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ADAPTIVE CLOSED FISHING SEASON IMPLEMENTATION REPORT

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Feed the Future Ghana Fisheries Recovery Activity

Adaptive Closed Fishing Season Implementation Report

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This report was prepared by:

Tetra Tech
159 Bank Street, Suite
Burlington, Vermont 05401 USA
Telephone: +1 (802) 495-0282
Fax: +1 (802) 658-4247
Email: international.development@tetratech.com

Tetra Tech Contact:

Heather D'Agnes, Chief of Party
Telephone: +233 (0) 599034200
Email: heather.dagnes@tetratech.com

COVER PHOTO: Participants pose for a group picture after the 2023 closed season assessment workshop. **GFRA 2024**.

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APW	Ali Poli Watsa
CPUE	Catch-Per-Unit-Effort
CSO	Civil Society Organization
FC	Fisheries Commission
FSSD	Fisheries Scientific Survey Division
GFRA	Ghana Fisheries Recovery Activity
GNCFC	Ghana National Canoe Fishermen Council
GSI	Gonadosomatic Index
ICCAT	International Commission for the Conservation of Atlantic Tuna
IUU	Illegal, Unregulated and Unreported
MOFAD	Ministry of Fisheries and Aquaculture Development
MFMP	Marine Fisheries Management Plan
MSY	Maximum Sustainable Yield
SFMP	Sustainable Fisheries Management Project
STWG	Scientific and Technical Working Group
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

The closed fishing season is a globally recognized fisheries management practice aimed at conserving fish populations by halting fishing during specific periods to allow fish to reproduce. Ghana adopted this strategy in 2019 to address declining small pelagic fish stocks. The Ministry of Fisheries and Aquaculture Development (MOFAD) and the Fisheries Commission (FC) have rigorously enforced this practice, conducting studies on its biological and socioeconomic impacts to optimize the timing and effectiveness of closures. In 2023, the closed fishing season ran from July 1 to July 31 for small-scale and semi-industrial boats, and from July 1 to August 31 for industrial trawlers. Scientific research identified July and August as the peak spawning months, making them the optimal period for fishing restrictions. This report presents the results of the biological assessment of the 2023 closed fishing season.

The assessment involved thorough sampling and analysis at eight major landing sites, focusing on four key small pelagic species. Post-closure, there was a mixed response among species. Round Sardinella landings decreased, Flat Sardinella landings varied by gear type, and Anchovy landings increased significantly. The mean price per kilogram of small pelagic fish increased, indicating heightened market demand post-closure.

There was an increase in average fish sizes post-closure, although many fish remained below the minimum landing size, indicating the need for stricter gear regulations to prevent capturing undersized fish. The Gonadosomatic Index (GSI) indicated higher reproductive activity post-closure, with most fish spawning during August and September. Shifting the closure to August could better align with peak spawning times. Recruitment rates for young fish were highest in August and September post-closure, showing that the closed season helps replenish fish stocks.

A multistakeholder workshop in February 2024 provided a platform for discussing improvements. Key recommendations include announcing the closed season early (in February) for better preparation, considering institutionalizing the closed season for consistent enforcement, proposing cash transfers instead of physical relief items to address distribution inefficiencies, enhancing collaboration between scientists and fishers for better data collection, expanding sampling sites, and improving data analysis techniques. Addressing socioeconomic impacts on communities, including income loss and food inflation, and allocating budgets for comprehensive socioeconomic assessments were emphasized. Strengthening enforcement strategies with regional support and creative funding solutions, such as using a percentage of premix fuel, was also recommended.

The 2023 closed season significantly benefited small pelagic species, with increases in fish size, reproductive activity, and young fish recruitment. However, to maximize benefits, shifting the closed season to August is recommended to align with peak spawning periods. Effective enforcement against illegal fishing practices is crucial for sustaining these gains. The workshop underscored the need for a multidimensional approach, integrating administrative, scientific, socioeconomic, and enforcement strategies to ensure the long-term sustainability of Ghana's fisheries and the livelihoods of its fishers.

1. BACKGROUND

The closed fishing season is a fisheries management practice that stops fishing during specific times of the year. This method has become a global strategy to help manage and conserve fish populations. The basic idea is to give fish a chance to reproduce, increasing their numbers. Closed fishing seasons are often the first step to control and reduce fishing pressure, and they can be combined with other measures if needed.

In response to decreasing fish stocks, Ghana began implementing closed fishing seasons in 2019 to help rebuild small pelagic fish populations. These efforts have been robustly enforced for about seven years for the industrial sector and five years for the artisanal (small-scale) sector. To understand the effects of these closures, the Ministry of Fisheries and Aquaculture Development and the Fisheries Commission (MOFAD/FC), along with partners, conducted studies on the biological and socioeconomic impacts. These studies are crucial for finding the best times to implement the closures and understanding how fishers and other stakeholders adjust to these changes.

In 2023, the closed fishing season was from July 1 to July 31 for small-scale and semi-industrial fishing boats, and from July 1 to August 31 for large industrial trawlers. Tuna fishing boats had already stopped fishing from January 1 to March 13, 2023, following rules set by the International Commission for the Conservation of Atlantic Tuna (ICCAT), of which Ghana is a member. The main goal of the closed fishing season is to give fish time to reproduce during their peak spawning period before being caught. Scientific research has shown that July and August are the best months for this because the ocean conditions are ideal for fish spawning. This decision is based on many years of research by the Fisheries Scientific Survey Division (FSSD) of the Fisheries Commission. Before the closed season started in July 2023, there were consultations and awareness campaigns in the four coastal regions of Ghana.

The closed season helps fish populations recover and grow. The long-term aim is to increase the number and size of fish, which will benefit people's livelihoods and ensure food security. Studies conducted before and after the closed season help assess the impact by looking at the average fish catch per boat, fish size, and monitoring the spawning seasons.

This report presents the results of the biological assessment of the 2023 closed fishing season. The socioeconomic assessment was not conducted in 2023, as these will occur every two years with the next schedule for the 2024 closed season. Given that the closed season management tool has been implemented comprehensively across all fishing sectors in Ghana for five years, the government also decided to closely examine the results across all five closed seasons to inform the design of this management measure for the coming year.

Having scientifically scrutinized the outcomes of the closed seasons, it is imperative to share these insights with stakeholders. It is against this background that MOFAD/FC, in partnership with the Ghana Fisheries Recovery Activity, hosted stakeholders in a workshop in February of 2024 to assess the implementation of the closed season fisheries management measure thus far. The workshop created a unique platform where government and stakeholders collectively evaluated the closed season, identifying areas for improvement based on scientific evidence. The administrative aspect of the management measure was also evaluated, and recommendation provided to guide future implementation.

2. BIOLOGICAL IMPACT ASSESSMENT OF 2023 CLOSED SEASON

2.1 Methodology

Utilizing established protocols in 2019[1] by the STWG, Fisheries Commission (FC) enumerators conducted a thorough assessment of fish samples in Ghana's coastal regions, focusing on eight major landing sites including Keta, Tema, Bortianor, Apam, Elmina, Shama, Sekondi, and Axim.

In each coastal region, a zonal officer served as the regional coordinator to oversee and manage the data collection program in his/her region. The zonal officers operated under the direction of the national coordinators from FC-FSSD (Fig 1).

A bi-weekly sampling regime was designed to gather crucial biological parameters that indicate the growth and reproductive patterns of four key small pelagic species. The enumerators measured fish length (cm), weight (g), sex, gonad (ovaries/testes) weight (g), and the maturity stage of the gonads. Based on macroscopic characteristics of the gonads, fish specimens were classified into three maturity stages: stages I and II (immature), stages III and IV (mature), and stage V (spent). This classification helps in understanding the reproductive status and potential of the fish populations.

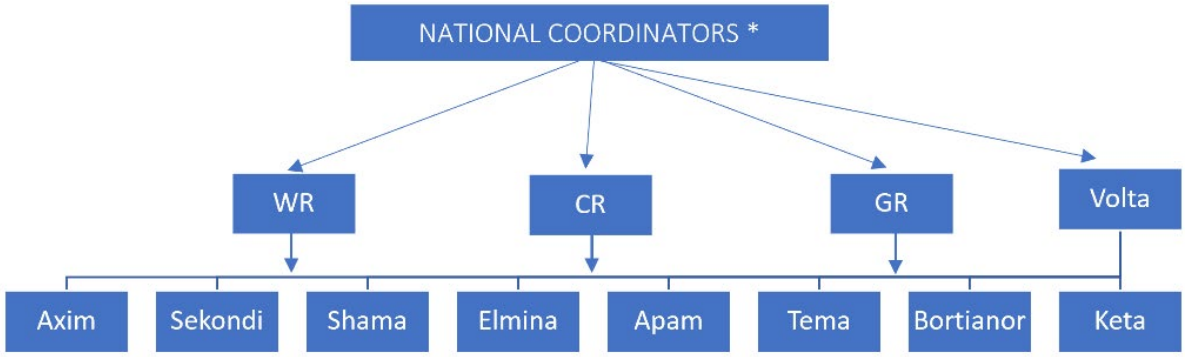

Figure 1: Illustrates data collection and transfer between FSSD and its regional offices.

As with previous assessments, the enumerators collected the bi-weekly data in the month of June before the closure of the fishing season and after resumption of fishing from August to October. Seventy (70) specimens for each species were randomly selected from the fish sample bought at each sampling site. These specimens were later analyzed for the aforementioned parameters.

To ascertain the spawning periods, the gonadosomatic index (GSI) was calculated using the formula *GSI = (gonad weight/body weight) x 100*. This index serves as an indicator of reproductive activity and helps determine the peak spawning periods for the species. By identifying these periods, fisheries management can implement more effective conservation measures to protect the fish during their most critical reproductive times.

In addition to biological data, enumerators also collected information on canoe fish catch and effort, including the catch per trip, the value per trip, and the mean price of fish per kilogram. This economic data provides insights into the fishery's productivity and financial viability, further informing management decisions.

[1] Lazar, Najih, Darko, Charles, Ansong, Ernest, Boateng, Kusi. (2020). Assessing the Biological Effects of the Fisheries Closed Season Implemented for the Artisanal and Semi-Industrial Fisheries in Ghana, 2019. USAID/Ghana Sustainable Fisheries Management Project. Narragansett, RI: Coastal Resources Center, Graduate School of Oceanography, University of Rhode Island. GH2014_SCI077_CRC. 23 pp

This comprehensive approach, combining biological and economic data, allows for a better understanding of fish population dynamics and the pressures they face. It supports the development of targeted management strategies to ensure sustainable fishing practices and recovery of Ghana's dwindling stocks.

2.2 Results

2.2.1 Mean catch rates of small pelagic species.

The average catch rates of the main small fish caught using purse seine gear ("APW") and set nets were compared. After the closed fishing season, there was a decrease in landings of Round Sardinella for both gear types. Similarly, landings of Flat Sardinella decreased for purse seine gear ("APW") but increased for set nets. However, Anchovy landings increased notably, with the highest average catch per trip being 485.34 kg after the closed season.

This means that the various species responded differently to the closure. Results from the analysis of the round sardinella suggest that the population might still be recovering or that the fishing conditions were not favorable for the species during that period. Unlike the round sardinella, results from the flat sardinella indicated that different fishing methods had varied impacts on the species populations, due to differences in how these gears interact with the fish or where they are used. Compared to the other two species, the anchovy population responded well to the closed season, leading to a higher availability of this species when fishing resumed. This further highlights the complexity of managing the different fish populations effectively.

After the closed season, there was a general rise in the mean price per kilogram of small pelagic fish, except for a slight decrease in price for Round Sardinella caught using purse seine gear and Flat Sardinella caught using set nets. This means that despite fluctuations in the catch amounts, there was still increased market demand for the small pelagics after the closed season.

Table 1: Mean catch per trip, price, and value per Kg of Round sardinella, Flat sardinella and Anchovy before and after closed season.

Species	Gear Type	Catch (kg)/Trip		Value (GHS)/Trip		Mean Price (GHS)/kg	
		Before	After	Before	After	Before	After
Round Sardinella	APW	284.71	182	4,816	3033	16.91	16.66
Flat Sardinella	APW	339.3	242.15	5,655	4,130.29	16.66	17.06
Anchovy	APW	453.7	485.34	4,350.76	5,467.59	9.59	11.27
Round Sardinella	Set net	113.58	15	1,893	262.5	16.6	17.5
Flat Sardinella	Set net	45	197.86	1,100	4,428.48	24.2	22.82
Anchovy	Set net	8	52.33	60	468	7.5	8.94

2.2.2 Mean Length Distribution

After the closed season, there was a noticeable increase in the average sizes of round sardinella, flat sardinella, and anchovies compared to before the season ended (fig 3). This suggests that during the closed period, the fish populations had a chance to recover from the pressures of fishing activity, leading to a temporary rebound in their size.

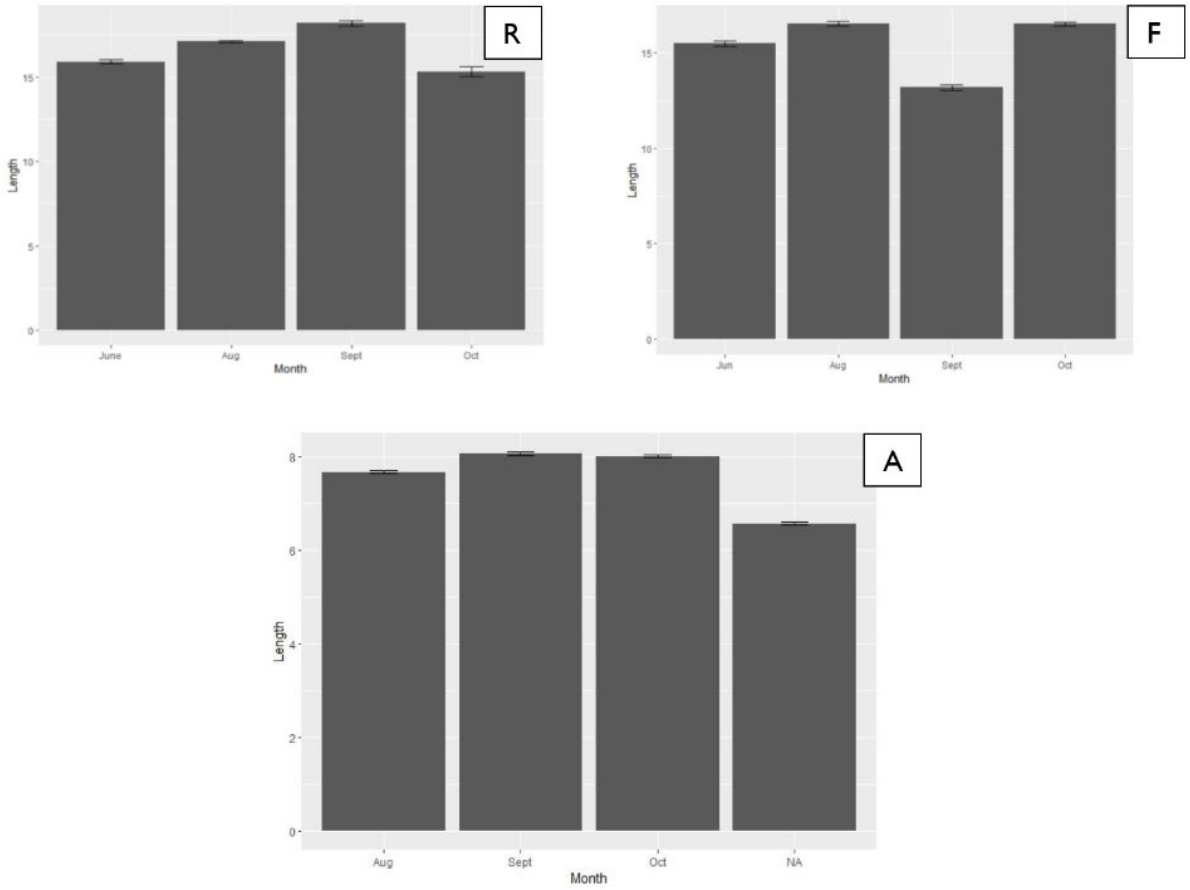

Figure 2: Mean length distribution amongst the three species (R-Round sardinella, F-Flat sardinella and A-Anchovy.

However, despite this positive trend, both round and flat sardinella remained below the minimum landing size of 18 cm on average throughout all months. This indicates that fishermen are still capturing a considerable number of undersized fish. This could be due to the continued use of fishing gear with smaller mesh sizes or employing light fishing techniques, which allow even smaller fish to be caught.

Overall, while the closed season provided a temporary respite for the fish stocks, the persistence of catching undersized fish suggests that more stringent measures may be needed to ensure the long-term sustainability of these species.

2.2.3 Proportion of Matured gonads and Spawning Periods

The biological assessment used a measure called the Gonadosomatic Index (GSI) to check how actively fish were reproducing. After the closed fishing season, the GSI values for round sardinella, flat sardinella, and anchovies were much higher, showing that these fish were more active in spawning during August and September. Before the closed season, from April to June, most of the fish had immature gonads, meaning they were not ready to spawn. However, after the closed season, especially in August, most of the fish had spent gonads, indicating they had already spawned. This suggests that the closed fishing season gave the fish a break from being caught, allowing them to mature and reproduce more successfully. As a result, more young fish joined the population.

However, the assessment also indicates that it might be more effective to have the closed season in August instead of July. Closing the fishing season in August would better align with the peak spawning time, helping to ensure more fish can reproduce and support the long-term health of the fish population.

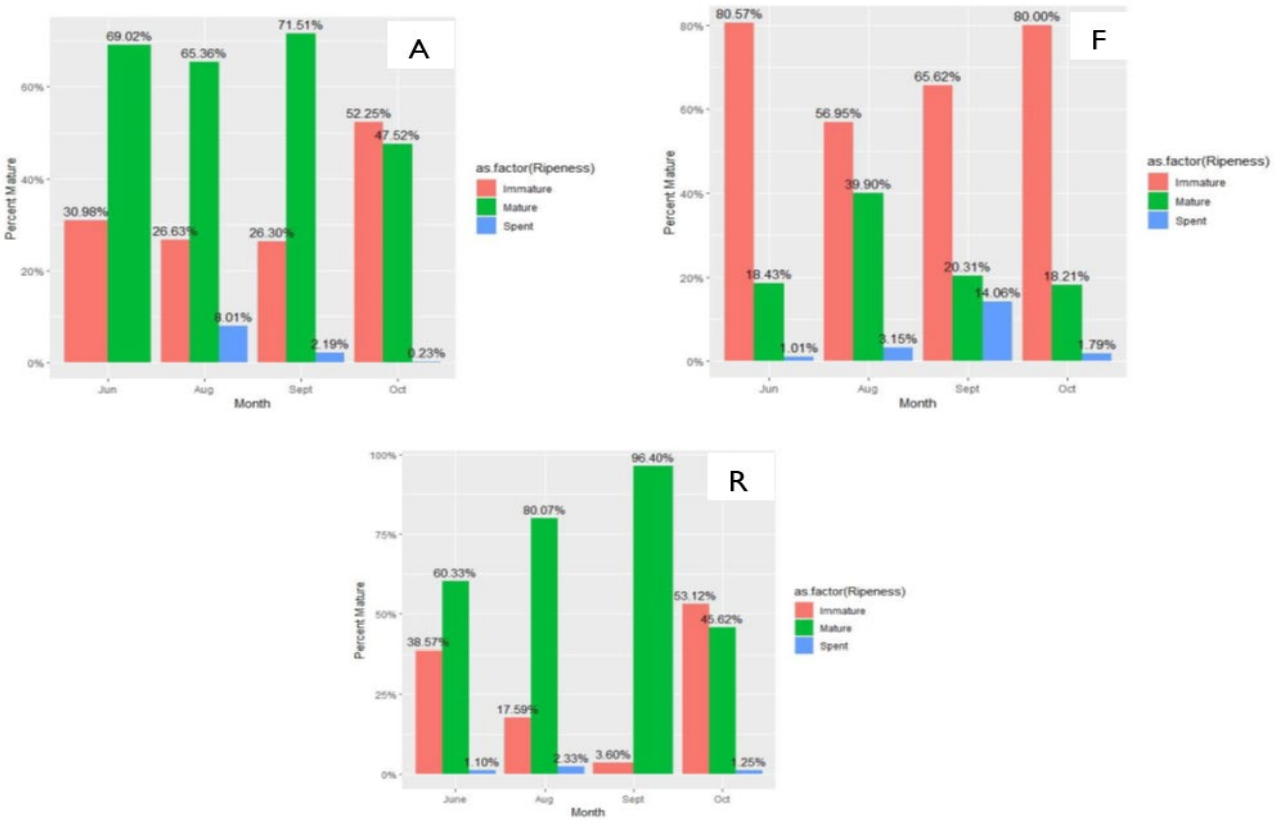

Figure 3: Maturity stages of gonads of Anchovy (A) Flat sardine (F) and Round sardinella (R) before and after the close season.

2.2.4 Recruitment of the small pelagics into the fishery

The highest number of young round sardinella joining the fishery were in August (65%) and September (76%) after the closed season, while the lowest was in June (25%) before the closure. For flat sardinella, the most recruitment happened in August (67%) and October (68%) after the closure, with the lowest in June (39%) before the closure. Anchovy recruitment was highest in September (71%) and October (73%) after the closure, and lowest in June (6%) before the closure. This shows that more young fish are entering the fishery after the closed season, helping to replenish fish stocks (Fig 4).

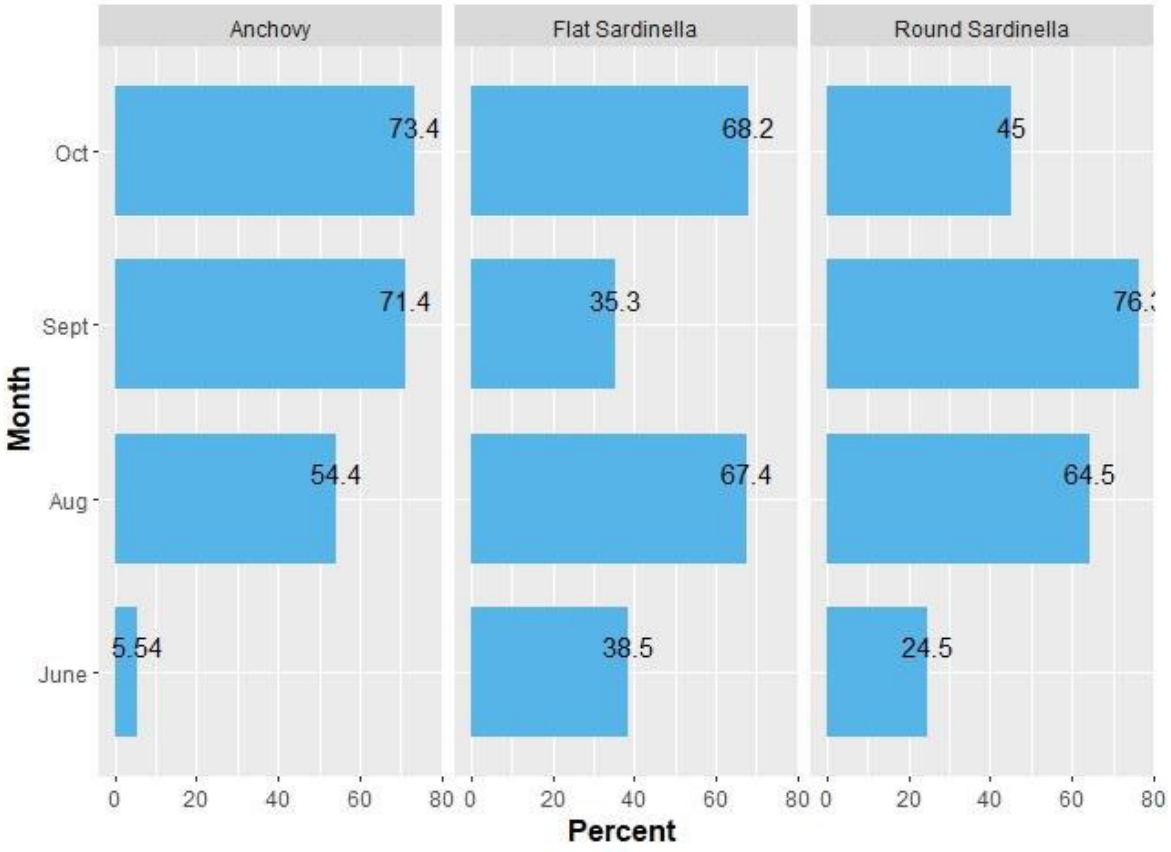

Figure 4: Monthly proportions of recruitment of the small pelagics into the fishery.

3. IMPROVING 2024 CLOSED SEASON IMPLEMENTATION IN GHANA

To improve the implementation of the 2024 closed fishing season, GFRA supported the MoFAD/FC to organize a multistakeholder workshop in February amongst key fisher groups, academia, development partners and CSOs. The workshop sought to enhance understanding of the scientific principles behind closed seasons among fishers and stakeholders, emphasizing education and knowledge dissemination. It also aimed to promote active participation from fishers in the 2024 closed season by presenting scientific evidence and fostering discussions to cultivate a collaborative approach. Additionally, the workshop focused on improving the timing of closed season announcements to ensure timely dissemination of information for effective preparation and compliance. Lastly, it aimed to refine protocols for impact assessments, both biological and socioeconomic, to enhance the evaluation of ecological and socio-economic effects of closures, facilitating evidence-based decision-making. The subsequent sections summarize the information presented at the workshop and the recommendations that emerged to inform the 2024 closed season.

3.1 History of Closed Seasons in Ghana

The closed season, legally supported by Section 84 of the Fisheries Act 2002 (Act 625), aims to prevent overfishing, and ensure sustainable fish stocks. This legislative support was reaffirmed by the inclusion of the closed season as a key fisheries management measure in the Marine Fisheries Management Plans (MFMP) for 2015-2019 and 2022-2026, as well as the Fisheries and Aquaculture Policy of 2022.

Initially, in 2013 year, Ghana applied the closed season fisheries management measure to the tuna sector, as regulated by the International Commission for the Conservation of Atlantic Tunas (ICCAT). Subsequently, in November 2016, the Ministry of Fisheries and Aquaculture Development (MoFAD) extended closed seasons to trawlers targeting demersal species. Over the following years, the closure timing was adjusted to January-February in both 2017 and 2018. While these early efforts were a significant step forward, the dates chosen lacked clear scientific justification and had no impact given the period did not align biologically with peak reproduction for the species.

To extend the closed season to the small pelagic fisheries targeted by the artisanal fishing sector, USAID's Sustainable Fisheries Management Project (SFMP) collaborated with MoFAD and the Scientific and Technical Working Group (STWG), an independent multi-stakeholder body, to design the management measure in a way that was underpinned by the best available science. The STWG's research on fish stock status warned of the imminent collapse of small pelagic stocks, predominantly fished by artisanal fishers, and recommended specific dates for the closed season, August 1 – 31, based on biological data. This led to in-depth discussions and eventual support from artisanal fishers for the closed season as a crucial management tool for these fisheries.

In 2018, a cabinet memo was developed to formalize the closed season. However, the initial approval met with strong opposition from stakeholders due to concerns about inadequate consultation, potential loss of income, and increased hunger and poverty. In response, the government paused the intervention to allow for more thorough consultations.

After additional negotiations and assurances, the artisanal sector agreed to implement the closed season from May 15 to June 15, 2019. The dates, however, were outside the spawning period for the target species. Fishers proposed the dates which represent the lean season where they do not traditionally go fishing but rather use the period to rest and mend their canoes and gears in preparation for the July-August 'bumper' fishing season. The MoFAD/FC agreed to the proposal from the fishers, recognizing the need for compromise given it was the first time the management measure had been introduced to the sector. While fishers demonstrated high compliance with the May-June 2029 closed season, there were many negative impacts on the fishery. Fishers returned to the sea in mid-June, with increased fishing intensity at a time that coincided with the fishery's peak spawning period of July-August thereby overfishing at the worst possible time in the fish's life cycle.

Although the closed season was not implemented in 2020 due to the COVID-19 pandemic, it resumed in July 2021 after further consultations. Using scientific evidence that did not show a significant impact of the May-June closure, as well as the STWG's recommendation of the closure in August, MoFAD/FC with support from its partners conducted extensive stakeholder engagements. This effort was led by GNCFC leadership, who were also members of the STWG and had better appreciation of the science behind the closure. With this strong leadership and support of the main fishing constituency, fishers ultimately agreed to observe the closure in July 2021. This new timing aimed to maximize biological benefits by aligning with peak reproductive seasons. Since 2019, the Fisheries Commission, with support from various stakeholders and development partners, has also conducted comprehensive assessments to measure the impact on fish stocks and the socioeconomic conditions of fishers.

The closed season, as a fisheries management measure, has since been adopted by Ivoire Coast and Benin in the sub region (fig 1). Cote D'Ivoire has replicated Ghana's implementation of the closed fishing season for all artisanal and industrial vessels for the months of July and August while Benin has just instituted it for fishers using beach seine gear from June to July.

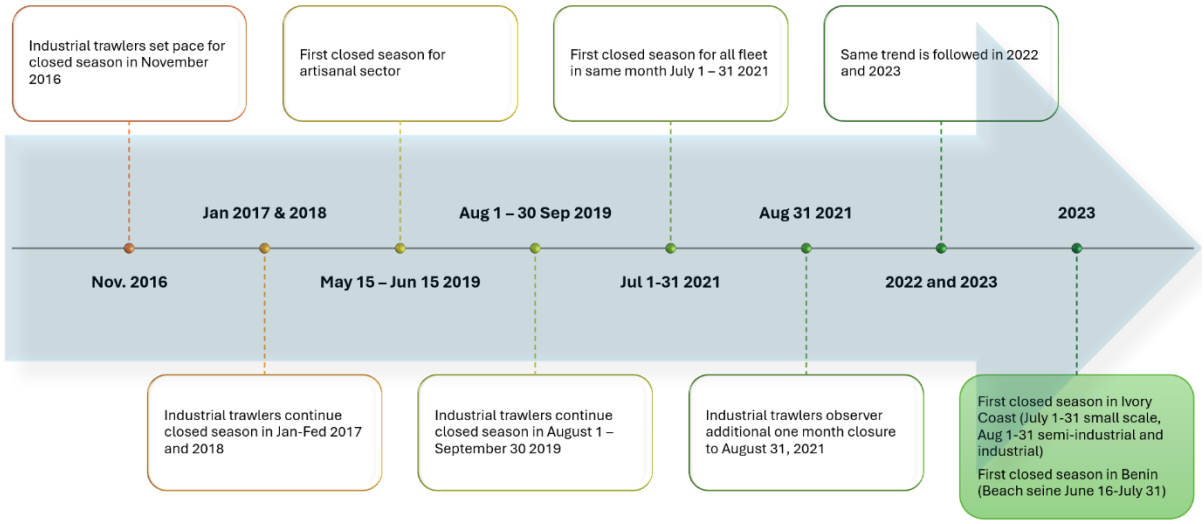

Figure 5: Closed season implementation in Ghana and the subregion.

3.2 Improving Closed Season Implementation

Following presentations at the workshop, participants were given an opportunity to brainstorm and make recommendations to guide the implementation of the 2024 closed season. Below are the highlights of the discussions.

Administration: During the discussions, there was a clear agreement on the timing of the announcement for the 2024 close season, favoring February to allow ample time for preparation. The idea of institutionalizing the closed season sparked extensive discussions, suggesting a potential shift in how the closed season is managed and enforced in the future.

Relief Items: The was a proposal to convert relief items into cash transfers aimed to address the inefficiencies in support distribution during close seasons. Participants suggested that providing affected individuals with direct financial assistance would better address their specific needs. However, the modalities for implementing this transfer method were inconclusive, indicating the need for further planning and development.

Science: The discussions highlighted the importance of collaboration between scientists and fishers in conducting research and data collection. Suggestions for a strategic division of focus between universities for research activities aimed at optimizing resources and expertise. Expansion of sampling sites, particularly in the Volta region, aimed to ensure a more comprehensive understanding of fishing

ecosystems along the Ghanaian coast. Moreover, there were calls for improved data collection and analysis techniques, particularly regarding mackerels, and a redefinition of fishing effort to better reflect the complexities of fishing activities.

Socioeconomics: Acknowledgment of the socio-economic challenges faced by communities during closed seasons prompted calls for more comprehensive examinations to capture all relevant aspects. Discussions encompassed various social and economic considerations, including the impact on crime, child labor, income loss, and local food inflation. Proposals for allocating budgets for socioeconomic examinations aimed to address these challenges systematically and effectively.

Enforcement: Enforcement strategies emphasized the importance of sensitization, follow-up on reports, and financial support at regional levels to ensure effective implementation. Creative funding sources, such as using a percentage of premix fuel, were suggested to sustain enforcement efforts. Capacity building for enforcement agencies and integration and collaboration between various bodies were highlighted as essential for enhancing enforcement effectiveness and impact.

4. CONCLUSIONS

Based on the findings from the 2023 closed season biological assessment, it is still evident that the July closure significantly benefits the growth, spawning, and recruitment of the small pelagic species. Observations show increases in average fish sizes, enhanced gonadal development, and a higher number of matured fish following the closure, underscoring the effectiveness of this management measure. These results are consistent with previous assessments from the closed fishing seasons in 2021 and 2022.

However, results still point to the highest spawning intensity occurring in August, which reinforces the STWG's 2016 recommendation that the closed season should be observed during this peak spawning period to achieve maximum benefits. Implementing the closure in August would align more closely with the natural reproductive cycles of these species, thereby enhancing the effectiveness of the measure. While this shift has been proposed in the past, it has not been accepted by fishers for a variety of reasons, including an annual festival in the Greater Accra region that occurs in August and would conflict with the closed season.

Strengthening enforcement against illegal fishing practices is essential to sustain the gains achieved during the closed season. Effective enforcement would help maintain the progress made in fish population recovery, ensuring the long-term sustainability and health of the fish stocks. Recommendations on improved enforcement strategies focused on sensitization, follow-up mechanisms, and creative funding sources to support regional enforcement efforts. This comprehensive approach supports the overall goal of stock recovery and the sustainable management of the small pelagic fishery.

Hosting a multistakeholder workshop to disseminate the results of the closed season has been the practice for the last two years and continues to provide valuable insights and recommendations across various dimensions of close season interventions in Ghana. The discussions underscored the importance of effective administration, robust scientific research, comprehensive socioeconomic assessments, and efficient enforcement strategies.

Key recommendations emerged, including the need for timely announcement and potential institutionalization of close seasons, conversion of relief items to cash transfers, and enhanced collaboration between scientists and fishers. Expansion of sampling sites, improved data collection and analysis techniques, and a holistic redefinition of fishing effort were also emphasized to better inform fisheries management decisions. Socioeconomic challenges faced by communities during closed seasons continue to be a primary concern, prompting calls for more in-depth examinations and budgetary allocations for socioeconomic assessments.

Given Ghana’s December 2024 elections, it is not likely that recommendations related to enhanced enforcement after the closed season and shifting the implementation of the closed season to August will be adopted given the political risks involved in introducing changes during the peak campaign period. Politicization of fisheries issues, where policy makers fear losing electoral votes if they enforce fisheries laws and regulations, will hinder the needed enforcement to address IUU fishing after the closed season. Budgetary constraints, which have often been cited as reasons for limited enforcement during and after the closed season, will persist. And, despite a strong call from stakeholders in 2023 for an early announcement, by February, of the 2024 closed season, MoFAD announced the closure on April 2, 2024, indicating a business-as-usual approach. With the incoming of a new administration following the elections, in 2025, it is likely that the announcement of the closed season will delay. GFRA will however organize another stakeholder workshop in January 2025 to sustain the discussions on closed season while encouraging the new government to institutionalize the closed season to avoid such occurrences in the near future.

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