SG80 is met.** |
| Ecosystem | 2.5.1 | Outcome | <60 | >80 | The fishery does not seem to have an important impact on any ecosystem element (target species – the number of vessels in the FIP have decreased in recent years and the volumes of the target species caught are relatively low and all the target stocks are closed to MSY; bycatch and ETP species – inexistent, or very low). However, during the pre-assessment this P.I. was scored as <60 due to the potential impact of the live bait fishery in the Bay of Hann. As indicated above, this Bay is now protected and the live baitfish fishery is not occurring there anymore. Therefore, it is considered that the fishery **meets SG80.** |
| 2.5.2 | Management strategy | <60 | >80 | As above. The score given during the pre-assessment was mainly based on the lack of management for the live bait fishery. This is a pelagic fishery with a relatively low impact on target and bycatch species, habitat and ecosystem. Live bait fishing is not occurring in the Bay of Hann since a MPA was created. Live bait fishing is now restricted to some specific areas along the Senegalese coast. Data gaps for the live baitfish fishery are now closed and a number of actions to address the management of the bait fishery have been proposed. Therefore, it is considered that a partial strategy is in place for managing the impact of the fishery on bait fish. **SG80 is met.** |
| 2.5.3 | Information | <60 | >80 | As indicated above, the FIP has conducted a large number of studies, including an ecological risk assessment, aimed at understanding the impact of the fishery on live baitfish (Fall & Guèye 2019, Gascoigne et al., 2019 and 2020, Sieben 2020). Information about species caught, volumes used, fishing areas, etc. is now available. The ICCAT (tuna species) and CECAF (bait species) conducts studies to understand the role and status of the affected species. Therefore, information is adequate to broadly understand the key elements of the ecosystem and infer the main impacts of the UoA on these key ecosystem elements. **SG>80 is met.** |
| 3 | Governance and Policy | 3.1.1 | Legal and customary framework | <60 | >80(ICCAT level)*60-79**(including the baitfish fishery)* | A management system exists within an appropriate and effective legal framework. The fishery operates in the territorial waters of Senegal. However, skipjack, yellowfin and bigeye tuna are highly migratory species and are subject to international management through the International Conventions on the Conservation of Atlantic Tuna (ICCAT). The ICCAT co-ordinate scientific research and make recommendations to maintain populations of tuna at MSY levels. Each year, the Commission adopts a number of Recommendations for the management of stocks, e.g., catch quotas and minimum sizes for a given stock. ICCAT Recommendations are binding only insofar as the CPCs agree to implement them domestically.The management system incorporates a mechanism for resolution of legal disputes. The effectiveness of the system is unclear as the current objections procedure does not represent “best practice”. However, recent MSC assessments, ANABAC and Sant Yago, concluded that the new score for 3.1.1 would be 80 as the ICCAT holds annual meetings, wherein any unresolved disputes can be settled in an informal setting. Both the International Court of Justice (ICJ) and International Tribunal for the Law of the Sea can be also used to settle unresolved disputes outside of the annual meetings. Cooperation amongst members and participation in discussions is encouraged throughout the system and transparency of the process is promoted in the ICCAT meetings, which include the participation of independent observers as witnesses.Considering the live bait fishery, there is a framework of cooperation to share information and management advice at the regional level through the Fishery Committee for The Eastern Central Atlantic (CECAF) but not for management of these fisheries. A project for the implementation of the ecosystem approach to fisheries for the management of sardinella stocks shared between Morocco, Mauritania, Senegal and The Gambia (Shared Sardinella) was launched in February 2020 under the supervision of FAO. A workshop was held in Rome to identify research activities to be carried out over the next three years (<https://www.fao.org/in-action/eaf-nansen/actualites-et-evenements/detail/fr/c/1269478/>)Also, the Working Group on the Assessment of Pelagic Stocks in the North West African Zone, under the aegis of FAO, was launched in October 2020 for the exchange of data between the different countries.Several stakeholders have requested the creation of a regional RFMO for the management of the sardinella stocks (<https://www.cffacape.org/publications-blog/fisheries-management-in-west-africa-the-example-of-sardinella>) Live baits are straddling stocks. There is a framework of cooperation to share information and management advice (CECAF) at the regional level but not for management but as sardinella is not considered a main species, it is considered **SG60 is met but SG80 is not.** |
| 3.1.2 | Consultation, roles and responsibilities | <60 | >80(ICCAT level)*60-79 (including the baitfish fishery)* | The management system at the international level (ICCAT) has effective consultation processes that are open to interested and affected parties. The role and responsibilities of organizations and individuals who are involved in the management process are clear and understood by all relevant parties. Based on elements collected on compliance reports, Ghana seems to understand clearly the different roles and responsibilities to respond to ICCAT data requirements.Considering live bait fishing: the framework of cooperation and dispute resolutions to manage the straddling stocks which are live bait is not present (no RFMO for small pelagic management at regional level). The consultation mechanism at regional level is unclear though. It seems to include consultation processes, at least at national level that regularly seek and accept relevant information, including local knowledge. However, the management system must demonstrate consideration of the information obtained by consultation at national and regional level. **SG80 is not met.** |
| 3.1.3 | Long term objectives | 60-79 | >80(ICCAT level)60-79*(including the baitfish fishery)* | ICCAT long term objectives are consistent with MSC fisheries standard. The precautionary approach and the ecosystem-based approach to fisheries management are explicit in ICCAT Resolutions 2015-12 and 2015-11, which deal explicitly with Principle 1 and Principle 2 of the MSC Principles and Criteria.In regard to the live bait fishery, there is no explicit management policy at the regional level in the absence of a RFMO to manage small pelagic species by applying a precautionary approach. **SG80 is not met** *(downgraded from the most recent score given in the FP profile)* |
| Fishery specific management system | 3.2.1 | Fishery specific objectives | 60-79 | >80(ICCAT level)60-79*(including the baitfish fishery)* | ICCAT has long term objectives to manage the species above the MSY. ICCAT also has short term specific fishery objectives in the form of the annual TAC and quota allocations for bigeye and yellowfin, for example, to fish at or above the MSY level (Principle 1), and it is implicit that ecosystem issues, such as bycatch reduction, are addressed at the fishery-specific level.In regard to the live bait fishery, coastal States in the area have not found tools to respond to the UNCLOS objective (article 63) to manage effectively these species in close cooperation either directly or through a regional management organizations. **SG80 is not met***(downgraded from the most recent score given in the FP profile)* |
| 3.2.2 | Decision making processes | 60-79 | >80(ICCAT level)*60-79 (including the baitfish fishery)* | At the ICCAT level, decision-making processes are in place, which are established, responsive and largely transparent. The processes respond to issues identified and have an appropriate approach to disputes. These processes generally result in measures and strategies to achieve management objectives.Considering live bait fishing: absence of evidence of a precautionary approach management for small pelagic fish. The impact of the live bait fishing is marginal and is not the key fishing activities to consider at the regional level for decision to solve serious and important issues on the sustainable management of the overall stock status of the stocks. There is a risk of collapse of small pelagic fishing according to scientists having analysed the stocks in the area. **SG80 is not met.** |
| 3.2.3 | Compliance and enforcement | <60 | >80(ICCAT level)*60-79 (including the baitfish fishery)* | At the international level, monitoring control and surveillance mechanisms exist, and have been implemented in these fisheries. As other RFMOs, the ICCAT has no enforcement capacity of its own but it relies on its Contracting Parties to implement management measures domestically and exercise control over its flagged vessels. However, sanctions are not considered fully effective as a deterrent (Medley et al., 2022)At the fishery level, there are potential concerns of fishing too small pelagic fish (young sardinellas) as live bait. There is also a degree of uncertainty that sanctions are consistently applied in the small pelagic fishing activities, as a number of contradictory/difficult to enforce[[5]](#footnote-5) measures have been implemented in that fishery. Therefore, as no specific information has been giving to the consultant about compliance in the fishery, **a precautionary score of 60-79 is given.** |
| 3.2.4 | Management performance evaluation | 60-79 | >80(ICCAT level)*60-79 (including the baitfish fishery)* | There are mechanisms in place to evaluate key parts of the fishery-specific management system and regular internal and occasional external review in the fisheries managed by ICCAT.Considering live bait fishing: although some activities have been undertaken under the FIP to close data gaps and improve the management of the bait fishery (such as the creation of the MPA in the Bay of Hann) it cannot be evidenced that there is a regular review of the live bait species management. **SG80 is not met.** |

## Environmental Workplan Results

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| --- | --- | --- | --- |
| Result | Related Action on FisheryProgress  | Related MSC Performance Indicator | Explanation |
| The bigeye tuna stock is rebuilding and returning to MSY levels within the required timeframes | Sustainable Stocks for Yellowfin and Bigeye Tuna | 1.1.1, 1.1.2 and 1.2.4 | This task is being addressed in collaboration with other FIPs is the area (EASTI, Ghana Pole & line FIPs), which have overlapping participants, such as GTA, Thai Union and WWF-UK and international associations, such as ISSF. The FIP has engaged with them to encourage active support for a sustainable stock for Yellowfin Tuna.Due to the COVID-19 pandemic, many ICCAT meetings have been cancelled or postponed. This includes the 2020 SCRS Panel 1 and plenary annual meeting. Panel 1 was due to discuss the state of tropical tuna stocks and fisheries and allocation of bigeye quotas. A bigeye stock assessment was conducted by ICCAT during 2021, and is more optimistic than recent assessments, suggesting that biomass and fishing mortality are close to the MSY level.The FIP also sent letters to delegates of coastal states to encourage additional support for measures that will further tuna conservation at the Commission meeting in November 2021 and it will be present at the next meeting and submitting another letter to delegates. This letter asks the management body asks for the adoption of harvest strategies for tropical tunas consistent with SCRS advice, including the adoption of well-defined HCRs, a review of the MSE roadmap for tropical tuna and the development of specific catch limits for tropical tunas.As indicated in the previous section, the most recent stock assessment for BET, conducted in 2021, indicated that the biomass of the species was close to the BMSY in 2019. Projections also indicated that with catches at the current TAC level (~60,000t), the biomass would reach the BMSY by 2025 (90% probability) and 2034 (98% probability). Therefore, the stock is now expected to return to the MSY level within the required timeframes. In the case of YFT and SKJ, both stocks are considered likely to be above or fluctuating around the MSY level. |
| The FIP has supported the development of HS and HCR for tuna species. A capacity building workshop on MSE for the DPM and CRODT in Senegal is being organized. | Strategy and operating rules for target species | 1.2.1, 1.2.2, 1.2.3, 1.2.4 | The FIP has collaborated and engaged with other industry stakeholders and in particular EASTI and OPAGAC FIPs in the Atlantic Ocean to encourage active support for the development of harvest strategies. In 2021, the FIP submitted a position statement to the ICCAT advocating for control strategies of capture and on the HCR and asking ICCAT to ensure that there is no further slippage of the agreed timetable. However, the Covid-19 pandemic meant that some ICCAT meetings and workshops were postponed or cancelled.The EASTI FIP was in communication with other tuna FIPs in the Atlantic (OPAGAC, the Senegal P&L tuna FIP) regarding a position paper on harvest strategy (HS) and harvest control rules (HCR) and other potential management options for the target stocks. However, a conducive conclusion was not reached. Nevertheless, the FIP continues is to lobby ICCAT on the importance of progress on harvest strategies, both alone and in collaboration with other partners (coastal/flag states, ISSF and other FIPs). Discussion on starting a MSE process for tropical tunas have been hold at the ICCAT but no further progress has been reported (<https://www.iccat.int/Documents/Meetings/Docs/2021/REPORTS/2021_TT_MSE_ENG.pdf>)The FIP is also organizing a capacity building workshop on MSE for the DPM and CRODT in Senegal. This was due to take place in May 2022 but as the vessels were not operating it has been postponed to Q4-2022. |
| The FIP has engaged with national authorities and has sent positions letters and taken part in ICCAT meetings to make sure that monitoring is SKJ is improved. No further progress made. | Improve Information and Monitoring  | 1.2.3 | In collaboration with other FIPs, the FIP sent a letter (position paper) to ICCAT asking the government body to adhere to the timeframe (announced for 2021) for the skipjack stock assessment. The letter asked ICCAT to implement a mandatory requirement for data reporting. It was considered that some of the information gaps for that stock will be addressed during the stock assessment of the species. However, the delays caused by the Covid-19 pandemic situation has altered the normal functioning of the ICCAT meetings and no further progress has been made.The FIP continues to collaborate and engage with the Senegalese authorities to make sure they play their full role as a CPC and ensure that the timelines don’t slip further. It also monitors and participates in ICCAT work. The FIP sent a letter to delegates of coastal states to encourage additional support for measures that will further tuna conservation at the Commission meeting. The FIP also lobbied DPM to make sure ICCAT Rec. 19-02 (now Rec. 21-01) was incorporated into Senegalese regulations. |
| Information about the live bait species used and volumes caught by the P&L fishery are understood. The baitfish used by the fishery is not considered a “main” species under the MSC standard definition.  | Improve information on the bait fishery | 2.2.1, 2.2.3, 2.5.3 | The FIP conducted a number of studies to understand data gaps in the live baitfish fishery (species used, volumes, stats, etc) and the small pelagic fishery in the country:* Fall & Guèye 2019 conducted a study of the live bait fishery and the use of FADs in the P&L fishery. Available at: <https://fisheryprogress.org/sites/default/files/documents_actions/Rapport%20Fall%20et%20Gu%C3%A8ye%20Senegal%2023102019_0.pdf#overlay-context=node/11420/improvement>
* Gascoigne et al., 2019 and 2020 collected the information, and identified data gaps in the live bait fishery and proposed actions to address those data gaps in the FIP. Available at: <https://fisheryprogress.org/sites/default/files/documents_actions/Live%20bait%20fishery%2C%20Information%2C%20data%20gaps%20and%20proposed%20FIP%20actions_2.pdf#overlay-context=node/11420/improvement>
* Ngom Sow & Thiam 2020 also studied the live bait caught by the P&L boats in order to provide information relating to the bait used, identify gaps and suggest what other information that can be collected. Available at: <https://fisheryprogress.org/sites/default/files/documents_actions/Rapport-FIP%20p%C3%AAche%20%C3%A0%20la%20canne%20et%20%C3%A0%20la%20ligne%20bas%C3%A9e%20au%20S%C3%A9n%C3%A9gal%20CRODT%2005092020_0.pdf#overlay-context=node/11420/improvement>
* Sieben 2020 conducted an ecological risk assessment for the impact of the P&L fishery on live bait species. Available at: <https://fisheryprogress.org/system/files/action_proof_files/Ecological%20risk%20assessment%20for%20the%20impact%20of%20the%20Senegal-based%20tuna%20pole-and-line%20fishery_0.pdf#overlay-context=node/11420/actions-progress>

In general, the findings show that the main live baitfish caught by the fishery is round sardinella and it would represent somewhere in the range of 4% of the weight of tuna caught. Therefore, baitfish would not be considered “main” bycatch species. In general, the impact of the fishery P&L fishery on live baitfish species should be limited (when comparing t other small pelagic fisheries in the country).A Marine Protected Area (MPA), although not directly linked to these reports, has been created now in the Bay of Hann in 2020 which has had a significant impact on this fishery leading to the reduction on the number of vessels in the FIP from 9 to 4 vessels. And therefore, the impact of the P&L fishery on those baitfish species has further decreased.  |
| As previous, better data on bait species used and volumes caught. Improvements in the management of the bait fishery limited. | Status of bait stocks and management at the national and regional level  | 2.2.1, 2.2.2, 2.5.1, 2.5.2, 3.2.2, 3.2.2, 3.2.4 | A long list of tasks was included under this activity, including identifying the projects/external organizations to improve the management of fishing bait and the ecosystem, developing a strategy and a framework for the implementation of the management of the live bait fishing or assessing opportunities for alternative sources of bait. The action is considered to be complete, although it is unclear if some of the tasks where completed.It is understood this activity was undertaken in combination with the previous one. A number of reports about the live bait fishery where prepared and based on the information obtained, the FIP has been working with the CRODT (the Senegalese marine institute) to draft a plan for the management of bait fish at a national level and reached out to the Sub-regional fisheries commission (SCRP) (<http://spcsrp.org/en>) to discuss the possibility of working together on the regional management of bait species.As indicated above, the main outcome of this activity has been the creation of a Marine Protected Area (MPA) in the Bay of Hann. |
| BioFAD workshops attended by skippers. No further improvements made. | Reduction of impacts on the ETP species and improvement of the monitoring | 2.3.1, 2.3.2, 2.3.3, 3.2.3 | The FIP is working with ISSF, the vessel owners and FAD manufacturers to move to 100% biodegradable FADs. After several postponements due to Covid, the FIP was finally able to organise a workshop with vessel owners and captains in Bermeo Spain in Q4 2021.The bioFADs were constructed in the Ivory Coast and trials of 100% biodegradable FADs should have started in early 2022 but bioFADs have not been deployed yet (initially due to licensing problems). |
| The Bay of Hann were bait fishing for the P&L fishery occurred is now a MPA and bait fishing has been moved aoutside that area. No impact of the fishery on habitats expected. | Reduction of the fisheries impact on habitat | 2.4.3 | A Level 2 Risk Assessment (ERA) of 19 bait species potentially used by the Senegal-based tuna pole-and-line fishery on species used as live bait was conducted in 2020 (Sieben 2020). Any of those species received a high PSA risk score in that assessment (resulting in MSC-PSA derived score >80. The impact of the fishery on the habitat was also considered low in that report (although that report does not seem to assessed directly the impact on the seabed). As indicated above, the Bay of Hann has recently been incorporated into a protected area (AMP Gorée) and live bait fishing has been moved outside that bay (Decree 2020-1133 of May 27, 2020 (<https://fisheryprogress.org/sites/default/files/documents_actions/D%C3%A9cret%20AMP%20du%20Kaalolaal%20Blouf-Fogny%20et%20de%20Gor%C3%A9e_0.pdf#overlay-context=node/11420/actions-progress>).The fishery has requested for the implementation of some spatial-temporal measures, as the Bay of Hann was the main area where baitfish were caught (and catching live baitfish in other areas does not seem to be economically viable) (<https://fisheryprogress.org/sites/default/files/documents_actions/Signed%20Minutes%20of%20the%20Extraordinary%20Meeting%20of%20the%20Joint%20Committee%2C%2024-25%20March%20-%20Dakar%20%285%29.pdf#overlay-context=node/11420/actions-progress>). This request has not been addressed by the Senegalese authorities yet.  |
| The FIP has agreed with the vessels the installation of an EMS system. No further progress made. | Improve Governance | 3.1.1, 3.1.2, 3.1.3, 3.2.1, 3.2.3 | A number of tasks were listed under this activity, including improving the monitoring of the fleet by implementing an EMS system, and other tasks related to how ICCAT management is implemented at the national level (roles and responsibilities, legislative gaps, penalties from non-compliance), etc. The FIP has agreed with the vessels the installation of an EMS system. The Basque government has agreed to finance part of the cost of the installation.However, the information given under this activity seems to be more related to the management of the bait fishery/straddling stocks[[6]](#footnote-6) than to the implementation of the ICCAT management, procedures and regulations at the national level.It is recommended that these two management areas are separated in two different actions. |

## Supporting References

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*Ngom Sow, F. & Thiam, N. (2020). Rapport de consultance: Appui a la pecherie thoniere a la cane au Senegal. Aout 2020. 19 pp.*

*Sieben 2020. Ecological risk assessment for the impact of the Senegal-based tuna pole-and-line fishery on species used as live bait. April 2020. 36 pp.*

1. According to the stakeholders, this fishery has not been operating for the first part of 2022. This is due to the fact the licences to fish bait for the P&L vessels were not renewed by the Senegalese government. The licences were finally granted in June and the vessels started to operate again in July 2022. [↑](#footnote-ref-1)
2. In this context indirect impacts refers to the impact of FADs used in the fishery on ETP species as the used gear, the Pole and Line, is considered very clean, with no impact on bycatch or ETP species. [↑](#footnote-ref-2)
3. When the fishery has first assessed, it was indicated that only the EU vessels had 100% observer coverage (The Senegalese vessels did not board observers). However, as only EU vessels are currently working in the fishery, it is understood that all trips are currently covered by observers. However, that data does was not made available. [↑](#footnote-ref-3)
4. A draft proposal to potentially replace Recommendation 21-01 has recently shared with relevant stakeholders by the Panel 1 chair (<https://ipnlf.org/ipnlf-position-statement-second-intersessional-meeting-of-iccat-panel-1-tropical-tunas/>). [↑](#footnote-ref-4)
5. For example, the consultant was told that live bait fishing in the Bay of Hann is prohibited for the P&L fishery but small-scale fisheries are still catching those same fish species for the fishmeal industry. Moreover, it seems that bait fish can still be caught inside the MPA, if it is done not more than 2 miles away from the MPA external limit and the fish dragged outside the area before pulling it aboard (which does not make a lot of sense taking into consideration that a “live” baitsfish which is dragged for more than 2 miles is probably not alive anymore). [↑](#footnote-ref-5)
6. Information given in the FIP profile: for the management of the bait fishery at the sub-regional level, the project for the implementation of the ecosystem approach to fisheries for the management of sardinella stocks shared between Morocco, Mauritania, Senegal and The Gambia (Shared Sardinella) was launched in February 2020 under the supervision of FAO. A workshop was held in Rome to identify research activities to be carried out over the next three years. Also, the Working Group on the Assessment of Pelagic Stocks in the Northwest African Zone, under the aegis of FAO, was launched in October 2020 for the exchange of data between the different countries. [↑](#footnote-ref-6)